
VALUATION OF HAY AND BAIT FISH HARVESTED FROM PRIVATELY-OWNED SOUTH DAKOTA WETLANDS

Charles R. Berry and Kenneth F. Higgins
U. S. Fish and Wildlife Service
S. D. Cooperative Fish and Wildlife Research Unit
South Dakota State University
Brookings, South Dakota 57007-1696

and

Gary Krull
South Dakota Agriculture Statistics Service
U. S. Department of Agriculture
Sioux Falls, SD 57117-5068

ABSTRACT

Questionnaires were sent in 1990 to eastern South Dakota farm operators to get information about wetland ownership and the amount of supplemental income derived from hay and bait fish produced in private wetlands. About 26% (n=1,454) of the questionnaires were returned; 1,282 were useful. Average farm size was about 1,034 acres; 54% of the farms had wetlands that averaged 5.8% (59 acres) of the farm. Approximately 37 wetland acres per farm produced an average of about 1.68 tons of wetland hay per acre. As a wetland product, hay represented a value of about \$50.40 per acre in 1988 and 1989. Of 705 landowners having wetlands, 18% had wetlands with fish; 30% harvested bait fish for personal use, and 3% harvested bait fish for sale. About 10% allowed bait harvest by others, but no one leased ponds for walleye production. Fish-related income was scant.

INTRODUCTION

Purposes of this study were to (1) collect information on supplemental income derived from livestock forage and bait fish and (2) determine wetland area on farms in eastern South Dakota.

Wetlands can have economic value for landowners by providing products such as timber, hay, water, bait fish, and furbearers (Hubbard, 1988). Income from these products could influence landowners' decisions about whether to retain or drain wetlands (Fortney et al., 1972). Also, data on the monetary value of wetland products are needed to determine the value of wetlands to society, as

well as for litigation concerning regulated activities (e.g. drainage) in wetlands (Mistch and Gosselink, 1986).

Reports on monetary values of wetland products have been reviewed for the Dakotas by Hubbard (1988) and Kantrud et al. (1989). Hunting wetland animals generated about \$60 million per year in the Dakotas in the 1970s (Hubbard, 1988). Wetlands were valued at about \$1,920 per acre for waterfowl hunting alone in 1982 (Johnson and Linder, 1986). Furbearer harvest was worth \$1 - 3 million per year in the 1980s (Kantrud et al., 1989). In Minnesota, bait species (i.e. minnows, leeches, crawfish) harvested from wetlands were valued at about \$16 million/year in 1978 (Peterson and Hennagir, 1980). Fathead minnows (*Pimephales promelas*) were worth up to \$1,000/acre in 1988 in South Dakota depending on wetland type (Carlson and Berry, 1990). While these general values are substantial, there is little information on alternative farm income derived from wetland products.

METHODS

We surveyed landowners living east of the Missouri River in South Dakota using procedures normally used by the South Dakota Agricultural Statistics Service. A questionnaire (Table 1) was pretested, adjusted, and mailed once to a 19% random sample of 27,463 farmers (USDA, 1991). The survey was mailed in winter 1990, and covered haying practices in 1988 and 1989, two drought years.

A wetland was defined as an area that was covered with water for at least 10 days in a year. Wetland hay does not include prairie hay or seeded forage hays such as alfalfa (*Medicago*), sweet clovers (*Melilotus*), and brome (*Bromus*) or wheat grasses (*Agropyron*).

Data were compiled in a Lotus data base, edited with the EDIT program, and summarized with the DESCRIPTIVE program (SAS Institute, 1988). Weighted means were used when combining data for 1988 and 1989.

RESULTS

Completed questionnaires were received from 1,454 respondents, but only 1,282 were usable, which represented a 26% (4,952 sent/1,282 returned) return. Some questions were unanswered by some respondents, so total responses for individual questions did not equal the total number of questionnaires returned.

Average farm size was 1,034 acres; about 54% (705 responses/1,282 questionnaires) of the farms had wetlands, that averaged 59 acres (n = 705, SD = 93) or about 5.7% of a farm. Forty-six percent of the respondents had no wetlands.

Table 1. Facsimile of a questionnaire used to determine supplemental farm income from wetland hay and bait fish species.

Wetland hay

1. What is the total acreage in your farming and/or ranching operation, including rented land?
2. Have you purchased wetland hay from any other operator during the last 5 years? If yes, what was the average cost per ton. Did you feed it to livestock?
3. Are there any wetlands on the farm you operate? If yes, what is the total acres of wetlands?
4. Did you cut hay on any wetlands on the farm land you operate during the last 5 years? If yes, did you feed it to livestock? If no, were any of the wetlands grazed?
5. What was the total acreage cut for hay? What was acreage for alfalfa/grass mixtures? For other upland forages? For wetland or slough hay?
6. How many tons of wetland hay were cut? How many tons fed? On hand? Sold? What was the price received?
7. How many tons of wetland hay do you have remaining on hand today? How many tons do you plan to feed? Sell?
8. What is the average value per ton of wetland hay whether sold or fed?

Bait fish

9. Do you have minnows or fish in any wetlands on your farm property? If yes, do you personally harvest any for your own use as bait? For sale? What is your estimated 1989 value of direct sales?
10. Do you allow bait dealers to harvest minnows, salamanders, or leeches from your wetlands? If yes, what is your total 1989 income from bait dealers?
11. Do you lease wetlands to private groups for raising walleye or other game fish for stocking or market? If yes, what is your 1989 income from these leases?
12. Additional comments?

Wetland hay value

When asked if they purchased wetland hay, 131 respondents said they did, but only 61 reported a purchase price (mean = \$31.50/ton, SD = \$17.24). Wetland hay was cut by 417 landowners in the last 5 years; most (n = 397) respondents reported feeding this hay to livestock. Grazing of wetlands was practiced by 210 landowners.

In 1988 and 1989, an average of about 37 acres of wetlands and 193 acres of uplands per farm was cut for hay (Table 2). Wetlands yielded about 1.68 tons/acre. When asked about their use of wetland hay in 1988 and 1989, most reported that wetland hay was either fed (76% of harvest) or kept in reserve. Nearly 3 dozen respondents reported selling wetland hay for \$35 - 39/ton (Table 2).

Table 2. Number (n) of responses to individual questions from 1,282 eastern South Dakota landowners about haying practices, and tons, value, and acres [Mean (standard deviation)] of wetland hay by various uses per farm in 1988 and 1989.

Question	1988		1989	
	n	x (SD)	n	x (SD)
How many acres were cut of...				
Tame seeded hay	532	100 (102)	529	103 (106)
Wild upland hay	430	91 (133)	432	94 (140)
Wetland hay	373	37 (46)	375	38 (44)
How many tons of wetland hay were...				
Harvested	350	58 (95)	354	66 (105)
Fed to livestock	317	52 (90)	283	42 (67)
On hand (winter 1990)	65	34 (55)	206	49 (74)
Sold	35	47 (81)	36	35 (29)
How many tons of wetland hay on hand in winter 1990 were...				
Yet to be fed	61	31 (56)	203	47 (73)
Yet to be sold	7	25 (16)	11	46 (58)
How many dollars/ton was hay worth...				
That was sold	35	\$35 (\$14)	33	\$39 (\$16)
That was on hand in winter 1990	310	\$30 (\$15)	329	\$29 (\$14)

When asked about value and planned use of wetland hay on hand in the winter of 1990, respondents reported that wetland hay on hand was worth about \$29/ton; most (89%) planned to feed the hay. Of this group, 61 respondents had hay left (mean = 31 tons) from the 1988 harvest; 203 had hay remaining (mean = 47 tons) from the 1989 harvest (Table 2).

Bait fish

Of the 705 landowners having wetlands, 18% or 128 believed that they had bait fish in their wetlands. Of these, about 30% harvested bait fish for personal use whereas only 3% harvested them for sale. About 10% allowed fish bait harvest by others. No farmers leased ponds for walleye (*Stizostedion vitreum*) production. Only two individuals reported income from bait fish sales.

About 17% of those responding in the open comments section of the survey indicated a desire for more information about bait fish harvesting. This need might be considered by agencies or universities when planning extension activities.

DISCUSSION

Almost half of the landowners in eastern South Dakota have no wetlands and are, perhaps, indifferent to many of the current wetland preservation controversies and programs. Those with wetlands are profiting from sales of wetland hay or are saving by not buying replacement hay during drought when upland hay is scarce.

Expanding these data to the population of 27,463 farms in eastern South Dakota yields summary information that is useful to various agencies dealing with wetland issues on private land. In eastern South Dakota there are about 14,830 landowners with wetlands. About 934,290 tons of wetland hay are cut from 556,125 wetland acres. At \$30/ton the average value of a wetland acre for hay production was about \$50.40 (\$30/ton x 1.68 tons/acre).

Our data on occurrence of wetlands and value of wetland hay generally agree with those of others. Fortney et al. (1972) found that 52% of South Dakota farmers had from 0 - 5% of the farm area in wetlands. Ogaard (1981) reported that the average price of wetland hay in North Dakota in 1980 was \$30 per ton, and estimated that the replacement value of wetland hay was about \$64 per acre, a figure close to our \$50.40 per acre for hay sold during 1988 and 1989. Of course, the value of all hay may change from year to year depending on weather conditions that affect availability and quality.

Our survey indicates the need to change the format of a national survey conducted by the Agriculture Statistics Division of the U. S.

Department of Agriculture. In their annual survey hay yield is estimated for either "non-tillable" upland hay or "planted" upland hay. We recommend that the non-tillable category be subdivided into upland and wetland categories.

Few landowners are profiting from bait fish in their wetlands, perhaps because few of them control large wetlands where water quality and quantity are suitable for bait fish production, or they are not fully aware of this possible means of supplemental income. Anglers in South Dakota spent about \$3 million for bait in 1985 (USFWS, 1988), so a substantial market exists. The bait fish industry in eastern South Dakota is comprised of hundreds of retail bait dealers and about a dozen wholesalers who primarily harvest wild fathead minnows (Gourneau and Hanten, 1987). Harvest sites are limited, and restrictions apply to many wetlands on state and Federal property; therefore, leasing private wetlands to bait dealers might be a way of deriving income from wetland bait fish.

Most wetlands are privately owned and landowner participation in wetlands conservation depends almost solely on economic gain and land market value considerations (NWPF, 1988; Leitch, 1983; Leitch and Nelson, 1985; Kantrud et al., 1989) rather than on those related to conservation of natural resources (Fortney et al., 1972; Shabman, 1986). Our data should increase awareness of often overlooked wetland products and should provide an appreciation of their economic values. Many methods have been proposed for placing a value on wetland goods and services, and all are controversial (Sather and Smith, 1984). Our data represents only a portion of the potential value of any one wetland for hay and bait fish production because the calculation depends in part on the amount of water for fish and wet meadow for hay. The whole value of a wetland to society involves many more kinds of wetland products and services.

ACKNOWLEDGEMENTS

Funding for the study was supplied, in part, by the Renewable Resources Extension Act (RREA) via the South Dakota State University, the S.D. Cooperative Fish and Wildlife Research Unit with South Dakota State University, S.D. Game, Fish, and Parks Department, U.S. Fish and Wildlife Service, and the Wildlife Management Institute, cooperating, and the Cooperative Extension Service. We greatly appreciate the cooperation of responding landowners.

REFERENCES

Carlson, B. and C. Berry. 1990. Population size and economic value of aquatic bait species in plaustrine wetlands of eastern South Dakota. *Prairie Naturalist* 22:119-128.

- Fortney, C. T., R. Dimit, D. Field, and H. Sauer. 1972. *Attitudes of South Dakota farm operators toward wetlands and waterfowl production*. Bulletin 592, Agricultural Experiment Station, South Dakota State University, Brookings.
- Gourneau, J., and R. L. Hanten. 1987. *South Dakota's bait fish harvest summary 1986*. S. D. Department of Game, Fish, and Parks, Pierre. Progress Report 87-8.
- Hubbard, D. E. 1988. *Glaciated prairie wetland functions and values: A synthesis of the literature*. Biological Report 88(43), U. S. Fish and Wildlife Service, Washington, D. C.
- Johnson, C.W. and R. Linder. 1986. An economic valuation of South Dakota's wetlands as a recreational resource for resident hunters. *Landscape Journal* 5:33-38.
- Kantrud, H., G. Krapu, and G. Swanson. 1989. *Prairie basin wetlands of the Dakotas: A community profile*. Biological Report 85(7.28), U. S. Fish and Wildlife Service, Washington, D. C.
- Leitch, J. 1983. Economics of prairie wetland drainage. *Trans. American Society Agricultural Engineers* 26:1465-1475.
- Leitch, J. and W. Nelson. 1985. Economics of joint production of agricultural commodities and wildlife. Pages 121-134 IN *Technologies to benefit agriculture and wildlife - Workshop proceedings*. U.S. Congress, Office of Technology Assessment, Washington, D.C. OTA-BP-F-34.
- Mitsch, W.J. and J.G. Gosselink. 1986. *Wetlands*. Van Nostrand Reinhold, New York, New York,
- NWPF (National Wetlands Policy Forum). 1988. *Protecting America's wetlands: An action agenda*. The Conservation Foundation, Washington, D. C.
- Ogaard, L. A. 1981. *Wetland vegetation of the Prairie Pothole Region: Research methods and annotated bibliography*. North Dakota Agriculture Experiment Station Research Report No. 85. Fargo.
- Peterson, D.L. and F. Hennagir. 1980. *Minnesota live bait industry assessment study*. National Marine Fisheries Service Completion Report 3-261-R. Department of Natural Resources, St. Paul.
- SAS Institute. 1988. *SAS/STAT user's guide*. Release 6.03 edition, SAS Institute, Cary, North Carolina.
- Sather, J. H. and R. D. Smith. 1984. *An overview of major wetland functions and values*. FWS/OBS-84/18, U. S. Fish and Wildlife Service, Washington, D. C.

- Shabman, L. 1986. The contribution of economics to wetlands valuation and management. Pages 9 - 13 IN J. Kusler and P. Riexinger (eds), *Proc. National Wetland Assessment Symposium*. ASWM Tech. Rept 1. Assoc. State Wetland Managers. Chester, Vermont.
- USFWS (U. S. Fish and Wildlife Service). 1988. *1985 national survey of fishing, hunting, and wildlife associated recreation*. U. S. Department of Interior, Washington, D.C.
- USDA (U. S. Department of Agriculture). 1991. *South Dakota Agriculture: 1984-1990*. South Dakota Agric. Stat. Serv., Sioux Falls.