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WETLAND FORAGE: IMPORTANCE IN A DROUGHT YEAR

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WETLAND FORAGE: IMPORTANCE IN A DROUGHT YEAR

by

Louis A. Ogaard*

The drainage of wetlands in Minnesota and the Dakotas has had a long and controversial history. Biologists have long claimed that the wetland complexes in these states are prime habitat for waterfowl production. Wetlands are essential in the life cycle of waterfowl and are invaluable to those who treat waterfowl as a beneficial natural resource. This includes bird-watchers, scientists, naturalists, hunters, and other similar groups.

On the other hand, wetlands provide a potential area for the expansion of arable land. They also may increase agricultural production costs because of the inconvenience and inefficiency of farming around them. Hence, farmers often have incentives to drain wetlands.

The prairie pothole region produces about one-half of this continent's waterfowl (Crissey, 1969). The region covers about 300,000 square miles in the prairie provinces of Canada and the Upper Midwest of the United States. The United States' portion, approximately 115,000 square miles, represents only about 10 percent of our wetlands but produces over 50 percent of our waterfowl (Niering, 1972). Figure 1 depicts the pothole region within North Dakota. A high correlation exists between the number of ducklings produced and the number of wetlands in the prairie pothole region, with as many as 75 percent of the country's ducklings produced there in a good year (Shaw and Fredine, 1971).

Prairie potholes are important for migration as well as production of waterfowl. Herbison notes (1967, p. 7):

Two major continental waterfowl flyways, Mississippi and the Central or Great Plains, partially overlap or merge in crossing North Dakota. Both carry heavy concentrations

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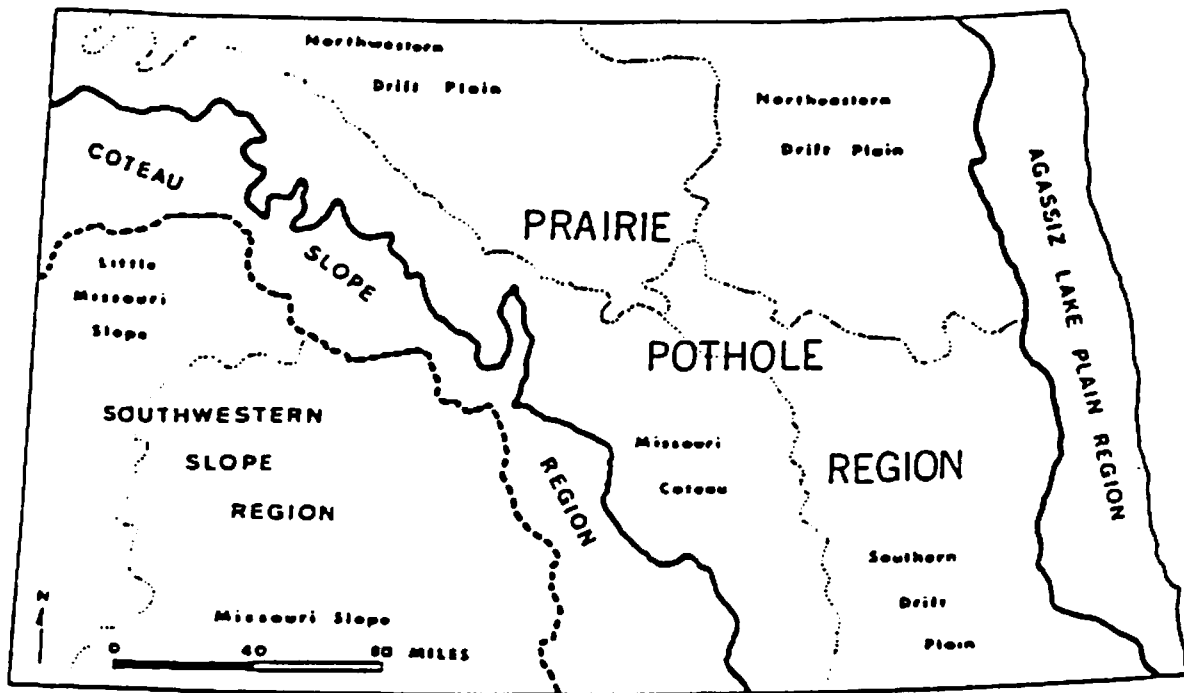


Figure 1. Prairie Pothole Region in North Dakota.

SOURCE: Stewart, R. E. and H. A. Kantrud. 1973. Ecological distribution of breeding waterfowl populations in North Dakota. J. Wildl. Manage. 37:40.

of Canadian geese, mallards, pintails, and other game ducks popular with gunners. In addition, an important tributary of the main Atlantic flyway crosses prairie farmlands located within the southern half of North Dakota. Canadian geese, redhead, and canvasback ducks in large numbers follow this latter migration route each year, together with many teal and a miscellany of other game duck providing wildfowlers and watchers alike a very large selection of waterfowl to enjoy.

Wetlands are important habitat for other types of wildlife as well. The value of wetlands for fur animals like muskrats, mink, and raccoons is well known because of the annual sale of wild furs, which amounted to \$3.8 million in North Dakota in 1978. That year, 24,100 muskrats, 4,730 mink, and 3,930 beavers were harvested from wetlands. Wetlands provided habitat for the 18,354 raccoon, 34,584 red fox, badger, bobcat, coyote,

jackrabbit, skunk, and weasel also taken by trappers and predator hunters in 1978 (Harmoning, 1980). Wetlands provide habitat for many upland species in the Central Flyway, especially during crucial winter months. Whitetail deer, sharptail grouse, ringneck pheasant, and red fox all rely on the shelter of wetlands in the winter. Hundreds of species of non-game mammals, birds, amphibians, and reptiles also find essential habitat in prairie potholes. At least eight major game and fur species have been identified as using wetlands in North Dakota, while the numbers are 17 and 12 for Minnesota and South Dakota, respectively (Shaw and Fredine, 1971).

The importance of the prairie potholes in producing and maintaining a national duck population was seen in the 1930's. Prolonged drought dried up potholes; first the temporary ones and then the more permanent ones. As the drought worsened, duck populations reached an all time low, to rebound only when the drought ended (Harmon, 1971).

Wetland drainage in the prairie pothole states has been continuing at an alarming rate. Over 8 percent of the wetland acres, in the last inventory in Minnesota in 1974, had been drained by 1979 (Nelson, 1979). Current estimates of the acreage of prairie potholes in North Dakota are about 1.5 million acres. Nearly one-half of all glacial wetlands were drained by 1955 in this region (United States Fish and Wildlife Service, 1967). Between 1965 and 1968, 125,000 acres were drained in the pothole country (Niering, 1972). Drainage was continuing at a rate of from 3 to 5 percent of remaining wetlands per year during the late 1960s (Haddock and DeBates, 1969).

A latent value which may periodically accrue to the landowner was examined in this study. Drought prevailed over most of North Dakota during the summer of 1980. As a result, normal hay production from upland hay fields and native grass production was severely impaired. This impairment induced haying of wetland vegetation (e.g. Myriophyllum exalbescens and Potamogeton pectinatus) that would not be harvested or pastured under normal precipitation conditions. It was postulated that this wetland vegetation would ameliorate the potential financial losses attributable to the drought. This study was conducted to test this hypothesis.

Methods

A telephone survey of farm operators within the Prairie Pothole Region of North Dakota was conducted during March, 1981. Eleven hundred names of operators were assembled from "hay lists" supplied by AGNET (a multistate computer service for farmers) as well as telephone book entries. A random sample of 620 farmers was taken from this group. Those sampled individuals who did use wetland vegetation as a source of forage were intensively queried about the extent and cost of this usage (see questionnaire, Appendix A). Percentages were calculated for affirmative and negative responses. Other objective responses were statistically analyzed using the Statistical Analysis System (SAS) on the IBM 370/158 computer at North Dakota State University.

Results and Discussion

A total of 248 or 40 percent of the sample population (620) answered a set of four preliminary questions.¹ Of this subsample, 46 (18.5 percent) had areas they hayed, pastured, or rented which normally were too wet to use and were willing to answer additional questions. This group (with wetlands) were asked questions from the remainder of the questionnaire.

Positive and negative response data are shown in Table 1. A majority of 248 respondents in the summer of 1980: (a) did harvest hay for their own use or for sale, (b) did not lease out their land for hay production, (c) did not cut any hay or pasture cattle in areas of their farm other than normal, and (d) did not rent pasture or hayland from someone other than normal. Of those that did lease pasture or hayland, the most common form of lease was cash rent for the growing season (54 out of 72, or 75 percent). Forty-eight (42 percent) of the respondents indicated that the new areas they hayed, pastured, or rented were normally too wet to use. Two of these 48 declined to answer further questions resulting in the sample size of 46 described above.

¹The remaining 60 percent were called but did not answer the questionnaire because they were: 1) unavailable (no answer); 2) unwilling to participate; 3) their phones were disconnected; or 4) they were deceased.

TABLE 1. WETLAND FORAGE SURVEY RESULTS FOR QUESTIONS REQUIRING A POSITIVE OR NEGATIVE RESPONSE

Question Number (See Appendix A)	Description	Positive Response* (Percent of Total)	Negative Response* (Percent of Total)
(responses to preliminary questions)			
1	Hay Harvested	208 (84%)	40 (16%)
2	Land Leased for Hay	28 (11%)	220 (89%)
3a	Harvest Hay or Pasture Cattle on New Areas	81 (30%)	145 (70%)
3b	Rent New Hay or Pasture Land	72 (33%)	144 (67%)
4	Any New Areas Normally Too Wet to Use	48 (42%)	67 (58%)

(responses to questions on wet area usage)			
3	Sold Hay From Wet Areas	6 (13%)	39 (87%)
4	Lease Out Wet Areas for Hay or Pasture	4 (9%)	41 (91%)
5	Harvesting Problems on Wet Areas	18 (40%)	27 (60%)
6a	Would Have Sold Livestock	5 (11%)	40 (89%)
6b	Would Have Earned Less Money	6 (13%)	-- ---
6c	Would Have Bought Hay	39 (87%)	6 (13%)
7	Pasture Livestock on Wet Areas	13 (29%)	32 (71%)
9	Lease Out Grazing Rights on Wet Areas	2 (4%)	43 (96%)
11	Additional Expenses to Pasture	7 (44%)	9 (56%)
12a	Like to Drain Wet Areas	5 (11%)	40 (89%)
12b	Drained Areas Used for Hay	1 (20%)	4 (80%)
12c	Drained Areas Used for Crops	2 (40%)	3 (60%)
12d	Drained Areas Used for Another Use	1 (20%)	4 (80%)

*Forty-six respondents agreed to answer questions about their use of wet areas. One individual indicated an inability to answer several questions due to insufficient knowledge. Hence, a summation of positive and negative responses for most questions yields a total of 45.

Table 2 shows the statistical analysis for numerical responses. A total of 3,905 acres were harvested from "wet areas" with a resultant crop of 7,792 tons. Respondents indicated the quality of this hay to be lower (26 of 45, or 58 percent) or very poor (15 of 45, or 34 percent). Only 8 percent (4 of 45) felt the hay quality was the same as that normally fed their cattle. The estimated average nutrient value of the wetland hay was 44 percent of the value of normal feed.

Few respondents (13 percent) sold hay from wet areas. Most used the hay to sustain their own operation. A total of 386 tons of hay was sold for cash receipts of \$11,525, an average price per ton of \$29.86. The average price of all baled hay sold in North Dakota in 1979 was \$37.88 per ton (North Dakota Crop and Livestock Reporting Service, 1980).

Most respondents (91 percent) did not lease out these normally wet areas for hay production. Those that did used a cash rent lease agreement.

The main problem incurred in the harvest of hay from these areas was that they were too wet late in the season. Some hay that was cut was lost because rains prevented subsequent removal.

The financial consequences of not having this wetland hay was broached in Question 6. Most farmers (89 percent) would not have been forced to sell cattle. Farmers who sold hay from the wet areas (13 percent) indicated they would not have been able to earn the extra money from selling hay. However, a strong majority (87 percent of 45 respondents) did indicate that they would have been forced to buy hay if the wetland hay had been unavailable.

The replacement cost for wetland hay was estimated at \$251,623 by 32 respondents. Several were quite emphatic about the importance of this wetland hay in 1980.

Most (71 percent) did not pasture cattle on these normally wet areas. Those that did (10 respondents) pastured an average of 170 cattle (beef) for 2.4 months on about 130 acres each. Again, quality of this pasture was assessed at a little poorer quality (6 of 15, or 40 percent) or poor quality (7 of 15, or 47 percent). Only 13 percent (2 of 15) felt the quality was comparable to normal forage.

TABLE 2. WETLAND FORAGE SURVEY RESULTS FOR WET AREA USE QUESTIONS REQUIRING NUMERICAL RESPONSE

Question Number (See Appendix A)	Description	Response* Frequency	Mean	Standard** Deviation	Mode	Total	Range of Response (difference between extremes)
1a	Wetland Acreage Harvested	44	88.75	83.68	40	3,905	385
1b	Tons of Wetland Hay Harvested	45	173.16	229.11	100	7,792	1,005
2b	Percentage of Total Digestible Nutrients of Wetland Hay Compared to Usual Feed	44	43.77	20.22	50	---	90
3b	Tons of Wetland Hay Sold	5	77.20	52.58	8	386	137
	Cash Receipts for Wetland Hay Sold	5	\$2,305.00	\$1,294.99	\$300	\$11,525	\$3,400
6d	Replacement Value for Wetland Hay	32	\$7,863.22	\$14,160.50	\$5,000	\$251,623	\$79,300
8a	Number of Cattle Pastured on Wetlands	10	170.00	175.18	50	1,700	500
8b	Months Cattle Pastured on Wetlands	10	2.40	.70	2	24	2
8c	Number of Wetland Acres on Which Cattle Pastured	10	129.50	102.40	160	1,295	275
10b	Percentage of Normal Carrying Capacity That These Wetlands Provided Last Year	12	47.91	25.89	50	---	90
10c	Percentage of Pasture Normally Wet	15	24.40	11.17	30	---	40

*Variations in response frequency due to respondents unable to answer some questions or questions were not asked due to previous response.

**Defined as the square root of averaged squared deviations from the mean or $\sqrt{\frac{\sum (x - \bar{x})^2}{N}}$ where x = datum, \bar{x} = mean for data, and N = number of observations.

In 1980, wetland pasture supplied about 48 percent of the carrying capacity for this sample of 46 North Dakota farmers. In a normal year, this group indicated that about 24 percent of their pasture was wet. These data illustrate the importance wetland forage played during the drought.

Respondents were split (44 percent yes; 56 percent no) on whether additional expenses were incurred to pasture livestock on these normally wet areas. Fencing was the expense cited by those that did have extra expense.

Nearly 90 percent of the 45 responding farmers expressed no interest in draining their wetlands. Reasons cited included the problem of where to drain, the need for wildlife habitat, the excellence of wetlands for hunting, and insurance against drought.

Those with an interest in drainage were split on the probable use to which they would put this land. Two individuals indicated a value for hay production and two would crop these areas.

Approximately 90 percent (558) of the initial sample of 620 was drawn from four counties: Kidder, McHenry, McLean, and Sheridan. The total population of farms in these counties is 3,438 (United States Department of Commerce, 1980). The random sample includes 16 percent of this total. All 46 of the 248 respondents who answered questions about wetlands were from these four counties and constitute 1.3 percent of the total 3,438 farms.

If one assumes the 248 respondents are representative of the total population of farmers within these four counties of the Prairie Pothole Region of North Dakota (Appendix B), then one may infer certain characteristics about this population. Thirty-two (12.9 percent of 248 farmers) estimated a total replacement value for wetland hay last year of \$251,623 (Table 2). The product of .129 and 3,438 farms yields an estimated 444 farms from the four counties which used wetland hay. The replacement value for this hay is calculated using the following proportion:

$$\frac{32 \text{ respondents}}{\$251,623 \text{ (replacement value)}} = \frac{444}{x}$$

where x = replacement value for the wetland hay used by the entire four-county population

$x = \$3,492,102.$

Using the same approach for the amount of wetland hay harvested by 45 respondents (7,792 tons; see Table 2), one achieves an estimated total tonnage harvested by the four-county population of 108,020 tons. This figure represents about 25 percent of the total hay harvested from these counties in 1979 (North Dakota Crop and Livestock Reporting Service, 1980).

Conclusions

If one assumes the 248 randomly-selected respondents within Kidder, McHenry, McLean, and Sheridan are representative of the total statistical population in these four counties, one may infer the following conclusions about this population: (1) most farmers using wetland hay (slough hay) would experience financial loss in very dry years if it were not available, (2) the magnitude of loss would be highly variable (exemplified by a standard deviation in excess of the mean for the replacement value, Question 6d), (3) a significant amount of wetland hay was harvested in the 1980 drought, (4) most of the 46 respondents to wetland questions (89 percent of those with wet areas in the four-county area) do not intend to drain their wetlands--particularly after last year's drought, and (5) the per acre value of this wetland hay (total replacement value divided by total acres harvested) comes to \$64.44.

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APPENDIX A

WETLAND FORAGE SURVEY

I am calling to gather some information on the economic effects of this past summer's drought on hay production and use.

1. Did you harvest hay this past summer for your own use or for sale?
____Yes ____No
2. Did you lease any of your land this past summer for hay production?
____Yes (continue) ____No (stop, if No to both #'s 1 and 2)
- 3a. During this past summer, did you cut any hay or pasture cattle on any areas of your farm that you normally would not? ____Yes ____No
- 3b. Did you rent pasture or hayland from someone else that you would not normally rent because of the drought? ____Yes ____No
(If Yes, under what kind of contractual arrangement?)_____
4. Are any of these new areas you hayed or pastured this summer usually too wet to use? ____Yes ____No (stop, if answer is No)

I would like to ask you a few questions about your harvest this past summer on these normally wet areas.

- 1a. How many acres did you harvest on these wet areas? _____
- 1b. How much hay did you put up, either in total from all acres or per acre?
____total tons ____tons per acre
____number of bales ____weight of each bale ____stacks
____number of stacks ____weight of each stack ____stacks
- 2a. How do you feel the quality of this hay compares to the hay you usually feed your livestock? ____about the same ____a little lower quality
____very poor

- 2b. If you had to estimate the percentage of nutrient value of this hay in total digestible nutrients compared to your usual feed, what would you estimate? _____ (assume normal is 100 percent)
- 3a. Did you sell any of the hay you harvested from these normally wet areas?
_____ Yes _____ No
- 3b. What did you sell? _____ number of bales for \$ _____ (each)
\$ _____ (total)
_____ tons for \$ _____ /ton _____ stacks for \$ _____ /stack
\$ _____ total \$ _____ total
4. Did you lease out any of these normally wet areas for hay production?
_____ Yes _____ No (If Yes, what were the terms of the lease?)

5. Were any problems encountered in the harvest of hay from these normally wet areas? _____ Yes _____ No (If Yes, have them explain.)

6. In assessing the consequences, if this normally wetland had not been available for hay production this past summer, would you say
Yes No
_____ a. you would have otherwise been forced to sell some of your cattle (if he has any).
_____ b. you would not have been able to earn extra money selling hay.
_____ c. you would have been forced to buy hay or buy more hay.
(If Yes to 6c, what do you think you would have had to pay for hay?)
- 6d. \$ _____ /bale \$ _____ /ton \$ _____ total \$ _____ /stack
_____ number of bales _____ number of tons _____ number of stacks

(If they had cattle or leased pasture, continue with the following questions. If not, skip to the end of the questionnaire.)

7. Did you pasture your cattle on these normally wet areas?
____ Yes ____ No (If No, go to Question 9.)
8. Can you estimate the actual use by your cattle of these normally wet areas?
a. That is, what type and number of cattle _____
(beef or dairy)
b. for how long _____, c. on _____ wetland acres.
(months)
9. Did you lease grazing rights on these normally wet areas to anyone else?
____ Yes ____ No (If Yes, what were the terms of the lease?)

10. How do you feel the quality of this pasture compares to your normal pasture?
a. ____ about the same ____ a little lower quality ____ poor quality
b. If you had to estimate the percentage these areas were of your normal pasture's carrying capacity last year, what would you say? _____ %
c. What percentage of your pasture is normally wet? _____ %
11. Did you have any additional expenses to pasture these normally wet areas?
(For example, fencing or weed control.) _____

12. Would you like to drain these wet areas? ____ Yes ____ No
(If Yes) Do you feel these drained areas would be valuable every year for hay? ____ Yes ____ No; for crops? ____ Yes ____ No; for another use? ____ Yes ____ No. If other use, define: _____

(If No) Why? _____



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