

## **A SURVEY OF NATURAL RESOURCE PROFESSIONALS PARTICIPATING IN WATERFOWL HUNTING IN SOUTH DAKOTA**

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### **ABSTRACT**

A 3-page waterfowl questionnaire and harvest diary was sent to natural resource agency professionals (n = 357) within South Dakota prior to the 1995 - 96 waterfowl season. Our primary objectives were to determine species composition in the bag and crippling losses by natural resource agency professionals. In addition, we wanted to determine hunting activity, demographics, experience and preferences, as well as assess attitudes concerning current waterfowl management and hunting issues. One hundred and forty-one (40%) usable questionnaires were returned. Ninety-six (67%) respondents hunted ducks and/or geese during the 1995 - 96 South Dakota waterfowl season. Species composition of waterfowl bagged by respondents indicated that mallards (n = 409) and Canada geese (n = 693) sustained the highest harvest levels of those species available. A total of 318 cripples (shot but unretrieved waterfowl) was reported by respondents resulting in a crippling rate of 10.3%. A total of 732 hunter days was documented for those respondents participating in the 1995 - 96 waterfowl season. Approximately 2,307 hours were spent pursuing waterfowl. About 50% of all respondents indicated they had  $\geq 16$  years of waterfowl hunting experience. Results of this questionnaire and diary will provide waterfowl managers and administrators with a better understanding of hunter activities and demographics as well as attitudes and preferences of a segment of South Dakota's waterfowl hunters.

### **INTRODUCTION**

Waterfowl are considered the most economically important group of migratory birds (Anonymous, 1986). Millions of consumptive and nonconsumptive users annually take to the marshes generating annual expenditures in excess of several billion dollars (Anonymous, 1986; Gray and Kaminski, 1994). In the United States, declines have occurred in duck stamp sales and the number of active adult waterfowl hunters over the last 30 years (Sharp, 1996). During the same period in South Dakota, hunter numbers have ranged from an estimated low of 21,944 (1962) to a all-time high of 40,675 (1971) (Sharp, 1996). Of the Central Flyway states, South Dakota ranks fifth based on the number of active adult waterfowl hunters ( $\bar{x}$  = 29,786, 1961-93) and contributes substantially to the Central Flyway's duck and goose harvest (Sharp, 1996). A slight

increase in hunter numbers has occurred over the last 4 years and may be attributed to an overall increase in waterfowl numbers (Caithamer and Dubovsky, 1996).

Surveys targeting waterfowl hunters include efforts to determine demographic characteristics and hunter preferences in certain geographic regions (Filion and Parker, 1984; Tori et al., 1988; Humburg et al., 1997), hunters' attitudes concerning specific waterfowl regulations (Anderson and Williamson, 1990), and estimating the number of illegal waterfowl hunters and illegal activities (Gray and Kaminski, 1993; 1994). Currently, South Dakota is one of 22 states cooperating in the Harvest Information Program (HIP) with all 50 states to be included by the 1998–99 hunting season. HIP is designed to provide more reliable harvest estimates of nonwaterfowl migratory birds as well as waterfowl harvested throughout the United States (USFWS unpubl. report). Species currently monitored by HIP in addition to waterfowl include coot (*Fulica americana*), mourning dove (*Zenaida macroura*), woodcock (*Scolopax minor*), snipe (*Gallinago gallinago*), sandhill crane (*Grus canadensis*), band-tailed pigeon (*Columba fasciata*), gallinule (*Porphyryula martinica*), and rails (*Family Rallidae*).

Despite a recent increase in the number of waterfowl hunter surveys (Scherff and Ringleman, 1994; Gigliotti, 1995), relatively limited information is available regarding waterfowl hunters in South Dakota. To address this lack of information, we surveyed natural resource agency professionals in South Dakota to (1) determine species composition of the harvest and crippling losses, (2) determine waterfowl hunting activity, demographics, experience, and preferences, and (3) assess attitudes concerning waterfowl management and hunting issues.

## METHODS

A statewide survey of 357 natural resource agency personnel within South Dakota were polled prior to the 1995–96 waterfowl season. These individuals were employed by several agencies within the state including South Dakota Department of Game, Fish and Parks, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Forest Service, Natural Resource and Conservation Service, as well as faculty, staff, and graduate students in the Department of Wildlife and Fisheries Sciences at South Dakota State University (SDSU). An initial list of names and addresses was generated from a database maintained through the Department of Wildlife and Fisheries Sciences at SDSU.

Natural resource agency professionals (i.e., those individuals not at SDSU) were mailed a harvest survey in the form of a daily diary and cover letter (Filion, 1978) on Department of Wildlife and Fisheries Sciences letterhead (Roehner, 1963) 1 week prior to the 1995 - 96 waterfowl hunting season. Attached to the diary was a 3-page questionnaire and postage-paid, pre-addressed envelope. Individuals at SDSU were hand delivered the same survey and questionnaire during this period. The harvest survey requested information such as date hunted, group size, hours hunted, number of waterfowl harvested by species, area hunted, and number of cripples by species. Approximately 2

weeks prior to the end of the hunting season, a sample of surveyed individuals was contacted in writing or by phone.

From survey information we derived estimates for species composition of the harvest, species composition for cripples, crippling rates, and hunter effort. In addition, the self-administered mail questionnaire provided a series of Likert-type statements (Tittle and Hill, 1976) and closed-response questions (Tacha, 1976) in which personnel were asked about places available to hunt, factors contributing to the historic declines in waterfowl populations, the use of different media sources regarding waterfowl populations and the upcoming hunting season, factors influencing whether or not they hunted, importance of a limit in defining the success of a hunt, favorite hunting method, and demographics.

Based on career affiliation, we assumed that attitudes and responses of questionnaires returned were representative of the sample population (Filion, 1975; 1976a), therefore nonresponse bias was not calculated. Similarly, Ringleman (1997) following results from Pierce et al. (1996) noted that "response bias in my survey, if one exists, is likely to be small." Chi-square analyses (Wilkinson 1990) were used to determine significance of associations between respondents' opinions concerning current waterfowl management issues (Dietz, 1990; Higgins et al., 1994). We tested for differences in attitudes between respondents that participated in the 1995-96 waterfowl season (i.e., hunters) and those that did not (i.e., non-waterfowl hunters). An alpha level of 0.05 was used in all statistical comparisons.

## RESULTS

One hundred and forty-two (40%) usable questionnaires were returned. Ninety-six (67%) respondents hunted ducks and/or geese during the 1995 - 96 South Dakota waterfowl season. Based on answers to the first 2 questions regarding participation in past (i.e., 1994) and upcoming (i.e., 1995) waterfowl seasons as well as respondents not participating in the harvest survey portion of the questionnaire, we were able to separate the returned questionnaires into 2 groups; individuals that participated in the 1995-96 waterfowl hunting season and those that did not. Significant differences ( $P \leq 0.05$ ) occurred for only 20.6% ( $n = 7$ ) of the 34 comparisons tested between 1995-96 waterfowl hunting season participants and nonparticipants, therefore we pooled all respondents in our analyses. We used a Bonferonni correction factor to maintain our alpha level. The adjusted alpha level for 34 comparisons was 0.002.

### Hunting Activity of Natural Resource Professionals

Ninety-five individuals (67.4%) indicated that they had hunted waterfowl the previous year. Approximately 75 percent of respondents ( $n = 106$ ) planned on participating in the upcoming waterfowl season. We derived estimates of hunting activity (732 hunter days [ $\bar{x} = 7.63$  days/hunter]) from 96 returns. Hunter effort was greatest in October (53.1% of hunter days) (Fig. 1) but declined throughout the season. About 2,307 hours ( $\bar{x} = 3.15$  hours/trip) were

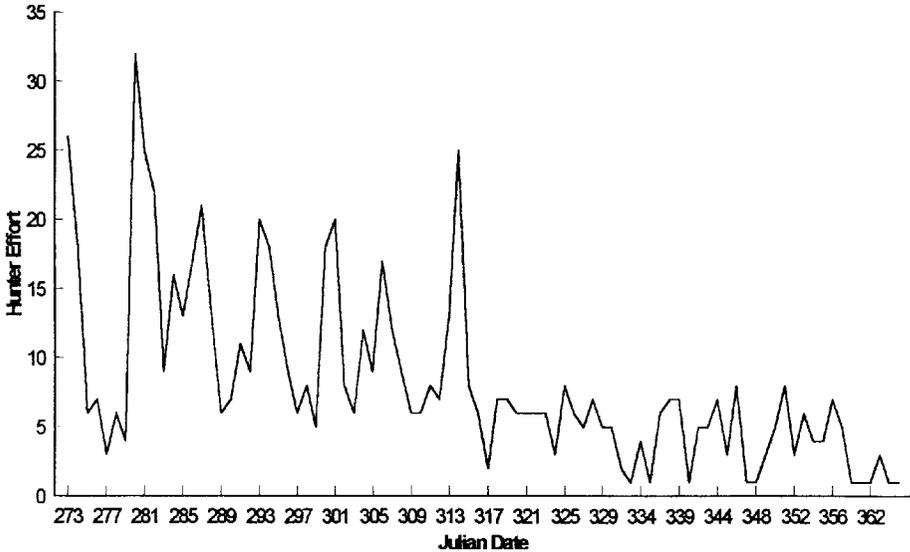


Figure 1. Chronology of hunter effort calculated for the 1995–96 South Dakota waterfowl season.

spent in the field and approximately 56% of all hunting trips were > 3 hours in duration. Group size averaged 3 hunters but ranged from 1 individual to 14.

An estimated 2,195 ducks and 901 geese were bagged by surveyed groups. An estimated 1,051 ducks, 776 geese, and 4 coots were bagged by survey respondents (Table 1). Average annual harvest per respondent during the season was 10.9 ducks and 8.1 geese. Average daily success rate for respondents was 1.4 ducks and 1.1 geese. Species composition of respondent's bags indicated that mallards (*Anas platyrhynchos*) (n = 409) and Canada geese (*Branta canadensis*) (n = 693) sustained the highest harvest levels of the available duck and goose species (Table 1). Similarly, mallards (n = 31) and Canada geese (n = 19) sustained the highest crippling losses (Table 2). However, a large number of ducks (n = 79), geese (n = 24), and unknown cripples (n = 138) were reported. Crippling rates were estimated at 10.3% with an average of 0.4 cripples/day/hunter. Nearly 71% of all hunting trips resulted in no reported cripples.

#### Hunter Characteristics of Natural Resource Professionals

A total of 130 males (92.2%) and 9 females (6.5%) responded to the survey and of these 91 males (94.8%) and 4 females (44.4%) participated during the 1995–96 waterfowl season. Overall, 78.7% of respondents (n = 111) were ≥ 31 years of age with 19.7% (n = 28) falling into the class interval 21–30 years of age. Forty-seven percent (n = 66) of all individuals surveyed indicated they had ≥ 16 years of waterfowl hunting experience. Residency of individual respondents was similar with nearly equal numbers falling into the categories of

Table 1. Species composition of harvested waterfowl (n = 1831) by natural resource professionals (n = 96) that participated during the 1995–96 waterfowl season.

Species	Number
<u>Ducks</u>	
Mallard ( <i>Anas platyrhynchos</i> )	409
Gadwall ( <i>Anas strepera</i> )	178
American wigeon ( <i>Anas americana</i> )	84
American green-winged teal ( <i>Anas crecca</i> )	78
Blue-winged teal ( <i>Anas discors</i> )	72
Bufflehead ( <i>Bucephala albeola</i> )	68
Northern shoveler ( <i>Anas clypeata</i> )	45
Northern pintail ( <i>Anas acuta</i> )	24
Wood duck ( <i>Aix sponsa</i> )	20
Redhead ( <i>Aythya americana</i> )	18
Ring-necked duck ( <i>Aythya collaris</i> )	18
Canvasback ( <i>Aythya valisineria</i> )	17
Ruddy duck ( <i>Oxyura jamaicensis</i> )	9
Common ( <i>Mergus merganser</i> ) and hooded ( <i>Lophodytes cucullatus</i> ) merganser	5
Common goldeneye ( <i>Bucephala clangula</i> )	5
American black duck ( <i>Anas rubripes</i> )	1
<u>Geese</u>	
Canada goose ( <i>Branta canadensis</i> )	693
Snow goose—white phase ( <i>Chen caerulescens</i> )	54
Snow goose—blue phase	21
Greater white-fronted goose ( <i>Anser albifrons</i> )	6
Ross' goose ( <i>Chen rossii</i> )	2
<u>Other</u>	
American coot ( <i>Fulica americana</i> )	4

towns ( $\leq 10,000$ ) (33.8%, n = 48), cities ( $> 10,000$ ) (35.2%, n = 50), or rural (28.9%, n = 41) areas.

#### Hunter Attitudes of Natural Resource Professionals

Survey participants indicated that a parent (36.6%, n = 52) or friend (28.9%, n = 41) was primarily responsible for their initiation to waterfowl hunting. Thirty respondents (21.1%) indicated they started waterfowl hunting on their own. Twelve respondents indicated a relative other than a parent introduced them to waterfowl hunting. Nearly 75% (n = 106) of respondents thought there

Table 2. Species composition of crippled waterfowl (n = 318) reported by natural resource professionals (n = 96) that participated during the 1995 - 96 waterfowl season.

Species	Number
<u>Ducks</u>	
Mallard	31
Gadwall	6
American green-winged teal	6
American wigeon	5
Blue-winged teal	2
Bufflehead	2
Northern shoveler	1
Common merganser	1
Unknown teal species	3
Unknown duck species	79
<u>Geese</u>	
Canada goose	19
Greater white-fronted goose	1
Unknown goose species	24
<u>Unknown species</u>	138

were enough places to hunt waterfowl. Public land (56.3%, n = 80) was hunted more often than private land (14.8%, n = 21).

When asked to rank the factors contributing to the historic decline in waterfowl populations, respondents indicated that loss of habitat, drought, and predators were most important (Table 3). Poor management and hunting ranked fairly high with regard to waterfowl population declines.

About 84% of respondents ranked state wildlife personnel (n = 120) and state/federal waterfowl reports (n = 120) as important sources of information regarding waterfowl populations and the upcoming waterfowl season (Table 4). Federal wildlife personnel (79.6%, n = 113) and Ducks Unlimited (60.6%, n = 86) ranked somewhat lower, and television ranked the lowest (34.5%, n = 49). The 4 most important factors that determined whether or not respondents participated in waterfowl hunting were time constraints, other interests, duck abundance, and cost (Table 5). The use of steel shot was the lowest of these factors.

When asked whether or not a limit was important in defining a successful hunt, only 7% (n = 10) responded positively while most participants (88.7%, n = 126) indicated the opposite. Nearly 70% (n = 99) of respondents used decoys as their favorite method of hunting waterfowl, whereas 17% (n = 24) favored pass shooting and jump shooting (6%, n = 8). Attitudes differed re-

Table 3. Ranking of factors that may contribute to the historic decline in waterfowl populations for natural resource professionals (n = 141).

Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response
Loss of habitat	1.4% (n = 2)	0.7% (n = 1)	2.8% (n = 4)	16.9% (n = 24)	72.5% (n = 103)	5.6% (n = 8)
Drought	2.8% (n = 4)	9.9% (n = 14)	16.9% (n = 24)	39.4% (n = 56)	22.5% (n = 32)	8.5% (n = 12)
Predators	8.5% (n = 12)	16.2% (n = 23)	26.8% (n = 38)	31.0% (n = 44)	10.6% (n = 15)	7.0% (n = 10)
Poor management (n = 9)	9.9%	33.8%	35.9%	10.6%	3.5%	6.3%
Hunting	21.8% (n = 31)	38.0% (n = 54)	22.6% (n = 32)	9.2% (n = 13)	1.4% (n = 2)	7.0% (n = 10)
$X^2 = 421.6$		d.f. = 20			$P \leq 0.0001$	

garding the importance of a limit in defining a successful hunt ( $X^2 = 98.0$ , d.f. = 4,  $P < 0.0001$ ) and one's favorite hunting method ( $X^2 = 108.1$ , d.f. = 2,  $P \leq 0.0001$ ).

### DISCUSSION

Response rates and sample sizes, though somewhat lower for this study (39.8% and 142, respectively) compared to other waterfowl survey studies (60%, Smith and Roberts, 1976; 77%, Gray and Kaminski, 1994; 79%, Gigliotti, 1995; 71.9%, Humburg et al., 1997) was considered adequate and representative of the sampled population. In a survey of North American waterfowl hunters, Ringleman (1997) (NAWHS) had an overall response rate of 54.5% and a duck hunter response rate of 45.0%. He also stated that "response bias in my survey, if one exists, is likely to be small with respect to questions relating to participation rates and hunter success". Numerous participants contacted after the waterfowl season indicated they had filled out the survey but had misplaced it. Results from our comparison of 1995-96 waterfowl hunting season participants and nonparticipants indicated few statistical differences in attitudes. Hence, we believe that results from this survey portray the attitudes of natural resource professionals in South Dakota.

Table 4. Ranking of sources of information regarding waterfowl populations and the upcoming waterfowl season for natural resource professionals (n = 141).

Source of Information	Never	Probably Not	Maybe	Probably	Definitely	No Response
Waterfowl Reports	6.3% (n = 9)	2.1% (n = 3)	14.1% (n = 20)	30.3% (n = 43)	40.1% (n = 57)	7.0% (n = 10)
State Wildlife Personnel	4.2% (n = 6)	5.6% (n = 8)	8.5% (n = 12)	32.4% (n = 46)	43.7% (n = 62)	5.6% (n = 8)
Federal Wildlife Personnel	6.3% (n = 9)	7.8% (n = 11)	13.4% (n = 19)	33.1% (n = 47)	33.1% (n = 47)	6.3% (n = 9)
Ducks Unlimited	9.9% (n = 14)	23.2% (n = 33)	22.5% (n = 32)	26.8% (n = 28)	11.3% (n = 16)	6.3% (n = 9)
Newspapers	13.4% (n = 19)	22.5% (n = 32)	27.5% (n = 39)	23.2% (n = 433)	5.6% (n = 8)	7.8% (n = 11)
Other Hunters	12.7% (n = 18)	24.7% (n = 35)	24.7% (n = 35)	19.0% (n = 27)	13.4% (n = 19)	5.6% (n = 8)
Magazines	16.2% (n = 23)	24.7% (n = 35)	26.8% (n = 38)	20.4% (n = 29)	4.9% (n = 7)	7.0% (n = 10)
Local Farmers	19.0% (n = 27)	31.7% (n = 45)	16.9% (n = 24)	19.7% (n = 28)	7.0% (n = 10)	5.6% (n = 8)
Television	24.7% (n = 38)	33.8% (n = 48)	21.1% (n = 30)	9.2% (n = 13)	4.2% (n = 6)	7.0% (n = 10)
$\chi^2 = 350.9$		d.f. = 40			P $\leq$ 0.0001	

#### Hunting Activity of Natural Resource Professionals

Surveyed agency professionals hunted a total of 732 days ( $\bar{x}$  = 7.63 days/hunter) or 2,307 hours ( $\bar{x}$  = 3.15 hours/trip). Approximately 56% of all hunting trips exceeded 3 hours in duration. These results are comparable to a hunter satisfaction survey conducted in South Dakota (Gigliotti, 1995) where the number of days hunted for ducks and geese averaged 8.6 and 7.0. Similarly, Humburg et al. (1997) documented an average of 10.2 and 9.6 days hunted for ducks and geese in Missouri, respectively. Hunter effort during our study showed a declining trend through time with over 50% of the effort oc-

Table 5. Ranking of factors that were important in determining whether or not natural resource professionals hunted waterfowl (n = 141).

Factor	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response
Other interests	5.6% (n = 8)	16.2% (n = 23)	23.9% (n = 34)	23.9% (n = 34)	19.0% (n = 27)	11.3% (n = 16)
Time constraints	8.5% (n = 12)	14.1% (n = 20)	21.8% (n = 31)	27.5% (n = 39)	19.0% (n = 27)	9.2% (n = 13)
Duck abundance	12.0% (n = 17)	21.8% (n = 31)	25.4% (n = 36)	23.9% (n = 34)	6.3% (n = 9)	10.6% (n = 15)
Cost	14.8% (n = 8)	26.8% (n = 23)	26.1% (n = 34)	14.8% (n = 34)	6.3% (n = 27)	11.3% (n = 16)
No place to hunt	20.4% (n = 29)	26.1% (n = 37)	21.1% (n = 30)	12.7% (n = 18)	7.8% (n = 11)	12.0% (n = 17)
No one to hunt with	32.4% (n = 46)	24.7% (n = 35)	17.6% (n = 25)	11.3% (n = 16)	3.5% (n = 5)	10.6% (n = 15)
Regulations too restrictive	24.7% (n = 35)	33.8% (n = 48)	19.7% (n = 28)	5.6% (n = 8)	4.9% (n = 7)	11.3% (n = 16)
Regulations too complex	22.5% (n = 32)	35.9% (n = 51)	14.8% (n = 21)	7.8% (n = 11)	8.5% (n = 12)	10.6% (n = 15)
Have to use steel shot	43.0% (n = 61)	26.8% (n = 38)	12.7% (n = 18)	4.9% (n = 7)	2.1% (n = 3)	10.6% (n = 15)

 $\chi^2 = 219.4$ 

d.f. = 40

P  $\leq$  0.0001

curing during the month of October (Fig. 1). Conversely, Gigliotti (1995) determined that in general, of those hunters with a preference, twice as many preferred the latter part of the season. Similar to our results, Martin and Carney (1977) documented that a large proportion of waterfowl harvested occurred during the early part of the hunting season. This high "early" season harvest may be attributed to relatively mild weather and large hunter numbers (Martin and Carney, 1977).

Our average annual harvest per respondent of 10.9 ducks and 8.1 geese is somewhat higher than comparable studies. Gigliotti (1995) documented an average annual harvest per hunter at 8.5 ducks and 5.0 geese. Humburg et al. (1997) estimated the average annual harvest for Missouri waterfowl hunters at

less than 5 ducks and geese. However, our estimates of average daily success rate of 1.4 ducks and 1.1 geese compare favorably to the national average of 1 to 2 ducks (Smith and Roberts, 1976). Gigliotti (1995) determined that waterfowl hunters averaged 1.2 ducks/day during the 1994–95 South Dakota waterfowl season, which was similar to our results. Species composition of respondent's bags generally followed Central Flyway harvest estimates (Sharp, 1996) and species composition reported by Nieman et al. (1987) with mallards and Canada geese sustaining the highest harvest levels (Table 1). Mallards and Canada geese were cited as the preferred waterfowl species by personnel participating in this survey; however, hunters in general are considered opportunistic (Nieman et al., 1987) desiring shooting activity rather than being selective (Hochbaum and Walters, 1984).

Crippling losses for waterfowl have been estimated at 4–5 million birds annually (Martin and Carney, 1977) with an average of 1 cripple lost for every 4 ducks bagged (Anderson and Burnham, 1976). Some authors (Hochbaum, 1947; Anderson, 1994) have argued that crippling losses may actually approach 1 cripple for every bird bagged. In most studies, crippling estimates range from 16–41% (Bellrose, 1953; Halladay, 1969; Geis and Crissey, 1973; Hochbaum and Walters, 1984). Our crippling rate estimates (10.3% [0.4 cripples/day]) may represent "actual" losses based on our sampled population or the estimates may be biased low due to survey design, a reluctance to report actual losses, or simply that respondents underestimated the number of cripples. Using "spy blind" techniques in Canada, Nieman et al. (1987) determined that hunters reported crippling 6 - 18% of waterfowl shot at while observed losses were approximately 45%. Van Dyke (1980) noted that the percentage of cripples increased as bag size increased. Species composition for cripples (Table 2) in our study generally mirrored the species composition of the harvest (Table 1). Accurately assessing crippling losses remains an important component of North American waterfowl harvest management.

#### Hunter Attitudes of Natural Resource Agency Professionals

Similarities existed between our survey of natural resource agency professionals and a random sample of South Dakota waterfowl hunters ( $n = 676$ ) (NAWHS) with regards to respondent's gender (94.8% versus 97.9% male), age (78% versus 57.4%  $\geq 31$  years old), and hunting experience (50% versus 49.2%  $\geq 16$  years of waterfowl hunting experience). The nationwide NAWHS results indicated that 98% of respondents were male, mean age was 41, and hunting experience averaged 20 years (Ringleman, 1997). Our results generally support similar studies (Smith and Roberts, 1976; Enck et al., 1993; Humburg et al., 1997) regarding hunter characteristics, demographics, and residency. Our results also demonstrate that a gender disparity exists within natural resource agencies in South Dakota. Our findings, though similar to other studies, indicate that an aging waterfowl hunter population will likely reduce the potential for recruiting new hunters to the sport (Enck et al., 1993). Our findings also corroborate Smith and Roberts (1976) who documented that half the respondents stated that a family member or older friend was responsible for their participation in waterfowl hunting.

Seventy-five percent of personnel surveyed during this study reported that access to waterfowl hunting areas was not a limiting factor to their participation. Conversely, Enck et al. (1993) demonstrated that "access issues" were important to waterfowl hunters in the state of New York. Public land was the most often hunted area (56.3%) for respondents in South Dakota and was selected more often than private land (14.8%). In Missouri, Humburg et al. (1997) determined that 44.2% of the days hunted for waterfowl were on public land while 38.3% of the days hunted were spent on private land. These same authors demonstrated that 53% of the waterfowl hunters surveyed indicated that "few places to hunt" was an important factor affecting their participation. Access to public lands is vitally important for waterfowl hunters; however, availability of these areas is highly variable geographically. Smith and Roberts (1976) asked 6,000 waterfowl hunters systematically sampled from Federal duck stamp purchases to rank 6 management activities in order of importance; providing more land for public hunting rated third with protecting nesting grounds and providing refuges for waterfowl ranking slightly higher.

Respondents from our survey ranked loss of habitat, drought, predators, poor management, and hunting (in order of importance) as factors believed to have contributed to the historic declines in waterfowl populations (Table 3). Enck et al. (1993) documented that 74% of New York waterfowl hunters indicated that their interest in the sport had declined due to "management activities." Such activities included confusing regulations, season dates and lengths, bag limits, and a dislike for the mandatory steel shot regulations. Results from the NAWHS indicated respondent's attitudes regarding regulations were the opposite (Ringleman, 1997). In fact, Ringleman (1997) demonstrated that in general, hunters were more accepting of "special" regulations. Gigliotti (1995) documented that resident and non-resident waterfowl hunters that participated in the 1994-95 South Dakota waterfowl season were generally satisfied with the current regulations. However, one suggestion made by this sample of hunters was a request for a longer season. Waterfowl hunters in Missouri generally did not cite regulations as important in their participation in waterfowl hunting (Humburg et al., 1997).

The 4 most important reasons affecting participation cited by respondents of our survey were; other interests, time constraints, duck abundance, and cost (Table 5). These results support findings of both Enck et al. (1993) and Ringleman (1997) who reported that respondents were "too busy" and that duck abundance had a greater effect on hunter participation rates than either bag size or season length, respectively. General comments provided by surveyed personnel during this study indicated that "costs" associated with the sport (i.e., equipment, stamps, shells, and gas) and poor quality table fare are other reasons that may determine whether or not respondents participated in waterfowl hunting in South Dakota.

Achievement-oriented factors (i.e., a limit of ducks/geese) ranked low (7%) for respondents of our survey and were similar to findings of Enck et al. (1993) and Ringleman (1997). Similarly, Missouri waterfowl hunters ranked "seeing waterfowl", "hunting with family and friends", and "hunting with decoys" higher than "bagging ducks or geese" as factors that added to their enjoyment

(Humburg et al., 1997). Our results demonstrated that hunting with decoys, pass shooting, and jump shooting were the favored methods of natural resource professionals in South Dakota. Analogous to these results, Humburg et al. (1997) documented decoying birds over water, jump shooting, pass shooting, and decoying birds over land were preferred hunting methods in Missouri. Pass shooting ranks high as a hunting method in South Dakota, which may be due to this method being preferred by a large segment of the goose hunting population along the Missouri River.

Natural resource agency professionals surveyed during this study indicated that they used other state wildlife personnel, state/federal waterfowl reports, other federal wildlife personnel, Ducks Unlimited, and other hunters as their 5 most important sources of information concerning waterfowl populations and the upcoming waterfowl season (Table 4). Newspapers, magazines, and television ranked relatively low ( $\leq 56\%$ ) as a source of information. In contrast, Smith and Roberts (1976) found that newspapers ranked highest followed by "talking to friends" and magazines. Results for South Dakota hunters who participated in NAWHS indicated that personal observation and contact with other hunters followed by state/federal waterfowl reports were considered important sources of information about duck abundance (Ringleman, 1997).

Recently waterfowl management and more specifically waterfowl harvest management has become increasingly complex with the number of hunting zones, season splits, and species specific regulations nearly doubling over the last 20 years (Ringleman, 1997). Results of the NAWHS indicate that, in general, managers poorly predicted hunter attitudes regarding harvest regulations and influences of regulations on participation rates. Results of our questionnaire and diary will aid waterfowl managers and administrators by providing a better understanding of waterfowl species composition, crippling losses, hunter activities, and characteristics of a segment of South Dakota's waterfowl hunters.

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