THE VALUE OF WOODED DRAWS ON THE NORTHERN HIGH PLAINS FOR HUNTING, FURS, AND WOODCUTTING[1]

by

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Abstract.--Data from wildlife habitat use, wood production, and values of hunting, trapping, and firewood reflect the contribution to values of wooded draws on the northern High Plains. Values included expenditures and net willingness to pay. Approximate values per annum derived were: deer hunting $26 million; turkey hunting $1 million; fur trapping $4 million; and firewood $7 million for a total annual value of $38 million from wooded draws.

INTRODUCTION

The application of assigned values (Brown 1984) to wooded draws of the northern High Plains can be divided into two categories; expenditure values and economic efficiency values. Expenditure value is that money spent by hunters and woodcutters. For hunters, expenditures may include gas, ammunition, lodging, food, and license fees. For woodcutters, expenditures may include gas, food, sawblades, and forest fees. Expenditures represent both costs to hunters and woodcutters, and also income to the local community. However, expenditures provide little information about decisions regarding the efficiency of alternative land uses.

Economic efficiency analysis is based on the benefits of alternative land uses. In the case of hunting, benefits are measured by determining how much more hunters would be willing to pay in excess of current expenditures for the hunting opportunity. This efficiency value is similar to the profit made by a woodcutter once the wood is sold and expedites and wages are paid. It is the net willingness to pay a firewood cutter in excess of his expenditures for the opportunity to cut wood. Both net willingness to pay and profit show the benefits generated from use of the resource.

Consider the case of a hunter who buys a license to hunt deer in one of two places. The first area is 100 miles away and the trip costs $75 once gas, food, and ammunition are bought. The second, nearly identical, location is 25 miles away and only costs $25 for all expenditures. Which area would the hunter choose? If all other factors are equal, he probably would choose the area which is closer and costs only $25. If his maximum willingness to pay was $75, a benefit of $50 is obtained. Expenditures would incorrectly indicate that the more distant hunting site is more expensive and more valuable; however, net benefits (net willingness to pay) indicate that the closer hunting site is more valuable. Expenditures indicate transfer of money from one site to another.

This paper only considers the values associated with hunting and trapping wildlife and private woodcutters on wooded draws. Several other aspects are of value including nonconsumptive viewing of wildlife, scenery enhanced by wooded draws, and preservation for future use or nonuse (Randall and Stoll 1983).

Wooded draws are important habitat for many wildlife species in the northern High Plains (Severson and Carter 1978, Steigers 1981, Uresk 1981). This paper uses data on wildlife user and wood production of wooded draws and data relating to expenditures and net values of wildlife species and wood cutting, to develop a value for wooded draws.

AREA

The northern High Plains is that area west of the Missouri River to the foothills of the Rocky Mountains and north of the Nioberra River to the North Platte, excluding the Black Hills. This area is also referred to as the Missouri Plateau (Fenneman 1931). The northern High Plains differs from other parts, the Great Plains by its higher altitude.

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The wooded draws are wooded interruptions in the otherwise grassland High Plains. Because of their scattered and hidden locations in drainages below the landscape, wooded draws have low visibility. For this reason, the High Plains often are considered to be treeless prairies. Although highly concentrated in some areas, wooded draws occupy only 1% of total area in the northern High Plains (Bjugstad 1978, Jakes and Smith 1982). Therefore, the production and value of wildlife is critically tied to (and often limited by) the availability of these scarce wooded draws. In addition, the scarcity of wooded draws limits the amount of available firewood.

METHODS

The techniques used in this paper to estimate expenditure and net willingness to pay values of a wooded draw were based on extrapolations. Data came from survey reports for wooded draw acreage, game license and fur sales, hunter expenditures, wooded draw wildlife use, and wood yields. Because all data was not specific to wooded draws, assumptions were made to allow extrapolation across resources.

DISCUSSION

Wooded draws represent about 55% of deer habitat (Steigers 1981, Severson and Carter 1978) on the northern High Plains. Several studies have addressed the issue of values associated with deer hunting. In 1975, Wyoming resident and nonresident deer hunters spent an average of $49.09 and $299.74, respectively (Phillips and Ferguson 1977). Residents hunted an average of 3.9 days, resulting in a value of $12.59/day. Hunting an average of 5.3 days, nonresidents spent $56.55. Mercier (1982) reported expenditures of $44.92/day and $125.03/day for resident and nonresident Wyoming deer hunters, respectively. Based on estimates of days hunted reported by Phillips and Ferguson (1977), total expenditures of $21.02 and $33.84 for resident and nonresident deer hunters (Hale 1973). All expenditures cited include license fees. Using the GNP implicit price deflator to update expenditures to a 1982 base results average daily values ranging from $20.24 to $125.03. In general, nonresident deer hunters spent more than resident deer hunters and nonresidents account for a smaller portion of the hunting population. Based on these generalizations, a conservative estimate of average daily deer hunting expenditures is $40.

Expenditure information indicates economic activity in a deer hunting area. However, to account for the total value of deer hunting, information concerning net willingness to pay also must be considered. Miller (1980) reported Colorado deer hunters would be willing to pay $9.11/day more than current expenditures before they would quit hunting. For a region encompassing Utah, Idaho, western Wyoming and Nevada, a deer hunting value of $20.55 was reported.[3] Adjusting to a 1982 base year and accounting for methodological inconsistencies (Sorg and Loomis 1984), the values are $18.40 and $39.64 for Colorado and the region, respectively. Because the northern High Plains is more similar to the regional value, a conservative estimate of net willingness to pay for deer hunting is $30. Adding the expenditure value to the net willingness to pay value results in a total value of $70/day.

Using South Dakota as an example, information on expenditures and net willingness to pay can be extrapolated to the northern High Plains (table 1).

In 1982, 15,106 resident and 1,314 nonresident (a total of 16,420) prairie deer licenses were sold for that area of South Dakota in the northern High Plains.[4] Because wooded draws represent 55% of prairie deer habitat, the assumption that at least 55% of total regional deer value is associated with wooded draws was made. Further, the assumption of 4 days hunting was made (Phillips and Ferguson 1977). Extrapolating the $40 expenditures and net willingness to pay of $30 to all hunters, with each hunter hunting 4 days, resulted in an expenditure of $2,627,200 and a economic efficiency value of $1,970,400. If as stated previously, 55% of this value is associated with wooded draws, then values for expenditures and net willingness to pay are $1,444,960 and $1,083,720, respectively. These values in other states were determined from percent of the northern High Plains in Montana, Wyoming, and North Dakota, respectively. This process is followed for each state in the northern High Plains. Summing expenditure and net willingness to pay values to the northern High Plains region of all states results in values of $14,889,124 and $11,166,844, respectively (table 1). This means prairie deer hunting generates expenditures of about $15 million in the northern High Plains from wooded draws. Furthermore, deer hunters would be willing to pay an additional $11 million for deer hunting associated with wooded draws. This results in a total deer hunting value of $26 million per annum (table 1). These values may be conservative if wooded draws are the limiting habitat factor or if very little substitution for this habitat is possible.

The estimation of value associated with prairie turkey production is similar to that for prairie deer. However, less value information is available. Hansen[3] reports a net willingness to pay value of $23.06/day for upland game bird hunting in a region encompassing Utah, Idaho, western Wyoming, and Nevada. Updating to 1982, this value is $37.06 Young et al. (1984) reported an Idaho upland game expenditure value of $20.90/day and net willingness to pay value of $28.50/day. In 1975, Wyoming resident and nonresident turkey hunters spent an average of $77.25 and $155.03, respectively (Phillips and Ferguson 1977). Residents hunted and average of 4.7 days, indicating daily expenditures of $16.44, or $26.42 in 1982 dollars. Nonresidents hunted 7.3 days, indicating daily expenditures of $21.24, or

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[3]Hansen, Christopher A. 1977. A report on the value of wildlife. Prepared for the Intermountain Region, Forest Service, December 1, 1977.

[4]Young, John S., Dennis M. Donnely, Cindy F. Sorg, and John B. Loomis. 1984. Value of recreational upland game hunting in Idaho. Report to Idaho Department of Fish and Game, Boise. 55 p.

Table 1.---Northern High Plains deer license sales, expenditures, willingness to pay and value extrapolation to wooded draws.

	Montana	North Dakota	South Dakota	Wyoming	Total
License sales	163,786[1]	49,129[2]	16,420[3]	119,754[4]	349,089
Expenditures/day	$40.00	$40.00	$40.00	$40.00	$40.00
Net willingness to pay/day	$30.00	$30.00	$30.00	$30.00	$30.00
Days hunted	4	4	4	4	4
Total expenditures for state	$26 million	$8 million	$3 million	$19 million	$56 million
Total net willingness to pay for state	$20 million	$6 million	$2 million	$14 million	$42 million
55% deer use of wooded draw					
wooded draw expenditures	$14 million	$4 million	$1 million	$11 million	$30 million
wooded draw net willingness to pay	$11 million	$3 million	$1 million	$8 million	$23 million
Percent of land in northern High Plains	60%	50%	N/A	25%	--
Northern High Plains wooded draw expenditures	$9 million	$2 million	$1 million	$3 million	$15 million
Northern High Plains draws net willingness to pay	$6 million	$2 million	$1 million	$2 million	$11 million

[1]Sale of 1982 licenses for the period May 1, 1982 - April 30, 1983. Montana Department of Fish, Wildlife, and Parks. Mimeograph Forms.

[2]McKenzie, James V., Jack Samuelson, and Roger Johnson. 1983. 1982 deer gun season an harvest. North Dakota State Game and Fish Department, Report No. A-055.

[3]Fowler, Ron. 1983. Prairie deer and turkey licenses sold in prairie units on the northern High Plains of South Dakota in 1982. Division of Wildlife, South Dakota Department of Game, Fish, and Parks, Pierre, South Dakota. Mimeograph forms.

[4]Annual report of big game harvest 1982, Wyoming Game and Fish Department, Cheyenne, Wyoming.

$34.13 in 1982 dollars. The Wyoming values were turkey specific; therefore, wooded draw extrapolations were based on expenditures of $28/day and 5 days of hunting. The expenditure value was similar to that of Young et al.;[5] therefore, it was assumed upland game hunting was similar to turkey hunting, and a net willingness to pay of $21/day was used for extrapolation. Expenditures plus net willingness to pay resulted in a total value of $49/day.

Again, considering South Dakota first, the value information was applied to license sales in South Dakota, and then values from other northern High Plains states were based on area in each state (table 2).

In 1982, 1,938 turkey licenses were sold for the area of the northern High Plains in South Dakota (Fowler 1983). Wooded draws represent 52% of prairie turkey habitat;[6] therefore, the assumption was made that 52% of turkey hunting value was associated with wooded draws. As with prairie deer, the $28/day in expenditures and $21/day in net willingness to pay was applied to all license sales with 5 days of hunting. This resulted in a South Dakota expenditure value of $271,320 and a willingness to pay value of $203,490. Assuming wooded draws contributed at least 52% of value; the values were $141,086 and $105,815 for expenditures and net willingness to pay, respectively. Further extrapolation to the northern High Plains for all states indicated turkey hunter expenditures associated with 1% of wooded draws were $548,806, and that hunters would be willing to pay an additional $411,605, for a total value of $960,411 per annum (table 2). As with deer, if wooded draws are a limiting habitat factor, then these estimates may be conservative.

The production of fur bearing species depends greatly on wooded draws. Wooded draws provide sites for denning, food, and travel lanes. Those fur bearing species utilizing wooded draws include raccoon, red fox, weasel, skunk, muskrat, and beaver. Wooded draws contribute 50% of coyote and bobcat habitat.

Table 3 reports northern High Plains state harvest totals, average price and total revenue from sales of the above fur bearing species (Deems and Pursley 1978). Bobcat and coyote revenues were adjusted to account for 50% wooded draw habitat utilization. Total state revenue was determined by adding the revenue of each species. This state value then was adjusted to reflect the percentage of total area occupied by northern High Plains. Total annual revenue from sale of pelts for the northern High Plains equaled $2,337,954 in 1975, or $3,757,354 updated to 1982 values. This value incorporated expenditures by trappers, wages, living expenses, and profits. No information was available on the costs associated with trapping; therefore, expenditures could not be

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[5]Young, John S., Dennis M. Donnelly, Cindy F. Sorg, and John B. Loomis. 1984. Value of recreattional upland game hunting in Idaho. Report to Idaho Department of Fish and Game, Boise. 55 p.

[6]Personal communication with Les Flake, South Dakota State University.

Table 2.--Northern High Plains turkey license sales, expenditures, willingness to pay, and value extrapolation to wooded draw.

	Montana	North Dakota	South Dakota	Wyoming	Total
License sales	6,513[1]	1,571[2]	1,938[3]	3,629[4]	13,651
Expenditures/day	$26.00	$26.00	$26.00	$26.00	$26.00
Net willingness to pay/day	$21.00	$21.00	$21.00	$21.00	$21.00
Days hunted	5	5	5	5	5
Total expenditures	$912,000	$220,000	$271,000	$506,000	$1,911,000
Total net willingness to pay	$684,000	$165,000	$203,000	$381,000	$1,433,000
52% turkey use of wooded draws					
expenditures	$474,000	$114,000	$141,000	$264,000	$994,000
net willingness to pay	$356,000	$86,000	$106,000	$198,000	$745,000
Percent of land in northern High Plains	60%	50%	N/A	25%	--
Northern High Plains wooded draw expenditures	$284,000	$57,000	$141,000	$66,000	$549,000
Northern High Plains wooded draws net willingness to pay	$213,000	$43 ,000	$106,000	$50,000	$412,000

[1]Sale of 1982 licenses for the period May 1. 1982 - April 30, 1983. Montana Department of Fish, Wildlife, and Parks. Mimeograph Forms.

[2]Tripp, Lowell A. 1983 Wild turkey harvest data, 1982-83. North Dakota State Game and Fish Department, Report No. 13-348.

[3]Fowler, Ron. 1983. Prairie deer and turkey licenses sold in prairie units on the northern High Plains of South Dakota in 1982. Division of Wildlife, South Dakota Department of Game, Fish, and Parks, Pierre, South Dakota. Mimeograph forms.

[4]Annual report of big game harvest 1982, Wyoming Game and Fish Department, Cheyenne, Wyoming.

broken out for comparison to hunting, and no calculation of net willingness to pay was possible. This revenue reflects both expenditures and net willingness to pay.

Firewood production of wooded draws was determined from data produced in a thinning study (Boldt et al. 1978). The study indicated that a 40% reduction of stems in a green ash stand which was rated to be in a decandent condition yielded 3.5 cords of fuel wood per acre. A 20-year rotation would require cutting to treat 5% of the wooded draws on the northern High Plains each year. The assumption was made that all 650,000 acres of wooded draws in the northern High Plains would produce similarly. However, all stands would not be cut at one time; but, a 20-year rotation would be feasible. This would mean 5 percent of the wooded draws would be thinned each year resulting in 113,700 cords available per year.

Markstrom and Rosenthal[7] reported a net willingness to pay of $11.42 per cord for small

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[7]Markstrom, Donald C., and Donald H. Rosenthal. 1984. Demand for firewood permits: A case study in Colorado. Draft manuscript.

Table 3.--Northern states fur harvest, 1975-65 season by species, state, and revenue.[1]

	Montana	North Dakota	South Dakota	Wyoming	Total
Beaver Harvest	8,627	2,305	1,679	2,250	14,861
Pelt price	$6.00	$6.00	$6.00	$6.00	$6.00
Beaver revenue	($51,762)	($13,830)	($10,07)	($13,500)	($89,166)
Bobcat Harvest	1068	76	708	2659	4511
Pelt price	$125.00	$125.00	$125.00	$125.00	$125.00
Bobcat revenue	$133,500	$9,500	$88,500	$332,375	$563,875
wooded draw Bobcat revenue	$66,750	($4,750)	($44,250)	($166,188)	($281,936)
Coyote Harvest	9,117	4,876	10,068	6,643	30,704
Pelt price	$45.00	$45.00	$45.00	$45.00	$45.00
Coyote revenue	$140,265	$219,420	$453.060	$238,935	$1,831,680
wooded draw Coyote revenue	($205,133)	($109,710)	($226,530)	($149,468)	($690,841)
Muskrat Harvest	52,069	48,622	29,065	6,870	136,626
Pelt price	$3.50	$3.50	$3.50	$3.50	$3.50
Muskrat revenue	($182,242)	($170,177)	($101,728)	($24,045)	($478,192)
Raccoon Harvest	4,700	11,511	23,854	6,657	46,722
Pelt price	$19.00	$19.00	$19.00	$19.00	$19.00
Raccoon revenue	($89,300)	($218,709)	($453,226)	($126,483	($887,718)
Red Fox Harvest	7,084	38,938	23,825	3,743	73,590
Pelt price	$30.00	$30.00	$30.00	$30.00	$30.00
Red Fox revenue	($212,520)	($1,168,140)	($714,750)	($112,290)	($2,207,700)
Skunk Harvest	6,644	458	1,946	403	9,451
Pelt price	$1.75	$1.75	$1.75	$1.75	$1.75
Skunk revenue	($11,627)	($802)	($3,406)	($705)	($16,540)
Weasel Harvest	632	176	49	-	857
Pelt price	$.90	$.90	$.90	-	$.90
Weasel revenue	($569)	($518)	($44)		($771)
State Total revenue	$819,903	$1,686,276	$1,554,008	$592,679	$4,652,866
Percent of land in northern High Plains	60%	50%	55%	25%	- -
Northern High Plains wooded draws revenue	$492,000	$843,000	$855.000	$148,000	$2,338,000

[1]Adapted from Northern American Furbearers, their management, research, and harvest status in 1976. Eugene F. Deems, Jr., and Duane Pursley, Editors. Published by the International Association of Fish and Game Agencies. 1978.

live lodgepole pine stumpage in the Denver-Boulder area in Colorado. This value, which reflects willingness to pay for weekend firewood collection for private use was, extrapolated to the northern High Plains. Assuming firewood sells for $60/cord would indicate expenditures of $48.58/cord ($60.00-$11.42) if all of net willingness to pay is captured. Applying expenditures and net willingness to pay to the 113,700 cords available per year on the northern High Plains resulted in values of $5,523,546 and $1,298,454 for a total of $6,822,000. This indicates expenditures for firewood of $5,523,546 to cut firewood on wooded draws in the northern High Plains, and a willingness to pay an additional $1,298,454, for a total wood value of $6,822,000 per annum.

CONCLUSIONS

Using site specific information, speculation to all wooded draws in the northern High Plains was made and the following total values were derived: deer hunting, $26 million; turkey hunting, $1 million; fur trapping, $4 million; and firewood, $7 million for a total annual revenue of $38 million. These values are not exact estimates, because they are based on studies not specific to wooded draws. They merely serve to generally evaluate the importance of wooded draws for the production of valuable resources. Other values are associated with wooded draws; however, they are not reflected in this study. They include: nonconsumptive wildlife use, scenery enhancement, erosion control, winter cattle shelter, and future options to use.

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