

Appendix I—Valuation Studies Summary

Thirty-three studies from the literature on wetland valuation were reviewed and classified according to the wetland function, goods or services provided, and economic value represented (appendix table 1).

Where possible, estimates of mean willingness to pay, any statistical or other range in willingness to pay values, and values per acre of wetlands were recorded.

In many cases, this process involved estimating the total value placed on wetlands for that function or ser-

vice and dividing by the number of acres of wetlands recorded in the study or estimated from other sources. All estimates were standardized using a 6-percent discount rate and a 50-year accounting period. Estimates in foreign currencies were converted to U.S. nominal dollar equivalents using appropriate exchange rates. Nominal dollar values were adjusted to 1992 constant dollar terms using the Gross Domestic Product implicit price deflator for the year to which the information in the study related.

Appendix table 1—Illustrative wetland functions and estimated values

Wetland function	Good or service	Economic value	Willingness to pay				Real value per acre ¹			Location and wetland type	Year	Deflator	Source
			Dollars/respondent/year				1992 dollars/acre						
			Mean	Low	High	Interval	Mean	Low	High				
Marketed goods													
Shellfish life support	Blue crabs	VAMP ²	na	na	na	na	\$7	na	na	Florida, Gulf coastal wetlands	1981	1.517	Lynne, and others, 1981
Shellfish life support	Blue crabs	Change in surplus	na	na	na	na	\$22	\$16	\$30	Florida, Gulf coastal wetlands	1986	1.241	Fischer, and others, 1986
Fish/shellfish life support	Fish/shellfish	VAMP ²	na	na	na	na	\$547	na	na	Louisiana, coastal wetlands	1983	1.368	Farber and Costanza, 1987
Fish/shellfish life support	Fish/shellfish	VAMP ²	na	na	na	na	\$702	\$651	\$702	Louisiana, coastal wetlands	1990	1.068	Farber, 1995
Shellfish life support	Oysters	VAMP ²	na	na	na	na	\$1,205	\$35	\$4,372	Virginia, coastal wetlands	1978	1.961	Batie and Wilson, 1979
Fish/shellfish life support	Fish/shellfish	VAMP ²	na	na	na	na	\$1,259	na	na	Florida, Gulf coastal wetlands	1976	2.242	Bell, 1989
Fish life support	Fish	VAMP ²	na	na	na	na	\$1,390	\$696	\$2,783	Lake St. Clair, Michigan	1986	1.241	Amacher, and others, 1989
Fish life support	Fish	Fish harvest	na	na	na	na	\$43,928	na	na	Morton Bay, Queensland, Australia	1990	1.068	Morton, 1990
Marketed goods-fish/shellfish life support (number, mean, median)						8	\$6,132	\$702					
Furs	Fur trapping	Fur harvest	na	na	na	na	\$13	na	na	United States	1975	2.370	Chabreck, 1979
Furs	Fur trapping	VAMP ²	na	na	na	na	\$261	na	na	Louisiana, coastal wetlands	1983	1.368	Farber and Costanza, 1987
Marketed goods-furs (number, mean, median)						2	\$137	na					
Human life support	Crops, fuelwood, fishing	VAMP ²	na	na	na	na	\$99	na	na	Nigeria, floodplain wetlands	1989	1.115	Barbier, 1994
Nonmarketed goods													
Fish and wildlife habitat-nonuser values													
General	Habitat	WTP ³	\$21	\$16	\$29	95%	\$115	\$88	\$154	Caithness flow, Scotland, forested peats	1991	1.028	Hanley and Craig, 1991
General	Habitat	WTP ³	\$114	na	na	na	\$1,155	na	na	New England	1995	0.929	Stevens, and others, 1995
General	Habitat	WTP ³	na	\$175	\$298	model	\$1,248	\$865	\$1,632	Alberta, Canada	1993	0.975	Phillips, and others, 1993
General	Habitat	WTP ³	\$24	\$10	\$39	95%	\$2,850	\$1,165	\$4,536	Nebraska, Rainwater Basin	1996	0.929	Poor, 1997
General	Habitat	WTP ³	\$127	\$64	\$190	95%	\$14,916	\$7,487	\$22,345	Nebraska, Rainwater Basin	1996	0.929	Poor, 1997
General	Habitat	WTP ³	\$3	\$2	\$5	95%	\$15,956	\$10,079	\$21,857	Austria Donau-Auen Danube, riparian wetlands	1993	0.975	Kosz, 1996
General	Habitat	WTP ³	\$11	\$7	\$14	95%	\$49,850	\$31,489	\$68,286	Austria Donau-Auen Danube, riparian wetlands	1993	0.975	Kosz, 1996
General	Recreation	WTP ³	\$11	\$5	\$17	na	\$52,848	\$24,679	\$80,532	Western Kentucky	1989	1.115	Whitehead and Blomquist, 1991

See notes at end of table.

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Appendix table 1—Illustrative wetland functions and estimated values—Continued

Wetland function	Good or service	Economic value	Willingness to pay				Real value per acre ¹			Location and wetland type	Year	Deflator	Source
			Dollars/respondent/year				1992 dollars/acre						
			Mean	Low	High	Interval	Mean	Low	High				
General	Habitat	WTP ³	\$14	\$9	\$20	95%	\$68,055	\$42,989	\$93,223	Austria Donau-Auen Danube, riparian wetlands	1993	0.975	Kosz, 1996
General	Habitat	WTP ³	\$28	\$18	\$39	95%	\$133,860	\$84,558	\$183,366	Austria Donau-Auen Danube, riparian wetlands	1993	0.975	Kosz, 1996
General	Habitat	WTP ³	\$152	\$123	\$188	90%	\$309,511	\$250,459	\$382,816	San Joaquin Valley, California	1989	1.115	Hannemann, and others, 1990; Loomis, and others, 1990
General	Habitat	WTP ³	\$251	\$235	\$268	90%	\$347,548	\$325,394	\$371,087	San Joaquin Valley, California	1989	1.115	Hannemann, and others, 1990; Loomis, and others, 1990
Nonmarketed-fish and wildlife-nonuser-general (number, mean, median)						12	\$83,159	\$32,903					
Nonmarketed-fish and wildlife-user values													
General	Habitat	WTP ³	\$103	na	na	na	\$105	na	na	Louisiana, coastal wetlands	1983	1.368	Farber and Costanza, 1987
General	Various values	Rep ⁴ /Dam ⁵	na	na	na	na	\$286	\$93	\$479	North Dakota, prairie potholes	1993	0.975	Leitch and Hovde, 1996
General	User/owner values	Rep ⁴ /Dam ⁵	na	na	na	na	\$591	\$168	\$1,013	North Dakota, prairie potholes	1993	0.975	Leitch and Hovde, 1996
General	Habitat	WTP ³	na	\$174	\$201	model	\$655	\$302	\$1,008	Alberta, Canada	1993	0.975	Phillips, and others, 1993
General	Habitat	WTP ³	na	\$5	\$7	na	\$3,578	\$3,067	\$4,089	Austria Donau-Auen Danube, riparian wetlands	1993	0.975	Kosz, 1996
General	Various values	MVP, ⁶ WTP, ³ Rep ⁴	na	na	na	na	\$9,859	\$9,142	\$9,859	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Nonmarketed-fish and wildlife-user-general (number, mean, median)						6	\$2,512	\$623					
Freshwater fishing	Fishing	WTP ³	decrease	\$15	na	1986\$	\$95	na	na	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Saltwater fishing	Fishing	WTP ³	decrease	\$56	na	1986\$	\$356	na	na	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Fishing	Fishing	TC ⁷	na	na	na	na	\$273	\$224	\$323	Lake St. Clair, Michigan	1986	1.241	Amacher, and others, 1989
Fishing	Fishing	UDV ⁸	na	\$257	\$353	na	\$362	\$280	\$444	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981

See notes at end of table.

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Appendix table 1—Illustrative wetland functions and estimated values—Continued

Wetland function	Good or service	Economic value	Willingness to pay				Real value per acre ¹			Location and wetland type	Year	Deflator	Source
			Dollars/respondent/year				1992 dollars/acre						
			Mean	Low	High	Interval	Mean	Low	High				
Fishing	Fishing	WTP ³	\$47	na	na	na	\$942	na	na	Lake St. Clair, Canada	1985	1.276	van Vuuren and Roy, 1993
Fishing	Fishing	WTP ³	na	na	na	na	\$15,126	\$3,725	\$26,528	Florida, coastal wetlands	1976	2.242	Bell, 1989
Fishing	Fishing	WTP ³	na	na	na	na	\$28,845	\$14,413	\$43,257	Lake St. Clair, Michigan	1986	1.241	Amacher, and others
Nonmarketed-fish and wildlife-user-fishing (number, mean, median)						7	\$6,571	\$362					
Waterfowl hunting	Hunting	UDV ⁸ per bird, drought	na	\$0	\$2 pair/brood		\$18	\$7	\$28	Saskatchewan, Canada	1993	0.975	Van Cooten, 1993
Trapping	Trapping	WTP ³	\$5	na	na	na	\$108	na	na	Lake St. Clair, Canada	1985	1.276	van Vuuren and Roy, 1993
Waterfowl hunting	Hunting	WTP ³ decrease	\$25	na	1986\$		\$156	\$145	\$156	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Waterfowl hunting	Hunting	UDV ⁸ per bird, nondrought	na	\$11	\$16 pair/brood		\$209	\$173	\$246	Saskatchewan, Canada	1993	0.975	Van Cooten, 1993
Waterfowl hunting	Public hunting	WTP ³	\$11	na	na	na	\$215	na	na	Lake St. Clair, Canada	1985	1.276	van Vuuren and Roy, 1993
Hunting and fishing	Hunting	WTP ³	na	\$262	\$265	model	\$1,031	\$542	\$1,519	Alberta, Canada	1993	0.975	Phillips, and others, 1993
Waterfowl hunting	Hunting	UDV ⁸	\$575	na	na	na	\$1,060	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Small game hunting	Hunting	UDV ⁸	\$316	na	na	na	\$1,066	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Waterfowl hunting	Hunting clubs	WTP ³	\$97	\$21	\$115	size	\$1,960	\$414	\$2,316	Lake St. Clair, Canada	1985	1.276	van Vuuren and Roy, 1993
Hunting, fishing, and trapping	Hunting/fishing	WTP ³	\$114	\$84	\$131	size	\$2,283	\$1,680	\$2,639	Lake St. Clair, Canada	1985	1.276	van Vuuren and Roy, 1993
Waterfowl hunting	Hunting	Hunting experience/existence value	na	na	na	na	\$3,101	\$2,190	\$4,013	Massachusetts, marshes	1970	3.268	Gupta and Foster, 1975
Nonmarketed-fish and wildlife-user-hunting (number, mean, median)						11	\$1,019	\$1,031					
Recreation	Recreation	WTP ³ , TC ⁷	na	na	na	na	\$91	\$40	\$129	Louisiana, coastal wetlands	1983	1.368	Farber and Costanza, 1987
Recreation	Recreation	WTP ³	\$24	\$19	\$29	95%	\$115	\$90	\$140	Western Kentucky	1990	1.068	Whitehead, 1992
Birds	Habitat	WTP ³	\$43	\$29	\$61	95%	\$131	\$86	\$183	Caithness flow Scotland, forested peats	1991	1.028	Hanley and Craig, 1991

See notes at end of table.

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Appendix table 1—Illustrative wetland functions and estimated values—Continued

Wetland function	Good or service	Economic value	Willingness to pay				Real value per acre ¹			Location and wetland type	Year	Deflator	Source
			Dollars/respondent/year				1992 dollars/acre						
			Mean	Low	High	Interval	Mean	Low	High				
Recreation	Recreation	WTP ³	\$360	na	na	na	\$160	na	na	Louisiana delta, 7 parishes	1987	1.203	Bergstrom, and others, 1990
Recreation	Recreation	WTP ³	\$323	na	na	na	\$327	na	na	Louisiana, coastal wetlands	1983	1.368	Farber and Costanza, 1987
Recreation	Coastal recreation, total	WTP ³	decrease	\$96	na	1986\$	\$607	\$563	\$607	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Nature study	Recreation	UDV ⁸	\$316	na	na	na	\$3,393	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Recreation	Recreation	WTP ³	\$37	\$31	\$42	wq improvements	\$4,287	\$2,428	\$5,501	Cornbelt, riparian wetlands	1987	1.203	Lant and Roberts, 1990
Nonmarketed-fish and wildlife-user-recreation (number, mean, median)						8	\$1,139	\$244					
Nonmarketed-ecological functions													
Wastewater treatment	Nutrient filtering/retention	Rep ⁴	na	na	na	na	\$1	\$0.46	\$1	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Life support-Biologic	Various functions	Rep ⁴	na	na	na	na	\$2	\$2	\$2	Sweden, freshwater wetlands	1989	1.115	Folke, 1991
Life support-Hydrologic	Various functions	Rep ⁴	na	na	na	na	\$6	\$1	\$11	Sweden, freshwater wetlands	1989	1.115	Folke, 1991
Storm protection	Storm damage	Dam ⁵	na	na	na	na	\$17	\$15	\$19	Louisiana, coastal wetlands	1980	1.656	Farber, 1987
Life support-Biogeochemical	Various functions	Rep ⁴	na	na	na	na	\$20	\$14	\$27	Sweden, freshwater wetlands	1989	1.115	Folke, 1991
Aquifer recharge	Water supply	Rep ⁴	na	na	na	na	\$37	\$34	\$37	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Storm protection	Storm damage	Rep ⁴	na	na	na	na	\$74	\$72	\$77	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Life support-Total	Various functions	Rep ⁴	na	na	na	na	\$1,659	\$882	\$2,435	Sweden, freshwater wetlands	1989	1.115	Folke, 1991
Water quality improvement	Riparian filtering	WTP ³	\$43	\$38	\$47	wq improvements	\$2,428	\$835	\$5,671	Cornbelt, riparian wetlands, outer 10 meters	1987	1.203	Lant and Roberts, 1990
Flood control	Short-term flood storage	Dam ⁵	na	na	na	na	\$3,916	na	na	Massachusetts, riverine wetlands	1971	3.106	USACE, 1971
Water quality improvement	Riparian filtering	WTP ³	\$43	\$38	\$47	wq improvements	\$5,501	\$1,688	\$13,694	Cornbelt, riparian wetlands,	1987	1.203	Lant and Roberts, 1990
Property buffering	Property protection	Reduced service flows	na	na	na	na	\$8,435	\$7,822	\$8,435	Louisiana, coastal wetlands	1990	1.068	Farber, 1996
Waste assimilation	Nutrient filtering/retention	Rep ⁴	na	na	na	na	\$51,874	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Flood control	Short-term flood storage	Dam ⁵	na	na	na	na	\$66,233	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981

See notes at end of table.

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Appendix table 1—Illustrative wetland functions and estimated values—Continued

Wetland function	Good or service	Economic value	Willingness to pay				Real value per acre ¹			Location and wetland type	Year	Deflator	Source
			Dollars/respondent/year				1992 dollars/acre						
			Mean	Low	High	Interval	Mean	Low	High				
Nitrogen assimilation	Nutrient filtering/retention	Rep ⁴	\$4,044	\$2,696	\$6,269	na	\$68,091	\$45,394	\$105,568	Gotland, Sweden	1990	1.068	Gren, 1995
Water supply	Water quantity and quality	Rep ⁴	na	na	na	na	\$137,247	na	na	Massachusetts, marshes	1970	3.268	Gupta and Foster, 1975
Water supply	Water quantity and quality	Rep ⁴	na	na	na	na	\$200,994	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Nonmarketed-ecological functions (number, mean, median)						17	\$32,149	\$2,428					
Nonmarketed-amenity/cultural functions													
Visual amenity	Scenic/open space	MHV ⁹	na	na	na	na	\$83	\$26	\$109	Lake St. Clair, Michigan	1986	1.241	Amacher, and others, 1989
Visual amenity	Scenic/open space	MHV ⁹	na	na	na	na	\$323	na	na	Massachusetts, riverine wetlands	1977	2.110	Thibodeau and Ostro, 1981
Visual amenity	Scenic/open space	MHV ⁹	na	na	na	na	\$573	(\$886)	\$2,306	Ramsey County, Minnesota	1990	1.068	Doss and Taff, 1993, 1996
Visual/cultural	Scenic/cultural	WTP ³	na	\$3,684	\$5,769	na	\$9,910	\$4,500	\$15,320	Massachusetts, marshes	1970	3.268	Gupta and Foster, 1975
Recreation and amenity	Scenic/recreation	WTP ³	\$119	\$105	\$132	95%	na	na	na	Broadland fens, U.K.	1991	1.028	Bateman, and others, 1995
Recreation and amenity	Scenic/recreation	WTP ³	\$152	\$140	\$142	95%	na	na	na	Broadland fens, U.K.	1991	1.028	Bateman, and others, 1995
Recreation and amenity	Scenic/recreation	WTP ³	\$248	\$133	\$462	95%	na	na	na	Broadland fens, U.K.	1991	1.028	Bateman, and others, 1995
Recreation and amenity	Scenic/recreation	WTP ³	\$22	na	na	na	na	na	na	Broadland fens, U.K.	1991	1.028	Gren, and others, 1994
Recreation and amenity	Scenic/recreation	WTP ³	\$7	na	na	na	na	na	na	Broadland fens, U.K.	1991	1.028	Gren, and others, 1994
Nonmarketed-amenity/cultural functions (number, mean, median)						4	\$2,722	\$448					

na = not available. ¹Published values standardized to 6-percent discount rate over a 50-year accounting period and converted to 1992 U.S. dollars. ²VAMP = Value of annual marginal product. ³WTP = Willingness to pay. ⁴REP = Replacement value. ⁵Dam = Damages avoided. ⁶MVP = Marginal value of production. ⁷TC = Travel cost. ⁸UDV = User day values. ⁹MHV = Marginal housing value.