DOCUMENTATION OF DATA USED IN

"The economic value of wetland services: A meta-analysis"
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This document provides detailed information on the data used in the paper "The economic value of wetland services: A meta-analysis" by Richard T. Woodward and Yong-Suhk Wui. The data were taken from published reports, "gray" literature, and theses. Each page presents one data or several observations in the column (s) on the left. On the right side of each page there is a discussion of the sources of the data, calculations, and comments on our subjective decisions.

Most of the variables are described in the manuscript but some of the variables listed in this document require some explanation.

- Acreage. The variable "used acres" is the acreage actually used. Some studies placed a value on an acreage change but reported both the change in acreage, Marginal acres, and the resulting acreage, Total acres. We discuss why we used one acreage value instead of the other, but there was certainly some subjectivity in our decision.
- Type of surplus. Studies measured both consumer and producer surplus (CS & PS respectively). Other studies measured total revenue, which does not map directly into either of these measures and a few studies used methods that do not correlate well with measures of economic surplus.

Additional supporting documentation:

- A PDF file with the manuscript in its latest form is available at http://ageco.tamu.edu/faculty/woodward/paps/WetlandMeta.pdf. This file will be removed upon publication.
- An Excel spreadsheet with the raw data used in the analysis is available at http://ageco.tamu.edu/faculty/woodward/paps/WetlandMetaData.xls
- An Excel spreadsheet with some of the calculations that are not completely explained in this document is available at http://ageco.tamu.edu/faculty/woodward/paps/WetlandMetaCalculations.xls

Source	Amacher et al. (1989)
State	MI
Total Value	8850000
Nominal $/acre	1475
Used acres	6000
Total acres	6000
Marginal acres	
coastal	1
year	1985
CPI	0.823
SW	0
Flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	1
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	3
Metrics	2
Stats	2
Publish	0
CS	1
PS	0
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 1.

Site

- Lake St. Clair of 6, 000 acres [1] , Michigan (p. 10)
- Coastal wetland [2]

Methods

- The Environmental Quality as an Input Methods (EQI) or commonly know as NFI (net factor income).[3]

Wetland functions noted

- Recreation fishing for yellow perch
- One fish

Data

- 1983~85, the recreational yellow perch data.
- Catch fish for yellow perch.
- Given the $0.5, 1.0, 1.5 price per pound and 100% contribution of marginal catch of wetlands.
- Hypothesized value.

Results

- This marginal catch pound per acre is 122.9 per month. (p. 11, equation 6.)
- The results are $737~$2, 212 per acre (mean=1474.5). (p. 12 Table 4)

[1] Great Lakes is similar to coastal wetlands composed by extremely large bodies of fresh water. Michigan coastal wetlands totaled 105,855 acres in 1986.
2 Great Lakes is similar to coastal wetlands composed by extremely large bodies of fresh water. Michigan coastal wetlands totaled 105,855 acres in 1986.
3 This is assuming the equal contribution of all wetland acre to fish production and catch and the perfect (in?)elastic market demand because of no demand information. EQI functions are used for only commercial fishing function usually. But here they the methods to recreational fishing .

Source	Amacher et al. (1989)
State	MI
Total Value	972400
Nominal $/acre	114.4
Used acres	8500
Total acres	8500
Marginal acres	
coastal	1
year	1985
CPI	0.823
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	3
Metrics	2
Stats	3
Publish	0
CS	0
PS	1
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 2

Site

- Saginaw Bay of 8, 500 acres, Michigan. (p. 10)
- Coastal wetland

Methods

- The Methods is the Environmental Quality as an Input Methods (EQI) or commonly know as NFI (net factor income).[4] Wetland functions noted
- Commercial fishing

Data

- 1983~85, the commercial fishing data.
- The pound of catch fish.
- For the contribution of commercial fishing to profits per acre, given the data such as price: $0.5, % catch attributed to wetlands: 50, 70, 100%, profit % per pound: 5, 10, 20%

Results

- This marginal catch pound per acre is 169.42 per month for a 6 month commercial season. (p. 10 equation 5)
- The results is $ 25.4 ~203.3 per acre (mean=114.36). (p. 11, Table 3, mean= (Min +Max)/2)

4 This is assuming the equal contribution of all wetland acre to fish production and catch and the perfect (in?)elastic market demand because of no demand information. EQI functions are used for only commercial fishing function usually. But here they the methods to recreational fishing .

Source	Amacher et al. (1989)
State	MI
Total Value	37740
Nominal $/acre	22.2
Used acres	1700
Total acres	1700
Marginal acres	
Coastal	1
Year	1989
CPI	0.949
SW	0
Flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
amenity	1
Habitat	0
Data	2
Theory	3
Metrics	1
Stats	2
Publish	0
CS	1
PS	0
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 3.

Site

- 1, 700 acres near Lake St. Clair. (1, 700 acres =250 acres +450 acres +1000 acres in results)
- 11 counties on or near Lake divided into 3 regions.
- Coastal wetland.

Methods

- The Implicit Price Hedonic Method (IPH) Wetland functions noted
- Amenity value

Data

- 1979~1989.
- A: wetland acreage traded in each regions, P: sale prices for wetland parcels.
- Region1 : p=..-61.8 A +0.3 A^2…… (n=15) , A=250 (p. 15, Table 6)
- Regiion2 : p=..66.72 A (n=15) , A=450 (For A, p. 17, 1st paragraph)
- Region3 : p=..24.5 A –3285 log (A) (n=10) , A=1000[5]
- From this three equations, they got an inverse demand function $\partial P / \partial A = a + g(A, \beta)$.

Results

- The CS/acres (average value per wetlands): $11.4, $22.2, $44.9 (mean=26.15)[6] (p. 17, 2nd , 3rd paragraph & p. 16 The triangle area in Figure 2)

5 The three A # is assumed. And for the value estimate the total real wetland acreage of each regions should be used. But here we used assumed acreage due to the lack of data.
6 This low value is caused by not including the opportunity cost of purchasing wetland parcels.

Source	Amacher et al. (1989)
State	MI
Total Value	1321800
Nominal $/acre	220.3
Used acres	6000
Total acres	6000
Marginal acres	
coastal	1
Year	1985
CPI	0.823
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	3
Metrics	2
Stats	9
Publish	0
CS	1
PS	0
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 4

Site

- Lake St. Clair of 6, 000 acres . (p. 21)
- Coastal wetland

Methods

- Travel Cost (TC) Method Wetland functions noted
- Recreation fishing.

Data

- Assumed W1=$per mile travel distance=$.20, W2=$per minute travel distance=$.40 (p. 19, Equation 13, 14)
- Simulated data for expenditure of anglers.
- Actual data of income and population of 1985 year,
- Distance from lake and travel time to lake, 7 zones divided , simulated visit number.
- Elastic and inelastic demand curve assumed.

Results

- $180.2~260.3/acre. (p. 21, 2nd paragraph)

Source	Amacher et al. (1989)
State	MI
Total Value	
Nominal $/acre	602, 360
Used acres	6, 000
Total acres	6, 000
Marginal acres	
coastal	
year	1986
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 5

Site

- Lake St. Clair of 6, 000 acres
- Coastal wetland

Methods

- Energy Analysis.
- Wetland functions noted
- Commercial fishing.

Data

- 20 calories of biomass = 1 calorie of fossil fuel by Farber , 1986.

Results

- $602, 360/acre/year. (p. 24)

Source	Amacher et al. (1989)
State	MI
Total Value	2457000
Nominal $/acre	409.5
Used acres	6000
Total acres	6000
Marginal acres	
coastal	1
year	1986
CPI	0.839
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	1
Metrics	9
Stats	9
Publish	0
CS	1
PS	0
TotRev	0

Amacher, G.S., R.J. Brazee, J.W. Bulkley, R.A. Moll. 1989. Application of Wetland Valuation Techniques: Examples from Great Lakes Coastal Wetlands. School of Natural Resources, University of Michigan, Ann Arbor, June.
Study 6.

Site

- Lake St. Clair of 6, 000 acres (p. 26, 2nd paragraph)
- Coastal wetland

Methods

- TC method with no adjustment for cost
- Gross Expenditure (GE) [7]
- Wetland functions noted
- Recreation fishing (angling).

Data

- 20 calories of biomass = 1 calorie of fossil fuel by Farber , 1986.

Results

- $273, $409, $546/acre/year according to conversion factor assumption. (p 26, Table 10**)**

[7] It is just to calculate expenditure per acre, not consumer surplus per acre.

Source	Barbier (1994)
State	Nigeria
Total Value	1.15E+08
Nominal $/acre	63.5
Used acres	1803830
Total acres	1803830
Marginal acres	
coastal	0
year	1990
CPI	1.000
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	1
Metrics	2
Stats	2
Publish	1
CS	0
PS	0
TotRev	1

Barbier, E.B. 1994. "Valuing Environmental Functions: Tropical Wetlands, " Land Economics 70 (2):155-73, May. Study 1.

Site
- 730, 000ha (1, 803, 830 acres) for Hadejia-Jama'are Floodplain, Nigeria (p. 162, Table 2, notes a.)
- Fresh water wetland

Methods
- Partial valuation of wetland
- The opportunity cost to wetland conversions by estimating some of the key direct use values the floodplain provides to the lower population

Wetland functions noted
- Fishing
- Crop production
- Fuelwood production
- * Gross value used , not net

Data
- 8% discount rate, 30 years project life, net present value. (p. 162, Table 2)
- U.S.$1=N7.5 (1989/90) (p. 161, Footnote 6)

Results
- N1, 176/ha (U.S. $156.8/ha, 63.5/acre) (p. 162, Table 2 3rd column)

Interpretation
- Source: Barbier, Adams, Kimmage, 1991.
- Crop and Fuelwood products are included to the total value per acre of analysis data

Source	Barbier , Strand (1998)
State	Mexico
Total Value	1.16E+08
Nominal $/acre	564
Used acres	206329
Total acres	206329
Marginal acres	
Coastal	1
Year	1990
CPI	1.000
SW	0
Flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	1
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	2
Theory	1
Metrics	2
Stats	2
Publish	1
CS	0
PS	0
TotRev	1

Barbier, Edward B. & Ivar Strand, 1998. "Valuing Mangrove-Fishery Linkages : A Case Study of Campeche, Mexico, " Environmental and Resource Economics, 12:151-66.

Site
- Campeche, Mexico
- Coastal wetland
- Mangrove field of Laguna de Terminos,
- 860 km^2 in 1980 year reduces into 835 km^2 in 1991 (p. 154, 3rd paragraph), 835km^2 * 247.1 acres/ km^2= 206, 329acres

Methods
- Open access fishing model of mangrove-shrimp fishing linkage.
- NFI

Wetland functions noted
- only Shrimp value for commercial fishing
- the value of mangrove systems as a breeding and nursing habitat for offshore fisheries focusing on mangrove-shrimp production linkage.

Data
- Production and value of shrimp harvests over 1980-1990
- Campeche shrimp fishing and mangrove area data over 1980-1990 period
- Results
- over 1980-1990 period, mangrove deforestation 2 km^2 /year, Loss $ 278, 704 (p. 160, 4th paragraph & p 162 4th paragraph)
- $563.95/acre (p. 161 Table 11)

Interpretation
- This paper analyses the value per acre based with an explicit assumption that the fishery benefiting from the wetlands is open access. However, under standard assumptions, an open access fishery generates zero rent or no economic surplus. Since the wetland value usually is based on economic surplus, changes in the wetland area do not actually lead to changes in surplus. The authors use revenue as a measure of wetland value in this paper. This is the reason that the paper is given a rank of 1 in terms of its theoretical value.

Source	Bell (1997)
State	FL
Total Value	34371900
Nominal $/acre	79.7
Used acres	431266
Total acres	431266
Marginal acres	
coastal	1
year	1984
CPI	0.795
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	2
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Bell, Frederick W. 1997."The economic valuation of saltwater marsh supporting marine recreational fishing in the southeastern United States "Ecological Economics 21: 243-254pp.
Study 1

Site
- Saltwater marsh on West Coast of Florida. 431, 266 acres (p 248, Table 1)

Methods
- A production function links the recreational catch to angler fishing effort and wetlands
- A linear angler demand curve is postulated.
- Consumer surplus is calculated
- Net Factor Income methods

Wetland functions noted
- Marine recreational fishing

Data
- discount rate (r) 0.08125
- Estuarine- dependent recreational catch and saltwater marsh acres for the southeastern states.
- marginal consumer surplus per acre of wetlands (MCSW)=capitalized value of an acre (CVW, 981) * discount rate (r) (p. 251, Equation 37, 39)

Results
- the annual flow of value from an increase in one acre of wetland : $79.71= $981*0.08125;

Source	Bell (1997)
State	FL
Total Value	50414756
Nominal $/acre	525.8
Used acres	95882
Total acres	95882
Marginal acres	
coastal	1
year	1984
CPI	0.795
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
amenity	0
Habitat	0
Data	2
Theory	3
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Bell, Frederick W. 1997."The economic valuation of saltwater marsh supporting marine recreational fishing in the southeastern United States "ecological economics 21: 243-254pp.
Study 2

Site
- Saltwater marsh on East Coast of Florida. 95, 882 acres (p. 248, Table 1)

Methods
- A production function links the recreational catch to angler fishing effort and wetlands
- A linear angler demand curve is postulated.
- Consumer surplus is calculated
- Net Factor Income methods

Wetland functions noted
- Marine recreational fishing

Data
- discount rate 0.08125
- Estuarine- dependent recreational catch and saltwater marsh acres for the southeastern states.
- marginal consumer surplus per acre of wetlands (MCSW)=capitalized value of an acre (CVW, 6, 471) * discount rate (r), (p 251, equation 37, 38)

Results
- the annual flow of value from an increase in one acre of wetland : $525.8= $6, 471*0.08125

Source	Bell (1989)
State	FL
Total Value	28871328
Nominal $/acre	35.62
Used acres	810537
Total acres	810537
Marginal acres	
coastal	1
year	1984
CPI	0.795
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	3
Theory	3
Metrics	3
Stats	2
Publish	0
CS	0
PS	1
TotRev	0

Bell, Frederick W. 1989. Application of wetland valuation Theory to Florida fisheries. Dept. of Economics, Florida State Univ. Tallahassee, Florida, 118p.
Study 2

Site
- Estuarine marine wetland in Florida.
- Salt marsh land
- 810, 537 acres of forested and emergent wetland on west coast in Florida. (P. 66, Table 5.9, E2F0+E2EM)

Methods
- marginal productivity theory : the incremental contribution of estuarine wetlands to the marine fishery catch
- Net Factor Income methods

Wetland functions noted
- Marine commercial fishery catch for blue crab, stone crab, spiny lobster, red snapper, oyster, black mullet, shrimp, all other species.

Data
- In 1984, 84% and 95% of commercial fishery landing on east and west respectively in Florida were estuarine-dependent.
- Long-run time series production function was estimated using the data up to 1984 year.

Results
- the value of marginal products for an acre of salt water marsh for the west coast : total $ 35.615 (see page , summary iv)

Interpretation
- Implicitly assumes that the MC of additional harvests is zero.

Source	Bergstrom, Stoll, et al. (1990)
State	LA
Total Value	27365000
Nominal $/acre	8.42
Used acres	3250000
Total acres	3250000
Marginal acres	
coastal	1
year	1986
CPI	0.839
SW	1
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	3
Theory	3
Metrics	3
Stats	3
Publish	1
CS	1
PS	0
TotRev	0

Bergstrom, J.C., J.R. Stoll, J.P. Titre, and V.L. Wright. 1990. "Economic Value of Wetlands-based Recreation, " Ecological Economics (1990):129-147.

Site
- Louisiana 3.25 million acres (p 133)
- coastal wetlands area

Methods
- CVM (p. 136)
- consumer surplus (CS) estimate

Wetland functions noted
- outdoor recreational user values of on-site
- waterfowl hunting
- freshwater and saltwater fishing
- recreational shrimp fishing and crabbing

Data
- survey during Dec. 1985 - Dec. 1986 (p. 135)
- 55.2 % real return rate among 3, 679 sample size
- CS per recreation person per year: $360 (p 141 Table 3)
- aggregate consumer surplus : $27 million (p 143)

Results
- $8.42 per acre annually (p. 143)

Source	Breaux, Farber, Day (1995)
State	LA
Total Value	85557
Nominal $/acre	150.1
Used acres	570
Total acres	570
Marginal acres	
coastal	1
year	1985
CPI	0.823
SW	1
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
amenity	0
Habitat	0
Data	3
Theory	3
Metrics	9
Stats	9
Publish	1
CS	0
PS	1
TotRev	0

Breaux, **Andree ;Farber, S. ; John Day,** 1995. "Using natural Coastal Wetlands Systems for Wastewater Treatment: An Economic Benefit Analysis ." *Journal of Environmental Management.* 44:285-291.
Study 1

Site
- Louisiana Coastal wetlands
- The city of Thibodaux Louisiana
- 570-acre swamp/bottomland forested area (p. 289)
- Methods
- cost savings
- Wetland functions noted
- Wastewater Treatment and water quality improvement (municipal wastewater)

Data
- 1985 year
- 9% discount rate, 30-year life
- capitalized cost savings; $448, 000~$1, 310, 000 (p. 288-289)

Results
- $76.5~$223.7/acre, year (* using PMT functions in EXCEL, PMT function is to calculate an annual value from a present value)

Source	Breaux, Farber, Day (1995)
State	LA
Total Value	153982.4
Nominal $/acre	53.84
Used acres	2860
Total acres	2860
Marginal acres	
coastal	1
year	1985
CPI	0.823
SW	1
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
amenity	0
Habitat	0
Data	2
Theory	3
Metrics	9
Stats	9
Publish	1
CS	0
PS	1
TotRev	0

Breaux, **Andree ;Farber, S. , John Day,** 1995. "Using natural Coastal Wetlands Systems for Wastewater Treatment: An Economic Benefit Analysis ." *Journal of Environmental Management.* 44:285-291.
Study 2

Site
- Dulac, Louisiana Coastal wetlands 2, 860 acres (p. 289 Sec 3.2)

Methods
- cost savings
- Wetland functions noted
- Wastewater Treatment and water quality improvement (seafood processing waste)

Data
- 1992 year
- 9% discount rate, 25-year life
- capitalized cost savings; $1.188 million~$1.837 million for each seafood plant. (p. 289)
- annual cost saving of $121, 000~$187, 000 is per year for each plant
- 15 seafood plants

Results
- $42.29~$65.39/acre, year (* using PMT functions in EXCEL , PMT (0.09, 25, 1.188mil (or 1.837mil)

Source	Breaux, Farber, Day (1995)
State	LA
Total Value	26697.2
Nominal $/acre	4306
Used acres	6.2
Total acres	6.2
Marginal acres	
coastal	1
year	1985
CPI	0.823
SW	1
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	3
Metrics	9
Stats	9
Publish	1
CS	0
PS	1
TotRev	0

Breaux, **Andree ;Farber, S. , John Day,** 1995. "Using natural Coastal Wetlands Systems for Wastewater Treatment: An Economic Benefit Analysis ." *Journal of Environmental Management.* 44:285-291.
Study 3

Site

- Grammercy, Louisiana Coastal wetlands
- 6.2 acres (p 290)
- Methods
- cost savings
- Wetland functions noted
- Wastewater Treatment and water quality improvement (potato chip manufacturing waste)

Data
- 1992 year
- 9% discount rate, 15-year life (p. 290)
- capitalized cost savings; $215, 220 per year. (p. 290)
- Results
- $4, 306.44/acre, year = PMT (9%, 15 yrs, $215, 220)

Interpretation
- This wetland value is from a very intensively used wetland.

Source	Baitie, Wilson (1995)
State	VA
Total Value	
Nominal $/acre	
Used acres	
Total acres	
Marginal acres	
coastal	
year	1969
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	1
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Batie, S.S. and J.R. Wilson. 1978. "Economic Values Attributable to Virginia's Coastal Wetlands as Inputs in Oyster Production." *Southern Journal of Agricultural Economics.* July:111-118.

Site
- All site of coastal marsh from 17 counties, VA
- From a high size of 63, 915 acres in Accomack county to a low size of 436 acres in Virginia Beach county

Methods
- NFI
- Cobb-Douglas production Model
- Wetland functions noted
- The wetland's marginal value of producing oyster on commercial fishing as an input in oyster production

Data
- 1969,

Results
- (p. 116 Table 2) (Each of these wetland values is included as a separate observation)
- Accomack, 63, 915 acres, $1.13/acre
- Isle of Wight, 6, 287 acres, $13.63/acre
- James City, 5, 614 acres, $1.64/acre
- Nothumberland, 1, 128 acres, $141.46/acre
- Virginia Beach, 436 acres, $4.24/acre
- Westmoland, 2, 282 acres, $107.22/acre
- York, 6, 622 acres, $1.88/acre
- total 86, 284 acres, 47.11/acre

Interpretation
- All the values per acre in the model used a NFI method are marginal value per acre. But it is still a value per acre.

Source	Chabreck, R.H. (1979)	Chabreck, R.H. (1979)
State	LA	LA
Total Value		
Nominal $/acre	9.6	3.88
Used acres		
Total acres		
Marginal acres		
coastal	0	1
year	1977	1977
CPI	0.464	0.464
SW	1	1
flood	0	0
Quality	0	0
Quantity	0	0
RecFish	0	0
ComFish	0	0
Single	0	0
BirdHunt	1	1
BirdWatch	0	0
Storm	0	0
amenity	0	0
Habitat	0	0
Data	3	3
Theory	1	1
Metrics	9	9
Stats	9	9
Publish	1	1
CS	0	0
PS	0	0
TotRev	1	1

Chabreck, R.H. 1979. "Wildlife harvest in wetlands of the United States, " in P.E. Greeson, J.R. Clark, and J.E. Clark (eds.) Wetland Functions and Values: The State of Our Understanding. Minneapolis, MN: American Water Resources Association, pp. 618- 631.
Study 1

Site
- Total Louisiana coastal and fresh wetland

Methods
- The market value of harvest.

Wetland functions noted
- Wild life and its harvest for outdoor recreation

Data
- Certain fur animals including muskrat, nutria, mink, raccoon, river OtterEstimated Mean # of fur animals harvested and value in coastal marsh and swamp

Results
- coastal $3.88/acre, Fresh : $9.60/acre (recalculated from p. 628 Table 5) . Here coastal includes Brackish and intermediate values, and Fresh and swap belongs to Fresh.

Interpretation
- This commercial value is different from consumer surplus.
- Bird Hunting function is extended into wildlife animal hunting.

Source	Chabreck, R.H. (1979)	Chabreck, R.H. (1979)
State	LA	LA
Total Value	241228.8	110762.4
Nominal $/acre	0.54	0.57
Used acres	446720	194320
Total acres	446720	194320
Marginal acres		
Coastal	1	0
Year	1973	1973
CPI	0.340	0.340
SW	1	1
Flood	0	0
Quality	0	0
Quantity	0	0
RecFish	0	0
ComFish	0	0
Single	0	0
BirdHunt	1	1
BirdWatch	0	0
Storm	0	0
Amenity	0	0
Habitat	0	0
Data	3	3
Theory	1	1
Metrics	9	9
Stats	9	9
Publish	1	1
CS	0	0
PS	0	0
TotRev	1	1

Chabreck, R.H. 1979. "Wildlife harvest in wetlands of the United States, " in P.E. Greeson, J.R. Clark, and J.E. Clark (eds.) Wetland Functions and Values: The State of Our Understanding. Minneapolis, MN: American Water Resources Association, pp. 618- 631. Study 2

Site
- Cameron and Vermilion Parishes, Louisiana (p. 629)
- Coastal and fresh marsh

Methods
- Commercial selling value

Wetland functions noted
- Wild life and its harvest of outdoor recreation

Data
- Estimated mean number and value of alligators harvested

Results
- coastal $0.54/acre, Fresh : $0.57/acre (p.629, Table 6, Brackish and intermediate are categorized as coastal)

Interpretation
- this commercial value is different from consumer surplus.
- Bird Hunting function is extended into wildlife animal hunting.

Source	Cooper, Loomis (1991)
State	CA
Total Value	64685000
Nominal $/acre	761
Used acres	85000
Total acres	85000
Marginal acres	
coastal	0
year	1987
CPI	0.870
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	2
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Cooper, Joseph & Loomis, J., 1991. "Economic value of Wildlife resources in the San Joaquin Valley: Hunting and viewing values", In the Economic and Management of Water and Drainage in Agriculture, eds. Diner & Zilberman, Kluwer Academic Publishers.
Study 1

Site
- San Joaquin Valley California
- 85, 000 acres (from Loomis & Hanemann etc (1991) p. 419)
- Fresh water wetlands

Methods
- Onsite recreational demand for wildlife
- CVM for viewing value

Wetland functions noted
- birds viewing

Data
- WTP of birds viewing : $112 in 1987 year (p. 45 4 , Table 4)
- Total annual value is $ 64, 723, 500 (p. 455)

Results
- $761/acre = $64, 723, 500/85, 000 acres

Source	Cooper, Loomis (1991)
State	CA
Total Value	16490000
Nominal $/acre	194
Used acres	85000
Total acres	85000
Marginal acres	
coastal	0
year	1987
CPI	0.870
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	3
Metrics	3
Stats	3
Publish	1
CS	1
PS	0
TotRev	0

Cooper, Joseph & Loomis, J., 1991. "Economic value of Wildlife resources in the San Joaquin Valley: Hunting and viewing values", In the Economic and Management of Water and Drainage in Agriculture, eds. Diner & Zilberman, Kluwer Academic Publishers.
Study 2

Site
- San Joaquin Valley California
- 85, 000 acres (from Loomis & Hangman etc (1991) p. 419)
- Fresh water wetlands

Methods
- Onsite recreational demand for wildlife
- TCM for hunting value

Wetland functions noted
- waterfowl hunting

Data
- waterfowl hunting in OCT. 1987 - Jan 1988 season
- Average consumer surplus of hunting : $ 55.41/hunter
- Total annual value is $ 16, 475, 074 (p. 457)

Results
- waterfowl hunting : $16.5million per year , $194 per acre

Source	Creel, Loomis (1992)	Creel, Loomis (1992)	Creel, Loomis (1992)
State	CA	CA	CA
Total Value	6970000	32980000	40460000
Nominal $/acre	82	388	476
Used acres	85000	85000	85000
Total acres	85000	85000	85000
Marginal acres			
Coastal	0	0	0
Year	1989	1989	1989
CPI	0.949	0.949	0.949
SW	0	0	0
Flood	0	0	0
Quality	0	0	0
Quantity	0	0	0
RecFish	0	1	0
ComFish	0	0	0
Single	0	0	0
BirdHunt	1	0	0
BirdWatch	0	0	1
Storm	0	0	0
Amenity	0	0	0
Habitat	0	0	0
Data	3	3	3
Theory	3	3	3
Metrics	3	3	3
Stats	2	2	2
Publish	1	1	1
CS	1	1	1
PS	0	0	0
TotRev	0	0	0

Creel, Michael & J. Loomis , 1992"Recreation value of Water to Wetlands in the San Joaquin Valley: Linked Multinominal Logit and Count data Trip Frequency Models" Water resources research Vol. 28 No10, p2597~2606

Site
- 14 recreational resources in the San Joaquin Valley California
- 85, 000 acres wetlands (from Loomis & Hangman etc (1991) p. 419)
- Fresh water wetlands

Methods
- CVM
- Linked multinomial Logit site selection models and count data trip frequency models

Wetland functions noted
- recreational benefits from providing increased quantities and qualities of water to wildlife and fisheries habitats.
- waterfowl hunting,
- fishing
- wildlife viewing

Data
- data survey during June 1988 to June 1989 with telephone and mail
- response rate: telephone (51%), mail (35%)

Results
- total annual benefits of viewing : $37 million ~ $ 44 million ($435~$518 per acre)
- total annual benefits of fishing : $34 million ~ $ 32 million ($376~$400 per acre)
- total annual benefits of hunting : $7 million ~ $ 7 million ($82 per acre)
- from table 4. p.2604, TB/85, 000 acres

Source	Dillman, Hook (1993)
State	SC
Total Value	265507.5
Nominal $/acre	106.203
Used acres	2500
Total acres	8500
Marginal acres	2500
Coastal	0
Year	1992
CPI	1.074
SW	0
Flood	1
Quality	1
Quantity	1
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	1
Habitat	1
Data	3
Theory	3
Metrics	3
Stats	2
Publish	0
CS	1
PS	0
TotRev	0

Dillman, Buddy L., Lawrence J. Beran, & Donald D. Hook, 1993. "Non-market valuation of Freshwater Wetlands: The Francis Biedler Forest. Report 135, South Carolina Water Resources Research Institute, Clemson Univ. 47p.
Study 1.

Site
- the Francis Beidler Forest in South Carolina, a 6, 000 acre freshwater wetland (p. 13)
- Additional 2, 500 acres for . (wetland development)
- Coastal plains freshwater wetland type.

Methods
- Dichotomous Choice Contingent Valuation (DCCV).
- State-wide household mail survey
- Three type wetlands were described. 1) Frequently flooded bottomland swamp, 2) infrequently flooded bottomland forest, 3) non-bottomland pine plantation.
- A discrete choice econometric Logit model of logistic form.
- 1992 spring survey

Wetland functions noted
- Flood control
- Sediment collection and water quality
- Water supply
- Recreation , hunting and fishing
- Fish and shellfish
- Waterfowl and other wildlife
- Open space and aesthetic value
- Rare and endangered species, food production, timber production, historic &archeological values, education & research

Data
- 21% response rate among 3, 600 sample (505 sample)
- a one time contribution for an additional purchase of wetland
- mean age 48 years
- total household of SC in 1990 : 1, 258, 783 (US census data in 1990), 6% discount rate for the annual value

Results
- (building on p. 28 , Table 6)
- WTP median $4.83 ($ 1.92 - $ 5.60) according to the wetland type.
- WTP mean $16.74 ($ 6.82~$ 19.57) depending on the wetland type.
- Median Value per acre: $58.7 ($25.7 - $ 75.04), Mean Value per acre : $ 106.2 ($43.27~$124.16)
- For value per acre : (WTP* total household * response rate / total acres)*discount rate

Interpretation

- For the value per acre, multiply the population of South Carolina with assumption of zero dollar to non-respondent
- The WTP from the CVM survey only belongs to the incremental acreage, not the total acreage of the wetland.

Source	Dillman et al. (1993)
State	SC
Total Value	
Nominal $/acre	49.17
Used acres	2, 500
Total acres	2, 500
Marginal acres	
coastal	
Year	1992
CPI	
SW	
flood	1
Quality	1
Quantity	1
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Dillman, Buddy L., Lawrence J. Beran, & Donald D. Hook, 1993. "Non-market valuation of Freshwater Wetlands: The Francis Biedler Forest. Report 135, South Carolina Water Resources Research Institute, Clemson Univ. 47p.
Study 2.

Site
- the Francis Beidler Forest in South Carolina, a 6, 000 acre freshwater wetland
- Additional 2, 500 acres for wetland preservation.
- Coastal plains freshwater wetland type.

Methods
- Dichotomous Choice Contingent Valuation (DCCV).
- State-wide household mail survey
- First type wetlands is considered: frequently flooded bottomland typified by cypress-tupelo swamp
- 1992 spring survey

Wetland functions noted
- Flood control
- Sediment collection and water quality
- Water supply
- Recreation , hunting and fishing
- Fish and shellfish
- Waterfowl and other wildlife
- Open space and aesthetic value
- Rare and endangered species, food production, timber production, historic &archeological values, education & research

Data
- 21% response rate among 3, 600 sample : 170 observation
- A one time contribution for an additional purchase of wetland
- Mean age 48.
- Total population of SC in 1990 : 1, 258, 783 (US census data in 1990)
- 6% discount rate for the annual value
- For value per acre : (WTP* total house hold * response rate / total acres)*discount rate

Results
- Mean WTP : $ 7.75 (p. 28, Table 6)
- Mean Value per acre: $ 49.17

Interpretation
- For the value per acre, multiply the household of South Carolina with assumption of zero dollar to non-respondent

Source	Dillman et al. (1993)
State	SC
Total Value	
Nominal $/acre	43.27
Used acres	2, 500
Total acres	2, 500
Marginal acres	0
coastal	0
Year	0
CPI	0
SW	0
flood	1
Quality	1
Quantity	1
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Dillman, Buddy L., Lawrence J. Beran, & Donna D. Hook, 1993. "Non-market valuation of Freshwater Wetlands: The Francis Biedler Forest. Report 135, South Carolina Water Resources Research Institute, Clemson Univ. 47p.
Study 3

Site
- the Francis Beidler Forest in South Carolina, a 6, 000 acre freshwater wetland
- Additional 2, 500 acres for wetland preservation.
- Coastal plains freshwater wetland type.

Methods
- Dichotomous Choice Contingent Valuation (DCCV).
- State-wide household mail survey
- Second type wetlands is considered: infrequently flooded bottomland hardwood forest
- 1992 spring survey

Wetland functions noted
- Flood control
- Sediment collection and water quality
- Water supply
- Recreation , hunting and fishing
- Fish and shellfish
- Waterfowl and other wildlife
- Open space and aesthetic value
- Rare and endangered species, food production, timber production, historic &archeological values, education & research

Data
- 21% response rate among 3, 600 sample : 155 observation
- a one time contribution for an additional purchase of wetland
- mean age 48
- Total household of SC in 1990 : 1, 258, 783 (US census data in 1990)
- 6% discount rate for the annual value
- For value per acre : (WTP* total house hold * response rate / total acres)*discount rate

Results
- Mean WTP : $6.82 (p. 28, table 6)
- Mean Value per acre: $ 43.27

Interpretation
- For the value per acre, multiply the household of South Carolina with assumption of zero dollar to non-respondent

Source	Dillman et al. (1993)
State	SC
Total Value	
Nominal $/acre	124
Used acres	2, 500
Total acres	2, 500
Marginal acres	
coastal	0
year	0
CPI	
SW	
flood	0
Quality	1
Quantity	1
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Dillman, Buddy L., Lawrence J. Beran, & Donna D. Hook, 1993. "Non-market valuation of Freshwater Wetlands: The Francis Biedler Forest. Report 135, South Carolina Water Resources Research Institute, Clemson Univ. 47p.
Study 4

Site
- the Francis Beidler Forest in South Carolina, a 6, 000 acre freshwater wetland
- Additional 2, 500 acres for wetland preservation.
- Coastal plains freshwater wetland type.

Methods
- Dichotomous Choice Contingent Valuation (DCCV).
- State-wide household mail survey
- Third type wetlands is considered: non-bottomland pine plantation with scattered hardwood runners
- 1992 spring survey

Wetland functions noted
- Water quality (low level)
- Water supply (low level)
- Recreation , hunting and fishing (low level)
- Waterfowl and other wildlife
- Open space and aesthetic value
- Rare and endangered species, food production, timber production, historic &archeological values, education & research

Data
- 21% response rate among 3, 600 sample : 180 observation
- A one time contribution for an additional purchase of wetland
- Mean age 48
- Total population of SC in 1990 : 1, 258, 783 (US census data in 1990)
- 6% discount rate for the annual value
- For value per acre : (WTP* total house hold * response rate / total acres)*discount rate

Results
- Mean WTP $ 19.57 (p. 28, table 6)
- Mean Value per acre: $ 124.16

Interpretation
- For the value per acre, multiply the household of South Carolina with assumption of zero dollar to non-respondent

Source	Doss, Taff (1996)
State	MN
Total Value	
Nominal $/acre	2511.5
Used acres	9, 878
Total acres	9, 878
Marginal acres	
coastal	
year	1992
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Doss, C.R., and S. J. Taff. 1996. "The influence of wetland type and wetland proximity on residential property values, " Journal of Agricultural and Resource Economics 21 (1): 120-129.

Site
- Urban wetland
- The city of St. Paul and surrounding suburban area.
- Four type of wetlands in Ramsey county, Minnesota
- Forested, scrub-shrub, emergent vegetation, open water wetland types
- 9, 878 acres (p. 124, Table 1) (= 1, 359+1, 570+5, 750+1, 191)

Methods
- Hedonic Pricing
- A quadratic function form is reported.
- The comparison of the values among four type wetlands

Wetland functions noted
- Housing value
- Distance effects of house place from wetlands

Data
- Detailed residential housing, wetland location data.
- 32, 417 sample house placed within 1, 000 miles from wetland

Results
- open water and scrub-shrub wetlands are preferred to emergent-vegetation and forested wetlands
- Lake view value : $46, 000 (need the acreage data) (p. 126, Table 4. Parameter estimate in Lake view variable)
- The implicit price of living an additional ten meters closer to
- A forested wetland: -$145. (p. 127)
- Emergent-vegetation : $136
- Open water: $99
    - Scrub-shrub: $145.
- The value per acre for 10M closer: Summation of all type value for 10 meter closer ($235)*total house in Ramsey (105, 568)/ 9, 878 acre=$2, 511.5.

Interpretation
- The above approach is not exact wetland value, but the value to live near wetlands.

Source	Doss, Taff (1996)
State	MN
Total Value	
Nominal $/acre	2511.5
Used acres	9, 878
Total acres	9, 878
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Doss, C.R., and S. J. Taff. 1994. The Relationship of Property Values and Wetlands Proximity in. Ramsey County, Minnesota Economic report 3-4, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. July. 42 pp.

Site
- Urban wetland
- The city of St. Paul and surrounding suburban area.
- Four type of wetlands in Ramsey county, Minnesota
- Forested, scrub-shrub, emergent vegetation, open water wetland types
- 9, 878 acres (p. 11, Table 3) (= 1, 359+1, 570+5, 750+1, 191)

Methods
- Hedonic Pricing
- The relative valuation placed on different types of wetlands
- WTP to live near four different types of wetlands
- A several function forms are reported.
- The comparison of the values among four type wetlands

Wetland functions noted
- Housing value of closer to four type wetlands
- Distance effects of house place from wetlands

Data
- Detailed residential housing, wetland location data.
- 105, 568 total single family houses lied within 1, 000 miles from wetland

Results
- open water and scrub-shrub wetlands are preferred to emergent-vegetation and forested wetlands
- Lake view value : $42, 458 - $44, 526 ($4.3 - $4.5/acre) (p. 37-42, parameter estimates in Lake view)
- The implicit price of living an additional ten meters closer to wetlands is very variant according to functional form. So here I don't calculate the value.

Interpretation
- The above approach is not exact wetland value, but the value to live near wetlands.
- A reference: Lupi, F., T.Graham-Tomasi, and S.J.Taff.1991. A hedonic approach to urban wetland valuation. Staff paper p91-8, Depart. Of Agricultural and Applied Economics, University of Minnesota. Feb.

Source	Elliot, Mulamoottil (1992)
State	Canada
Total Value	
Nominal $/acre	68.2
Used acres	16, 783
Total acres	16, 783
Marginal acres	
coastal	
year	1987
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Elliot, Lynne and George Mulamoottil. 1992. "Agricultural and Marshland Uses on Walpole Island: Profit Comparisons." Canadian Water Resources journal 17 (2): 111-119.

Site
- Walpole Island, southern Ontario, Canada
- A large expanse of relatively undisturbed wetlands and some reclaimed wetlands
- An Indian reserve in Lambton county within lake St. Clair
- 6, 792 ha

Methods
- Net profit comparison between agriculture and wetlands
- Net-operating profits of outputs caught in the wetlands

Wetland functions noted
- Hunting
- Fishing
- Trapping

Data
- The net operating profits from Walpole island hunting fishing study (Montour & Williams, 1988)
- Resident harvester survey from local hunters, and non-resident survey from Duck hunter on Aug. 1986 - July. 1987
- Net operating profits for one hectare: $C 168.52

Results

- Ecological value is greater than agricultural value. $C 68.20/acre

Interpretation
- The value represents only the selling revenue of fish and animals caught in the lake.
- A making $20, 000 (not including salary $22, 000) doesn't make sense , So we did not include this in the analysis

Source	Farber (1996)
State	LA
Total Value	
Nominal $/acre	
Used acres	2, 400, 000
Total acres	2, 400, 000
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1996. "Welfare Loss of Wetlands Disintegration: A Louisiana Study." *Contemporary Economic Policy.* 14:92-106.
Study 1 over 5

Site

- Louisiana total wetland 2.9 ~ 3.1 million acres
- The projection of 80% wetland loss (2, 400, 000 acres) until 2083 year from 1990 year (p. 94)
- 25, 806 acres loss per year (p. 95)
- Coastal wetlands

Methods

- Substitute costs estimation

Wetland functions noted

- Commercial fishing

Data

- 1990 year value
- Marginal productivity of wetlands increases up to 56% from 1990 year on the 80% loss of wetlands to 2083 year. (It is also another assumption)
- The use of Bell (1989) and Costanza and Farber (1985)'s results about marginal value: $36.93 ~ $51.52/acre, year (p. 94)
- 3% discount rate and 93 years time lag during 1990~2083 year.
- Total capital value: $1, 155.30 mil ~1, 611.80 millions (p. 96, Table 1)

Results

- The average value of wetland is $45.99 ~ $64.16 per acre, year (twice PMT function apply because they obtained the wetland value from the loss value during the years.)
- Interpretation
- The result differs between average and marginal values
- We have to take care the calculation of annual average value per acre from the total net present value. It was very complicated.

Source	Farber (1996)
State	LA
Total Value	
Nominal $/acre	31.2
Used acres	2, 250, 000
Total acres	2, 250, 000
Marginal acres	
Coastal	
Year	1990
CPI	
SW	
Flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1996. "Welfare Loss of Wetlands Disintegration: A Louisiana Study." *Contemporary Economic Policy.* 14:92-106.
Study 2 over 5

Site
- Louisiana total wetland 2.9 ~ 3.1 million acres
- The projection of 75% wetland loss (2, 250, 000 acres) until 2083 year from 1990 year (p. 99)
- 24, 194 acres loss per year
- Coastal wetlands

Methods
- WTP of recreation participants

Wetland functions noted
- Recreational fishing
- Waterfowl hunting.

- **Data**
- 3% discount rate
- 1990 year value
- The use of Louisiana Dept. of Culture, Recreation, and tourism (1986) results: $96.22/person, 75% loss of catch bag rates is a essential assumption
- Population projection in 1990 year: 2.127 million
- The total value: $756.60 mil ~ $ 815.10 millions (p. 96, Table 1)

Results
- The value is $30.12 ~$32.45 per acre, year

Source	Farber (1996)
State	LA
Total Value	
Nominal $/acre	
Used acres	2, 400, 000
Total acres	2, 400, 000
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	1
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1996. "Welfare Loss of Wetlands Disintegration: A Louisiana Study." *Contemporary Economic Policy.* 14:92-106.
Study 3 over 5

Site
- Louisiana total wetland 2.9 ~ 3.1 million acres
- The projection of 80% wetland loss (2, 400, 000 acres) until 2083 year from 1990 year (p.95, 25, 806*93yrs ~ 2, 400, 000)
- 25, 806 acres loss per year
- Coastal wetlands

Methods
- Levee construction costs and substitute cost.
- Wetland functions noted
- Storm protection by levee construction and property protection

Data
- 1990 year value
- -3% discount rate
- Total value of storm protection ($ 230.50 mil~$ 690.23millions) and property loss ($ 5, 054.69 millions) (p. 96, Table 1)
- Results
- The value is $210.38 ~ $228.68 per acre, year

Interpretation
- Surely this paper is assuming a lot of things for future. It is not real data but is based on the real and reasonable data.

Source	Farber (1996)
State	LA
Total Value	
Nominal $/acre	.057
Used acres	2, 400, 000
Total acres	2, 400, 000
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1996. "Welfare Loss of Wetlands Disintegration: A Louisiana Study." *Contemporary Economic Policy.* 14:92-106.
Study 4 over 5

Site
- Louisiana total wetland 2.9 ~ 3.1 million acres
- The projection of 80% wetland loss (2, 400, 000 acres) until 2083 year from 1990 year
- 25, 806 acres loss per year
- Coastal wetlands

Methods
- The construction coat of wastewater treatment system.

Wetland functions noted
- Water treatment losses

Data
- 1990 year value
- The city of Thibodaux, La. 570 acre wetland treatment of waste water
- Total value ($ 1.43 millions) (p. 96, Table 1)

Results
- The value is $0.057 per acre, year

Interpretation
- Appears to be the same research but different results.
- Not included in analysis

Source	Farber (1996)
State	LA
Total Value	
Nominal $/acre	
Used acres	2, 400, 000
Total acres	2, 400, 000
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	1
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1996. "Welfare Loss of Wetlands Disintegration: A Louisiana Study." *Contemporary Economic Policy.* 14:92-106.
Study 5 over 5

Site
- Louisiana total wetland 2.9 ~ 3.1 million acres
- the projection of 80% wetland loss (2, 400, 000 acres) until 2083 year from 1990 year
- 25, 806 acres loss per year
- Coastal wetlands

Methods
- Alternative supply cost

Wetland functions noted
- water supply

Data
- 1990 year value
- 3% discount rate
- total value ; $ 40.55millions (p. 96, Table 1)

Results
- the value is $1.614 per acre, year

Source	Farber (1988)
State	LA
Total Value	
Nominal $/acre	6.52
Used acres	650, 000
Total acres	650, 000
Marginal acres	
coastal	
year	1985
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Farber, S. 1988. "The Value of Coastal Wetlands for Recreation: an Application of Travel Cost and Contingent Valuation Methodologies." *Journal of Environmental Management.* 26:299-312.
Study 1

Site
- Louisiana Coastal wetlands
- Terrebonne Parish wetlands.
- 650, 000 acres (p. 308)

Methods
- travel cost method (TV)
- seven rings of 35-mile increments in radii centered at Dulac, LA
- CVM

Wetland functions noted
- recreational value

Data
- July, 1984 - June, 1985
- 7837 questionnaire distributed and 14.4% response rate.
- WTP :
    1. using linearly connected points: $3.898~1.277 million **depending on** the wage time cost./annual
    2. demand functions: (quadratic form) $7.204 million

Results
- $1.96~$11.08/acre.year. it is calculated using the data of table 6 on p. 305 divided by acres
- the capitalized value is $36~111 on p 308

Interpretation
- Due to a very localized use of the wetlands, TCM is not appropriate to determine WTP.
- TCM may be underestimated because of some shortage of data

Source	Farber (1988)
State	LA
Total Value	6513000
Nominal $/acre	10.02
Used acres	650000
Total acres	650000
Marginal acres	
coastal	1
Year	1985
CPI	0.823
SW	1
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	1
Metrics	1
Stats	1
Publish	1
CS	1
PS	0
TotRev	0

Farber, S. 1988. "The Value of Coastal Wetlands for Recreation: an Application of Travel Cost and Contingent Valuation Methodologies." *Journal of Environmental Management.* 26:299-312.

Site
- Louisiana Coastal wetlands
- Terrebonne Parish wetlands.
- 650, 000 acres in 1970 (USDI, 1980)

Methods
- CVM
- Open-ended Question

Wetland functions noted
- recreational value

Data
- July, 1984 - June, 1985
- 7837 questionnaire distributed and 14.4% response rate.
- WTP : direct question: mean $103.48 per household annually. **(p. 306 5th paragraph)**
- Bertland (1984) : # of fishermen's household using wetlands: 110, 373 in 1982 -1983 year season at La Fourche/Terrebonne Parish (TP) wetlands.
- 60% is assigned to TP. so 66, 224 persons used this areas.=30, 518 households.
- the total annual WTP: $3.16 million per year. (p. 307 1st paragraph)
- * By consumer surplus of demand function, the value per household is $323.22 . (the three times) (p. 307 3rd paragraph)

Results
- $4.86 ~ $15.18/acre, year (3.16mil/650, 000 acres ~ 323.22*30, 518/650, 000)

Interpretation
- the estimated annual consumer surplus by CVM is between the TC estimates using the full wage and 60 5 of full wage as measures of the value of time.

Source	Farber (1987)
State	LA
Total Value	64000
Nominal $/acre	0.4
Used acres	160000
Total acres	40000000
Marginal acres	160000
coastal	1
year	1980
CPI	0.631
SW	1
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	1
Amenity	0
Habitat	0
Data	3
Theory	2
Metrics	2
Stats	2
Publish	1
CS	0
PS	1
TotRev	0

Farber, S. 1987. "The Value of Coastal Wetlands for Protection of Property against Hurricane Wind Damage." *Journal of Environmental Economics and Management.* 14:143-151.

Site
- Louisiana Coastal wetland
- Holly beach, marsh Is. Grand Is. weeks Is.
- approx. 250 miles of whole Louisiana coastal lines **(p. 145)**
- 160, 000 acres per 1 mile wide. **(p. 149)**
- total 40 million acres (it's incredible?, total size of LA wetlands is 11.326 million acres in 1982 year: (ERS 1998))

Methods
- Hurricane damage function

Wetland functions noted
- Hurricane property damages

Data
- data on property damages from gulf coast hurricanes were obtained from U.S. Army Corps of Engineers
- 1980 dollars
- the marginal value of one mile of wetlands: $0.0063 per person (p. 149)
- Results
- total incremental annual damages from 1 mile of wetlands : $63, 676 per year. (p. 149, 3rd paragraph))
- $0.40/acre, year ($63, 676/160, 000 acres per a mile)

Source	Farber, Costanza (1987)
State	LA
Total Value	2.73E+08
Nominal $/acre	37.46
Used acres	7300000
Total acres	7300000
Marginal acres	
coastal	1
year	1983
CPI	0.762
SW	1
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	2
Metrics	2
Stats	2
Publish	1
CS	0
PS	1
TotRev	0

Farber, S. and R. Costanza. 1987. "The Economic Value of Wetlands Systems." *Journal of Environmental Management.* 24:41-51.

Site
- south Louisiana coastal zone
- 7.3 million acres of total marsh in LA (p. 43, Table 2)

Methods
- NFI

Wetland functions noted
- commercial fishing , trapping

Data
- Shrimp, Blue crab, oyster, Menhaden,
- Trapping values
- 1983 year price applied.

Results
- total MP value : $37.46/acre (p. 48 Table 6)

Source	Farber, Costanza (1987)
State	LA
Total Value	4.95E+09
Nominal $/acre	678
Used acres	7300000
Total acres	7300000
Marginal acres	
coastal	1
year	1983
CPI	0.762
SW	1
flood	0
Quality	1
Quantity	0
RecFish	1
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	1
Amenity	0
Habitat	0
Data	2
Theory	1
Metrics	9
Stats	9
Publish	1
CS	0
PS	0
TotRev	0

Farber, S. and R. Costanza. 1987. "The Economic Value of Wetlands Systems." *Journal of Environmental Management.* 24:41-51.

Site
- South Louisiana coastal zone
- 7.3 million acres of total marsh in LA

Methods
- Energy Analysis the total amount of energy captured by natural ecosystems

Wetland functions noted
- all functions related with physical energy production of wetland

Data
- using the Gross Primary Production

Results
- Net marsh-aquatic change in annual value: $509 ~ 847/acre (p. 50 Table 7)

Interpretation
- do not include option and existence values not having close relationship to physical productivity

Source	Folke, C. (1991)
State	Sweden
Total Value	750066.2
Nominal $/acre	96.36
Used acres	7784
Total acres	8401.4
Marginal acres	7784
coastal	0
year	1989
CPI	0.949
SW	0
flood	1
Quality	1
Quantity	1
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	1
Habitat	1
Data	2
Theory	1
Metrics	9
Stats	9
Publish	1
CS	0
PS	1
TotRev	0

Folke, C. 1991. "The Societal Value of Wetland Life-support, " in Folke, C. and Kaberger, T. (eds.) Linking the Natural Environment and the economy: Essays from the Eco-Eco Group, Kluwer Academic Publishers, pp. 141-171.

Site

- The Martebomire, on the island of Gotland in the Baltic sea, Sweden ,
- Fresh wetland,
- Prior to exploitation 34 km^2 (8401.4 acres) wetland is reduced to 2.5km^2 (617.8acres). (p. 146)
- The size reduction is 7, 783.65 acres so far.

Methods

- Replacement value. evaluate the loss of the wetland's support functions in terms of the reduced solar energy fixing ability (Gross Primary Product , GPP) and compare it to the cost of replacing these environmental functions with technical process
- Estimate the life-support value of entire wetland ecosystems

Wetland functions noted

- Maintaining drinking water quality, quantity, ground water level, and surface water level.
- Moderation of waterfowls
- Processing sewage, cleansing, nutrients and chemicals
- Filter to coastal waters
- Providing food for humans and domestic animals
- Sustaining anadromous trout populations and other fish species, wetland dependent flora and fauna.
- Species diversity, storehouse for genetic material
- Bird watching, sport fishing, boating, and other recreational values
- Aesthetic and spiritual values.

Data

- Substitutes: irrigation dams, water transportation, well drilling, water purification, sewage treatment plants, fertilizers, fishing farming, and efforts to save endangered species.

Results

- The annual monetary replacement cost: 2.5 - 7 million Swedish crowns (U.S. $0.4-1.1million). they published this $ data also. (p. 156 Table 3)
- The annual $/ acre= ($0.4-1 million)/7784acres=$51.39-$141.32/acre, average value is $96.36.

Interpretation

- The lost wetland value is counted, so the value per acre is divided by only lost size of wetland.

Source	Gren (1995)
State	Sweden
Total Value	
Nominal $/acre	560.5
Used acres	
Total acres	
Marginal acres	
coastal	0
year	1991
CPI	1.042
SW	0
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	3
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Gren, I.M. 1995. "The value of investing in wet-lands for nitrogen abatement, " European Review of Agricultural Economics 22 (2):157-172.

Site
- Gotland, an area with a high concentration of nitrate in the groundwater , a Swedish island in the Baltic Sea
- For the size, need to check another Gren's papers (1992, 1994)
- When the arid area were restored to wetland, what is the value of nitrogen abatement and secondary effects?

Methods
- The biophysical models.
- CVM
- Open-ended question

Wetland functions noted
- The value of nitrogen abatement for water quality of no more than 50 mg NO3 /l in ground water.
- The secondary effects by nitrogen abatement : water buffering as water supply, supply of energy and provision of habitat

Data
- 3% discount rate, 10 years for inter-temporal values.
- Nitrogen reduction: SEK 200 /kg. reduction per year : 215-500 kg/ha (p. 166, 3rd paragraph)
- Exchange rate for SEK against U.S $: SEK6.052/$ in 1991 (Economic Report of the President, 1993)
- Total acreage not presented. This study is not used in the econometric analysis

Results
- Water quality: $337.08-$783.92/acre = PMT (3%, 10 yrs, (200SeK/kg, N*215 (or 500)kg/ha)/2.471/6.052))
- Secondary effects: $188.8 - $439.2/acre (can be separated)

Interpretation
- Only direct value is included for the analysis.
- Hairstone (1992) obtained $51/acre as the secondary value by replacement value.

Source	Gupta, Foster (1975)
State	MA
Total Value	417760
Nominal $/acre	52.22
Used acres	8000
Total acres	8000
Marginal acres	
coastal	0
year	1972
CPI	0.320
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	2
Theory	2
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Gupta, T.R. and J.H. Foster. 1975. "Economic Criteria for Freshwater Wetland Policy in Massachusetts." *American Journal of Agricultural Economics*. 57:40-5.
Study 1

Site
- freshwater wetlands
- 8, 000 acres bought during 1969 - 1971 were analyzed
- Methods
- wild life biologist's scoring to each wetlands

Wetland functions noted
- wildlife values

Data
- WTP: Max $70/year based on the purchase price of the wetland by a Government Division. (p. 41)

Results
- $36 ~ $ 66/acre (p. 42, Table 1)
- average value $52.22/acre = (36+40+48+49+54+56+58+63+66)/9

Source	Gupta, Foster (1975)
State	MA
Total Value	263099.3
Nominal $/acre	167.9
Used acres	1567
Total acres	1567
Marginal acres	
coastal	0
year	1972
CPI	0.320
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	1
Storm	0
Amenity	1
Habitat	0
Data	2
Theory	2
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Gupta, T.R. and J.H. Foster. 1975. "Economic Criteria for Freshwater Wetland Policy in Massachusetts." *American Journal of Agricultural Economics*. 57:40-5. Study 2

Site
- freshwater wetlands
- total 1, 567 acres of land purchase

Methods
- wild life biologist's scoring to each wetlands

Wetland functions noted
- Visual -cultural benefits
- recreation, education, aesthetics

Data
- Scoring for landform, wetland type, size, water body size, location, visual and noise pollution
  - based State-aided purchase price for wetland as open-space.
  - 1972 year
  - 29 municipality

Results
  - $74 ~ $ 252/acre (p. 43, Table 2)

Source	Gupta, Foster (1975)
State	MA
Total Value	
Nominal $/acre	2800
Used acres	
Total acres	
Marginal acres	
coastal	0
year	1972
CPI	0.320
SW	0
flood	0
Quality	0
Quantity	1
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	1
Metrics	9
Stats	9
Publish	1
CS	0
PS	1
TotRev	0

Gupta, T.R. and J.H. Foster. 1975. "Economic Criteria for Freshwater Wetland Policy in Massachusetts." *American Journal of Agricultural Economics*. 57:40-5. Study 3

Site
- Massachusetts
- freshwater wetlands

Methods
- Substitute by the cost at the wellhead of supply water from well field

Wetland functions noted
- Municipal water supply

Data
- U.S. Geological Survey data in the north Atlantic region: 4.27 C per 1, 000 gpd
- annual $28/1, 000 gpd (p.43)

Results
- Assuming 10 acres in size , $2, 800/acre (p.43)

Interpretation
- As pointed out by Anderson and Rockel, since the water supply benefits are not actually being used, the replacement value must be an overestimate

Source	Gupta, Foster (1975)
State	MA
Total Value	
Nominal $/acre	76.82
Used acres	8, 422
Total acres	8, 422
Marginal acres	
coastal	
year	1972
CPI	
SW	
flood	1
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Gupta, T.R. and J.H. Foster. 1975. "Economic Criteria for Freshwater Wetland Policy in Massachusetts." *American Journal of Agricultural Economics*. 57:40-5. Study 4

Site
- freshwater wetlands
- 8, 422 acres in natural storage areas in the Charles basin in Metropolitan Boston (p.43)

Methods
- DC

Wetland functions noted
- Flood control

Data
- Army corps of Engineers' study

Results
- avoided loss $647, 000/year until the year 2000 (p.43)
- $76.82/acre = $647000/8, 422

Interpretation
- the quotation of USACE results as pointed out by Anderson and Rockel, the use of avoided costs overestimates benefits by ignoring opportunities of averting behavior.

Source	Hanley, Crag (1991)
State	Scotland
Total Value	7007741
Nominal $/acre	14.01548
Used acres	500000
Total acres	991767.6
Marginal acres	500000
coastal	0
year	1991
CPI	1.042
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	1
Data	2
Theory	2
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Hanley, N. and S. Crag, "Wilderness Development Decisions and the Krutilla-Fisher Model, " 1991` Ecological Economics 4, p145~164

Site
- The Flow county of Caithness and Sutherland in northern Scotland, U.K.
- 401, 375ha (991, 767.6acres). Only 202, 000ha (500, 000acres) considered for preservation bids.
- Fresh water wetland.
- the social efficiency of afforestation in the U.K.

Methods
- CVM for the values of preservation benefits. Open-ended questions were used.
- Mail survey

Wetland functions noted
- user and nonuser preservation values for wilderness
- Bird breeding replacement

Data
- 6% discount rate (for annual value it is used)
- 400 samples , 40% response rate, 129 sample used.
- Mean Income : U.K. 14, 883
- Scottish population over 16 years old : 4.075million (p.156)

Results
- Mean WTP : U.K.16.79 (p.154)
- The value per acre : 16.79*4.075 (present population)*0.06 (annual value)* income ratio representation (difference between sample mean and population
- mean) / 500, 000=U.K. 7.93
- 1.7674 (exchange rate in 1991 , Economic report of the president, 1993) * 7.93=$14.02

Interpretation
- Analysis was deemed questionable (rank of 2) because of the open-ended structure. However, despite this weakness, the authors appear to have taken a reasonable approach.

Source	Hovde, Brett (1993)
State	ND
Total Value	18.39
Nominal $/acre	6.13
Used acres	3
Total acres	3
Marginal acres	
coastal	0
Year	1993
CPI	1.106
SW	0
flood	1
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	1
Data	1
Theory	1
Metrics	1
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Hovde, Brett. 1993. Dollar values of Two Prairie Potholes. M.S. thesis, North Dakota State University, Fargo,

Hovde, Brett and Jay A. Leitch. 1994. Valuing prairie Potholes: Five case Studies. Agricultural Experiment station, , North Dakota State University, Fargo, 27p.

Study 1

Site

- A prairie pothole wetland, Nome wetland (case study), 2 miles southwest of Nome North Dakota.
- 3 acres in the farm land. (p. 5 , 1994)
- Emergent seasonally flooded

Methods

- Damage Cost
- The market value of output.

Wetland functions noted

- Flood control
- Sediment entrapment
- Wildlife habitat for recreation
- Aesthetics, education and research benefits

Results

- Flood control : $2.68/acre, sediment entrapment:$0.17 (P. 75, $0.5/3 acres), wildlife habitat: $2.94/acre, aesthetics: $0.33/acre. (p. 67, Table 3)

Interpretation

- Most of value is explained by hay producing , But it is not considered in this analysis.
- Only positive effects are considered.

Source	Hovde, Brett (1993)
State	ND
Total Value	190.4
Nominal $/acre	11.2
Used acres	17
Total acres	17
Marginal acres	
coastal	0
year	1993
CPI	1.106
SW	0
flood	0
Quality	1
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	1
Habitat	1
Data	1
Theory	1
Metrics	1
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Hovde, Brett. 1993. Dollar values of Two Prairie Potholes. M.S. thesis, North Dakota State University, Fargo,

Hovde, Brett and Jay A. Leitch. 1994. Valuing prairie Potholes: Five case Studies. Agricultural Experiment station, , North Dakota State University, Fargo, 27p.

Study 2

Site

- A prairie pothole wetland, Buchanan wetland (case study), 12 miles east of Buchanan, North Dakota,
- 17 acres, it is in the farm land. (p. 5 , 1994)
- Palustrine emergent aquatic bed semi-permanently flooded wetland

Methods

- Damage Cost or output value

Wetland functions noted

- Sediment entrapment and nutrient assimilation
- Wildlife habitat value
- Aquatic habitat value
- Waterfowl hunting
- Aesthetics, education and research benefits
- Agricultural usage (hay production)

Results

- (p. 69, Table 4, 1993)
- sediment entrapment:$0.65 ($11/17 acres, p. 76),
  wildlife habitat: $5.71/acre,
- aquatic habitat : 0.01/acre,
- waterfowl hunting:4.52/acre (p. 71),
- aesthetics: $0.06/acre,
- Agricultural usage (hay producing): $ 0.83,

Interpretation

- most of value is explained by waterfowl and hunting.
- Only positive effects are considered.

Source	Hovde, Brett (1993)
State	ND
Total Value	33.84
Nominal $/acre	4.23
Used acres	8
Total acres	8
Marginal acres	
coastal	0
year	1993
CPI	1.106
SW	0
flood	1
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	1
Data	1
Theory	1
Metrics	1
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Hovde, Brett. 1993. Dollar values of Two Prairie Potholes. M.S. thesis, North Dakota State University, Fargo,

Hovde, Brett and Jay A. Leitch. 1994. Valuing prairie Potholes: Five case Studies. Agricultural Experiment station, , North Dakota State University, Fargo, 27p.

Study 3

Site

- A prairie pothole wetland, Alice wetland (case study), 6miles west , 2 miles north, Alice North Dakota
- 8 acres , it is in the crop land. (p. 6, 1994)
- Palustrine emergent temporarily flooded

Methods

- Damage Cost or output value

Wetland functions noted

- Flood control ($2.67)
- Wildlife habitat value ($1.43)
- Aesthetics, education and research benefits ($0.13)
- Agricultural usage (wheat production) ($24.5)
- Value from rent for agricultural production ($35)

Results

- (p. 17, Table 4, 1994)
- Flood control:$2.67/acre,
- wildlife habitat: $1.43/acre,
- aesthetics: $0.13/acre.

Interpretation

- Most of value is explained by wheat production.
- Only positive effects are considered.

Source	Hovde, Brett (1993)
State	ND
Total Value	15.16
Nominal $/acre	3.79
Used acres	4
Total acres	4
Marginal acres	
coastal	0
year	1993
CPI	1.106
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	1
Data	1
Theory	1
Metrics	1
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Hovde, Brett and Jay A. Leitch. 1994. Valuing prairie Potholes: Five case Studies. Agricultural Experiment station, , North Dakota State University, Fargo, 27p.
Study 4

Site
- A prairie pothole wetland, Tower City wetland (case study), 3miles north, Tower City, North Dakota
- 4 acres , it is in the crop land. (p. 6)
- Palustrine emergent temporarily flooded

Methods
- Damage Cost or output value

Wetland functions noted
- Wildlife habitat value ($3.54)
- Aesthetics, education and research benefits ($0.25)
- Agricultural usage (hay production) ($15)

Results
- Wildlife habitat: $3.54/acre, (p. 18 , Table 5)
- aesthetics: $0.25/acre.

Interpretation
- Most of value is explained by hay production. Only positive effects are considered.

Source	Hovde, Brett (1993)
State	ND
Total Value	43164
Nominal $/acre	19.62
Used acres	2200
Total acres	2200
Marginal acres	
coastal	0
year	1993
CPI	1.106
SW	0
flood	1
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	1
Metrics	1
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Hovde, Brett and Jay A. Leitch. 1994. Valuing prairie Potholes: Five case Studies. Agricultural Experiment station, , North Dakota State University, Fargo, 27p.
Leitch, J.A., and B. Hovde. 1996. "Empirical valuation of prairie potholes: Five case studies, " Great Plains Research 6:25-39.
Study 5

Site
- A prairie pothole wetland, Rush lake wetland complex (case study), 6miles west , 2 miles north, Alice North Dakota
- 2, 200 acres. (p. 7, 1994)
- Fresh wetland
- Ideal habitat for waterfowl production, an essential component of the central and Mississippi flyways.

Methods
- Damage Cost or
- The market value of output.

Wetland functions noted
- Flood control ($7.0)
- Wildlife related experiences ($8.42)
- Hunting and trapping recreation ($4.20)
- Agricultural usage (hay production) ($6.85)

Data
- 40% of wildlife related expenditures is assumed as the consumer surplus.

Results
- Flood control:$7.0/acre, wildlife related experiences: $8.42/acre, hunting and trapping recreation:$4.20/acre. (p. 20, Table 6, 1994)

Interpretation
- Only positive effects are considered.

Source	Johnson, Linder (1986)
State	SD
Total Value	33855418
Nominal $/acre	25.9
Used acres	1307159
Total acres	1307159
Marginal acres	
coastal	0
year	1982
CPI	0.739
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	2
Metrics	2
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Johnson, C.W. and R.L. Linder. 1986. "An Economic Valuation of South Dakota Wetlands as a Recreation Resource for Resident Hunters." *Landscape Journal.* 5:33-38.

Site
- 1, 307, 159 acres in South Dakota
- 529, 000ha wetland, riparian areas (is composed as natural ponds and lakes (441, 000ha) and impounded one by stock dam (88, 000ha)) (p. 34)
- public wetland: 169, 000ha and private wetland: 360, 000ha
- fresh wetland

Methods
- CVM and consumer surplus (CS) estimation
- open-ended question

Wetland functions noted
- recreational value of resident hunters
- CS for waterfowl, upland big game and predator hunting on wetland habitat

Data
- 1, 737 license holder mail survey in March 1982
- 61% return rate with 1, 053 return mail.
- Results (p. 37)
- $33, 866, 411/1, 307, 159 acres = $25.92/acre for all resident hunters of SD

Source	Joworski, Eugene (1978)
State	MI
Total Value	68911605
Nominal $/acre	651
Used acres	105855
Total acres	105855
Marginal acres	
coastal	1
year	1980
CPI	0.631
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	1
Metrics	9
Stats	9
Publish	0
CS	0
PS	0
TotRev	1

Joworski, Eugene and C. Nicholas Raphel, 1978. Fish, Wildlife and Recreational Values Of Michigan's Coastal Wetlands. Michigan Dept. of Natural Resources. Michigan.

Joworski, Eugene and C. Nicholas Raphel, 1980. "Results of Specific Wetlands Value Study in Michigan" Study 1

Site
- Coastal wetland in Michigan
- 42, 856ha (105, 855acres) (p. 1 , 1978)

Methods
- A Gross Economic Return Methodology (GER): the market value of total output.

Wetland functions noted
- Sport & Commercial wetland harvests
- Non-consumptive recreation.
- Sport fishing
- Commercial fishing
- Waterfowl hunting
- Fur-bearers trapping

Data
- Existing data
- Catch and harvest statistics in 1980

Results
- The value per acre: total : $ 651, sport fishing: $426, non-consumptive recreation:$148, waterfowl hunting: $42, fur-bearers trapping:$30, commercial fishing: $5. (p. 447, Table 2, 1980)

Source	Joworski, Nicholas (1978)
State	MI
Total Value	
Nominal $/acre	1, 399
Used acres	105, 855
Total acres	105, 855
Marginal acres	
coastal	
year	1980
CPI	
SW	
flood	0
Quality	1
Quantity	1
RecFish	1
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Joworski, Eugene and C. Nicholas Raphel, 1978. Fish, Wildlife and Recreational Values Of Michigan's Coastal Wetlands. Michigan Dept. of Natural Resources. Michigan.
Joworski, Eugene and C. Nicholas Raphel, 1980. "Results of Specific Wetlands Value Study in Michigan" Study 2

Site
- Great lake coastal wetland in Michigan
- 42, 856ha (105, 855acres) (p. 447, 1980)

Methods
- Replacement cost Methodology for replacement value.

Wetland functions noted
- Nutrient control.
- Water supply.
- Fish production.
- Waterfowl feed and breed (I consider it as habitat function)

Data
- Catch and harvest statistics in 1980
- Tilton. Et al. (1978) data used

Results
- The annual replacement values per acre: total : $ 1, 398.6, Nutrient control:$679.9, water supply:$6.48, fish production: $420.9, waterfowl feed and breed:$291.4. (p 450, 1980; calculated from p. 449, Table 2)

Interpretation
- References: Gupta (1973) and OK, I need to investigate again the reliability of this analysis in more detail. For this , I need to obtain the Tilton, Donald l. et. al., 1978 report.

Source	Kosz (1996)
State	Austria
Total Value	5498690
Nominal $/acre	193.5
Used acres	28417
Total acres	28417
Marginal acres	
coastal	0
year	1993
CPI	1.106
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	1
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Kosz, Michael . 1996. “Valuing riverside wetlands: the case of the "Donau-Auen" national park.” *Ecological Economics.16*:109-127.
Study1

Site
- Donau-Auen national park , east of Vienna in Austria
- Declaration around 12, 000 ha of wetlands as floodplain forest. (p. 109)
- Fresh water wetlands

Methods
- WTP survey
- CVM

Wetland functions noted
- recreational Value of visit

Data
- 1.1 million visitors per year. (p. 115, sec 2.2.6)
- entrance fee 80 ATS per visit.
- 11.639 shilling/$1 in 1993

Results
- use value 64 million ATS per year (p. 115, sec 2.2.6)
- 2, 252ATS/acre (= $64mil/28, 417acres)
- $193.5/acre

Source	Kosz (1996)	Kosz (1996)	Kosz (1996)
State	Austria	Austria	Austria
Total Value	1.03E+08	38295271	21819442
Nominal $/acre	3630.8	1597.7	3270.3
Used acres	28417	23969	6672
Total acres	28417	23969	6672
Marginal acres			
Coastal	0	0	0
Year	1993	1993	1993
CPI	1.106	1.106	1.106
SW	0	0	0
Flood	0	0	0
Quality	0	0	0
Quantity	0	0	0
RecFish	1	1	1
ComFish	0	0	0
Single	0	0	0
BirdHunt	1	1	1
BirdWatch	1	1	1
Storm	0	0	0
Amenity	0	0	0
Habitat	1	1	1
Data	3	3	3
Theory	3	3	3
Metrics	3	3	3
Stats	2	2	2
Publish	1	1	1
CS	1	1	1
PS	0	0	0
TotRev	0	0	0

Kosz, Michael . 1996. “Valuing riverside wetlands: the case of the "Donau-Auen" national park.” *Ecological Economics.16*:109-127.
Study 2

Site
- Donau-Auen national park , east of Vienna in Austria
- Declaration around 12, 000 ha of wetlands as floodplain forest. (p. 109)
- Fresh water wetlands

Methods
- WTP survey to 962 Austrians, personal interview.
- CVM
- logistic regression model

Wetland functions noted
- Non-user values WTP and their motives for payment (existence, bequest, option value) * how can I distinct between user and non-user values.

Data
- June-July in 1993
- 572 of a total sample of 962 expressed preference for the conservation project. Hence we interpret this as meaning that 41% have a WTP of less than or equal to zero
- only 572 data sets used, 50.2% want to pay. Austrian Population : in 1993 7.988 million. Population under 18 23.2% for an over 18 pop of 6.134 million. (from UN, Demographic Yearbook and Populaiong Vital Statistics Report ?IMF/ Eurostat)Exchange rate in 1993 : 11.639 shilling/$1.

Results
Calculations (p. 120, Table 5)

ATS	pop over 18	Xchange	resp	sample	val/person $	Tot value	acres	val/acre
329	6.134	11.639	572	962	28.28851	103175087	28,417	3,630.8
122	6.134	11.639	572	962	10.50004	38296211	23,969	1,597.7
70	6.134	11.639	572	962	5.982473	21819533	6, 672	3,270.3

Source	Lant, Tobin (1989)	Lant, Tobin (1989)
State	IL	IOWA
Total Value	216383.4	1251741
Nominal $/acre	102.6	1129.73
Used acres	2109	1108
Total acres	2109	1108
Marginal acres		
coastal	0	0
year	1987	1987
CPI	0.870	0.870
SW	0	0
flood	0	0
Quality	1	1
Quantity	0	0
RecFish	0	0
ComFish	0	0
Single	0	0
BirdHunt	0	0
BirdWatch	0	0
Storm	0	0
Amenity	0	0
Habitat	0	0
Data	1	1
Theory	2	2
Metrics	2	2
Stats	2	2
Publish	1	1
CS	1	1
PS	0	0
TotRev	0	0

Lant, c. L. & G.A. Tobin , 1989. "The Economic Value of Riparian corridors in Cornbelt Flood plains : A Research Framework. "*Professional geographer* 41 (3) : 337-349.

Site
- Riparian corridors (wetlands) in flood plains of the agricultural Midwest, Iowa, Illinois
- fresh water wetland
- South Skunk, Edwards and Wapsipincon rivers.

Methods
- The authors consider the value of the riparian wetlands needed to improving water quality of the CVM

Wetland functions noted
- Table 5, p. 344
- associated rivers to that of the next best river. That is, Edwards to South Skunk and South Skunk to Wapsipinicon. Although there are variety of river benefits noted, only the water-quality improving characteristic of the wetlands are considered. No on-site benefits are noted

Data
- Per acre values are based on a study in which respondents were asked about their WTP for improvements in river systems.
- Estimate that 2109 acres would be required to improve the Edwards to that of the South Skunk and 1108 acres would be required to improve the South Skunk to that of the Wapsipinicon
- Data set is extremely limited: 7 observations of the Edwards, 16 for the South Skunk, and 12 for the Wapsipinicon.

Results
- $102.61/acre (p. 345, Table 5) South Skunk to Wapsipinicon
- $1, 129.73/acre (p. 345, Table 5) Edwards to South Skunk

Source	Loomis, Hanemann (1991)	Loomis, Hanemann (1991)
State	CA	CA
Total Value	2.18E+08	62680000
Nominal $/acre	3751	1567
Used acres	58000	40000
Total acres	85000	125000
Marginal acres	58000	40000
coastal	0	0
year	1990	1990
CPI	1.000	1.000
SW	0	0
flood	0	0
Quality	0	0
Quantity	0	0
RecFish	0	0
ComFish	0	0
Single	0	0
BirdHunt	1	1
BirdWatch	1	1
Storm	0	0
Amenity	0	0
Habitat	1	1
Data	3	3
Theory	3	3
Metrics	3	3
Stats	3	3
Publish	1	1
CS	1	1
PS	0	0
TotRev	0	0

Loomis, J., M. Hanemann, B. Kanninen & T. Wegge, 1991. "WTP to protect wetlands and Reduce wildlife Contamination from Agricultural Drainage", In the Economic and Management of Water and Drainage in Agriculture, eds. Diner & Zilberman, Kluwer Academic Publishers.

Site
- San Joaquin Valley California
- 85, 000 acres of wetlands (P. 419)
- Fresh water wetlands

Methods
- CVM
- Logit model

Wetland functions noted
- contamination control : water quality relating with water birds
- salmon fishing : sport and commercial fishing
- wetland habitat and wildlife programming : bird hunting and watching, wildlife viewing.

Data
- 803 completed interview from 1573 contacted households
- 51% response rate with 1003 responses (despite the low response rate, the authors stated confidence in their mean estimates ignoring the non-respondents rather than treating those a zero-value respondents)

Results
- Two relevant results are presented: (P. 423, Table 2)
- Total WTP of $2, 501M for improvements from 85 to 1125 thousand acres or $62525/acre
- Total WTP of $1515M to avoid a loss from 85 to 27 thousand acres or $26120/acre

Interpretation
- Both of these values are capitalized value (one-time payments) so they are converted to annualized values. No interest rate is available in the study so a 6% rate is used yielding $62525/acre×0.06 = 1567/acre and 26120/acre×0.06=$3751/acre.

Source	Lynne, Conroy (1981)
State	FL
Total Value	137891.6
Nominal $/acre	0.275
Used acres	501424
Total acres	501424
Marginal acres	
coastal	1
year	1974
CPI	0.378
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	1
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	3
Metrics	3
Stats	3
Publish	1
CS	0
PS	1
TotRev	0

Lynne, G.D., P. Conroy and F.J. Prochaska. 1981. "Economic Valuation of Marsh Areas for Marine Production Processes." *Journal of Environmental Economics and Management.* 8:175-186.

Site
- natural marsh-estuarine system
- Florida's Gulf coast
- 501, 424 acres in 1974 year (p. 182)

Methods
- the marginal value productivity of marsh

Wetland functions noted
- the economic productivity of marine system
- Blue crab economic productivity
- Results
- marginal value productivity: $0.25~0.3 per acre (p. 181)

Interpretation
- As Anderson and Rockel point out the VMP is not theoretically correct but the error may be small for relatively small changes over which the price of the output is relatively elastic.

Source	Mahan (1997)
State	OR
Total Value	
Nominal $/acre	35
Used acres	
Total acres	
Marginal acres	
coastal	
year	1994
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Mahan, Brent L. 1997. "Valuing urban Wetlands: A Property Pricing Approach" Institute for Water Resources Report 97-R-1, U.S.Army Corps of Engineers

Site
- Urban portion of Multnomah County, Oregon
- Over 4, 500 wetlands and deepwater habitats

Methods
- Hedonic pricing method
- Willingness-to-pay

Functions
- Log-log functional forms

Data
- A data set of about 14, 200 observations
- Data between June 1992 and May 1994
- 187, 300 household in Portland in 1990. (p. 34)
- Ln (p)=1.62-. 45Ln (q), p: the implicit price per acre per household of the nearest wetland, q: the size of nearest wetland in acres. (p. 61)
- Mean q: 40.799 (1.0~358.0) (p. 47)

Results
- $35/acre (p. 55, A linear model result)

Interpretation
- No data available in a total wetland size.

Source	Morton, RM (1990)
State	Australia
Total Value	1222188
Nominal $/acre	2068
Used acres	591
Total acres	591
Marginal acres	
coastal	1
Year	1988
CPI	0.905
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	1
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	2
Theory	1
Metrics	2
Stats	9
Publish	1
CS	0
PS	0
TotRev	1

Morton, R.M. 1990. "Community structure, density, and standing crop of fishes in a subtropical Australian mangrove area, " Marine Biology 105:385-394

Site
- A subtropical mangrove forest in Moreton Bay, Eastern Australia
- Coastal estuarine areas
- Large forest of mangroves: 185ha, salt marsh vegetation: 54ha, total 239ha (591 acres) (p. 386)

Methods
- Catch fish value caught by block net.

Wetland functions noted
- Providing a habitat for aquatic animals with shelter and food. Mainly finfishes

Data
- Catch species and # during November 1987 to November 1988.

Results
- Total catch value A$8, 380/ha. (=$2, 068/acre) for only commercial marketable fish (p. 391)

Interpretation
- It does not take into account the numerous commercially important juveniles captured or non-commercial values (e.g. recreation, education etc).

Source	Mullarkey, D (1997)
State	WI
Total Value	1484120
Nominal $/acre	13492
Used acres	110
Total acres	110
Marginal acres	
coastal	0
Year	1996
CPI	1.201
SW	0
flood	1
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	3
Theory	3
Metrics	3
Stats	3
Publish	0
CS	1
PS	0
TotRev	0

Mullarkey, Daniel. "Contingent Valuation of Wetlands: Testing Sensitivity to Scope." Ph.D. dissertation, Department of Agricultural and Applied Economics, University of Wisconsin - Madison, 1997.

Site
- 110 acres wetlands faced the filling by a highway expansion project in Northwest Wisconsin.
- 47 acres of tributary system wetlands ad 63 acres of isolated basins

Methods
- A mail surveys in Nov. 1994 to 550 households in WI
- WTP higher state income taxes in order to preserve the original wetlands

Wetland functions noted
- Information about the following wetland functions were provided to the respondents.
- Floodflow Alteration
- Water purification, Nutrient Removal and Transformation
- Production Export , Aquatic Diversity and Abundance, Wildlife Breeding , Mitigation and Wintering Habitat

Data
- One time pay for the wetland (p. 88)
- Lump sum WTP to preserve the original wetlands : $ 20.77/households (p. 163)
- Wisconsin Households : about 2million.
- Response Rate:59.55% (280 received except 80 from error among 550)
- Total capitalized value = $2, 473, 7070 , divided by acres results in a capitalized value $224, 882 per acre. (p. 163-164)

Results
- Aggregate value to WI per acre: $ 13, 492.92= about 2million*20.77/house*.5955 (response rate)*discount rate (.06)

Interpretation
- Only natural wetland value is included in the final analysis. For the manmade wetland, a capitalized value per acre is $38, 383, and an annual value per acre becomes $ 2, 303. (p. 164)
- For the annual value use 6% discount rate

Source	Pate, Loomis (1997)
State	CA
Total Value	
Nominal $/acre	6, 907
Used acres	90, 000
Total acres	90, 000
Marginal acres	
coastal	0
year	1990
CPI	1
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	2
Theory	3
Metrics	3
Stats	3
Publish	1
CS	1
PS	0
TotRev	0

Pate, Jennifer & J. Loomis , 1997"The effect of distance on WTP values: a case study of wetlands and salmon in California, " Ecological Economics 20, p199~207

Site
- San Joaquin Valley California
- 90, 000 acres wetlands (p. 200)
- Fresh water wetlands

Methods
- CVM
- Logit model

Wetland functions noted
- contamination control, salmon fishing, wetland habitat and wildlife programming were considered.

Data
- Survey on California , Oregon, Washington, Nevada residents
- 51% response rate with 1003 responses (p. 202)
- Respondents were asked if they would be willing to pay *$x* per year in additional taxes to support the program
- Two programs considered in the study,
- average total WTP for wetland improvement program : $41million ~ $ 1, 202 million (p. 204)
- average total WTP for contamination control program : $32 million ~ $ 1, 270 million (p. 204)

Results
- WTP $459~13, 356 / acre for wetland improvement
- WTP $351~14, 110/acre for contamination control

Interpretation
- In the total WTP , 51% response rate is considered, that is 49% of residents have zero value.
- This paper uses the same data set as Loomis & Hanemann (1991). So we don't include this data in our final analysis.

Source	Phillips, Haney (1993)
State	Canada
Total Value	4076400
Nominal $/acre	33.97
Used acres	120000
Total acres	240000
Marginal acres	120000
coastal	0
year	1993
CPI	1.106
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	3
Theory	2
Metrics	2
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Phillips, W.E., T.J. Haney, and W.L. Adamowicz. 1993. "An Economic Analysis of Wildlife Habitat Preservation in Alberta, " Canadian Journal of Agricultural Economics, 41 (4):411-418.

Site
- The prairie pothole region in Alberta , Canada.
- A project of an additional 120, 000 acres for enhanced and improved habitat in the future (p. 412)
- Fresh wetland

Methods
- CVM
- Mail survey to 1, 500 anglers, 1, 500 hunters, 3, 000 random households in Alberta.
- Discrete choice valuation questions
- Payment ways: perpetual Income tax or one-time donation.

Wetland functions noted
- Maintaining and enhancing wildlife habitat.

Data
- Assessing BWP (the Buck for Wildlife Program) by Macnab and Brusnyk (1993).
- Response rate : 44.3%, 41.1%, 26.9% to each respondents respectively.
- Surveyed respondents were asked about their WTP to improve the quality of an additional 120, 000 acres, increasing the total number acres in the program to 240, 000
- 10% discount rate for the annual value
- For the Canadian dollars from the American dollar, the exchange rate of 1993: 1.2902.

Results
- Authors report capitalized estimates of WTP per acre of C$109.53 to C$767.03. (p. 414, Table 3) These had been capitalized using a 10% discount rate. Hence, the annual values are 1/10th these values or, C$10.95 to C$76.70. Converting to US dollars per acre leads to $8.49 – 59.45/acre.

Interpretation
- Since quality , not quantity is valued in the WTP survey, the habitat function is included as a function of the value.
- Since anglers and hunters were explicitly surveyed, hunting and fishing benefits are assumed to be valued in addition to the habitat.
- For the comparison: Van Kooten, G.C. 1993. Bio-economic Evaluation of Government Agricultural programs on Wetlands Conversion. *Land economics* 69:27-38.
- For the reference: Macnab, B. And L. Brusnyk. 1993 A Socioeconomic Assessment of the Buck for wildlife

Program. Prepared by D.A.Westworth and Associates Ltd. For Alberta Fish and wildlife Services. 87 pp.

Source	Poor, Joan (1997)
State	NE
Total Value	12700000
Nominal $/acre	302.417
Used acres	41995
Total acres	75995
Marginal acres	41995
coastal	0
year	1996
CPI	1.201
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	1
Data	3
Theory	3
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Poor, P Joan. 1999. The Value of Additional Central Flyway Wetlands: The Case of Nebraska's Rainwater Basin Wetlands. *Journal of Agricultural and Resource Economics* 24 (1):253-65. Need to check the value? I changed the data but original one was different.

Site
- Nebraska's Rainwater basin wetland region.
- About 34, 000 acres exits. (p. 3)
- Three alternatives considered: an additional 16, 000 acres (31.31% of sample), 41000 acres (33.4% of sample), & 66, 000 acres (35.29 of sample) (Table 2 & p. 264) The average acreage change considered, therefore is 41, 995
- Fresh wetland

Methods
- CVM
- Mail survey to 2, 400 NB households of random sample
- A double bounded referendum format for an annual tax
- A censored regression model

Wetland functions noted
- Value of wetland habitat for migratory waterfowl.
- Although it is possible that respondents considered other wetland benefits, the question explicitly only the habitat value.

Data
- the summer of 1996
- Response rate : 46% (1, 070 sample)
- WTP of household: Median; $21.05 and 4.17 respectively (p. 260)
- The household # of NB in 1990 census: 602, 363 (US. Dept. of Commerce, 1992). (p. 12 of Poor 1997 - presented paper)
- Total WTP is estimated at $12.7 million

Results
- Value per acre calculated as $12.7 M/41, 995 = $302.42/acre
- Note that median was substantially lower

Interpretation
- While the analysis looks thorough, there appeared to be some problems in the econometrics. There are substantial “tail” problems seen in the fact that over 10 percent of the sample accepted the highest bid considered. This led to a substantial difference between the mean and the median WTP.

Source	Shabman, L.A. & Batie (1987)
State	LA
Total Value	47273355
Nominal $/acre	871.8
Used acres	54225
Total acres	47975
Marginal acres	
coastal	1
Year	1984
CPI	0.795
SW	1
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	1
Single	0
BirdHunt	1
BirdWatch	1
Storm	1
Amenity	1
Habitat	1
Data	2
Theory	1
Metrics	2
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Shabman, L.A. & S.S. Batie , 1987 "Mitigating Damages from Coastal Wetland", *Marine Resource Economics* 4 : 227-248

Site
- Louisiana Coastal Marsh
- 19, 000 acres created since 1970 until 1984
- During the future 50 years, a new wetland of 54, 225 acreage is assumed (p 241)

Methods
- The replacement cost of wetlands construction and rehabilitation as a basis for setting damages

Wetland functions noted
- All functions of wetlands will be considered because of new wetlands

Data
- The cost of constructing new wetlands by three different technologies of construction
- 50 years, 10% discount rate.

Results (p. 242-6, Table1-6)
- The Dredged Material : 33, 306 acres and $443.7-$997.32/acre, mean $ 720.51
- The 25, 000 CFS controlled sediment diversions: 15, 680acres and $1077.1-$1850.5/acre, mean $1463.8
- The uncontrolled sediment diversions: 5, 245acres and $265.5-$596.8/acre.mean $431.14
- Total: 54, 225acres and $871.8/acre.

Interpretation
- Projects attempted to "duplicate, in some sense, the natural processes that have continued for eons -- with sediment laden rivers providing the material for wetlands creation." Hence, we assume that the values reflect a desire to obtain the full suite of benefits of coastal wetlands, only excluding water quality and water quantity, which are more characteristic of inland wetlands.
- While replacement cost method is lacking when hypothetical costs are used, in this case actual expenditures were used so theoretical validity was upgraded to 2.

- Source: U.S. Army Corps of Engineers, 1984,

Source	Stevens et al. (1995)
State	New England
Total Value	
Nominal $/acre	
Used acres	
Total acres	
Marginal acres	
coastal	
Year	1993
CPI	
SW	
flood	1
Quality	1
Quantity	1
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Stevens, T.H., S. Benin, and J.S. Larson. 1995."Public attitudes and economic values for wetland preservation in New England, " Wetlands 15:226-231.

Site
- New England
- Four type wetlands for 1) flood protection, water supply, water pollution, 2) rare species of plant for ecosystem stability and genetic diversity, 3) recreation such as hunting, fishing, swimming, boating etc, 4) food for shellfish.

Methods
- CVM, total economic value of wetland preservation
- Mail survey of 2, 510 sample in 1993
- Partition into 5 groups

Wetland functions noted
- flood protection, water supply, water pollution , ii) rare species of plant for ecosystem stability and genetic diversity, iii) recreation such as hunting, fishing, , swimming, boating etc. , iv) food for shellfish

Data
- 34% response rate, median age: 44 years, 43% graduating college.
- Total population in New England: 9.6 million

Results
- WTP for type 1: $74 - 80/year, person. Type 2: $81-96/year, person. Total average: $114 - 114.6/year, person. (p. 230, Table 1)
- When zero dollar is assumed to non-respondents, aggregated value type1 : $242-261 million, type 2 :$264 - 313 million (p. 230, left 2nd paragraph)

Interpretation
- For the value per acre, the total wetland size in New England is needed.

Source	Thibodeau, Ostro (1981)
State	MA
Total Value	17070000
Nominal $/acre	2000
Used acres	8535
Total acres	8535
Marginal acres	
coastal	0
year	1976
CPI	0.436
SW	0
flood	1
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	2
Metrics	1
Stats	1
Publish	1
CS	1
PS	0
TotRev	0

Thibodeau, F.R. and B.D. Ostro. 1981. "An Economic Analysis of Wetland Protection." *Journal of Environmental Management.* 12:19-30.
Study 1

Site
- Charles River basin, Suffolk, Norfolk and Middlesex Counties, Massachusetts.
- 8, 535 acres of marsh and wooden swamp (p. 20, 2.study area)
- Fresh water wetlands
- Near to the Boston city

Methods
- as the cost of the property damage

Wetland functions noted
- Flood Control

Data
- The corps of Engineers (1976)
- expected annual flood damage on the loss of wetlands: nearly $18 million

Results
- about $2, 000/acre (p. 22 2nd paragraph)

Source	Thibodeau, Ostro (1981)
State	MA
Total Value	1280250
Nominal $/acre	150
Used acres	8535
Total acres	8535
Marginal acres	
coastal	0
year	1970
CPI	0.297
SW	0
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	1
Habitat	0
Data	2
Theory	2
Metrics	2
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Thibodeau, F.R. and B.D. Ostro. 1981. "An Economic Analysis of Wetland Protection." *Journal of Environmental Management.* 12:19-30.
Study 2

Site
- Charles River basin, Wellesley, Natick and Needham Counties, Massachusetts.
- 8, 535 acres of marsh and wooden swamp (p. 20)
- Fresh water wetlands
- Near to the Boston city

Methods
- a survey of local property appraisers and a multivariate regression analysis
- hedonic Pricing
- Wetland functions noted
- the increase in property values to those abutting the open space

Data
- The U.S. Geological Survey Maps for Property
- 1970 Block Data for Boston SMSA (?) provided by the U.S. Census bureau
- 62 census blocks analyzed, only 3 block away from the wetlands
- the total increment to property values : $1, 305, 000 (p. 23 6th paragraph)

Results
- about $150/acre (p. 23 6th paragraph)

Interpretation
- They estimated the hedonic function on p. 23.

Source	Thibodeau, Ostro (1981)
State	MA
Total Value	13314600
Nominal $/acre	1560
Used acres	8535
Total acres	8535
Marginal acres	
coastal	0
year	1970
CPI	0.297
SW	0
flood	0
Quality	1
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	2
Theory	1
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Thibodeau, F.R. and B.D. Ostro. 1981. "An Economic Analysis of Wetland Protection." *Journal of Environmental Management.* 12:19-30.
Study 3

Site
- Charles River basin, Wellesley, Natick and Needham Counties, Massachusetts.
- 8, 535 acres of marsh and wooden swamp
- Fresh water wetlands
- Near to the Boston city

Methods
- as the construction cost of adding tertiary treatment to an existing plant.

Wetland functions noted
- Pollution reduction

Data
- EPA 1977
- The environmental consulting firm, IEP study: Great Meadow wetland in Lexington, MA., Nutrient removal per acre per day from 48 acres
- EPA (1978)

Results
- plant costs of $85/acre, and annual operation and maintenance cost $1, 475/acre (p. 240.) : totals $1, 560/acre= $1, 475+$85)

Interpretation
- Anderson and Rockel comment "method does not consider the demand for wetland services or people's behavior in the absence of those water supply services."

Source	Thibodeau, Ostro (1981)
State	MA
Total Value	
Nominal $/acre	6044
Used acres	8, 535
Total acres	8, 535
Marginal acres	
coastal	
year	1970
CPI	
SW	
flood	0
Quality	0
Quantity	1
RecFish	0
ComFish	0
Single	0
BirdHunt	0
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Thibodeau, F.R. and B.D. Ostro. 1981. "An Economic Analysis of Wetland Protection." *Journal of Environmental Management.* 12:19-30.
Study 4

Site
- Charles River basin, Wellesley, Natick and Needham Counties, Massachusetts.
- 8, 535 acres of marsh and wooden swamp
- Fresh water wetlands
- Near to the Boston city

Methods
- as the difference between the cost of wetland wells and the cost of providing water from the next best source-Metropolitan District Commission (MDC).

Wetland functions noted
- water supply

Data
- Cederstrom (1970). the average cost of obtaining well water in the North Atlantic states is $0.0744/1000gal/day
- Gupta (1973) :average supply 1, 000, 000 gal /day per 10 acres, so 100, 000 gal/day at the cost $7.44/acre
- the cost at MDC is $24
- so the difference is 16.56 per day .

Results
- $6, 044/acre/year. (p. 25, 2nd paragraph)
- Value appears to be simply reinterpretation of other data in the sample. Not included in analysis.

Source	Thibodeau, Ostro (1981)
State	MA
Total Value	861096.2
Nominal $/acre	100.89
Used acres	8535
Total acres	8535
Marginal acres	
coastal	0
year	1970
CPI	0.297
SW	0
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	1
Theory	2
Metrics	9
Stats	9
Publish	1
CS	1
PS	0
TotRev	0

Thibodeau, F.R. and B.D. Ostro. 1981. "An Economic Analysis of Wetland Protection." *Journal of Environmental Management.* 12:19-30.
Study 5

Site
- Charles River basin, Wellesley, Natick and Needham Counties, Massachusetts.
- 8, 535 acres of marsh and wooden swamp
- Fresh water wetlands
- Near to the Boston city

Methods
- calculating the opportunity cost and the consumer surplus. (CVM)

Wetland functions noted
- recreational benefits

Data
- -the Division of Ecological Services of U.S. Fish and Wildlife Service (USFWS): the amount of recreational activities in the same area (Evans, 1976)
- USFWS (1977): national data for the cost and consumer surplus associated with wildlife related data.

Results
- (CS calculated from p. 25, Table 3 by as A·D/E). The WTP values are taken from a national database, not site specific.)
- This accommodates Anderson and Rockel's criticism that total value, not surplus is measured.
- Small game hunting $17.68/acre.
- Waterfowl hunting $15.35/acre.
- Fishing: $11.63/acre
- Nature study: $ 56.23/acre
- Total; $100.89
- Interpretation
- originally the total recreational value= (expenditure consumer surplus)/per acre. year.
- Above the results is re-calculated excluding expenditure , that is only with consumer surplus.
- small game hunting and waterfowl hunting are considered as the bird hunting, and nature study as the bird watching. (???)

Source	Van Kooten (1993)
State	Canada
Total Value	
Nominal $/acre	
Used acres	312
Total acres	312
Marginal acres	
coastal	
year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Van Kooten, G.C. "Preservation of Waterfowl Habitat in Western Canada: Is the North American Waterfowl Management Plan a Success?" Natural Resources Journal 33 (3):759-776. 1993.

Site
- Wetland conservation on private agricultural land in the pothole region of western Canada,
- The rural Municipal (RM) of Antler in southeastern Saskatchewan. 312 sq. mil (p. 768)

Methods
- Social cost-benefit analysis (CBA)

Wetland functions noted
- Migratory waterfowl, recreational source, hunting,
- Bird watching, and existence value

Data
- Baseline waterfowl population and wetland densities for 1987 were completed for both the 312 square miles Antler RM and 120 square miles Walpole RM adjacent to it
- 5 year study (1986 - 1990) (p. 768)
- 6% discount rate, 10-year life

Interpretation
- Comparison between agricultural support and wetland reduction w.r.t. MAWMP.

Source	Van Vuuren, Roy (1993)
State	Canada
Total Value	
Nominal $/acre	107.4
Used acres	1, 161
Total acres	1, 161
Marginal acres	
coastal	
Year	1985
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	0
ComFish	0
Single	0
BirdHunt	1
BirdWatch	0
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Van Vuuren, W., and P. Roy. 1993. "Private and Social Returns from Wetland Preservation versus Those from Wetland Conversion to Agriculture, " Ecological Economics 8 (1993): 289-305.
Study 1

Site
- Marshes on the east share of Lake St. Claire in Southwestern Ontario, Canada
- Fresh water
- diked and undiked marshes, 470 ha= (20ha + 150ha+ 300ha) = 1, 161 acres.

Methods
- TCM

Wetland functions noted
- Bird Hunting
- Angling
- Trapping

Data
- 1985 data
- 605 consumer surplus of hunters and anglers would be lost in the vicinity of the marshes
- 4% discount, 50 years for social benefits

Results
- (Only social benefits)
- enclosed marsh diked: 20ha : $131.27/acre
- enclosed marsh diked: 150ha: $113.54/acre
- -Undiked open marsh : 300ha:$83.55/acre
- from p. 299, table 2, using Exel's PMT function

Source	Whitehead (1990)
State	KY
Total Value	4350000
Nominal $/acre	870
Used acres	5000
Total acres	5000
Marginal acres	
coastal	0
year	1989
CPI	0.949
SW	0
flood	1
Quality	1
Quantity	1
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
amenity	0
Habitat	1
Data	3
Theory	3
Metrics	3
Stats	2
Publish	1
CS	1
PS	0
TotRev	0

Whitehead, John C. 1990. "Measuring WTP for Wetlands Preservation with the Contingent valuation method." *wetlands* 10 (2):187-201.

Site
- 5, 000 acres, Preservation of the Clear Creek wetland in Kentucky, faced with surface coal mining activities (p. 191, Survey Design)
- Bottomland hardwood forest wetland
- Freshwater

Methods
- CVM, household mailing, dichotomous choice questions.
- Logistic error model of linear and log-linear functional forms
- Groups within the sample received information about different substitutes for the wetland.
- Independent variables include substitute wetland, knowledge and use of wetland and socioeconomic characteristics

Wetland functions noted
- Flood and erosion control
- Water quality enhancement
- Ground water recharge
- Outdoor recreational such as hunting and nature observation
- A summer nesting habitat for wood ducks and a winter habitat for mallard ducks and Canada geese
- The other potential uses such as coal mining, agricultural production, and residential, urban, highway development are mentioned.

Data
- Sample was selected randomly from the Kentucky population during the summer at 1989
- Response rate of 31 %
- Sample size 214 yielding 418 observations due to multiple questions on each survey.
- Mean education:14 years, mean income: $32, 500

Results
- Linear Function: Mean WTP : $12.67 (p. 196)
- Log-linear Function : Mean WTP : $6.31 (p. 196)
- Total value for Kentucky population (1.5 million) : $19.05 M & $9.48 M respectively. (p. 198)
- When the no response's WTP is assumed as $0 for more conservative estimates, the aggregate value is $2.94~5.91 million. (p. 198)
- So the value per acre is $1, 896-$3, 810 and $588-$1, 182 depending on the function form. (p. 198), mean= (588+1182)/2=$870.

Interpretation
- Value from the log-linear specification were used for analysis

Source	Whitehead (1992)
State	KY
Total Value	
Nominal $/acre	
Used acres	
Total acres	
Marginal acres	
coastal	
Year	1990
CPI	
SW	
flood	0
Quality	0
Quantity	0
RecFish	1
ComFish	0
Single	0
BirdHunt	1
BirdWatch	1
Storm	0
Amenity	0
Habitat	0
Data	0
Theory	0
Metrics	0
Stats	0
Publish	0
CS	0
PS	0
TotRev	0

Whitehead, J.C. 1992. "Measuring Use Value from Recreation Participants, " Southern Journal of Agricultural Economics 24 (2):113-119, Dec.

Site
- Western Kentucky coalfield along the lower Ohio River, faced with surface coal mining activities
- Three county recreation regions: wildlife areas, recreation areas, waterfowl refugees
- Freshwater

Methods
- CVM, household mailing.
- Logistic model

Wetland functions noted
- Use value of outdoor recreation participation.
- Outdoor recreational such as fishing, hunting , and nature observation

Data
- 730 households were selected randomly from the Kentucky population during the spring at 1990
- Response rate:67%.
- 447 observations.
- Mean education:12.6 years, mean age: 49 years old.

Results
- Mean WTP : $5.16, median:$1.88, range ($0.12 - 25.64) (p. 118 Table 4)
- Use value per season:$23.89, forecast participants: 14, 700 persons (p. 117)
- Aggregate use value: $351, 183 (p. 118, Table 4)

Interpretation
- For the value per acre, need the total acres of the site.