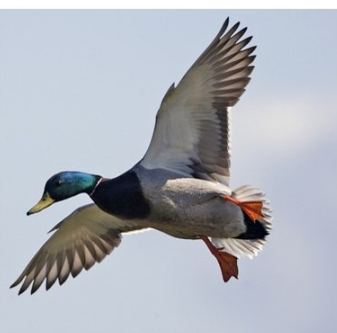


National Survey of Waterfowl Hunters: Summary Report Mississippi Flyway 2018



NATIONAL FLYWAY COUNCIL

Pacific est. 1952 - Central est. 1948 - Mississippi est. 1952 - Atlantic est. 1952



Migratory Bird
JOINT VENTURES



North American Waterfowl
Management Plan



A cooperative study completed by:

Minnesota Cooperative Fish and Wildlife Research Unit
University of Minnesota

And

The Ohio State University

for the

National Flyway Council

National Survey of Waterfowl Hunters: Summary Report Mississippi Flyway 2018

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Section 1. Introduction and Overview

BACKGROUND

In cooperation with the four Flyway Councils (Atlantic, Mississippi, Central, and Pacific), the North American Waterfowl Management Plan (NAWMP) Committee, and non-governmental agencies, the National Flyway Council (NFC) initiated the formation of a Human Dimensions Working Group (HDWG) to obtain and incorporate human dimensions information and approaches into migratory bird conservation programs, policies and practices.

The 2012 NAWMP Revision *Vision Statement* provides a new conception of waterfowl management that emphasizes a growing and supportive core of waterfowl hunters and an engaged conservation community inspired by waterfowl and wetlands. The goal is to have a public supportive of waterfowl and wetlands conservation that have strong emotional and pragmatic ties to waterfowl and wetlands.

To achieve this goal, NAWMP partners must engage both the traditional waterfowl hunting community and other nontraditional stakeholder groups who are interested in waterfowl and the conservation of waterfowl and wetlands. To facilitate this engagement, the NFC's HDWG and other NAWMP partners conducted a research study using both stakeholder and general public surveys of North Americans that can inform: 1) NAWMP objectives; 2) harvest objectives and strategies; 3) habitat management; and 4) public engagement strategies.

STUDY OBJECTIVES

This study had the following key objectives:

- 1) Assess what hunters and other waterfowl conservationists (i.e., birders) most desire from their natural resource-based management and social settings to inform NAWMP objectives and select habitat and population management alternatives.
- 2) Establish baseline measures that can be repeated to inform the development of a Public Engagement Strategy and monitor trends in achieving the NAWMP goal of "growing numbers of waterfowl hunters, other conservationists, and citizens who enjoy and actively support waterfowl and wetlands conservation."

- 3) Assess waterfowl hunters' and conservationists' knowledge, preferences, levels of use and support for waterfowl and wetlands conservation.
- 4) Assess the general publics' participation in waterfowl-associated recreation and how much they support waterfowl and wetlands conservation.
- 5) Assess the general publics' awareness and their perceptions regarding the importance of the benefits and values (i.e., Ecological Goods and Services - EGS) provided by waterfowl and wetlands conservation.
- 6) Assess waterfowl professionals' perspectives on the levels of waterfowl populations and habitats needed to support hunter and viewer use opportunities.

The expected outcomes of this study include:

- 1) Quantified measures of stakeholder preferences;
- 2) NAWMP objectives and management actions that can be directly informed by waterfowl and wetland stakeholders;
- 3) A focus on harvest management actions that will provide the greatest benefits in terms of stakeholder preferences within the context of what is biologically feasible.

This study was completed by a collaborative research team at the U.S. Geological Survey's Fort Collins Science Center, the Minnesota Cooperative Research Unit located at the University of Minnesota, and the University of Alberta.

STUDY DESIGN AND METHODS

Survey Questionnaires

The project included three surveys – a general public survey, a waterfowl hunter survey, and a birdwatcher survey. The general public survey was mailed to 5,000 individuals throughout the continental United States with a completed sample size target of 1,200. A separate summary report is available for that effort (U.S. Geological Survey 2017). Throughout the rest of this report the waterfowl hunter survey is referred to as the National Survey of Waterfowl Hunters (NSWH) and the birdwatcher survey is referred to as the North American Birdwatching Survey (NABS).

The stakeholder studies involved multiple phases and research activities. A core portion of the NSW and NABS involved discrete choice experiments (DCEs). The DCEs allow identification of key attributes and levels on those attributes that most influence hunter and viewer preferences for waterfowl hunting and viewing. The attributes used in the DCEs were identified through a series of workshops with stakeholders conducted by researchers from the U.S. Geological Survey Fort Collins Science Center.

Design and implementation of the U.S. stakeholder workshops began in November 2014 and was completed in June 2015. A total of 12 workshops with hunters and 12 with birdwatchers were completed in key geographic locations across the Flyways in the U.S. to provide a diverse representation of important ecological characteristics associated with these places and the social traditions associated with waterfowl hunting and viewing opportunities. A similar approach was taken in Canada. The primary outcome of the workshops was the identification of key attributes of waterfowl hunting and birdwatching experiences. This information was used in the design of the DCE in both the NSW and NABS studies.

The NSW and NABS were designed between June 2015 and September 2016. In addition to the stakeholder workshops, the survey design involved multiple workshops, meetings, and webinars, as well as reviews and comments from representatives of key partners. The core design team for the NSW included Human Dimensions Working Group members from the Atlantic, Mississippi, Central and Pacific Flyways. This team held multiple meetings and webinars to identify appropriate sampling and questionnaire design. In addition to achieving the previously identified objectives and implementing DCE on hunting and viewing preferences, the hunter and birdwatching surveys also include questions targeting three areas identified by the HDWG as important:

1. Decisions: Individual decisions to participate in viewing, hunting, and conservation are reflected in participation patterns. This series of questions would determine baseline participation levels in viewing, hunting, and conservation and offer the potential to identify stakeholder segments based on participation levels as well as types of participation.
2. Identity: Measures of identity formation will focus on determining the degree to which hunters, viewers, and conservationists have developed personal identities associated with an activity or social role. (i.e., the individual's progression in formation of their identity as a hunter, viewer, etc.).

3. Capacity: The NAWMP suggests the long-term sustainability of waterfowl and wetlands will depend on building support among and relevancy to a broader conservation constituency. In essence, it is a matter of maintaining or increasing (where possible) waterfowl populations, protect and restore habitat, and increase and improve upon the activities people enjoy that involve waterfowl and wetlands. Social science research suggests that institutional capacity can be thought of in terms of the social, political, economic, and human capital (“capital” can be defined as the available resources that can be used to effect action and outcomes).

Additionally, the NSWH in particular was designed to replicate key questions of interest to waterfowl managers from the 2005 National Duck Hunter Survey (NDHS) (NFC 2006), and address several key management questions specific to each of the four Flyways. Appendix A contains a copy of the NSWH, and a question-by-objective matrix that summarizes which objective was addressed by each survey item and that item’s source.

Sampling Design

The target population for the NSWH included all U.S. residents 18 years of age or older who had participated in waterfowl hunting during 2015. A subset of the 2015 Migratory Bird Harvest Information Program (HIP) database was used as the sample frame. The sampling design from the 2005 National Duck Hunter Survey (NDHS; National Flyway Council 2006) was used as a guide for sampling in the NSWH. However, the NDHS sampled only individuals who hunted ducks and harvested at least one duck during the year prior to the survey (2004). In the NSWH, all HIP registrants 18 years of age or older who hunted ducks, geese, sea ducks, or brant during 2015 *whether or not they actually bagged any birds* were included when possible. However, sampling procedures varied in 5 states due to errors in coding HIP information when collected at the state level (discussed below).

The Migratory Bird HIP (<https://www.fws.gov/birds/surveys-and-data/harvest-surveys/harvest-information-program.php>) is a method state wildlife agencies use to generate reliable estimates of hunting activity and the number of all migratory game birds harvested throughout the country. These estimates give biologists the information they need to make sound decisions concerning hunting seasons, bag limits, and population management. Individuals who hunt ducks, geese, brant, or other migratory birds are required to participate in HIP in every state in which they hunt migratory birds. When signing up, individuals must provide their name, address, and date of birth. In addition, HIP registrants are asked to voluntarily answer several

questions about their experience during the previous year's hunting season, including whether they hunted waterfowl (ducks, sea ducks, geese, or brant) and how many waterfowl they bagged. Each state collects information on the more than 1 million waterfowl hunters nationwide and provide those data to the U.S. Fish and Wildlife Service (FWS). The FWS uses the HIP database to conduct surveys to develop information about overall hunter activity and harvest estimates. The robust nature of the HIP database makes it an excellent sampling frame for other studies of waterfowl hunters.

Because the HIP information is collected and managed by the states, use of the data for contacting hunters requires permission from each state. In the NSWH, all 49 states involved in the study (excludes Hawaii) provided permission to sample up to 3,000 resident waterfowl hunters, 18 years of age or older, from their state's HIP data. In consultation with FWS Migratory Bird staff, a standard sampling protocol was developed, consisting of the following steps:

1) Limited the sample frame as:

- a) Hunters \geq 18 years old
- b) In-state hunters
- c) Active waterfowl hunters:
- d) Ducks bagged 0 or more;
- e) Geese bagged 0 or more;
- f) Sea ducks bagged 0 or more;
- g) Brant bagged 0 or more.

2) Limited states with problems

- a) Georgia – No registrations before August had valid stratification information for harvest. These were identified in the data set by having all strata coded as 6. Used only hunters with valid stratification.
- b) South Dakota – invalid stratification for the entire year. Drew simple random sample of entire data set of in-state hunters older than 18 years old.

c) Idaho, Texas, and West Virginia – lumped Did Not Hunt and bagged 0 in their bag coding. Included *only* successful hunters for these 3 states.

- 3) Removed records with known undeliverable addresses.
- 4) Randomized the order of the remaining records.
- 5) Conducted a simple random sample of the remaining hunter records with sample size of 3,000. For states with fewer than 3,000 registrations, all hunters were selected.
- 6) Corrected addresses based on information from previous mailing attempts.

A total of 138,948 hunter records were initially selected from the HIP records, with 3,000 in each of the 49 states except the following, which had less than that number of registrants: AK (723), CT (2,992), NH (2,479), NM (2,902), NV (2,441), RI (650), VT (2,769), and WV (992).

Following the 2005 NDHS (NFC 2006), the sample was stratified into 12 sub-regional strata across the four Flyways (table 1.1 and Figure 1.1). The target completed sample size was $n = 400$ in each substratum which would provide estimates within $\pm 5\%$ at the 95% confidence level, given an anticipated a response rate of 20% across the study after removing undeliverable addresses. Thus, each sub-regional stratum had an initial sample of $n = 2,100$ to achieve 400 completed surveys.

Within the sub-regions, random sample was drawn generally proportional to the number of waterfowl hunters in each state based on the average number of waterfowl hunters in each state as reported by the FWS in 2014 and 2015 (Raftovich, Chandler, and Wilkins. 2015). However, to achieve a minimum number of 40 respondents from each state, the minimum sample size drawn in any state was $n = 200$, even if the proportion of waterfowl hunters in a state was less than .095 for that region ($2100 * .095 = 200$). In order to select a minimum of $n = 200$ from all states and not exceed a sample size of $n = 2100$ in each sub-region, a disproportionately small sample was selected from states with relatively large populations of waterfowl hunters. In addition, 7 states (AR, FL, IN, MO, NC, SD, WI) requested oversampling in their state to ensure a minimum of 400 respondents in their state. For these states, the sample size was increased up to 2000, which provided an initial overall nationwide sample size of $n = 35,101$ (Table 1.2). In Arkansas, Florida and North Carolina, the target sample size of $n = 400$ was not achieved after 4 contacts, so the remaining 1000 waterfowl hunters in each of those states were contacted. In addition, response rates in Alabama, Arizona, Georgia,

Louisiana, Maine, Mississippi and Tennessee were low after 4 contacts, so an additional random sample was drawn in those states from the remaining names that had not been drawn for the initial sample in those states (Table 1.2).

Data Collection

Procedures outlined in Dillman, Smyth, and Christian (2014) for mixed-mode survey implementation using a four-contact postal mail implementation were adapted for this study. Waterfowl hunters were initially contacted via the US Postal Service with a letter that provided a brief explanation of the study and invited them to participate in the study by completing a survey on line (see Appendix for copies of the contact letters). The letters were printed on University of Minnesota letterhead from the Department of Fisheries, Wildlife and Conservation Biology, and mailed in #10 University of Minnesota envelopes. These letters and envelopes also included the logo of the state wildlife management agency for each relevant state.

The individuals were provided a web address with instructions on how to enter it into their browser along with a unique 6-digit access code which was required to begin the survey. Individuals were also provided an e-mail that they could contact to receive an automated reply e-mail with the same web address included as a link that they could click on to connect to the survey. A web-based survey was used to reduce costs and to facilitate the implementation of the DCE portion of the survey. Discrete choice experiments can be cumbersome to implement in tradition paper-and-pencil surveys due to their complexity of design and the amount of space required to present questions. Data were collected using Sawtooth Software's Lighthouse Studio (<https://www.sawtoothsoftware.com>). Sawtooth Software was chosen for data collection because it allows for the design, hosting, implementation, data collection and analysis of DCE data using Choice Based Conjoint (CBC) software.

Initial contact letters were mailed November 15th, 2016. Approximately 2 weeks later, a second contact letter containing the same information was mailed to everyone in the initial sample as a reminder to complete the survey. After updating the mailing list for undeliverable addresses, a third contact letter was sent the second week of January 2017 to everyone who had not yet completed the online survey. The caption "HUNTER STUDY" was printed in 16pt. Arial black font on the lower left side of the University of Minnesota envelopes used to mail the contact letter to encourage recipients to open the envelopes. We did not include state logos, but referenced their state's participation in the study in the contact letter. Also, a \$1 incentive was

included in contact letters during the third mailing in states for which the response rate was below 12 percent after two rounds of contact.

After updating the mailing list for additional undeliverable addresses, a fourth contact letter was sent the second week of February to all individuals who had not completed the survey online. This letter was more urgent and again referenced their state wildlife agency's support and interest in the study and was mailed in University of Minnesota envelope labeled "HUNTER STUDY".

By March 1, 2017, response rates in most states were at or above 20 percent. Data from all states were collected through March 20, 2017. By that date, 1,742 individuals were identified as having undeliverable addresses or deceased. Of the 33,359 living recipients with valid contact information a total of 7,689 individuals had at least partially completed the survey nationwide (23% response rate). There was a total of 25,670 non-respondents with apparent valid addresses remaining from the original 35,101.

Response rates varied across the states. For this reason, 4,500 more individuals were sampled from the 10 states described previously (AL, AR, AZ, FL, GA, LA, ME, MS, NC, TN, Table 1.2). Individuals were contacted using the exact protocols as with the initial sample except we included a \$1 incentive in the first round of mailing. All individuals in these 10 states were contacted twice—the 3rd week of February and the 1st week of March. For Florida and North Carolina, we obtained letterhead and envelopes from the wildlife agencies in those states and contacted individuals 2 additional times. Both Florida and North Carolina requested sample sizes of $n = 400$ and these additional contacts were made to attempt to obtain the desired sample size.

To conduct a non-response assessment, a proportional random sample of 16,000 was drawn from the 25,670 non-respondents remaining in the initial sample of 35,101. This sample was drawn proportional to the number of waterfowl hunters in each state. These 16,000 individuals were sent a shortened survey questionnaire the second week of April 2017, and asked to respond by mail. Completed non-response surveys were collected through May 31, 2017, and a total of 1,879 surveys were returned (11.7% response rate). Key questions concerning waterfowl hunting experiences, identity, and demographics were collected from non-respondents to assess if there are any substantive differences between people who completed the complete survey and those who did not respond to it. A summary of the non-response results are provide in Section 10 of the report.

Where appropriate we report results of statistical tests in summary tables. We use the following convention when reporting statistical significance for these tests: * $p \leq 0.05$, ** $p \leq 0.01$, and *** $p \leq 0.001$.

Table 1.1 Study stratification for sampling

Flyway	Sub-regions	States
Atlantic	Lower Atlantic	FL, GA, NC, SC
	Middle Atlantic	DE, MD, NJ, PA, VA, WV
	Upper Atlantic	CT, ME, MA, NH, NY, RI, VT
Mississippi	Lower Mississippi	AL, AR, LA, MS, TN
	Middle Mississippi	IL, IN, IA, KY, MO OH
	Upper Mississippi	MI, MN, WI
Central	Lower Central	NM, OK, TX
	Middle Central	CO, KS, NE, WY
	Upper Central	MT (ZIP 59000-59699), ND, SD
Pacific	Lower Pacific	AZ, NV, UT
	Middle Pacific	CA
	Upper Pacific	AK, ID, MT (ZIP 59700-599990), OR, WA

Figure 1.1 Flyway map



Table 1.2 Initial sample sizes for states within NSWH study

State	Initial Sample Size	Additional Sample	State	Initial Sample Size	Additional Sample	Final Sample Size
Alabama	200	100	Nevada	272		
			New			
Alaska	200		Hampshire	200		
Arizona	249	100	New Jersey	200		
Arkansas	2000	1000	New Mexico	200		
California	2000		New York	900		
			North			
Colorado	655		Carolina	2000	1000	
			North			
Connecticut	200		Dakota	1240		
Delaware	200		Ohio	321		
Florida	2000	1000	Oklahoma	342		
Georgia	433	400	Oregon	483		
Idaho	490		Pennsylvania	584		
Illinois	547		Rhode Island	200		
			South			
Indiana	2000		Carolina	462		
			South			
Iowa	265		Dakota	2000		
Kansas	719		Tennessee	200	100	
Kentucky	200		Texas	1558		
Louisiana	793	600	Utah	1578		
Maine	200	100	Vermont	200		
Maryland	523		Virginia	392		
Massachusetts	200		Washington	633		
			West			
Michigan	503		Virginia	200		
Minnesota	807		Wisconsin	2000		
Mississippi	200	100	Wyoming	200		
Missouri	2000			35101		
Montana	626					
Nebraska	526					
Total Sample				35101	4500	39601

Table 1.3 Unadjusted response rate by state

State	Initial + additional Sample Size	Response	Response Rate	State	Initial Sample Size	Response	Response Rate
Alabama	300	55	18.3%	Nevada	272	72	26.5%
Alaska	200	75	37.5%	New Hampshire	200	38	19.0%
Arizona	349	58	16.6%	New Jersey	200	49	24.5%
Arkansas	3000	438	14.6%	New Mexico	200	50	25.0%
California	2000	473	23.7%	New York	900	216	24.0%
Colorado	655	154	23.5%	North Carolina	3000	397	13.2%
Connecticut	200	55	27.5%	North Dakota	1240	259	20.9%
Delaware	200	42	21.0%	Ohio	321	97	30.2%
Florida	3000	386	12.9%	Oklahoma	342	71	20.8%
Georgia	833	91	10.9%	Oregon	483	111	23.0%
Idaho	490	117	23.9%	Pennsylvania	584	134	22.9%
Illinois	547	128	23.4%	Rhode Island	200	59	29.5%
Indiana	2000	539	27.0%	South Carolina	462	114	24.7%
Iowa	265	72	27.2%	South Dakota	2000	465	23.3%
Kansas	719	155	21.6%	Tennessee	300	50	16.7%
Kentucky	200	47	23.5%	Texas	1558	319	20.5%
Louisiana	1393	142	10.2%	Utah	1578	404	25.6%
Maine	300	26	8.7%	Vermont	200	46	23.0%
Maryland	523	110	21.0%	Virginia	392	107	27.3%
Massachusetts	200	54	27.0%	Washington	633	158	25.0%
Michigan	503	113	22.5%	West Virginia	200	44	22.0%
Minnesota	807	213	26.4%	Wisconsin	2000	503	25.2%
Mississippi	300	50	16.7%	Wyoming	200	46	23.0%
Missouri	2000	421	21.1%				
Montana	626	148	23.6%				
Nebraska	526	152	28.9%				
Total Sample					39601	8123	20.5%

Table 1.4 Non-response sample and return rate by state

State	Sample Size	Returns	Return Rate	State	Sample Size	Returns	Return Rate
Alabama	102	6	5.9%	Nevada	173	29	16.8%
Alaska	73	9	12.3%	New Hampshire	100	11	11.0%
Arizona	158	20	12.7%	New Jersey	102	13	12.7%
Arkansas	469	43	9.2%	New Mexico	62	8	12.9%
California	1334	150	11.2%	New York	647	86	13.3%
Colorado	420	57	13.6%	North Carolina	550	63	11.5%
Connecticut	100	16	16.0%	North Dakota	787	115	14.6%
Delaware	69	8	11.6%	Ohio	219	27	12.3%
Florida	215	10	4.7%	Oklahoma	230	24	10.4%
Georgia	275	20	7.3%	Oregon	319	29	9.1%
Idaho	325	35	10.8%	Pennsylvania	432	62	14.4%
Illinois	359	45	12.5%	Rhode Island	100	13	13.0%
Indiana	114	19	16.7%	South Carolina	293	20	6.8%
Iowa	178	23	12.9%	South Dakota	350	49	14.0%
Kansas	461	53	11.5%	Tennessee	92	10	10.9%
Kentucky	97	9	9.3%	Texas	1045	71	6.8%
Louisiana	542	32	5.9%	Utah	1002	117	11.7%
Maine	144	9	6.3%	Vermont	100	14	14.0%
Maryland	392	38	9.7%	Virginia	270	24	8.9%
Massachusetts	133	17	12.8%	Washington	415	51	12.3%
Michigan	319	58	18.2%	West Virginia	69	8	11.6%
Minnesota	512	100	19.5%	Wisconsin	501	80	16.0%
Mississippi	130	10	7.7%	Wyoming	114	17	14.9%
Missouri	371	33	8.9%				
Montana (P)	168	29	17.3%				
Montana (C)	229	40	17.5%				
Nebraska	339	49	14.5%				
Total Sample					16000	1879	11.7%

Section 2. Participation

HUNTING

Respondents reported on average that they began hunting waterfowl around age 20 (Table 2.1). There were significant but small differences between the substrata, with hunters starting at age 22 on average in the Middle Mississippi and 19 in the Lower Mississippi. Respondents also indicated their typical pursuits when waterfowl hunting, with most in the Middle (85%) and Upper (78%) reporting that they hunt both geese and ducks; analysis of this variable revealed significantly fewer respondents in the Lower Mississippi indicated hunting both geese and ducks (48%). Most respondents indicated hunting for waterfowl in 5 of the past 5 years (66-73%; Table 2.2) with significant but small differences between the substrata.

RECENT TRIP CHARACTERISTICS

Respondents were highly variable in the average number of days they reported having hunted per year in the past 5 years, with 5 days or less being the most frequent response in the Upper Mississippi (29%) and 11 to 20 days the most frequent response in the Lower and Middle Mississippi (28-30%; Table 2.3). Overall, respondents in the Upper Mississippi indicated spending significantly fewer days afield over the past 5 years. Respondents also indicated the number of days they hunted for waterfowl in 2015, on average spending 11-15 days afield, with significant but small differences between the flyway substrata (Table 2.4).

Most respondents reported a combination of self-planned trips and invited trips (65-69%; Table 2.5), while only 10-16% indicated that they only went if someone else invited them. This finding is likely driven by the high number of avid hunters in the respondent pool, indicating a level of comfort and familiarity with trip planning. There were significant but small differences between the substrata. Most respondents also indicated taking primarily day trips (66-81%; Table 2.6) with significant but small differences between the substrata; overnight or multi-day trips were more common in the Lower (21%) and Upper Mississippi (21%) than in the Middle Mississippi (9%).

Across the substrata, less than half of respondents indicated they had taken a person who had never been waterfowl hunting before, with respondents in the Lower Mississippi (46%) significantly more likely than those in the Middle (44%) or Upper Mississippi (36%) to introduce someone new to waterfowl hunting (Table 2.7). Respondents in the Middle Mississippi were more likely to report that they took a coworker waterfowl hunting for the first time (21%) when compared to the Lower (16%) or Upper Mississippi (11%; Table 2.8, 2.8a). Across the flyway substrata, children represented more than 60% of new hunters taken on a trip.

HARVEST

Respondents were highly variable in their estimates of duck harvest over the past 5 years, and differences between the substrata were significant (Table 2.9). Harvest appeared overall lower in the Upper Mississippi than in the Lower Mississippi, with 33% in the Upper reporting 5 ducks or less and 13% in the Lower reporting 5 ducks or less. Goose harvest was less variable than duck harvest for the Lower Mississippi, with most respondents reporting that they harvested 5 or less geese per year on average (62%), however, overall reports of goose harvest was significantly higher in the Middle and Upper Mississippi than in the Lower Mississippi (Table 2.10).

Table 2.1 Age at first waterfowl hunt and general pursuits

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How old were you when you started waterfowl hunting	Mean	18.7	22.2	19.2	19.8
	SD	12.42	14.01	12.49	12.29
	Valid N	711	1285	817	2806
Pursuits in waterfowl hunting	I hunt only ducks	40.2%	9.2%	10.5%	20.3%
	I hunt ducks and geese	48.0%	85.4%	77.5%	69.5%
	I hunt only geese	.3%	1.0%	3.4%	1.7%
	I hunt neither ducks nor geese	11.5%	4.4%	8.6%	8.5%
	Valid N	734	1304	829	2863
	Pursuits significance:	$\chi^2 (6) = 446.56^*$		Cramer's V = .28*	
	Age at start significance:	F (2, 2813) = 21.77*		$\eta^2 = .02$	

Table 2.2 Years hunted waterfowl of previous 5

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How many years of the last 5 years have you hunted waterfowl?	None	3.7%	.7%	2.1%	2.2%
	1 Year	5.1%	1.2%	2.9%	3.2%
	2 Years	8.1%	6.1%	6.8%	7.1%
	3 Years	9.2%	9.8%	11.7%	10.4%
	4 Years	7.4%	9.6%	9.3%	8.8%
	5 Years	66.4%	72.6%	67.1%	68.4%
	Valid N	649	1247	757	2619
Significance:		$\chi^2 (10) = 58.17^*$		Cramer's V= .11*	

Table 2.3 Average number of days per year hunting waterfowl

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Over the last five years, about how many days did you usually hunt waterfowl in a year?	5 days or less	21.0%	21.1%	28.8%	24.1%
	6 to 10 days	23.3%	23.0%	28.6%	25.3%
	11 to 20 days	28.0%	29.9%	26.9%	28.1%
	21 to 30 days	16.7%	14.6%	11.6%	14.1%
	More than 30 days	11.0%	11.5%	4.1%	8.4%
	Valid N	614	1226	738	2535
Significance:		$\chi^2 (8) = 58.74^*$		Cramer's V= .11*	

Table 2.4 Days hunted for waterfowl in 2015

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
During last year's (2015) waterfowl hunting season, how many days did you hunt for waterfowl?	Mean	13.6	14.5	10.8	12.8
	SD	13.50	15.51	10.12	13.07
	Valid N	567	1132	667	2320
Significance:		F (2, 2364) = 16.03*		$\eta^2 = .01$	

Table 2.5 Circumstances for hunting trip

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Under what circumstances do you typically go hunting?	When I plan the hunt myself	16.9%	19.2%	25.5%	20.9%
	When someone else invites me	15.5%	11.8%	9.8%	12.2%
	Both when I plan the hunt or someone else invites me	67.5%	69.0%	64.8%	66.9%
	Valid N	622	1232	732	2540
Significance:		$\chi^2 (4) = 25.15^*$		Cramer's V = .07*	

Table 2.6 Hunting trips primarily day trips or overnight trips

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Do you primarily take day trips or overnight/multi-day trips when you waterfowl hunt?	Primarily day trips	66.2%	81.4%	67.2%	70.9%
	Primarily overnight or multi-day trips	21.1%	8.9%	21.2%	17.6%
	Both about equally	12.7%	9.7%	11.6%	11.4%
	Valid N	619	1232	733	2537
Significance:		$\chi^2 (4) = 85.46^*$		Cramer's V = .13*	

Table 2.7 Recruit New Hunter Yes/No

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
During the past season did you take anyone waterfowl hunting who had never waterfowl hunted before?	Yes	46.0%	43.9%	36.2%	42.2%
	No	54.0%	56.1%	63.8%	57.8%
	Valid N	567	1180	695	2387
Significance:		$\chi^2 (2) = 15.36^*$		Cramer's V = .08*	

Table 2.8 Recruit new hunter

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Who was the new hunter you took last season?	My own children	27.1%	24.5%	22.6%	24.8%
	Related children	22.3%	18.1%	15.2%	18.6%
	Other children	28.3%	27.1%	23.0%	26.1%
	Adult close family	9.8%	13.3%	12.4%	11.8%
	Adult extended family	6.5%	10.9%	7.4%	8.2%
	Adult friend	42.3%	53.7%	51.7%	49.0%
	Co-worker	16.1%	21.4%	10.5%	15.8%
	Other	7.3%	6.3%	10.8%	8.2%
	Valid N	261	518	251	992

Table 2.8a Recruit new hunter significance tests

		Chi-Square	df	Cramer's V
Who was the new hunter you took last season?	My own children	1.57	2	.04
	Related children	4.95	2	.07
	Other children	2.41	2	.05
	Adult close family	1.90	2	.04
	Adult extended family	4.96	2	.07
	Adult friend	9.41*	2	.10*
	Co-worker	15.41*	2	.12*
	Other	4.82	2	.07

*p < 0.05

Table 2.9 Average yearly duck harvest

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Over the last five years, how many ducks did you harvest in a year on average?	5 or less	13.4%	26.5%	32.8%	24.6%
	Between 6 and 10	16.5%	18.9%	22.3%	19.4%
	Between 11 and 20	19.1%	26.2%	24.8%	23.3%
	Between 21 and 50	29.3%	20.3%	16.6%	21.9%
	More than 50	21.7%	8.0%	3.5%	10.9%
	Valid N	619	1222	714	2507
Significance:		$\chi^2 (8) = 212.57^*$		Cramer's V = .20*	

Table 2.10 Average yearly goose harvest

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Over the last five years, how many geese did you harvest in a year on average?	5 or less	61.6%	38.5%	39.2%	46.7%
	Between 6 and 10	15.5%	21.4%	21.5%	19.4%
	Between 11 and 20	11.2%	21.3%	17.9%	16.6%
	Between 21 and 50	6.5%	10.5%	11.7%	9.5%
	More than 50	5.3%	8.3%	9.7%	7.8%
	Valid N	334	1109	649	1971
Significance:		$\chi^2 (8) = 64.77^*$		Cramer's V = .12*	

Section 3. Satisfaction

SATISFACTION WITH DUCK HUNTING

The highest levels of satisfaction was reported on the number of ducks in the daily limit (\bar{x} = 3.7-3.8), and the lowest levels of satisfaction was with the number of ducks typically present during the hunting season (\bar{x} = 2.4-2.6; Table 3.1, .31a). While analyses revealed significant differences between the substrata for several items, effect sizes suggest that these are small (Table 3.1b).

REQUIREMENTS FOR A SATISFYING TRIP

For the Upper and Middle Mississippi, 67-68% of respondents indicated that they needed to harvest between 0-2 ducks to feel satisfied, while in the Lower Mississippi 37% of respondents were in the 0-2 range (Table 3.4); analyses suggest significant differences between the substrata in their harvest preferences. Distributions were more similar across the substrata for the smallest acceptable daily bag limit of ducks, where the most frequent response was any size bag limit for the Middle (33%) and Upper Mississippi (28%), and responses in the Lower Mississippi were split between any bag limit (26%) and 4 ducks minimum bag limit (22%). Analyses suggested these differences were significant but small (Table 3.5). Finally, the most frequent responses to the minimum number of duck hunting days that were acceptable was that they would hunt any number of days available (Lower: 32%; Middle: 34%; Upper: 31%) and there were no significant differences between the substrata (Table 3.6).

PERCEPTIONS RELATED TO CROWDING AND HUNTING PRESSURE

On average, respondents perceived crowding at hunting areas, hunting pressure, interference from other hunters, and lack of public places for waterfowl hunting to be slight to moderate problems (Table 3.7). Conflict with other hunters was rated as less of a problem in all regions of the Flyway. Overall, there were significant, but not substantive differences in ratings across the Flyway regions (Table 3.7a). About 1 in 4 of the hunters across the Flyway, reported that lack of

public places for waterfowl hunting was a severe to very severe problem in the places they hunt ducks the most (Table 3.7b).

Table 3.1 Satisfaction with hunting in most hunted state

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
The number of ducks you see during the season	2.8	1.24	613	2.7	1.23	1217	2.7	1.17	702	2.7	1.21	2481
The number of ducks you harvest during the season	2.8	1.22	613	2.7	1.15	1210	2.9	1.10	701	2.8	1.15	2474
The number of days in the duck season	3.3	1.19	612	3.0	1.24	1214	3.3	1.19	701	3.2	1.21	2475
The number of ducks in the daily limit	3.7	1.07	612	3.8	1.06	1212	3.8	1.04	696	3.7	1.06	2466
The number of ducks typically present during the hunting season	2.6	1.20	613	2.4	1.15	1216	2.5	1.13	701	2.5	1.16	2478
Quality of the habitat where you hunt	3.6	1.04	613	3.2	1.21	1212	3.3	1.15	701	3.4	1.14	2476
Your overall duck hunting experience	3.6	1.10	613	3.4	1.10	1218	3.5	1.08	703	3.5	1.09	2481

Scale from 1=Very dissatisfied to 5=Very satisfied

Table 3.1a Satisfaction with hunting response distribution

Item	Response					Valid N
	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	
The number of ducks you see during the season	17.5%	32.2%	19.6%	23.3%	7.3%	2481
The number of ducks you harvest during the season	13.6%	30.6%	26.8%	21.2%	7.7%	2474
The number of days in the duck season	9.8%	19.7%	30.0%	23.8%	16.7%	2475
The number of ducks in the daily limit	2.6%	8.4%	31.0%	27.8%	30.3%	2466
The number of ducks typically present during the hunting season	20.0%	35.6%	19.6%	19.6%	5.1%	2478
Quality of the habitat where you hunt	6.9%	15.9%	26.4%	33.8%	16.9%	2476
Your overall duck hunting experience	4.4%	16.5%	23.0%	38.7%	17.4%	2481

Table 3.1b Satisfaction with hunting in most hunted state ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	η^2
The number of ducks you see during the season	Between Groups	7.76	2.00	3.88	2.63	0.07	
	Within Groups	3731.89	2529.47	1.48			
	Total	3739.65	2531.47				0.00
The number of ducks you harvest during the season	Between Groups	12.56	2.00	6.28	4.75	0.01	
	Within Groups	3333.36	2521.38	1.32			
	Total	3345.91	2523.38				0.00
The number of days in the duck season	Between Groups	47.55	2.00	23.77	16.11	0.00	
	Within Groups	3724.13	2524.24	1.48			
	Total	3771.67	2526.24				0.01
The number of ducks in the daily limit	Between Groups	2.90	2.00	1.45	1.29	0.27	
	Within Groups	2820.79	2516.40	1.12			
	Total	2823.69	2518.40				0.00
The number of ducks typically present during the hunting season	Between Groups	21.48	2.00	10.74	8.05	0.00	
	Within Groups	3370.32	2527.22	1.33			
	Total	3391.80	2529.22				0.01
Quality of the habitat where you hunt	Between Groups	69.07	2.00	34.53	25.91	0.00	
	Within Groups	3362.48	2523.34	1.33			
	Total	3431.54	2525.34				0.02
Your overall duck hunting experience	Between Groups	13.99	2.00	6.99	5.85	0.00	
	Within Groups	3027.56	2530.36	1.20			
	Total	3041.55	2532.36				0.00

Table 3.2 Number of times hunter shot daily bag limit

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How many times did you shoot a limit of ducks/geese during last year's season (2015)?	Never	32.2%	43.7%	50.5%	42.6%
	On at least one of my hunts	23.3%	22.9%	21.7%	22.6%
	Occasionally on my hunts	29.2%	24.5%	19.9%	24.2%
	Most of my hunts	11.3%	7.0%	4.1%	7.3%
	Every time I hunted	.7%	.1%	0.0%	.2%
	I did not hunt in 2015	3.4%	1.9%	3.8%	3.1%
	Valid N	621	1233	736	2544
Significance:		$\chi^2 (10) = 79.23^*$		Cramer's V = .12*	

Table 3.3 Satisfaction and shooting daily bag limit

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How many times do you feel you need to shoot a daily bag limit of ducks/geese to have a satisfying season?	Never	28.3%	48.8%	54.6%	44.4%
	On at least one of my hunts	11.0%	15.8%	15.0%	13.9%
	Occasionally on my hunts	37.6%	28.2%	24.9%	30.0%
	Most of my hunts	19.4%	6.3%	4.8%	10.0%
	Every time I hunted	3.7%	.8%	.7%	1.7%
	Valid N	621	1229	735	2542
Significance:		$\chi^2 (8) = 209.31^*$		Cramer's V = .20*	

Table 3.4 Minimum number of ducks harvested per day to feel satisfied

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Minimum number of ducks you have to harvest in a day to feel satisfied?	0	11.5%	22.4%	22.7%	18.9%
	1	9.7%	21.0%	21.2%	17.3%
	2	15.9%	24.7%	23.1%	21.2%
	3	21.0%	17.1%	17.5%	18.5%
	4	23.4%	10.9%	9.3%	14.4%
	5	5.0%	1.9%	2.7%	3.2%
	6	8.3%	1.4%	2.8%	4.2%
	7	.9%	.3%	.4%	.5%
	>7	4.2%	.3%	.3%	1.6%
Valid N		596	1189	690	2424
Significance:		$\chi^2 (16) = 262.27^*$		Cramer's V = .23*	

Table 3.5 Smallest acceptable daily bag limit of ducks

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
What is the smallest daily bag limit you would accept before you would no longer hunt?	1 duck	3.10%	3.60%	3.00%	3.20%
	2 ducks	8.20%	11.30%	12.00%	10.50%
	3 ducks	18.70%	16.00%	22.00%	19.20%
	4 ducks	21.70%	22.00%	21.90%	21.90%
	5 ducks	6.80%	5.10%	5.30%	5.70%
	6 ducks	15.80%	8.90%	7.40%	10.60%
	I'll hunt with any size daily bag limit	25.6%	33.2%	28.4%	28.8%
	Valid N	613	1213	700	2474
Significance:		χ^2 (12)= 51.91*		Cramer's V= .10*	

Table 3.6 Minimum acceptable number of days for duck hunting

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
What is the minimum number of days in a waterfowl hunting season you would accept before you would no longer hunt?	10 days	1.70%	1.10%	1.80%	1.60%
	15 days	1.30%	1.10%	1.70%	1.40%
	20 days	4.60%	2.90%	4.20%	3.90%
	25 days	3.20%	1.90%	1.50%	2.20%
	30 days	13.60%	15.70%	16.70%	15.40%
	35 days	1.5%	1.9%	2.2%	1.9%
	40 days	8.70%	6.60%	6.20%	7.10%
	45 days	8.80%	8.40%	10.60%	9.40%
	50 days	6.90%	8.00%	5.10%	6.50%
	55 days	1.50%	1.00%	1.20%	1.30%
	60 days	16.70%	17.60%	17.50%	17.20%
	I'll hunt with any season length	31.6%	33.8%	31.3%	32.1%
	Valid N	612	1210	701	2472
Significance:		χ^2 (22)= 28.06		Cramer's V= .08	

Table 3.7 Perceptions of problems with crowding, hunting pressure, interference, and conflict

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Crowding at hunting areas	2.8	1.38	615	2.8	1.28	1225	2.5	1.15	728	2.7	1.28	2522
Hunting pressure	2.9	1.28	615	2.9	1.21	1223	2.6	1.16	730	2.8	1.23	2522
Interference from other hunters	2.6	1.31	612	2.5	1.19	1217	2.3	1.14	727	2.4	1.22	2511
Conflict with other hunters in places I hunt	2.0	1.21	612	1.9	1.08	1220	1.9	1.04	726	1.9	1.11	2512
Lack of public places for waterfowl hunting	2.5	1.34	612	2.8	1.41	1225	2.3	1.28	727	2.5	1.35	2517

Scale from 1=Not at all a problem, 2 = Slight problem, 3 = Moderate Problem, 4 = Severe Problem, 5=Very severe problem

Table 3.7a Perceptions of problems with crowding, hunting pressure, interference, and conflict ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	η^2
Crowding at hunting areas	Between Groups	64.48	2	32.24	19.95	0.001	0.02
	Within Groups	4145.44	2565	1.62			
	Total	4209.92	2567				
Hunting pressure	Between Groups	69.97	2	34.98	23.73	0.001	0.02
	Within Groups	3779.40	2564	1.47			
	Total	3849.36	2566				
Interference from other hunters	Between Groups	33.67	2	16.84	11.55	0.001	0.01
	Within Groups	3722.66	2553	1.46			
	Total	3756.34	2555				
Conflict with other hunters in places I hunt	Between Groups	9.45	2	4.72	3.92	0.02	0.0
	Within Groups	3078.47	2555	1.21			
	Total	3087.91	2557				
Lack of public places for waterfowl hunting	Between Groups	124.74	2	62.37	33.84	0.001	0.03
	Within Groups	4720.89	2561	1.84			
	Total	4845.63	2563				

Table 3.7b Perceptions of problems with crowding, hunting pressure, interference and conflict (Flyway Level)

Item	Response					Valid N
	Not at all	Slight Problem	Moderate Problem	Severe Problem	Very Severe Problem	
Crowding at hunting areas	23.3%	22.2%	27.6%	16.5%	10.3%	2517
Hunting pressure	19.1%	21.8%	32.0%	16.9%	10.2%	2522
Interference from other hunters	27.5%	28.1%	24.8%	12.1%	7.5%	2511
Conflict with other hunters in places I hunt	46.7%	26.9%	16.5%	5.8%	4.1%	2512
Lack of public places for waterfowl hunting	32.2%	20.4.3%	23.4%	12.6%	11.4%	2517

Section 4. Place

PREFERENCES

Nearly all respondents reported the Mississippi Flyway as their most hunted flyway (92-98%; Table 4.1), and most respondents reported hunting states within their own substrata (Table 4.2). There were large significant differences between the substrata in the states most frequently hunted, suggesting a strong tendency among hunters to stay within their flyway substrata. Most respondents in the Upper Mississippi (57%) reported using public lands and waters for waterfowl hunting, while in the Middle Mississippi (44%) and Lower Mississippi (38%), significantly fewer respondents used public lands and waters. Notably, 30% of respondents in the Middle reported using private property owned by a friend or another landowner who gave them permission to hunt for free (Table 4.3).

Respondents also indicated how important it was to them to hunt certain species in the Mississippi Flyway: diving ducks, mallards, other dabbling ducks, and geese. Overall, mallards received the highest average importance rating (\bar{x} = 3.8-4.1) and diving ducks received the lowest importance rating overall (\bar{x} = 2.3-2.9; Table 4.4). While there were significant differences between the substrata for some species, effect size suggest most were small, with the exception of geese, which received higher importance ratings in the Middle (\bar{x} = 3.6) and Upper (\bar{x} = 3.4) than they were in the Lower Mississippi (\bar{x} = 2.4; Table 4.4a).

ECOSYSTEM SERVICES

Overall, the highest average levels of concern across various ecological benefits were for hunting opportunities (\bar{x} = 3.6-3.7) and providing a home for wildlife (\bar{x} = 3.5-3.7; Table 4.5, 4.5a). Respondents reported the lowest level of concern for losing storage of greenhouse gases, such as carbon (\bar{x} = 2.4-2.7), scenic places for inspiration or spiritual renewal (\bar{x} = 2.6), and wildlife viewing and birdwatching opportunities (\bar{x} = 2.5-2.8). Analyses revealed significant but small differences across the substrata (Table 4.5b).

Though there were significant differences between the substrata for services of least concern, there was an overall consensus that storage of greenhouse gases (28-33%) or scenic places for

inspiration and spiritual renewal (26-32%) were of least concern (Table 4.6). Similarly, there were significant differences between the substrata for ecological services respondents were most concerned about losing, and most respondents were concerned with losing hunting opportunities (40-43%) or providing a home for wildlife in the Middle and Upper (24%), and flooding protection in the Lower Mississippi (15%; Table 4.7).

Table 4.1 Flyway hunted most in 2015

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
In which Flyway did you hunt most often last year (2015) or the year you last hunted?	Pacific Flyway	0.0%	0.0%	0.0%	0.0%
	Central Flyway	2.8%	1.7%	8.1%	4.5%
	Mississippi Flyway	96.9%	98.3%	91.9%	95.4%
	Atlantic Flyway	.3%	0.0%	0.0%	.1%
	Valid N	622	1235	734	2545
Significance:		$\chi^2 (4) = 60.08^*$		Cramer's V = .11*	

Table 4.2 State hunted waterfowl most over past 5 years

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
In which state or Canadian Province have you hunted waterfowl most often over the past 5 years?*	AL	6.7%	0.0%	0.0%	2.2%
	AR	36.5%	.7%	.5%	12.3%
	IA	0.0%	13.0%	0.0%	3.7%
	IL	0.0%	26.4%	.1%	7.6%
	IN	0.0%	8.4%	0.0%	2.4%
	KY	.2%	6.8%	0.0%	2.0%
	LA	37.5%	.4%	0.0%	12.4%
	MI	0.0%	.0%	23.2%	9.0%
	MN	0.0%	0.0%	32.0%	12.4%
	MO	.5%	26.3%	.1%	7.7%
	MS	11.1%	0.0%	0.0%	3.7%
	OH	0.0%	16.2%	0.0%	4.6%
	TN	5.5%	.1%	0.0%	1.8%
	WI	0.0%	.4%	35.5%	13.8%
	Valid N	622	1235	734	2545
Significance:		χ^2 (56)= 4943.68*		Cramer's V= .98*	

*States within flyway reported

Table 4.3 Public vs private lands waterfowl hunting

Please indicate where you do most of your waterfowl hunting:	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Public lands or waters	38.0%	43.9%	56.5%	46.8%
Private property owned by you, your family or in partnership with someone else	19.1%	15.1%	13.8%	15.9%
Private property owned by a friend or another landowner who give you permission to hunt for free	17.2%	30.3%	26.7%	24.6%
Private property you lease or pay to hunt on	19.3%	8.4%	1.7%	9.4%
Guest on private property someone else leases or pay to hunt on	6.5%	2.4%	1.2%	3.3%
Valid N	619	1235	730	2536
Significance:	$\chi^2 (8) = 208.34^*$		Cramer's V = .20*	

Table 4.4 Importance of hunting species in Mississippi

	Flyway substrata						Flyway ID					
	Lower Mississippi			Middle Mississippi			Upper Mississippi			Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Diving ducks	2.3	1.25	585	2.5	1.23	1205	2.9	1.36	667	2.6	1.31	2388
Mallards	4.1	1.08	592	4.0	1.08	1199	3.8	1.15	667	4.0	1.11	2394
Other dabbling ducks	3.8	1.05	596	3.6	1.19	1210	3.3	1.23	663	3.5	1.18	2399
Geese	2.4	1.31	583	3.6	1.28	1200	3.4	1.32	669	3.1	1.40	2384

Scale from 1=Not at all important to 5=Extremely important

Table 4.4a Importance of hunting species in Mississippi ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Diving ducks	Between Groups	117.08	2.00	58.54	36.21	0.00	
	Within Groups	3966.85	2453.78	1.62			
	Total	4083.93	2455.78				0.03
Mallards	Between Groups	30.19	2.00	15.09	12.50	0.00	
	Within Groups	2965.06	2454.96	1.21			
	Total	2995.25	2456.96				0.01
Other dabbling ducks	Between Groups	80.26	2.00	40.13	29.31	0.00	
	Within Groups	3374.93	2464.83	1.37			
	Total	3455.18	2466.83				0.02
Geese	Between Groups	544.26	2.00	272.13	161.36	0.00	
	Within Groups	4128.70	2448.06	1.69			
	Total	4672.97	2450.06				0.12

Table 4.5 Level of concern for ecological benefits

	Flyway substrata						Flyway ID					
	Lower Mississippi			Middle Mississippi			Upper Mississippi			Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Flooding Protection	3.2	.92	555	3.1	.92	1166	3.0	.97	688	3.1	.95	2352
Erosion Protection	3.3	.82	556	3.2	.85	1164	3.1	.90	687	3.2	.86	2351
Wildlife viewing and birdwatching	2.5	1.01	553	2.7	1.04	1162	2.8	1.02	686	2.7	1.03	2346
Hunting opportunities	3.7	.63	551	3.7	.61	1166	3.6	.64	686	3.7	.63	2345
Storage of greenhouse gases, such as carbon	2.4	1.03	552	2.6	1.05	1157	2.7	1.04	685	2.6	1.04	2340
Clean water	3.4	.82	556	3.5	.77	1167	3.5	.79	688	3.5	.79	2356
Clean air	3.4	.90	556	3.4	.84	1165	3.4	.85	688	3.4	.86	2355
Providing home for wildlife	3.5	.69	555	3.7	.60	1167	3.6	.68	688	3.6	.66	2354
Providing a home for animals such as butterflies and bees that pollinate plants and crops	3.2	.90	553	3.4	.79	1163	3.4	.82	688	3.3	.84	2349
Scenic places for inspiration or spiritual renewal	2.6	1.10	554	2.6	1.07	1158	2.6	1.10	683	2.6	1.09	2340

Scale from 1=Not at all concerned to 4=Very concerned

Table 4.5a Level of concern for ecological benefits response distribution

Item	Response				Valid N
	Not at all concerned	Slightly concerned	Somewhat concerned	Very concerned	
Flooding Protection	8.3%	16.8%	34.8%	40.1%	2352
Erosion Protection	5.0%	13.8%	35.1%	46.2%	2351
Wildlife viewing and birdwatching	15.9%	25.5%	32.4%	26.2%	2346
Hunting opportunities	1.3%	4.8%	20.3%	73.6%	2345
Storage of greenhouse gases, such as carbon	19.4%	27.7%	30.2%	22.7%	2340
Clean water	3.4%	8.9%	24.0%	63.7%	2356
Clean air	5.1%	9.8%	25.6%	59.5%	2355
Providing home for wildlife	1.4%	5.7%	24.5%	68.4%	2354
Providing a home for animals such as butterflies and bees that pollinate plants and crops	4.2%	12.3%	31.8%	51.7%	2349
Scenic places for inspiration or spiritual renewal	21.9%	25.8%	27.1%	25.2%	2340

Table 4.5b Level of concern for ecological benefits ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Flooding Protection	Between Groups	17.95	2.00	8.98	10.23	0.00	
	Within Groups	2110.67	2405.39	0.88			
	Total	2128.62	2407.39				.01
Erosion Protection	Between Groups	14.57	2.00	7.29	9.90	0.00	
	Within Groups	1769.10	2403.49	0.74			
	Total	1783.67	2405.49				.01
Wildlife viewing and birdwatching	Between Groups	22.18	2.00	11.09	10.52	0.00	
	Within Groups	2528.69	2398.34	1.05			
	Total	2550.87	2400.34				.01
Hunting opportunities	Between Groups	1.79	2.00	0.90	2.29	0.10	
	Within Groups	937.47	2399.71	0.39			
	Total	939.27	2401.71				.00
Storage of greenhouse gases, such as carbon	Between Groups	18.46	2.00	9.23	8.50	0.00	
	Within Groups	2597.08	2391.25	1.09			
	Total	2615.54	2393.25				.01
Clean water	Between Groups	2.32	2.00	1.16	1.87	0.15	
	Within Groups	1492.11	2408.81	0.62			
	Total	1494.43	2410.81				.00
Clean air	Between Groups	1.91	2.00	0.95	1.31	0.27	
	Within Groups	1756.86	2406.60	0.73			
	Total	1758.77	2408.60				.00
Providing home for wildlife	Between Groups	6.87	2.00	3.43	8.28	0.00	
	Within Groups	998.13	2407.19	0.41			
	Total	1005.00	2409.19				.01
Providing a home for animals such as butterflies and bees that pollinate plants and crops	Between Groups	17.55	2.00	8.77	12.84	0.00	
	Within Groups	1640.03	2401.14	0.68			
	Total	1657.58	2403.14				.01
Scenic places for inspiration or spiritual renewal	Between Groups	0.09	2.00	0.05	0.04	0.96	
	Within Groups	2818.97	2391.43	1.18			
	Total	2819.06	2393.43				.00

Table 4.6 Ecological services least concerned about losing

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Flooding Protection	5.5%	6.7%	11.0%	8.0%
Erosion Protection	2.7%	3.3%	4.3%	3.5%
Wildlife viewing and birdwatching	16.2%	14.0%	12.6%	14.1%
Hunting opportunities	4.5%	4.0%	4.0%	4.1%
Storage of greenhouse gases	33.1%	31.0%	27.8%	30.4%
Clean water	.9%	.9%	.8%	.9%
Clean air	2.2%	2.8%	2.6%	2.6%
Providing a home for wildlife	1.0%	.5%	.5%	.7%
Providing a home for butterflies and bees (pollinators)	8.1%	4.4%	4.9%	5.8%
Scenic places for inspiration and spiritual renewal	25.8%	32.4%	31.6%	30.0%
Valid N	541	1146	678	2310
Significance:	χ^2 (18)= 42.48*		Cramer's V= .10*	

Table 4.7 Ecological services most concerned about losing

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Flooding Protection	15.3%	11.5%	6.8%	10.9%
Erosion Protection	10.4%	3.7%	2.9%	5.5%
Wildlife viewing and birdwatching	.6%	1.6%	1.1%	1.1%
Hunting opportunities	41.7%	39.7%	43.3%	41.7%
Storage of greenhouse gases	.3%	.2%	.5%	.4%
Clean water	11.9%	14.9%	18.7%	15.4%
Clean air	3.0%	.7%	1.1%	1.6%
Providing a home for wildlife	15.0%	23.8%	23.6%	20.9%
Providing a home for butterflies and bees (pollinators)	1.1%	3.0%	1.2%	1.7%
Scenic places for inspiration and spiritual renewal	.6%	.9%	.9%	.8%
Valid N	545	1154	679	2322
Significance:	$\chi^2 (18) = 120.48^*$		Cramer's V = .16*	

Section 5. Discrete Choice Modeling of Waterfowl Hunting Trips

This study included a discrete choice experiment (DCE) examining the preferences of waterfowl hunters concerning different potential combinations of hunting experiences. Choice models present hypothetical scenarios to respondents to derive individuals' preferences for alternatives composed of multiple resource and management attributes (Adamowicz, Louviere, & Williams 1994; Louviere, Hensher, & Swait 2000; Oh et al. 2005). The approach depends on the imperfect relationship between behavioral intention and behavior (Ajzen & Fishbein 1980), yet allows estimation of the effects of all parameters of interest independently. Individuals are assumed to be utility maximizers, and respondents' choices reflect the perceived utility of the alternatives presented (McFadden 1981). Individual respondent choices reflect the personal utility of attributes and attribute levels, and are aggregated to estimate the utility of attributes and attribute levels in a population (McFadden 1981). In an economic sense, utility is simply a measure of the perceived usefulness of something to an individual. The degree to which someone chooses one circumstance over another provides the ability to measure its perceived usefulness, or utility, to that person. In general, the utility of an attribute level may be considered a reflection of relative desirability (Orme 2014).

Alternatives presented in this DCE consisted of five hunting related attributes:

- 1) Harvest:** The number of waterfowl you are likely to harvest in a day;
- 2) Access Effort:** How easy or difficult it is to get into, out of and around an area in order to hunt;
- 3) Length of Travel:** The time you have to travel one-way in order to hunt;
- 4) Quantity of Waterfowl:** The number of ducks/geese that you see in a day when hunting even if not in shooting range; and
- 5) Potential for Interference/Competition:** Competition from other hunters who might interfere with your hunt in some way such as making you feel crowded or competing for hunting spots or birds.

Response levels varied from 3 to 5 for each attribute (Table 5.1). In order to have adequate power to conduct this experiment, we developed 10 survey versions. In each, respondents were presented with 10 different hypothetical comparisons of birdwatching experiences and asked to choose one option. Each scenario included two hunting option choices plus a “none” (i.e., I would not go waterfowl hunting if these were my only choices). The background explanation of the DCE and an example of the choice scenarios are presented in Figures 5.1 and 5.2.

Results for the hierarchical Bayes model, including average utilities, or usefulness, for each attribute level, summarize the preferences of waterfowl hunters in Florida for different hunting experiences. The attribute importances (Table 5.2) provide a summary of how important each of the 5 attributes were in respondents’ choices.

The utilities of each level for each attribute are summarized in Table 5.3. The larger the range in the part-worth utilities (i.e. the average utilities across levels within that attribute) for an attribute, the more influential that attribute is on respondents’ choices and the greater the importance of that attribute. For example, harvest was the most influential attribute in the DCE, as indicated by the largest range in part-worth utilities (range in utilities = 136; Table 5.3). The set of part-worth utilities for each attribute is scaled to sum to zero, so some part-worth utilities are necessarily negative numbers for some levels. A negative part-worth utility does not mean that the level has a negative utility; but the larger the number, the higher the utility. This means that a large positive value has higher utility than a larger negative value.

In summary, the order of importance of the attributes is: 1) potential for interference/competition; 2) harvest; 3) length of travel; 4) quantity of waterfowl; and 5) access effort. The individual levels on the attributes that had the highest utility were: 1) harvesting 6 birds, 2) travel time of 30 minutes or 1 hour; and 3) no competition or low completion from other hunters. The lowest utilities were: 1) high competition from other hunters; 2) harvesting only 1 bird; and 3) a travel time of 4 hours.

Table 5.1 Possible trip choice characteristics in discrete choice experiment

Attribute	Possible levels
Harvest: The number of waterfowl you are likely to harvest in a day	<ul style="list-style-type: none"> - One bird - 3 birds - 6 birds
Access Effort: How easy or difficult it is to get into, out of and around an area in order to hunt	<ul style="list-style-type: none"> - Easy access that takes little effort - Moderate access that takes some effort - Difficult access that takes a lot of effort
Length of Travel: The time you have to travel one-way in order to hunt	<ul style="list-style-type: none"> - 30 minutes - 1 hour - 2 hours - 3 hours - 4 hours
Quantity of Waterfowl: The number of ducks/geese that you see in a day when hunting even if not in shooting range	<ul style="list-style-type: none"> - 25 birds or less - 50 birds - 250 birds - 500 birds - 1,000 birds or more
Potential for Interference/Competition: Competition from other hunters who might interfere with your hunt in some way such as making you feel crowded or competing for hunting spots or birds	<ul style="list-style-type: none"> - No competition - Low competition from other hunters - Moderate competition from other hunters - High competition from other hunters

Figure 5.1 Background for Discrete Choice Experiment (DCE) for waterfowl hunting

CBCIntro


WATERFOWL HUNTING CHOICES

Waterfowl hunting experiences can vary across many different areas and situations. You might hunt very near your home or drive a few hours away to hunt. You might hunt on public land for free or pay a daily or seasonal lease fee to hunt on private land. We are interested in knowing what experiences and conditions influence where you decide to hunt on a given trip. On the next few pages, we present 10 different hypothetical comparisons of waterfowl hunting trips you could choose to take. These trips vary on 5 conditions:

- 1) **Harvest:** The number of waterfowl you are likely to harvest in a day;
- 2) **Access Effort:** How easy or difficult it is to get into, out of and around an area in order to hunt;
- 3) **Length of Travel:** The time you have to travel one-way in order to hunt;
- 4) **Quantity of Waterfowl:** The number of ducks/geese that you see in a day when hunting even if not in shooting range; and
- 5) **Potential for Interference/Competition:** Competition from other hunters who might interfere with your hunt in some way such as making you feel crowded or competing for hunting spots or birds.

Some of these scenarios might seem unlikely to you, or neither option represents the places you currently hunt, but we are still interested in understanding which described hunts you would choose. Your opinions about these comparisons will help waterfowl managers better understand waterfowl hunter preferences.

For each scenario, select the one choice you would make if these were your only hunting options and assuming all other conditions were the same.




0%  100%

Figure 5.2 Example of choice scenario for waterfowl hunting DCE

HunterDC_Random1

If these were your only options for a waterfowl hunt, which would you choose?
Choose by clicking one of the buttons below:

(1 of 10)

	Option 1	Option 2	WOULD NOT GO
Harvest: Number of waterfowl you likely harvest in a day	One bird	3 birds	NONE: I would not go waterfowl hunting if these were my only choices.
Access Effort: How easy or difficult it is to get into, out of and around an area in order to hunt	Easy access that takes little effort	Moderate access that takes some effort	
Length of Travel: The time you have to travel one-way in order to hunt	3 hours	30 minutes	
Quantity of Waterfowl: The number of ducks/geese that you see in a day when hunting even if not in shooting range	50 birds	1,000 birds or more	
Potential for Interference/Competition: Competition from other hunters who might interfere with your hunt	High competition from other hunters	Moderate competition from other hunters	
Choose one option	HunterDC_Random1=1 <input type="radio"/>	HunterDC_Random1=2 <input type="radio"/>	HunterDC_Random1=3 <input type="radio"/>

▶

0% 100%

Table 5.2 Relative attribute importance derived from hierarchical Bayes estimation of utilities for waterfowl hunting DCE

Season choice attribute	Importances	SD
Harvest	25.87	11.37
Access Effort	10.06	4.88
Length of Travel	24.56	11.49
Quantity of Waterfowl	13.23	5.96
Potential for Interference/Competition	26.28	12.15

Notes: n = 871

Table 5.3 Results of the hierarchical Bayes model for waterfowl hunting DCE using zero-centered differences.

Choice attribute - level	Average utilities	SD
Harvest		
One bird	-70.82	33.67
3 birds	16.60	11.65
6 birds	54.22	31.92
Access Effort		
Easy access that takes little effort	16.07	13.29
Moderate access that takes some effort	10.51	12.72
Difficult access that takes a lot of effort	-26.58	18.69
Length of Travel		
30 minutes	51.99	36.07
1 hour	41.50	25.61
2 hours	-1.77	12.94
3 hours	-30.02	27.22
4 hours	-61.70	34.43
Quantity of Waterfowl		
25 birds or less	-29.91	18.80
50 birds	-12.76	13.43
250 birds	1.85	11.97
500 birds	10.70	13.20
1,000 birds or more	30.12	19.77
Potential for Interference/Competiton		
No competition	40.35	28.54
Low competition from other hunters	37.64	19.68
Moderate competition from other hunters	4.95	13.54
High competition from other hunters	-82.93	40.62
None	-47.02	116.72

Notes: n = 871

Section 6. Policy and Regulatory Preferences

PRIORITIES

The policy objective receiving the highest average priority rating was having the largest duck populations possible (\bar{x} = 4.2-4.3), and the lowest average rating was for having the largest bag limits possible (\bar{x} = 2.7-3.1; Table 6.1, 6.1a). Analyses revealed significant differences between the substrata but effect sizes suggest that these were small (Table 6.1b). Respondents were also asked to rank their top 3 highest priority objectives of those listed, with having the largest duck populations possible ranked first more frequently than any other objective across substrata (Table 6.2).

PERCEPTION OF EXISTING POLICY

Overall, respondents felt that current bag limits were neither difficult to understand (80-84%) nor difficult to comply with in the field (71-78%; Table 6.3), and differences were significant but small. Respondents were also asked about their preferred scenario for bag limits of duck species with typically small bag limits, and respondents were split in their response with significant differences between the substrata (Table 6.3). Respondents in the Upper Mississippi were more supportive of creating simpler regulations (56%) than in the Lower (41%) or Upper (44%) Mississippi.

FLYWAY-SPECIFIC REGULATORY PREFERENCES

Responses to most of the policy questions were highly variable. Responses were split on the favored approach for setting bag limits for duck species other than mallards (Table 6.4.). The most preferred season length/bag limit tended towards more days and fewer ducks in the Middle and Upper Mississippi, and fewer days and more ducks in the Lower Mississippi, though this trend was not significant (Table 6.4). Around half of the respondents in each substrata indicated acceptance of a lower daily bag limit of 4 ducks per day if they could harvest 4 ducks of any kind (44-54%; Table 6.6). Most respondents (63-69%) indicated that the drake mallard

bag limit over the past 5 years was about right (Table 6.7). On the question of the preferred liberal season, the most frequent response was to maintain the length of 60 days (43-49%; Table 6.8).

Table 6.1 Preferred agency priorities for duck hunting regulations

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Having the largest bag limits possible	3.1	.99	597	2.8	.90	1207	2.7	.92	719	2.8	.95	2475
Having the longest seasons possible	3.5	1.04	596	3.8	.94	1207	3.6	.96	718	3.6	.99	2472
Having the largest duck populations possible	4.3	.85	592	4.3	.79	1205	4.2	.81	718	4.2	.82	2467
Avoiding different season lengths for different duck species	3.4	1.16	597	3.5	1.13	1202	3.5	1.16	717	3.5	1.15	2470
Providing the simplest regulations possible	3.9	1.00	591	3.9	.99	1196	3.9	.98	715	3.9	.99	2455
Reducing the number of species-specific bag limits	3.1	1.05	597	3.0	1.09	1205	3.0	1.04	719	3.0	1.06	2474
Having the largest drake mallard bag limits possible	3.2	1.07	597	3.2	1.07	1208	3.0	.97	720	3.1	1.03	2477
Scale from 1=Very low to 5=Very high												

Table 6.1a Preferred agency priorities for duck hunting regulations response distribution

Item	Response					Valid N
	Very low	Low	Moderate	High	Very high	
Having the largest bag limits possible	8.2%	25.6%	46.9%	13.9%	5.4%	2475
Having the longest seasons possible	2.6%	8.3%	35.5%	32.8%	20.7%	2472
Having the largest duck populations possible	0.7%	1.4%	16.4%	36.7%	44.9%	2467
Avoiding different season lengths for different duck species	5.9%	12.6%	32.4%	25.7%	23.4%	2470
Providing the simplest regulations possible	1.7%	5.7%	26.5%	32.3%	33.8%	2455
Reducing the number of species-specific bag limits	7.9%	20.3%	41.9%	20.0%	9.8%	2474
Having the largest drake mallard bag limits possible	6.3%	18.6%	43.3%	20.9%	10.9%	2477

Table 6.1b Preferred agency priorities for duck hunting regulations ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Having the largest bag limits possible	Between Groups	51.76	2.00	25.88	29.95	0.00	
	Within Groups	2177.49	2520.16	0.86			
	Total	2229.25	2522.16				.02
Having the longest seasons possible	Between Groups	37.68	2.00	18.84	20.03	0.00	
	Within Groups	2367.86	2517.65	0.94			
	Total	2405.54	2519.65				.02
Having the largest duck populations possible	Between Groups	2.90	2.00	1.45	2.19	0.11	
	Within Groups	1660.59	2512.66	0.66			
	Total	1663.48	2514.66				.00
Avoiding different season lengths for different duck species	Between Groups	3.46	2.00	1.73	1.32	0.27	
	Within Groups	3298.98	2513.49	1.31			
	Total	3302.44	2515.49				.00
Providing the simplest regulations possible	Between Groups	2.53	2.00	1.27	1.30	0.27	
	Within Groups	2438.04	2498.44	0.98			
	Total	2440.57	2500.44				.00
Reducing the number of species-specific bag limits	Between Groups	5.43	2.00	2.71	2.40	0.09	
	Within Groups	2848.58	2518.15	1.13			
	Total	2854.00	2520.15				.00
Having the largest drake mallard bag limits possible	Between Groups	22.19	2.00	11.10	10.26	0.00	
	Within Groups	2727.67	2521.79	1.08			
	Total	2749.86	2523.79				.01

Table 6.2 Ranked top 3 highest priority regulations

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Having the largest bag limits possible	First	22.9%	15.7%	14.7%	18.4%
	Second	29.5%	29.7%	28.0%	29.1%
	Third	47.6%	54.7%	57.3%	52.5%
	Valid N	246	373	178	789
Having the longest seasons possible	First	33.1%	44.1%	31.9%	36.2%
	Second	46.4%	40.9%	47.1%	44.8%
	Third	20.5%	15.0%	21.1%	18.9%
	Total	355	893	453	1609
Having the largest duck populations possible	First	65.3%	62.7%	70.5%	66.6%
	Second	23.3%	23.2%	20.0%	22.0%
	Third	11.4%	14.1%	9.4%	11.4%
	Valid N	479	915	571	1947
Avoiding different season lengths for different duck species	First	9.3%	13.2%	13.0%	12.1%
	Second	37.4%	35.3%	40.2%	38.2%
	Third	53.3%	51.5%	46.7%	49.7%
	Valid N	129	304	234	667
Providing the simplest regulations possible	First	15.6%	9.9%	16.6%	14.5%
	Second	35.9%	36.7%	34.1%	35.3%
	Third	48.6%	53.4%	49.3%	50.2%
	Valid N	246	560	394	1189
Reducing the number of species-specific bag limits	First	6.3%	8.9%	11.2%	9.0%
	Second	26.9%	31.4%	34.4%	31.2%
	Third	66.7%	59.7%	54.4%	59.8%
	Valid N	104	179	133	423
Having the largest drake mallard bag limits possible	First	17.4%	13.8%	9.8%	13.9%
	Second	37.2%	38.3%	34.7%	36.8%
	Third	45.4%	47.9%	55.5%	49.4%
	Valid N	138	281	118	508

Table 6.3 Bag limits difficult to comply with and preferred bag limits for species with small bags

		Flyway substrata			Flyway ID
		Lower Miss.	Middle Miss.	Upper Miss.	Miss.
Are rules for current species-specific bag limits difficult to understand?	Yes	15.8%	16.9%	19.8%	17.7%
	No	84.2%	83.1%	80.2%	82.3%
	Valid N	574	1183	706	2412
Are the current species-specific bag limits difficult to comply with in the field	Yes	23.5%	22.0%	29.2%	25.3%
	No	76.5%	78.0%	70.8%	74.7%
	Valid N	572	1182	705	2408
Preferred scenario for bag limits of duck species that typically have smaller bag limits	Maximize harvest opportunity by maintaining individual species bag limits	58.7%	56.4%	44.1%	52.3%
	Create simpler regulations by creating aggregate bag limits for a combination of certain species	41.3%	43.6%	55.9%	47.7%
	Valid N	572	1177	701	2400
Rules difficult to understand significance:		$\chi^2 (2) = 4.02$		Cramer's V = .04	
Limits difficult to comply with significance:		$\chi^2 (2) = 12.30^*$		Cramer's V = .07*	
Preferred scenario significance:		$\chi^2 (2) = 35.33^*$		Cramer's V = .12*	

Table 6.4 Preferred approach for bag limits for ducks other than mallards

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Approach favored for setting bag limits for duck species other than mallards	Simpler regulations: 6-bird, 3-bird, 1 bird	41.4%	42.3%	44.3%	42.7%
	Offer largest bag limit possible for every duck species	36.7%	38.5%	32.7%	35.7%
	No preference	22.0%	19.2%	23.0%	21.5%
	Valid N	550	1159	641	2279
Significance:		χ^2 (4)= 7.86		Cramer's V= .04	

Table 6.5 Most preferred season length/bag limit

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Most preferred	23 days, 4 ducks	41.6%	22.8%	25.9%	30.0%
	30 days, 3 ducks	40.2%	41.3%	43.7%	41.9%
	37 days, 2 ducks	18.2%	35.9%	30.4%	28.1%
	Valid N	449	945	537	1878
Significance:		χ^2 (4)= 71.92*		Cramer's V= .14*	

Table 6.6 Acceptability lower daily bag limit of 4 ducks of any kind

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Would you accept a lower daily bag limit of 4 ducks per day if you could harvest 4 ducks of any kind	Yes	43.7%	46.9%	53.9%	48.5%
	No	29.4%	23.6%	13.8%	21.8%
	Does not matter to me	26.9%	29.5%	32.3%	29.7%
	Valid N	550	1159	638	2275
Significance:		$\chi^2 (4) = 44.04^*$		Cramer's V = .10*	

Tale 6.7 Perception of drake mallard daily bag limit in past 5 years

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How do you feel about the drake mallard bag limit over the last 5 years	Drake mallard daily bag limit too low	10.6%	11.8%	5.7%	9.1%
	Drake mallard daily bag limit about right	63.3%	68.7%	63.1%	64.8%
	Drake mallard daily bag limit too high	2.3%	1.2%	2.4%	2.0%
	No opinion	23.9%	18.3%	28.9%	24.1%
	Valid N	551	1161	638	2279
Significance:		$\chi^2 (6) = 44.50^*$		Cramer's V = .10*	

Table 6.8 Most preferred liberal season

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Liberal season length most preferred	Reduce from 60 to 53 days	14.6%	9.9%	18.0%	14.5%
	Maintain 60 days	48.7%	47.5%	44.3%	46.7%
	Increase from 60 to 74 days	22.7%	32.6%	22.6%	25.6%
	No preference	14.0%	10.0%	15.1%	13.2%
	Valid N	549	1159	638	2274
Significance:		χ^2 (6)= 54.39*		Cramer's V= .11*	

Section 7. Avidity

Avidity can refer to several aspects of a recreational experience (Scott and Shafer 2001)—here, it was assessed via the respondents' involvement and identification with conservation groups and the centrality or importance of hunting for the individual. Respondents described their level of involvement with Delta Waterfowl, Ducks Unlimited, and their regional or state waterfowl association, and most indicated no involvement with Delta Waterfowl (67-87%; Table 7.1), though involvement was more frequently reported in the Lower Mississippi than elsewhere. Involvement with Ducks Unlimited was more varied, with respondents in the Middle Mississippi less likely to indicate no involvement (38%), compared to the Lower (50%) or Middle Mississippi (48%), and analyses suggest these differences are significant but small (Table 7.2). Most respondents also indicated no involvement with their regional or state waterfowl association, with no differences between the substrata (79-81%; Table 7.3).

Respondents indicated the degree to which they identify with each of 5 different identities relevant to waterfowl management (birdwatcher, duck hunter, goose hunter, other type of hunter, or conservationist). Respondents on average most identified as a conservationist (\bar{x} = 3.8-4.1) or duck hunter (\bar{x} = 3.9-4.1) and least identified as a birdwatcher (\bar{x} = 2.4-2.7; Table 7.4, 7.4a). Analyses revealed significant differences between the substrata, but effect sizes were small. One notable difference was that the level of identification as a goose hunter was lower in the Lower Mississippi (\bar{x} = 2.5) than in the Middle (\bar{x} = 3.6) or Upper Mississippi (\bar{x} = 3.4; Table 7.4b).

Respondents could indicate their agreement with a series of statements related to waterfowl hunting, with the highest average agreement with the statement, "Waterfowl hunting is one of the most enjoyable activities I do," (\bar{x} = 4.1-4.2; Table 7.5, 7.5a). The lowest average agreement was with the statement, "If I couldn't go waterfowl hunting I am not sure what I would do instead," (\bar{x} = 2.6-2.8). Analyses revealed significant differences between the substrata, but effect sizes were small (Table 7.5b).

Table 7.1 Involvement: Delta Waterfowl

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
No involvement	66.5%	83.1%	87.0%	79.1%
Slight involvement	21.8%	10.5%	9.8%	13.9%
Moderate involvement	10.6%	4.8%	2.7%	5.9%
High involvement	1.1%	1.6%	.5%	1.0%
Valid N	526	1052	616	2150
Significance:	χ^2 (6)= 96.48*		Cramer's V= .15*	

Table 7.2 Involvement: Ducks Unlimited

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
No involvement	49.6%	37.8%	48.0%	45.5%
Slight involvement	33.8%	38.4%	38.0%	36.8%
Moderate involvement	13.8%	16.6%	11.0%	13.5%
High involvement	2.8%	7.2%	3.1%	4.2%
Valid N	555	1169	685	2350
Significance:	χ^2 (6)= 51.67*		Cramer's V= .10*	

Table 7.3 Involvement: Regional or State Waterfowl Association

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
No involvement	80.7%	81.2%	78.5%	80.0%
Slight involvement	12.7%	12.6%	15.5%	13.8%
Moderate involvement	5.9%	4.7%	5.0%	5.2%
High involvement	.7%	1.5%	1.0%	1.1%
Valid N	503	1031	633	2131
Significance:	χ^2 (6)= 6.25		Cramer's V= .04	

Table 7.4 Social Identity

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Identify yourself as a Birdwatcher	2.4	1.10	551	2.6	1.16	1159	2.7	1.17	684	2.6	1.16	2339
Identify yourself as a Duck Hunter	4.1	.95	563	4.0	.95	1171	3.9	1.04	693	4.0	.99	2374
Identify yourself as Goose Hunter	2.5	1.23	554	3.6	1.14	1168	3.4	1.13	693	3.2	1.25	2361
Identify yourself as an Other type of hunter	3.9	1.17	553	3.9	1.06	1173	4.1	1.00	686	3.9	1.08	2352
Identify yourself as a Conservationist	3.8	1.03	556	4.1	.91	1165	4.0	1.00	687	4.0	.99	2353
Scale from 1=Not at all to 5=Very strongly												

Table 7.4a Level of social identification with group types response distribution

Item	Response					Valid N
	Not at all	Slightly	Moderately	Strongly	Very strongly	
Identify yourself as a Birdwatcher	20.9%	28.3%	29.6%	14.9%	6.3%	2339
Identify yourself as a Duck Hunter	1.1%	7.1%	22.3%	31.5%	38.0%	2374
Identify yourself as Goose Hunter	10.2%	22.6%	27.6%	20.9%	18.8%	2361
Identify yourself as an Other type of hunter	3.7%	7.2%	16.9%	35.0%	37.2%	2352
Identify yourself as a Conservationist	1.6%	6.4%	21.2%	33.3%	37.5%	2353

Table 7.4a Social Identity ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Identify yourself as a Birdwatcher	Between Groups	42.79	2.00	21.39	16.11	0.00	
	Within Groups	3175.12	2391.15	1.33			
	Total	3217.90	2393.15				.01
Identify yourself as a Duck Hunter	Between Groups	11.62	2.00	5.81	6.07	0.00	
	Within Groups	2321.12	2424.20	0.96			
	Total	2332.74	2426.20				.00
Identify yourself as Goose Hunter	Between Groups	468.56	2.00	234.28	174.90	0.00	
	Within Groups	3231.89	2412.80	1.34			
	Total	3700.45	2414.80				.13
Identify yourself as an Other type of hunter	Between Groups	15.93	2.00	7.96	6.98	0.00	
	Within Groups	2750.19	2409.29	1.14			
	Total	2766.11	2411.29				.01
Identify yourself as a Conservationist	Between Groups	37.18	2.00	18.59	19.99	0.00	
	Within Groups	2237.52	2405.40	0.93			
	Total	2274.70	2407.40				.02

Table 7.5 Centrality of waterfowl hunting

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Waterfowl hunting is one of the most enjoyable activities I do	4.2	.86	568	4.2	.87	1180	4.1	.87	696	4.2	.87	2388
Most of my friends are in some way connected with waterfowl hunting	3.8	1.00	569	3.5	1.05	1177	3.3	1.07	695	3.5	1.06	2387
Waterfowl hunting has a central role in my life	3.4	1.09	569	3.5	1.14	1175	3.3	1.16	695	3.4	1.13	2386
A lot of my life is organized around waterfowl hunting	3.1	1.15	569	3.2	1.19	1174	3.0	1.18	695	3.1	1.18	2385
If I couldn't go waterfowl hunting I am not sure what I would do instead	2.7	1.26	569	2.8	1.27	1177	2.6	1.24	695	2.7	1.26	2387

Scale from 1=Strongly disagree to 5=Strongly agree

Table 7.5a Centrality of waterfowl hunting response distribution

Item	Response					Valid N
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Waterfowl hunting is one of the most enjoyable activities I do	0.9%	3.3%	13.9%	38.0%	43.8%	2388
Most of my friends are in some way connected with waterfowl hunting	3.0%	16.7%	23.6%	39.1%	17.5%	2387
Waterfowl hunting has a central role in my life	4.5%	19.1%	29.2%	27.5%	19.6%	2386
A lot of my life is organized around waterfowl hunting	7.7%	25.1%	30.3%	21.4%	15.5%	2385
If I couldn't go waterfowl hunting I am not sure what I would do instead	17.4%	32.9%	22.7%	14.8%	12.2%	2387

Table 7.5b Centrality of waterfowl hunting ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Waterfowl hunting is one of the most enjoyable activities I do	Between Groups	3.96	2.00	1.98	2.63	0.07	0.00
	Within Groups	1833.67	2439.74	0.75			
	Total	1837.63	2441.74				
Most of my friends are in some way connected with waterfowl hunting	Between Groups	57.25	2.00	28.62	26.18	0.00	0.02
	Within Groups	2665.18	2437.97	1.09			
	Total	2722.43	2439.97				
Waterfowl hunting has a central role in my life	Between Groups	9.20	2.00	4.60	3.57	0.03	0.00
	Within Groups	3138.75	2435.81	1.29			
	Total	3147.95	2437.81				
A lot of my life is organized around waterfowl hunting	Between Groups	21.76	2.00	10.88	7.85	0.00	0.01
	Within Groups	3373.71	2434.28	1.39			
	Total	3395.47	2436.28				
If I couldn't go waterfowl hunting I am not sure what I would do instead	Between Groups	7.53	2.00	3.77	2.36	0.09	0.00
	Within Groups	3882.10	2437.97	1.59			
	Total	3889.63	2439.97				

Section 8. Engagement

PARTICIPATION IN NON-HUNTING ACTIVITIES

Respondents reported most often voting for candidates or ballot issues to support wetlands or waterfowl conservation (\bar{x} = 2.4; Table 8.1, 8.1a), and least often contacting elected officials or government agencies about wetlands and waterfowl conservation (\bar{x} = 1.4-1.5). While analyses revealed significant differences between the substrata on several items, effect sizes suggest differences were small (Table 8.1b).

Across substrata, 90% or more respondents reported spending time in nature away from home, participating in backyard/at-home nature activities, or fishing, while over 80% reported hunting any other game animals in the past 12 months (Table 8.2). Responses to hunting other game birds was significantly different between the substrata, with 58% selecting this activity in the Lower Mississippi, compared to 83% in the Middle Mississippi and 88% in the Upper Mississippi (Table 8.2a). Additionally, responses to hunting migratory birds other than waterfowl was significantly different between the substrata, with 52% selecting this activity in the Upper Mississippi, compared to 74% in the Middle and the Upper Mississippi.

Most respondents in each flyway substrata reported watching birds at their home in the past 12 months (86-91%) and watching birds away from home in the past 12 months (67-73%; Table 8.3). Installing or maintaining nest boxes for birds was significantly less reported in the Lower Mississippi (38%) than in either the Middle (45%) or Upper Mississippi (50%; Table 8.3a), but these differences were small.

COMMUNITY

We used a social network approach to understand the diversity of relationships and connections that individuals have in their personal networks (Harshaw and Tindall 2005; Lin, Fu & Hsung 2001). Respondents were presented with a list of 24 avocational, occupational, and organizational structural positions and asked what relationship if any they had with the position through an acquaintance, close friend, relative, or self. The percentage of respondents

reporting ties to the positions at each level of relationship are summarized in Tables 8.4a through 8.4f.

TRUST

Respondents were asked to rate their trust (1 = Do not trust at all to 5 = Trust completely) in several governmental institutions. Trust was highest in waterfowl hunting/conservation organizations (\bar{x} = 3.2-3.6; Table 8.5, 8.5a), and was lowest for elected officials (\bar{x} = 1.9-2.1). While analyses revealed significant differences between the substrata on several items, effect sizes suggest these were small (Table 8.5b).

SUPPORT

Monetary support for conservation can take the form of donations, permit purchases, and fees. Respondents were asked about their previous support in the past year to wetland or waterfowl conservation, conservation of other birds, birdwatching and related issues, and waterfowl hunting. Possible responses to this item were \$0, less than \$250, \$250-\$999, \$1000-\$2499, \$2500-\$4999, \$5000-\$9999, and \$10,000 or more. Because of the non-normal distribution of donations (see Tables 8.5b-8.6e), responses were dichotomized as \$0 donation or more than \$0. Expectedly, most respondents reported having donated to waterfowl hunting (87-90%; Table 8.6), as well as wetland or waterfowl conservation (82-89%). Few reported donating to causes related to birdwatching and related issues (10-12%). Analyses revealed significant but small differences (Table 8.6a), particularly in donations to wetland or waterfowl conservation (Lower: 86%; Middle: 89%; Upper: 82%). Most indicated that they had not spent money on wetland management on private lands in the previous 12 months (Lower: 72%; Middle: 72%; Upper: 83%; Table 8.7). Money spent averaged \$750 in the past year, and there were no significant differences between the substrata.

Table 8.1 Level of involvement in wetlands or waterfowl conservation in past 12 months

	Lower Mississippi			Flyway substrata Middle Mississippi			Upper Mississippi			Flyway ID Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Worked on land improvement project related to wetlands or waterfowl conservation	1.8	1.13	554	2.0	1.21	1159	1.7	1.04	683	1.8	1.12	2341
Attended meetings about wetlands or waterfowl conservation	1.6	.88	553	1.7	.95	1152	1.7	.97	682	1.6	.94	2334
Volunteered my personal time and effort to conserve wetlands and waterfowl	1.6	.95	553	1.8	1.07	1156	1.7	1.00	683	1.7	1.01	2337
Contacted elected officials or government agencies about wetlands and waterfowl conservation	1.4	.77	549	1.5	.83	1152	1.4	.83	682	1.4	.81	2330
Voted for candidates or ballot issues to support wetlands or waterfowl conservation	2.4	1.38	550	2.4	1.35	1154	2.4	1.39	679	2.4	1.37	2328
Advocated for political action to conserve wetlands and waterfowl	1.7	1.07	546	1.8	1.12	1151	1.8	1.19	679	1.8	1.13	2320

Scale from 1=Never to 5=Very often

Table 8.1a Participation in conservation activities response distribution

Item	Response				Valid often	Valid N
	Never	Rarely	Sometimes	Often		
Worked on land improvement project related to wetlands or waterfowl conservation	57.5%	14.8%	17.6%	7.3%	2.8%	2341
Attended meetings about wetlands or waterfowl conservation	61.0%	18.6%	16.2%	3.1%	1.2%	2334
Volunteered my personal time and effort to conserve wetlands and waterfowl	62.3%	16.0%	15.4%	4.5%	1.8%	2337
Contacted elected officials or government agencies about wetlands and waterfowl conservation	73.4%	13.0%	11.1%	1.9%	0.7%	2330
Voted for candidates or ballot issues to support wetlands or waterfowl conservation	41.5%	8.3%	24.8%	17.8%	7.6%	2328
Advocated for political action to conserve wetlands and waterfowl	60.8%	13.4%	15.3%	7.5%	3.0%	2320

Table 8.1b Level of involvement in wetlands or waterfowl conservation past 12 months ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
Worked on land improvement project related to wetlands or waterfowl conservation	Between Groups	29.40	2.00	14.70	11.22	0.00	
	Within Groups	3135.27	2393.19	1.31			
	Total	3164.67	2395.19				0.01
Attended meetings about wetlands or waterfowl conservation	Between Groups	6.03	2.00	3.01	3.42	0.03	
	Within Groups	2101.44	2383.48	0.88			
	Total	2107.46	2385.48				0.00
Volunteered my personal time and effort to conserve wetlands and waterfowl	Between Groups	20.11	2.00	10.06	9.61	0.00	
	Within Groups	2498.60	2387.81	1.05			
	Total	2518.72	2389.81				0.01
Contacted elected officials or government agencies about wetlands and waterfowl conservation	Between Groups	1.44	2.00	0.72	1.07	0.34	
	Within Groups	1595.63	2380.77	0.67			
	Total	1597.07	2382.77				0.00
Voted for candidates or ballot issues to support wetlands or waterfowl conservation	Between Groups	0.79	2.00	0.40	0.21	0.81	
	Within Groups	4442.01	2380.91	1.87			
	Total	4442.80	2382.91				0.00
Advocated for political action to conserve wetlands and waterfowl	Between Groups	4.88	2.00	2.44	1.91	0.15	
	Within Groups	3030.24	2372.79	1.28			
	Total	3035.12	2374.79				0.00

Table 8.2 Nature Based Recreation

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Spending time in nature away from home	%	90.2%	92.8%	95.7%	93.1%
	Valid N	557	1171	690	2363
Viewing wildlife	%	75.8%	84.1%	87.8%	82.9%
	Valid N	558	1168	690	2361
Learning about nature	%	50.1%	57.7%	58.2%	55.5%
	Valid N	558	1152	684	2343
Backyard/at home nature activities	%	91.0%	93.2%	93.3%	92.5%
	Valid N	560	1170	686	2359
Fishing	%	94.1%	92.4%	93.9%	93.5%
	Valid N	562	1171	688	2366
Hunting migratory birds other than waterfowl	%	74.3%	74.2%	52.3%	65.7%
	Valid N	559	1167	686	2356
Hunter other game birds	%	57.8%	82.7%	88.0%	76.8%
	Valid N	551	1170	690	2353
Hunting any other game animals	%	88.4%	82.7%	86.5%	86.0%
	Valid N	558	1163	689	2356
Other	%	8.6%	9.4%	8.2%	8.7%
	Valid N	223	463	271	934

Table 8.2a Nature Based Recreation significance tests

		Chi-Square	df	Cramer's V
Activity	Spending time in nature away from home	11.84*	2	.07*
	Viewing wildlife	31.26*	2	.11*
	Learning about nature	12.02*	2	.07*
	Backyard/at home nature activities	3.64	2	.04
	Fishing	2.97	2	.04
	Hunting migratory birds other than waterfowl	107.27*	2	.21*
	Hunter other game birds	177.26*	2	.27*
	Hunting any other game animals	11.05*	2	.07*

Table 8.3 Wild Bird Activities

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Watching birds at my home	%	86.4%	88.0%	91.0%	88.7%
	Valid N	556	1167	687	2352
Feeding birds at my home	%	68.4%	71.1%	76.7%	72.6%
	Valid N	555	1165	685	2348
Watching birds away from my home	%	67.2%	73.1%	71.8%	70.8%
	Valid N	550	1162	680	2333
Photographing or filming birds	%	26.8%	27.2%	24.2%	25.9%
	Valid N	547	1142	670	2304
Counting/monitoring birds	%	13.7%	15.3%	11.2%	13.2%
	Valid N	547	1131	666	2293
Keeping track of the birds you see on a list	%	8.9%	10.0%	12.3%	10.6%
	Valid N	545	1127	665	2287
Installing or maintaining next boxes for birds	%	37.9%	45.4%	49.9%	45.0%
	Valid N	556	1142	671	2318

Table 8.3a Wild bird activities significance tests

		Chi-Square	df	Cramer's V
Wild bird activities	Watching birds at my home	27.91*	2	.11*
	Feeding birds at my home	25.98*	2	.10*
	Watching birds away from my home	19.21*	2	.09*
	Photographing or filming birds	1.94	2	.03
	Counting/monitoring birds	5.63	2	.05
	Keeping track of the birds you see on a list	5.70	2	.05
	Installing or maintaining nest boxes for birds	32.13*	2	.12*

Table 8.4a Personal community: Recreation

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: Birdwatcher	Acquaintance	38.7%	41.0%	41.4%	40.5%
	Close Friend	27.2%	33.6%	32.8%	31.5%
	Relative	36.5%	43.2%	51.4%	44.7%
	Myself	46.0%	52.9%	59.6%	53.7%
	Valid N	357	850	522	1680
Personal Community: Angler	Acquaintance	52.7%	53.7%	58.6%	55.3%
	Close Friend	70.3%	74.4%	74.5%	73.2%
	Relative	61.9%	70.4%	75.3%	69.7%
	Myself	74.4%	81.9%	86.9%	81.5%
	Valid N	547	1142	680	2317
Personal Community: Waterfowl Hunter	Acquaintance	60.1%	61.9%	63.0%	61.8%
	Close Friend	77.1%	79.5%	79.6%	78.8%
	Relative	67.2%	66.7%	69.5%	68.0%
	Myself	91.6%	93.3%	91.9%	92.2%
	Valid N	558	1166	685	2353
Personal Community: Other hunter	Acquaintance	63.6%	64.1%	69.5%	66.0%
	Close Friend	76.4%	81.2%	83.1%	80.4%
	Relative	73.2%	74.8%	79.2%	76.0%
	Myself	88.6%	87.5%	91.2%	89.3%
	Valid N	544	1148	678	2315

Table 8.4b Personal community: Agencies

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: State/provincial park manager/employee	Acquaintance	69.2%	75.7%	72.8%	72.6%
	Close Friend	21.6%	25.9%	24.0%	23.8%
	Relative	14.7%	8.6%	11.0%	11.4%
	Myself	3.7%	2.2%	8.5%	4.6%
	Valid N	217	521	187	847
Personal Community: National Park Manager/ Employee	Acquaintance	75.9%	74.7%	68.4%	73.3%
	Close Friend	19.2%	21.6%	29.4%	23.0%
	Relative	11.4%	10.0%	10.7%	10.7%
	Myself	2.2%	1.3%	3.1%	2.1%
	Valid N	206	437	167	757
Personal Community: Federal wildlife agency manager/employee	Acquaintance	78.6%	83.0%	78.2%	79.8%
	Close Friend	24.5%	19.5%	25.6%	23.3%
	Relative	8.9%	5.2%	14.2%	9.3%
	Myself	1.9%	4.4%	7.8%	4.4%
	Valid N	197	337	139	648
Personal Community: State/provincial wildlife agency manager/employee	Acquaintance	73.2%	77.4%	72.7%	74.4%
	Close Friend	33.5%	33.6%	31.0%	32.8%
	Relative	9.8%	10.4%	12.8%	10.9%
	Myself	4.6%	7.3%	6.4%	6.0%
	Valid N	292	556	227	1023

Table 8.4c Personal community: Environmental Occupations

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: Farmer/Rancher	Acquaintance	48.7%	54.7%	56.5%	53.4%
	Close Friend	54.8%	57.6%	46.7%	52.7%
	Relative	42.8%	46.3%	43.9%	44.3%
	Myself	24.7%	24.0%	14.6%	20.8%
	Valid N	491	1078	564	2049
Personal Community: Outdoor Educator	Acquaintance	65.3%	65.5%	56.4%	62.1%
	Close Friend	31.9%	36.6%	42.0%	37.0%
	Relative	12.6%	11.0%	16.9%	13.6%
	Myself	13.7%	16.7%	18.5%	16.4%
	Valid N	274	620	313	1152
Personal Community: Wildlife artist	Acquaintance	66.1%	76.3%	60.0%	66.8%
	Close Friend	21.1%	16.5%	29.0%	22.7%
	Relative	18.8%	13.9%	22.5%	18.8%
	Myself	8.5%	8.3%	6.5%	7.7%
	Valid N	178	336	191	691
Personal Community: Wildlife biologist	Acquaintance	69.6%	71.5%	66.0%	68.9%
	Close Friend	30.4%	33.4%	38.1%	33.8%
	Relative	9.1%	10.4%	10.6%	10.0%
	Myself	6.0%	9.2%	5.8%	6.8%
	Valid N	264	452	229	927
Personal Community: Wildlife photographer	Acquaintance	63.3%	59.4%	51.4%	57.4%
	Close Friend	28.0%	25.6%	34.0%	29.7%
	Relative	21.1%	25.6%	30.4%	26.1%
	Myself	21.1%	23.7%	22.3%	22.3%
	Valid N	238	501	302	1019

Table 8.4d Personal community: Conservation organizations

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: Member of fishing/ conservation organizations	Acquaintance	52.5%	53.9%	58.1%	55.2%
	Close Friend	53.9%	60.4%	59.7%	58.2%
	Relative	37.4%	37.7%	40.7%	38.9%
	Myself	37.2%	43.0%	42.4%	41.0%
	Valid N	295	630	408	1314
Personal Community: Member of national conservation organization	Acquaintance	60.7%	65.0%	60.4%	61.8%
	Close Friend	34.7%	34.6%	35.5%	35.0%
	Relative	20.1%	21.7%	35.4%	26.6%
	Myself	12.3%	20.7%	23.1%	18.9%
	Valid N	134	267	162	554
Personal Community: Member of local conservation organization	Acquaintance	57.6%	65.1%	62.8%	61.9%
	Close Friend	50.9%	52.7%	57.1%	54.0%
	Relative	30.0%	33.7%	41.7%	35.9%
	Myself	31.6%	45.3%	52.4%	44.1%
	Valid N	209	461	285	935
Personal Community: Member of local naturalist organization	Acquaintance	58.5%	68.9%	71.0%	66.0%
	Close Friend	36.3%	37.8%	33.4%	35.7%
	Relative	16.0%	19.3%	18.7%	17.9%
	Myself	12.4%	18.6%	17.3%	16.0%
	Valid N	107	204	107	408

Table 8.4e Personal community: Hunting organizations

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: Member of Ducks Unlimited	Acquaintance	58.0%	57.0%	53.7%	56.0%
	Close Friend	70.5%	72.9%	69.7%	70.9%
	Relative	50.9%	54.1%	51.2%	52.0%
	Myself	52.6%	65.1%	53.5%	56.8%
	Valid N	472	1060	595	2054
Personal Community: Member of Delta Waterfowl	Acquaintance	60.0%	58.6%	54.9%	58.1%
	Close Friend	64.5%	58.7%	53.5%	59.7%
	Relative	39.3%	27.4%	32.8%	34.3%
	Myself	33.2%	33.0%	31.3%	32.6%
	Valid N	365	491	248	1112
Personal Community: Member of state waterfowl association	Acquaintance	59.0%	58.9%	60.5%	59.6%
	Close Friend	53.6%	59.2%	53.9%	55.3%
	Relative	27.0%	24.8%	30.9%	28.0%
	Myself	22.4%	25.3%	32.1%	27.1%
	Valid N	203	385	254	839
Personal Community: Member of non-waterfowl hunting organization	Acquaintance	57.1%	59.5%	58.1%	58.2%
	Close Friend	60.5%	61.8%	59.8%	60.6%
	Relative	33.9%	46.2%	48.6%	43.5%
	Myself	38.7%	47.6%	50.1%	45.9%
	Valid N	331	771	442	1491

Table 8.4f Personal community: Bird groups

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal Community: Member of birding group	Acquaintance	65.3%	65.0%	61.5%	63.8%
	Close Friend	20.9%	26.6%	30.1%	26.1%
	Relative	21.6%	19.3%	32.2%	24.9%
	Myself	2.8%	10.2%	10.4%	8.0%
	Valid N	119	267	145	511
Personal Community: Member of bird conservation group	Acquaintance	60.8%	62.1%	58.1%	60.1%
	Close Friend	33.9%	32.2%	32.9%	33.0%
	Relative	23.9%	25.3%	35.8%	29.1%
	Myself	13.1%	19.4%	19.0%	17.2%
	Valid N	146	285	183	609
Personal Communication: Member of ornithological group	Acquaintance	72.0%	68.2%	67.2%	69.2%
	Close Friend	26.0%	22.7%	24.9%	24.7%
	Relative	9.9%	11.7%	20.9%	14.6%
	Myself	5.9%	7.2%	2.4%	4.9%
	Valid N	82	137	88	309

Table 8.5 Trust in state wildlife agencies

	Flyway substrata									Flyway ID		
	Lower Mississippi			Middle Mississippi			Upper Mississippi			Mississippi		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
State wildlife agencies	3.3	.99	564	3.2	1.03	1167	3.0	1.00	689	3.2	1.01	2366
Federal wildlife and land management agencies	3.1	1.12	562	3.1	1.05	1166	2.9	1.02	687	3.0	1.06	2360
Elected officials	2.1	.95	559	1.9	.88	1167	1.9	.86	688	1.9	.90	2360
Waterfowl hunting/conservation organizations	3.2	1.00	558	3.6	.87	1167	3.6	.88	689	3.5	.93	2359
Birding/bird conservation organizations	2.7	1.04	541	2.9	1.08	1142	2.9	1.05	669	2.8	1.06	2294
Other conservation organizations	2.7	.96	536	3.0	.96	1141	3.0	.96	678	2.9	.96	2300
University researchers/scientists	2.9	1.00	555	2.9	1.04	1149	2.9	1.06	684	2.9	1.04	2338

Scale from 1=Do not trust at all to 5=Trust completely

Table 8.5a Trust in various institutions response distribution

Item	Response					Valid N
	Do not trust at all	Trust a little	Trust somewhat	Trust a lot	Trust completely	
State wildlife agencies	6.3%	17.2%	35.9%	33.2%	7.4%	2366
Federal wildlife and land management agencies	9.9%	19.8%	36.0%	27.8%	6.5%	2360
Elected officials	38.2%	36.4%	20.6%	4.2%	0.7%	2360
Waterfowl hunting/conservation organizations	3.1%	10.7%	32.3%	42.8%	11.2%	2359
Birding/bird conservation organizations	12.8%	22.0%	37.9%	22.6%	4.6%	2294
Other conservation organizations	8.7%	22.8%	43.6%	20.9%	3.9%	2300
University researchers/scientists	11.1%	20.7%	38.4%	25.3%	4.5%	2338

Table 8.5b Trust in state wildlife agencies ANOVA tests

		Sum of Squares	df	Mean Square	F	Sig.	Eta
State wildlife agencies	Between Groups	28.75	2.00	14.37	14.11	0.00	
	Within Groups	2461.17	2416.13	1.02			
	Total	2489.92	2418.13				0.01
Federal wildlife and land management agencies	Between Groups	12.88	2.00	6.44	5.74	0.00	
	Within Groups	2704.47	2411.38	1.12			
	Total	2717.35	2413.38				0.00
Elected officials	Between Groups	17.11	2.00	8.56	10.72	0.00	
	Within Groups	1924.54	2411.18	0.80			
	Total	1941.66	2413.18				0.01
Waterfowl hunting/conservation organizations	Between Groups	59.72	2.00	29.86	36.37	0.00	
	Within Groups	1979.65	2411.32	0.82			
	Total	2039.37	2413.32				0.03
Birding/bird conservation organizations	Between Groups	16.89	2.00	8.44	7.49	0.00	
	Within Groups	2647.37	2348.57	1.13			
	Total	2664.25	2350.57				0.01
Other conservation organizations	Between Groups	22.83	2.00	11.41	12.41	0.00	
	Within Groups	2163.45	2352.13	0.92			
	Total	2186.28	2354.13				0.01
University researchers/scientists	Between Groups	2.83	2.00	1.41	1.31	0.27	
	Within Groups	2572.36	2385.17	1.08			
	Total	2575.19	2387.17				0.00

Table 8.6 Percent making donation greater than \$0 in past year

	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Wetland or Waterfowl conservation	86.1%	88.7%	82.2%	85.4%
Conservation of other birds	25.9%	37.0%	33.6%	32.5%
Birdwatching and related issues	11.8%	11.9%	10.1%	11.2%
Waterfowl hunting	89.6%	88.4%	86.5%	88.0%
Valid N	735	1304	829	2865

*Table 8.6a Percent making donation greater than \$0 in past year
significance tests*

		Chi-Square	df	Cramer's V
Percent making donation greater than \$0 in past year	Wetland or Waterfowl conservation	46.25*	2	.14*
	Conservation of other birds	37.99*	2	.13*
	Birdwatching and related issues	4.29	2	.04
	Waterfowl hunting	32.34*	2	.12*

Table 8.6b Donations to wetland or waterfowl conservation

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Wetland or waterfowl conservation	\$0	42.0%	27.2%	38.8%	36.5%
	Less than \$250	44.7%	53.0%	46.2%	47.7%
	\$250 to \$999	10.1%	15.6%	12.7%	12.7%
	\$1000 to \$2499	1.8%	3.1%	1.5%	2.1%
	\$2500 to \$4999	0.2%	0.5%	0.3%	0.3%
	\$5000 to \$9999	0.4%	0.4%	0.4%	0.4%
	\$10,000 or more	0.7%	0.2%	0.1%	0.3%
	Valid N	555	1143	679	2327

Table 8.6c Donations to conservation of other bird species

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Conservation of other bird species	\$0	81.5%	66.7%	73.3%	74.0%
	Less than \$250	16.2%	27.1%	21.1%	21.2%
	\$250 to \$999	1.9%	5.2%	4.5%	3.9%
	\$1000 to \$2499	0.3%	0.8%	1.2%	0.8%
	\$2500 to \$4999	0.2%	0.2%	0.0%	0.1%
	\$5000 to \$9999	0.0%	0.0%	0.0%	0.0%
	\$10,000 or more	0.0%	0.0%	0.0%	0.0%
	Valid N	520	1044	635	520

Table 8.6d Donations to birdwatching and related issues

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Birdwatching and relating issues	\$0	91.6%	89.1%	91.8%	90.9%
	Less than \$250	7.7%	9.6%	6.7%	7.8%
	\$250 to \$999	0.5%	1.0%	0.7%	0.7%
	\$1000 to \$2499	0.0%	0.3%	0.8%	0.4%
	\$2500 to \$4999	0.0%	0.0%	0.0%	0.0%
	\$5000 to \$9999	0.0%	0.0%	0.0%	0.0%
	\$10,000 or more	0.3%	0.0%	0.0%	0.1%
	Valid N	517	1026	627	2139

Table 8.6e Donations to waterfowl hunting and hunting related issues

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Waterfowl hunting and hunting related issues	\$0	39.4%	26.6%	35.1%	34.0%
	Less than \$250	41.2%	50.9%	48.2%	46.7%
	\$250 to \$999	13.3%	15.5%	13.4%	14.0%
	\$1000 to \$2499	3.7%	5.3%	2.8%	3.8%
	\$2500 to \$4999	1.8%	1.2%	0.5%	1.1%
	\$5000 to \$9999	0.2%	0.3%	0.1%	0.2%
	\$10,000 or more	0.4%	0.2%	0.0%	0.2%
	Valid N	553	1130	673	2309

Table 8.7 Money spent on wetlands management on private lands in past 12 months

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
In the past 12 months did you personally spend money for wetlands management on private lands?	No	71.9%	71.7%	82.7%	76.1%
	Yes	8.1%	12.5%	6.7%	8.9%
	Yes, but I'd rather not say how much	19.9%	15.8%	10.5%	15.1%
Amount?	Median	2,000	1,000	500	750
	Valid N	567	1175	694	2381
Spent money-Y/N significance:		$\chi^2 (4) = 43.37^*$		Cramer's V = .09*	
Amount significance:		F (2, 225) = 5.18*		$\eta^2 = .04$	

Section 9. Respondent Characteristics

Respondents answered a series of sociodemographic questions regarding race, ethnicity, gender, age, education, profession, rural land ownership, urban/rural residence, urban/rural upbringing, income, and state of residence. Respondents were largely white (99-100%; Tables 9.1. 9.1a), non-Hispanic (99-100%; Table 9.2), and male (97-99%; Table 9.3).

After removing any respondents under the age of 18, the average age of respondents was 48 years old, with significant but small differences between the substrata (Table 9.4). Around half of respondents reported a Bachelor's degree or higher (47-58%; Table 9.5), with significant but small differences between the substrata. Most respondents indicated that a nature related profession was not their primary source of personal income across substrata (83-87%; Table 9.6). Across substrata, 47-54% made less than \$75,000 per year in personal income, while 12-17% made more than \$150,000 (Table 9.7). Analyses indicate significant but small differences between the substrata in personal income.

A majority of respondents did own rural land (53-58%), and there were no differences in rural land ownership between the substrata (Table 9.8). In the Lower substrata, 36% of respondents reported living in a medium or large urban area, with significantly more rural residents in the Upper and Middle Mississippi (Upper: 31%, Middle: 33%, and Lower: 25%; Table 9.9).

Respondents also reported the population size of the area where they grew up, and respondents in the Upper Mississippi were slightly more likely to report an urban upbringing, with a skew towards rural upbringing in the Middle Mississippi (Upper: 29%, Middle: 32%, and Lower: 27%; Table 9.10). Differences in upbringing were statistically significant but small.

Table 9.1 Percent reporting race

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Race	American Indian/Native American	2.6%	2.4%	1.4%	2.1%
	Asian	.1%	.5%	1.2%	.7%
	Black or African American	.9%	.3%	0.0%	.4%
	Native Hawaiian or Pacific Islander	0.0%	.3%	.1%	.1%
	White	98.6%	99.7%	99.2%	99.2%
	Valid N	554	1155	678	2332

Table 9.1a Race significance tests

		Chi-Square	df	Cramer's V
Race	American Indian/Native American	2.65	2	.03
	Asian	5.24*	2	.05*
	Black or African American	6.78*	2	.05*
	Native Hawaiian or Pacific Islander	2.31	2	.03
	White	1.68	2	.03

Table 9.2 Ethnicity

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Hispanic or Latino	Yes	1.4%	.5%	.7%	.8%
	No	98.6%	99.5%	99.3%	99.2%
	Valid N	549	1149	679	2323
Significance:		$\chi^2 (2) = 3.18$		Cramer's V=.04	

Table 9.3 Gender

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Gender	Male	97.5%	98.7%	97.4%	97.8%
	Female	2.5%	1.3%	2.6%	2.2%
	Valid N	557	1166	688	2357
Significance:		$\chi^2(2) = 5.21$		Cramer's V = .05	

Table 9.4 Age

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Age	Mean	45	50	49	48
	SD	14.94	15.57	16.15	15.74
	Range	93	98	98	98
	Valid N	556	1167	684	2350
Significance:		F (2, 2406) = 18.93*		$\eta^2 = .02$	

Table 9.5 Education

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Level of education	Some high school or less	1.2%	1.5%	1.8%	1.5%
	High school diploma or GED	15.2%	17.4%	12.7%	14.9%
	Some college (no degree)	17.7%	20.8%	19.3%	19.2%
	Associate's degree (2 years)	8.1%	13.4%	16.3%	12.9%
	Bachelors degree (4 years)	35.8%	26.8%	34.1%	32.5%
	Graduate or professional school	22.0%	20.2%	15.8%	19.0%
	Valid N	545	1151	680	2320
Significance:		$\chi^2 (10) = 44.25^*$		Cramer's V = .10*	

Table 9.6 Nature-related profession

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Is a nature-related profession primary source of personal income?	Yes	16.0%	17.2%	13.3%	15.3%
	No	84.0%	82.8%	86.7%	84.7%
	Valid N	554	1168	689	2355
Significance:		$\chi^2 (2) = 4.85$		Cramer's V = .09	

Table 9.7 Income

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal income	Less than \$24,999	9.2%	8.7%	10.8%	9.7%
	\$25,000 to \$49,999	16.3%	20.0%	16.9%	17.6%
	\$50,000 to \$74,999	21.0%	24.9%	24.9%	23.7%
	\$75,000 to \$99,999	18.7%	17.9%	17.6%	18.1%
	\$100,000 to \$124,999	11.5%	12.8%	11.3%	11.8%
	\$125,000 to \$149,999	6.4%	3.9%	6.0%	5.5%
	\$150,000 to \$199,999	6.5%	5.1%	6.1%	5.9%
	\$200,000 to \$249,999	2.5%	2.1%	3.2%	2.7%
	\$250,000 to \$299,999	2.3%	1.0%	.8%	1.3%
	\$300,000 or more	5.6%	3.4%	2.3%	3.7%
Valid N		504	1059	631	2145
Significance:		$\chi^2 (18) = 30.40^*$		Cramer's V=.08*	

Table 9.8 Rural land ownership

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Do you own land in a rural area	Yes	57.5%	53.0%	54.8%	55.1%
	No	42.5%	47.0%	45.2%	44.9%
How many acres of rural land?	Mean				
	SD				
	Range				
	Valid N	553	1168	688	2351
Own land Y/N significance:		$\chi^2 (2) = 3.16$		Cramer's V = .03	
Acreage owned significance:		F (2,) =		$\eta^2 =$	

Table 9.9 Urban vs Rural Residence

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Where you live now	Large Urban area (500,000 or more)	7.1%	8.4%	10.5%	8.8%
	Medium Urban area (50,000 to 499,999)	28.4%	15.8%	12.9%	18.6%
	Small city (10,000 to 49,999)	20.8%	20.9%	23.7%	22.0%
	Small town (2,000 to 9,999)	18.7%	22.3%	21.7%	20.9%
	Rural area (less than 2,000)	24.9%	32.6%	31.2%	2.6%
	Valid N	557	1171	687	2357
Significance:		$\chi^2 (8) = 62.78^*$		Cramer's V = .11*	

Table 9.10 Urban vs Rural Upbringing

		Flyway substrata			Flyway
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Where you grew up	Large Urban area (500,000 or more)	8.3%	8.2%	13.9%	10.5%
	Medium Urban area (50,000 to 499,999)	20.9%	14.8%	14.5%	16.6%
	Small city (10,000 to 49,999)	18.1%	21.6%	20.7%	20.1%
	Small town (2,000 to 9,999)	23.7%	23.6%	23.5%	23.6%
	Rural area (less than 2,000)	29.0%	31.8%	27.4%	29.2%
	Valid N	550	1157	680	2331
Significance:		χ^2 (8)= 31.55*		Cramer's V= .08*	

Section 10. Non-response Survey Summary

We developed a shortened, mail-out survey to assess differences between those who completed the NWHS online and those who did not (Appendix B). We mailed the non-response survey to 4,005 individuals in the Mississippi Flyway (Upper Mississippi = 1332, Middle Mississippi = 1338, Lower Mississippi = 1335) who did complete a survey online. A total of 495 (12.4%) returned a survey in the mail by May 31, 2017 (Upper Mississippi = 238, Middle Mississippi = 156, Lower Mississippi = 101).

Non-respondents in the Mississippi Flyway reported that they were slightly younger on average (16.5) when they began waterfowl hunting than web survey respondents (19.8). Compared to web survey respondents (8.5%), a larger percentage of non-respondents indicated that they do not hunt either ducks or geese (26.1%). However, there were no substantive difference in the number of years in the past 5 or the number of days non-respondents and respondents reported waterfowl hunting each year.

Similar percentages of non-respondents and respondents shared the circumstances under which they hunted and whether they took single or multiple-day hunting trips, and a majority of respondents and non-respondents reported hunting on public lands or waters. Non-respondents and respondents rated the importance of different species very similarly, with a majority indicating mallards as very or extremely important.

Although, less than 10% of hunters who responded to the web survey indicated that would need to harvest 5 or more ducks a day to feel satisfied, almost 15% of non-respondents reported they needed to harvest 5 or more ducks to feel satisfied. However, respondents and non-respondents reported similar levels of acceptability of daily bag limits season lengths.

Slightly larger percentages of non-respondents perceived crowding, hunting pressure, interference from other hunters, conflict with other hunters and lack of public place to hunt to be sever or very severe problems. However, non-respondents and respondents reported very similar ratings of satisfaction with different characteristics of their hunting experiences and similar rating of priority for duck hunting regulations.

Non-respondents had similar mean scores as respondents on items measuring the centrality of waterfowl hunting to their personal lives. The gender, age, and ethnicity of respondents and

non-respondents also were very similar, but non-respondents had slightly lower average education and income levels and tended to be more rural.

Table 10.1 Age at first waterfowl hunt and general pursuits

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How old were you when you started waterfowl hunting	Mean	20.8	16.8	14.1	16.5
	Median	16.0	15.0	12.0	14.0
	SD	13.82	8.63	6.78	10.30
	Valid N	75	160	158	393
	I hunt only ducks	35.0%	7.7%	7.3%	16.7%
Pursuits in waterfowl hunting	I hunt ducks and geese	17.0%	72.9%	75.2%	55.1%
	I hunt only geese	0.0%	1.9%	4.3%	2.0%
	I hunt neither ducks nor geese	48.0%	17.4%	13.2%	26.1%
	Valid N	100	155	234	489
Pursuits significance:		$\chi^2 (6) = 134.13^{***}$		Cramer's V = .37***	

Table 10.2 Years hunted waterfowl of previous 5

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
How many years of the last 5 years have you hunted waterfowl?	None	12.1%	3.1%	3.9%	5.6%
	1 Year	6.9%	1.6%	1.0%	2.7%
	2 Years	12.1%	3.9%	4.9%	6.4%
	3 Years	10.3%	10.1%	10.8%	10.5%
	4 Years	3.4%	10.9%	13.2%	10.2%
	5 Years	55.2%	70.5%	66.2%	64.6%
Valid N		58	129	204	391
Significance:		$\chi^2 (10) = 25.93^{**}$		Cramer's V= .18**	

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Table 10.3 Average number of days per year hunting waterfowl

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Over the last five years, about how many days did you usually hunt waterfowl in a year?	5 days or less	36.0%	17.5%	25.8%	25.0%
	6 to 10 days	16.0%	23.8%	28.3%	23.6%
	11 to 20 days	22.0%	26.2%	25.8%	25.0%
	21 to 30 days	10.0%	15.9%	12.6%	13.4%
	More than 30 days	16.0%	16.7%	7.6%	13.1%
Valid N		50	126	198	374
Significance:		$\chi^2 (8) = 24.5^{**}$		Cramer's V= .18**	

Table 10.4 Circumstances for hunting trip

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Under what circumstances do you typically go hunting?	When I plan the hunt myself	17.3%	16.1%	17.7%	17.0%
	When someone else invites me	26.9%	11.3%	9.6%	14.4%
	Both when I plan the hunt or someone else invites me	55.8%	72.6%	72.7%	68.6%
	Valid N	52	124	198	374
Significance:		$\chi^2 (4) = 12.01^*$		Cramer's V= .13*	

Table 10.5 Hunting trips primarily day trips or overnight trips

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Do you primarily take day trips or overnight/multi- day trips when you waterfowl hunt?	Primarily day trips	64.7%	82.7%	72.3%	74.4%
	Primarily overnight or multi-day trips	17.6%	8.7%	12.3%	12.2%
	Both about equally	17.6%	8.7%	15.4%	13.4%
	Valid N	51	127	195	373
Significance:		$\chi^2 (4) = 7.88$		Cramer's V= .10	

Table 10.6 Public vs private lands waterfowl hunting

Please indicate where you do most of your waterfowl hunting:	Flyway substrata			Flyway ID
	Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Public lands or waters	47.8%	38.0%	57.8%	47.7%
Private property owned by you, your family or in partnership with someone else	8.7%	24.8%	16.6%	18.3%
Private property owned by a friend or another landowner who give you permission to hunt for free	15.2%	29.8%	23.0%	23.7%
Private property you lease or pay to hunt on	28.3%	7.4%	2.7%	10.2%
Valid N	46	121	187	354
Significance:	$\chi^2 (8) = 46.06^{***}$		Cramer's V = .26***	

Table 10.7 Minimum number of ducks harvested per day to feel satisfied

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Minimum number of ducks you have to harvest in a day to feel satisfied?	0	14.3%	13.0%	19.4%	15.6%
	1	4.1%	19.5%	15.7%	14.5%
	2	12.2%	18.7%	23.6%	19.1%
	3	20.4%	16.3%	21.5%	19.1%
	4	16.3%	22.8%	11.5%	16.8%
	5	16.3%	3.3%	4.7%	7.2%
	6	4.1%	3.3%	2.6%	3.2%
	7	4.1%	2.4%	0.5%	2.0%
	>7	8.2%	0.8%	0.5%	2.6%
Valid N		49	123	191	363
Significance:		$\chi^2 (16) = 46.84^{***}$		Cramer's V = .25^{***}	

Table 10.8 Smallest acceptable daily bag limit of ducks

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
What is the smallest daily bag limit you would accept before you would no longer hunt?	1 duck	11.8%	7.9%	5.3%	7.8%
	2 ducks	13.7%	16.7%	13.2%	14.5%
	3 ducks	9.8%	10.3%	18.5%	13.3%
	4 ducks	11.8%	20.6%	12.7%	15.6%
	5 ducks	11.8%	2.4%	3.7%	5.2%
	6 ducks	17.6%	4.0%	6.9%	8.1%
	I'll hunt with any size daily bag limit	23.5%	38.1%	39.7%	35.5%
	Valid N	51	126	189	366
Significance:		$\chi^2 (12) = 31.17^{**}$		Cramer's V = .21^{**}	

Table 10.9 Minimum acceptable number of days for duck hunting

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
What is the minimum number of days in a waterfowl hunting season you would accept before you would no longer hunt?	10 days	6.0%	3.1%	1.0%	2.6%
	15 days	2.0%	3.1%	2.6%	2.3%
	20 days	2.0%	1.6%	6.3%	3.4%
	25 days	2.0%	1.6%	3.7%	2.6%
	30 days	14.0%	14.0%	11.5%	13.4%
	35 days	0.0%	0.8%	1.0%	0.9%
	40 days	4.0%	7.8%	5.2%	6.0%
	45 days	4.0%	5.4%	7.9%	6.0%
	50 days	4.0%	3.1%	1.0%	2.6%
	55 days	2.0%	0.0%	1.6%	1.1%
	60 days	14.0%	7.8%	10.5%	10.3%
	I'll hunt with any season length	46.0%	51.9%	47.6%	48.9%
	Valid N	50	129	191	370
Significance:		χ^2 (22)= 20.68		Cramer's V= .17	

Table 10.10 Importance of hunting species in Mississippi Flyway

	Upper Mississippi			Flyway substrata Middle Mississippi			Lower Mississippi			Flyway ID Mississippi		
	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD
Diving ducks	2.91	188	1.317	2.57	116	1.302	2.33	49	1.334	2.72	354	1.329
Mallards	3.84	193	1.031	4.01	123	1.175	4.10	49	1.105	3.93	365	1.093
Pintails	2.71	185	1.317	3.24	118	1.313	3.68	50	1.267	3.03	353	1.353
Other dabbling ducks	3.69	192	1.103	3.71	121	1.229	3.88	50	1.208	3.73	363	1.159
Geese	3.50	194	1.218	3.46	121	1.310	2.16	49	1.337	3.31	364	1.341

Scale from 1=Not at all important to 5=Extremely important

Table 10.10a Importance of hunting species in Mississippi Flyway (response distribution)

Item	Response					Valid N
	Not at all important	Slightly important	Moderately Important	Very important	Extremely important	
Diving ducks	26.3%	21.0%	26.9%	13.2%	12.6%	354
Mallards	4.9%	5.2%	17.7%	33.0%	39.1%	365
Pintails	15.8%	17.3%	24.2%	22.1%	20.6%	353
Other dabbling ducks	6.7%	8.2%	20.1%	34.1%	30.9%	363
Geese	18.1%	12.5%	25.9%	20.7%	22.7%	364

Table 10.11 Perceptions of problems with crowding, hunting pressure, interference, and conflict

	Upper Mississippi			Flyway substrata Middle Mississippi			Lower Mississippi			Flyway ID Mississippi		
	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD
Crowding at hunting areas	2.69	193	1.264	2.93	115	1.333	3.29	47	1.342	2.85	354	1.310
Hunting pressure	2.71	189	1.250	3.04	117	1.291	3.14	48	1.503	2.88	355	1.309
Interference from other hunters	2.51	190	1.255	2.63	116	1.247	2.87	47	1.360	2.60	353	1.269
Conflict with other hunters in places I hunt	2.11	190	1.124	2.01	117	1.077	2.37	48	1.321	2.11	355	1.139
Lack of public places for waterfowl hunting	2.39	187	1.378	3.06	115	1.517	2.81	43	1.447	2.66	346	1.463

Scale from 1=Not at all a problem, 2 = Slight problem, 3 = Moderate Problem, 4 = Severe Problem, 5=Very severe problem

Table 10.11a Perceptions of problems with crowding, hunting pressure, interference and conflict (Flyway Level)

Item	Response					Valid N
	Not at all	Slight Problem	Moderate Problem	Severe Problem	Very Severe Problem	
Crowding at hunting areas	17.8%	21.8%	28.7%	14.8%	16.9%	354
Hunting pressure	17.7%	22.2%	26.6%	16.2%	17.4%	355
Interference from other hunters	19.9%	33.2%	23.3%	10.3%	13.3%	353
Conflict with other hunters in places I hunt	38.3%	26.3%	24.3%	5.1%	6.0%	355
Lack of public places for waterfowl hunting	28.3%	21.7%	16.8%	14.9%	18.3%	346

Table 10.12 Satisfaction with hunting in most hunted state

	Upper Mississippi			Flyway substrata Middle Mississippi			Lower Mississippi			Flyway ID Mississippi		
	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD
The number of ducks you see during the season	2.90	195	1.187	2.73	125	1.306	2.91	51	1.110	2.84	371	1.218
The number of ducks you harvest during the season	2.78	193	1.074	2.66	124	1.185	2.92	51	1.037	2.76	368	1.108
The number of days in the duck season	3.29	192	1.088	3.05	124	1.363	3.15	51	.969	3.19	367	1.176
The number of ducks in the daily limit	3.60	193	.985	3.75	124	1.075	3.46	50	1.045	3.63	367	1.026
Your overall hunting experience	3.50	193	1.129	3.57	124	1.135	3.61	51	1.004	3.54	368	1.113
The number of ducks typically present during the hunting season	2.75	192	1.175	2.63	125	1.211	2.69	51	1.055	2.70	368	1.170
Quality of the habitat where you hunt	3.45	193	1.071	3.40	126	1.179	3.32	50	1.117	3.42	369	1.113

Scale from 1=Very dissatisfied to 5=Very satisfied

Table 10.12a Satisfaction with hunting response distribution (Flyway level)

Item	Response					Valid N
	Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied	
The number of ducks you see during the season	14.5%	31.1%	18.8%	27.4%	8.3%	371
The number of ducks you harvest during the season	13.3%	30.5%	28.0%	22.8%	5.5%	368
The number of days in the duck season	8.6%	19.9%	32.9%	22.8%	15.9%	367
The number of ducks in the daily limit	3.2%	7.8%	37.2%	27.4%	24.5%	367
The number of ducks typically present during the hunting season	14.1%	37.9%	19.8%	21.3%	6.9%	368
Quality of the habitat where you hunt	5.4%	17.5%	25.8%	34.4%	16.9%	368
Your overall duck hunting experience	7.2%	9.5%	21.3%	44.8%	17.2%	369

Table 10.13 Preferred agency priorities for duck hunting regulations

	Upper Mississippi			Flyway substrata Middle Mississippi			Lower Mississippi			Flyway ID Mississippi		
	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD
Having the largest bag limits possible	2.56	192	.992	2.81	123	.921	2.84	51	.968	2.68	366	.971
Having the longest seasons possible	3.31	191	1.028	3.55	124	1.022	3.37	51	.952	3.40	367	1.019
Avoiding different season lengths for different duck species	3.25	190	1.217	3.21	125	1.163	3.04	50	1.283	3.21	365	1.207
Reducing the number of species-specific bag limits	2.82	189	.914	2.77	125	.979	2.83	51	1.065	2.80	365	.956
Having the largest drake mallard bag limits possible	2.78	191	.998	3.30	123	1.020	3.15	51	.923	3.01	365	1.022
Scale from 1=very low, 2 = low, 3 = moderate, 4 = high, 5=very high priority												

Table 10.13a Preferred agency priorities for duck hunting regulations response distribution (Flyway level)

Item	Response					Valid N
	Very low	Low	Moderate	High	Very high	
Having the largest bag limits possible	12.4%	23.4%	47.4%	13.3%	3.5%	366
Having the longest seasons possible	2.9%	13.8%	38.6%	28.5%	16.1%	367
Avoiding different season lengths for different duck species	9.9%	18.0%	34.8%	19.1%	18.3%	365
Reducing the number of species-specific bag limits	10.1%	23.1%	48.6%	12.7%	5.5%	365
Having the largest drake mallard bag limits possible	7.0%	18.6%	44.9%	20.6%	9.0%	365

Table 10.14 Centrality of waterfowl hunting

	Upper Mississippi			Flyway substrata Middle Mississippi			Lower Mississippi			Flyway ID Mississippi		
	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD	Mean	Valid N	SD
Waterfowl hunting is one of the most enjoyable activities I do	3.98	194	.917	4.21	126	.902	3.98	51	.897	4.06	372	.913
Most of my friends are in some way connected with waterfowl hunting	3.31	193	1.091	3.50	126	1.051	3.80	51	.974	3.44	371	1.073
Waterfowl hunting has a Mississippi role in my life	3.24	194	1.065	3.40	126	1.134	3.39	51	1.005	3.31	371	1.081
A lot of my life is organized around waterfowl hunting	2.90	194	1.091	3.06	126	1.155	3.14	49	1.153	2.99	370	1.122
If I couldn't go waterfowl hunting I am not sure what I would do instead	2.70	194	1.218	2.88	125	1.313	2.68	50	1.252	2.76	370	1.255

Scale from 1=Strongly disagree to 5=Strongly agree

Table 10.15 Nature Based Recreation

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Spending time in nature away from home	%	70.3%	81.3%	89.3%	80.4%
	Valid N	100	155	233	488
Viewing wildlife	%	61.4%	72.5%	83.8%	72.4%
	Valid N	100	155	233	488
Learning about nature	%	39.4%	36.4%	47.4%	40.9%
	Valid N	100	155	233	488
Backyard/at home nature activities	%	83.0%	87.6%	91.9%	87.5%
	Valid N	100	155	233	488
Fishing	%	78.2%	87.0%	97.0%	87.5%
	Valid N	100	155	233	488
Hunting migratory birds other than waterfowl	%	44.6%	59.7%	38.3%	47.5%
	Valid N	100	155	233	488
Hunting other game birds	%	16.2%	49.0%	75.7%	47.1%
	Valid N	100	155	233	488
Hunting any other game animals	%	81.2%	87.1%	89.3%	85.9%
	Valid N	100	155	233	488

Table 10.16 Wild Bird Activities

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Watching birds at my home	%	70.0%	76.8%	84.1%	76.9%
	Valid N	100	155	233	488
Feeding birds at my home	%	62.0%	62.6%	72.2%	65.6%
	Valid N	100	155	233	488
Watching birds away from my home	%	45.0%	49.0%	65.8%	53.4%
	Valid N	100	155	233	488
Photographing or filming birds	%	15.0%	15.2%	17.1%	15.8%
	Valid N	100	155	233	488
Counting/monitoring birds	%	11.0%	9.1%	10.3%	10.0%
	Valid N	100	155	233	488
Keeping track of the birds you see on a list	%	2.0%	2.6%	5.1%	3.3%
	Valid N	100	155	233	488
Installing or maintaining next boxes for birds	%	25.0%	43.5%	48.5%	38.8%
	Valid N	100	155	233	488

Table 10.17 Gender

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Gender	Male	89.9%	98.1%	97.9%	95.3%
	Female	1.2%	2.7%	1.6%	4.7%
	Valid N	99	154	233	486
Significance:		$\chi^2(2) = 8.32^*$		Cramer's V = .07*	

Table 10.18 Age

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Mean		48.0	50.5	51.4	50.4
Median		49.0	53.0	55.0	53.0
SD		17.15	15.23	17.51	16.57
Valid N		85	186	189	460

Table 10.19 Education

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Level of education	Some high school or less	8.2%	2.6%	3.0%	4.6%
	High school diploma or GED	31.6%	34.0%	32.6%	32.9%
	Some college (no degree)	28.6%	18.3%	21.9%	23.0%
	Associate's degree (2 years)	6.1%	14.4%	14.2%	11.4%
	Bachelor's degree (4 years)	13.3%	21.6%	16.7%	17.0%
	Graduate or professional school	12.2%	9.2%	11.6%	11.2%
	Valid N	98	153	233	484
Significance:		$\chi^2(10) = 7.8$		Cramer's V = .09	

Table 10.20 Urban vs Rural Residence

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Where you live now	Large Urban area (500,000 or more)	6.1%	7.2%	5.6%	6.4%
	Medium Urban area (50,000 to 499,999)	19.4%	10.5%	12.5%	14.1%
	Small city (10,000 to 49,999)	23.5%	15.0%	22.0%	20.3%
	Small town (2,000 to 9,999)	22.4%	25.5%	22.4%	23.4%
	Rural area (less than 2,000)	28.6%	41.8%	37.5%	35.8%
	Valid N	98	153	232	483
Significance:		$\chi^2 (8) = 57.66^{***}$		Cramer's V = .25***	

Table 10.21 Rural land ownership

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Do you own land in a rural area	Yes	55.6%	58.4%	56.0%	56.6%
	No	44.4%	41.6%	44.0%	43.4%
	Valid N	99	154	232	485
Own land Y/N significance:		$\chi^2 (2) = .67$		Cramer's V = .04	

Table 10.22 Income

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Personal income	Less than \$24,999	20.7%	13.8%	13.0%	15.9%
	\$25,000 to \$49,999	25.3%	26.1%	28.8%	26.8%
	\$50,000 to \$74,999	19.5%	25.4%	26.0%	23.8%
	\$75,000 to \$99,999	11.5%	12.3%	9.6%	10.9%
	\$100,000 to \$149,999	10.3%	13.8%	11.1%	12.0%
	\$150,000 to \$199,999	5.7%	3.6%	6.3%	5.1%
	\$200,000 to \$249,999	1.1%	1.4%	2.4%	1.6%
	\$250,000 to \$299,999	1.1%	2.9%	0.5%	1.4%
	\$300,000 or more	4.6%	0.7%	2.4%	2.5%
	Valid N	87	138	208	433
Significance:		χ^2 (18)= 14.24		Cramer's V=.13	

Table 10.23 Percent reporting race

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Race	American Indian/Native American	6.9%	2.6%	3.4%	4.2%
	Asian	0.0%	0.0%	0.0%	0.0%
	Black or African American	1.0%	0.0%	0.0%	0.2%
	Native Hawaiian or Pacific Islander	0.0%	0.0%	0.0%	0.5%
	White	93.1%	98.1%	95.8%	95.8%
	Valid N	101	156	238	495

Table 10.24 Ethnicity

		Flyway Substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
Hispanic or Latino	Yes	1.1%	0.7%	0.0%	0.6%
	No	98.9%	99.3%	100.0%	99.4%
	Valid N	91	151	227	469
Significance:		$\chi^2 (2) = 2.14$		Cramer's V=.07	

Table 10.25 Percent reporting reason for not completing survey online

		Flyway substrata			Flyway ID
		Lower Mississippi	Middle Mississippi	Upper Mississippi	Mississippi
I didn't receive the invitation in the mail		2.0%	5.8%	1.3%	3.0%
I don't have access to the internet		16.8%	21.2%	18.5%	19.0%
I have internet access, but couldn't open the website		4.0%	17.3%	13.4%	11.5%
I didn't have time to complete the study earlier		42.6%	26.3%	32.8%	33.9%
I don't like to answer questions online		23.8%	28.2%	34.5%	28.7%
I don't hunt ducks or geese		18.8%	9.6%	6.3%	11.7%
I didn't think the survey applied to me		18.8%	7.1%	9.2%	11.5%
Valid N		101	156	238	495

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Appendices

Appendix A. Survey Instrument

Appendix B. Non-response Survey

<IDNUM>

National Waterfowl Hunter Survey

1. Which of the following statements best describes your pursuits in waterfowl hunting? (Check only one)

- ☐ I hunt only ducks
☐ I hunt ducks and geese
☐ I hunt only geese
☐ I hunt neither ducks nor geese → **GO TO QUESTION 17**

2. How old were you when you started waterfowl hunting? _____ Age (write in number)

3. How many of the last 5 years have you hunted WATERFOWL? (Circle one number below or check the box for "0")

1 2 3 4 5 Years ☐ 0 (None) → **GO TO QUESTION 17**

4. Over the last five years, about how many days did you usually hunt WATERFOWL in a year? (Check only one)

- ☐ 5 days or less
☐ 6 to 10 days
☐ 11 to 20 days
☐ 21 to 30 days
☐ More than 30 days

5. Under what circumstances do you typically go hunting? (Check only one).

- ☐ When I plan the hunt myself
☐ When someone else invites me
☐ Both when I plan the hunt or someone else invites me

6. In which state/province have you hunted ducks most over the last 5 years? _____

7. How important is it to you to hunt the following: (Check one box for each)

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Diving ducks (scaup/bluebills, canvasback, redheads, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mallards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pintails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other dabbling ducks (teal, wood ducks, gadwall, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geese	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Please indicate how much of a problem the following are in the state where you hunt ducks most. (Check one box for each)

	Not at all	Slight Problem	Moderate Problem	Severe Problem	Very Severe Problem	Don't Know
a. Crowding at hunting areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Hunting pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Interference from other hunters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Conflict with other hunters in places I hunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Lack of public places for waterfowl hunting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. In the state where you hunt ducks most often, how satisfied or dissatisfied are you with: (Check one box for each)

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Very Dissatisfied
a. The number of ducks you see during the season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Number of ducks you harvest during the season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The number of days in the duck season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The number of ducks in the daily limit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Your overall hunting experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. The number of ducks typically present during the hunting season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Quality of habitat where you hunt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. What is the minimum number of ducks you have to harvest in a day to feel satisfied with the hunt? (Circle one number)

0 1 2 3 4 5 6 7 More than 7 DUCKS

11. What is the smallest daily bag limit you would accept before you would no longer hunt ducks? (Circle one or check the box)

1 2 3 4 5 6 DUCKS or ☐ I'll hunt with any size daily bag limit

12. What is the minimum number of days in a waterfowl hunting season you would accept before you would no longer hunt ducks? (Circle one below or check the box)

10 15 20 25 30 35 40 45 50 55 60 Days
or ☐ I'll hunt with any season length

13. Do you primarily take day trips or overnight/multi-day trips when you waterfowl hunt? (Check only one)

☐ Primarily day trips ☐ Primarily overnight or multi-day trips ☐ Both about equally

14. Please indicate where you do most of your waterfowl hunting? (Check only one).

- ☐ Public land or waters
- ☐ Private property owned by you, your family or in partnership with someone else
- ☐ Private property owned by a friend or another landowner who gives you permission to hunt for free
- ☐ Private property you lease or pay to hunt on

15. How much priority should state and federal agencies give the following when setting annual duck hunting regulations? (Please rate the priority of each by checking a box).

	Very Low	Low	Moderate	High	Very High
Having the largest bag limits possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having the longest seasons possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avoiding different season lengths for different duck species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintaining unique hunting traditions (e.g., diving duck hunting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing the number of species-specific bag limits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having as large of mallard drake bag limits as possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. We are interested in knowing how much waterfowl hunting means to you. Please indicate how much you disagree or agree with the following statements about your involvement in waterfowl hunting. (Check one for each)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a. Waterfowl hunting is one of the most enjoyable activities I do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Most of my friends are in some way connected with waterfowl hunting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Waterfowl hunting has a central role in my life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. A lot of my life is organized around waterfowl hunting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. If I couldn't go waterfowl hunting I am not sure what I would do instead	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. A person can think of themselves in a variety of ways. On a scale of "1" to "7", where "1" is "not at all" and "7" is "completely", how much would you identify yourself as the following?

	Not at all			Moderately			Completely
Birdwatcher	1	2	3	4	5	6	7
Duck Hunter	1	2	3	4	5	6	7
Goose Hunter	1	2	3	4	5	6	7
Other hunter	1	2	3	4	5	6	7
Conservationist	1	2	3	4	5	6	7

18. In the last 12 months, have you participated in the following nature-based activities? *Please check Yes or No for each.*

<input type="checkbox"/> Yes	<input type="checkbox"/> No	Spending time in nature away from home (e.g., picnicking, relaxing in nature, camping, hiking)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Viewing wildlife (e.g., wildlife watching, bird watching, bird feeding, wildlife photography)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Learning about nature (e.g., attending festivals or lectures, visiting a nature center)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Backyard/at-home nature activities (e.g., gardening, landscaping)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Fishing
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Hunting other migratory birds (doves, woodcock, rail, etc.)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Hunting other game birds (grouse, pheasants)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Hunting all other game animals (deer, elk, rabbit, etc.)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Watching birds at my home
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Feeding birds at my home
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Watching birds away from my home
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Photographing or filming birds
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Counting/monitoring birds (e.g. Christmas or Backyard Bird Count)
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Recording the birds you see on a list, online or on paper
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Installing or maintaining nest boxes for birds

About You To help us compare your responses to those of others, we have some questions about you. Please be assured that all of your answers will remain completely confidential.

19. In what year were you born? 19_____

20. Are you...? ☐ Male ☐ Female

21. What is the highest level of education you have completed? (*Check one*).

- | | |
|---|--|
| <input type="checkbox"/> Some high school or less | <input type="checkbox"/> Associate's degree (2 years) |
| <input type="checkbox"/> High school diploma or GED | <input type="checkbox"/> Bachelor's degree (4 years) |
| <input type="checkbox"/> Some college (no degree) | <input type="checkbox"/> Graduate or professional school |

22. Do you own land in a rural area (outside of an urban or suburban area)?

- ☐ No ☐ Yes → If YES how many acres do you own in total _____ ACRES

23. Which of these categories best describes the place where you live now? (*Check one*)

- ☐ Large urban area (population of 500,000 or more)
- ☐ Medium urban area (population between 50,000 and 499,999)
- ☐ Small city (population between 10,000 and 49,999)
- ☐ Small town (population between 2,000 and 9,999)
- ☐ Rural area (population less than 2,000)

24. Please indicate which of the following categories applies to your personal income for the last 12 months? (*Check one*).

- | | | |
|---|--|--|
| <input type="checkbox"/> Less than \$24,999 | <input type="checkbox"/> \$75,000-\$99,999 | <input type="checkbox"/> \$200,000-\$249,999 |
| <input type="checkbox"/> \$25,000-\$49,999 | <input type="checkbox"/> \$100,000-\$149,999 | <input type="checkbox"/> \$250,000-\$299,999 |
| <input type="checkbox"/> \$50,000-\$74,999 | <input type="checkbox"/> \$150,000-\$199,999 | <input type="checkbox"/> \$300,000 or more |

25. What ethnicity do you consider yourself? (*Check one*).

- ☐ Hispanic or Latino
- ☐ Not Hispanic or Latino

26. From what racial origin(s) do you consider yourself? (*Please check all that apply*).

- ☐ American Indian or Alaskan Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

27. Please let us know why you chose not to complete the survey online earlier? (*Check all that apply*)

- | | |
|--|--|
| <input type="checkbox"/> I didn't receive the invitation in the mail | <input type="checkbox"/> I don't like to answer questions online |
| <input type="checkbox"/> I don't have access to the internet | <input type="checkbox"/> I don't hunt ducks or geese |
| <input type="checkbox"/> I have internet access, but couldn't open the website | <input type="checkbox"/> I didn't think the survey applied to me |
| <input type="checkbox"/> I didn't have time to complete the study earlier | |

Appendix C. Contact Letters

November , 2016

<FirstName> <LastName>
<Address>
<City> <State> <Zip>

Dear <Name>,

We are contacting you to participate in a national study about waterfowl hunting and management. We are working in close collaboration with the <Agency> to complete this study. We are coordinating the study at the University of Minnesota for your state and the National Flyway Council (NFC). We are contacting you because you purchased a license to hunt migratory waterfowl in <Homestate>, and we believe you have a very important point-of-view to share about waterfowl hunting and management.

To simplify the survey process, the survey is designed to be completed online. To complete the survey, please go to the secure website: **<https://duckhuntersurvey.org/login.html>**

Because it is a secure website, you will need to enter the survey website address in your web browser (Internet Explorer, Mozilla Firefox, Safari, Chrome). Typically you will enter this address in the web address bar located in the upper left corner of your web browser screen. You CANNOT get to the survey website by searching for it on a search engine such as Google or Yahoo.

To start the survey, enter the following **Access Code: «Password»**

It is important to note that your survey code is unique and cannot be used more than once. If you have trouble getting to the web address please e-mail us at: **umn.duckhunter@gmail.com** and we will forward a link to the survey website.

The survey will take about 20 minutes to complete and we greatly appreciate your time and effort. Your participation and responses are very important because they will help guide waterfowl management into the future. Participation in this study is voluntary. If you decide to participate, you are free to not answer any question on the survey. We will treat your involvement in this study with confidentiality, and the records of this study will be kept private and secure.

Please contact us if you have any questions after reading this letter. Please e-mail us at **umn.duckhunter@gmail.com** or call **612-625-3718** if you have any questions. Thank you very much for helping us with this important study!

Regards,

State Logos in Text Box Here

December, 2016

<FirstName> <LastName>
<Address>
<City> <State> <Zip>

2nd ltr

Dear <Name>,

We contacted you about 10 days ago to participate in a national study of waterfowl hunters. We are working in close collaboration with the <Agency> to complete this study and contacting you because you purchased a license to hunt migratory waterfowl in <Homestate>. We believe you have a very important point-of-view to share about waterfowl hunting and management. If you have not already completed the survey, we ask that you do so now.

To simplify the survey process, the survey is designed to be completed online. To complete the survey, please go to the secure website: **<https://duckhuntersurvey.org/login.html>**

Because it is a secure website, you will need to enter the survey website address in your web browser (Internet Explorer, Mozilla Firefox, Safari, Chrome). Typically you will enter this address in the web address bar located in the upper left corner of your web browser screen. You CANNOT get to the survey website by searching for it on a search engine such as Google or Yahoo.

To start the survey, enter the following **Access Code: «Password»**

It is important to note that your survey code is unique and cannot be used more than once. If you have trouble getting to the web address please e-mail us at: **umn.duckhunter@gmail.com** and we will forward a link to the survey website.

The survey will take about 20 minutes to complete and we greatly appreciate your time and effort. Your participation and responses are very important because they will help guide waterfowl management into the future. Participation in this study is voluntary. We will treat your involvement in this study with confidentiality, and the records of this study will be kept private and secure.

Please contact us if you have any questions after reading this letter. Please e-mail us at **umn.duckhunter@gmail.com** or call **612-625-3718** if you have any questions. Thank you very much for helping us with this important study!

Regards,

Insert State Logos in Text Box
Here

January, 2017

<FirstName> <LastName>
<Address>
<City> <State> <Zip>

3RD ltr

Dear <Name>,

About one month ago, we sent you a request to participate in a web-based nationwide study of waterfowl hunters. To the best of our knowledge we have not yet received a response from you. We are working in close collaboration with the <Agency> to complete this study. If you have not already completed the survey, we ask that you do so now.

The survey is designed to be completed online, and you can use a computer, tablet or smartphone. The following address should take you to a secure website:

<https://duckhuntersurvey.org/login.html>

Because it is a secure website, you will need to enter the survey website address in your web browser (Internet Explorer, Mozilla Firefox, Safari, Chrome). Typically you will enter this address in the web address bar located in the upper left corner of your web browser screen. You CANNOT get to the survey website by searching for it on a search engine such as Google or Yahoo.

To start the survey, enter the following **Access Code: «Password»**

It is important to note that your survey code is unique and cannot be used more than once. If you have trouble getting to the web address please e-mail us at: **umn.duckhunter@gmail.com** and we will forward a link to the survey website.

The survey will take about 20 minutes to complete and we greatly appreciate your time and effort. Your participation and responses are very important because they will help guide waterfowl management into the future. Participation in this study is voluntary. We will treat your involvement in this study with confidentiality, and the records of this study will be kept private and secure.

Please contact us if you have any questions after reading this letter. Please e-mail us at **umn.duckhunter@gmail.com** or call **612-625-3718** if you have any questions. Thank you very much for helping us with this important study!

Regards,

February 10, 2017

<FirstName> <LastName>
<Address>
<City> <State> <Zip>

Dear <Name>,

During the past couple of months, we contacted you to participate in a web-based nationwide study of waterfowl hunters. We are working in close collaboration with the **<Agency>** to complete this study. To the best of our knowledge we have not yet received a response from you. If you have not already completed the survey online, we ask that you do so now if at all possible.

We really want to include you in the online study if possible and are interested in your responses even if you have not hunted in a few years.

The survey is designed to be completed online, and you can use a computer, tablet or smartphone. The following address **<https://duckhuntersurvey.org/login.html>** will take you to the website.

To start the survey, enter the following **Access Code: <PASSWORD>**

You will need to enter the survey website address in your web browser (Internet Explorer, Mozilla Firefox, Safari, Chrome). Typically you will enter this address in the web address bar located in the upper left corner of your web browser screen. You CANNOT get to the survey website by searching for it on a search engine such as Google or Yahoo.

If you have trouble getting to the web address please e-mail us at: umnwild1@umn.edu and we will forward a link to the survey website.

The survey will take about 20 minutes to complete and we greatly appreciate your time and effort. Thank you so much for helping us with this important study!

Regards,

PS: If you cannot get access to the internet, we will be following up with a short mail survey in about 1 month.

March 31, 2017

<FirstName> <LastName>
<Address>
<City> <State> <Zip>

<idcode>

Dear <FirstName>,

During the past winter, we contacted you to participate in a web-based nationwide study of waterfowl hunters. We are working in close collaboration with the **<Agency>** to complete this study.

To the best of our knowledge you did not complete the survey online. We really want to include you in the study if possible. We have enclosed a shortened copy of the survey that you can complete and mail back to us in the enclosed postage paid envelope. We are interested in your responses regardless of how much you waterfowl hunt or even if you have not hunted in a few years.

The findings from this study will be used to help plan and manage for waterfowl across North America. Hearing from hunters like you is important to helping improve hunter experiences in the future.

The survey will take about 10 minutes to complete and we greatly appreciate your time and effort. The study is voluntary and all your responses will be kept confidential.

Thank you so much for helping us with this important study!

Regards,

A handwritten signature in cursive script, appearing to read 'Sue Schroeder'.

Sue Schroeder, Research Associate

Appendix D. Institutional Review Board Determination

DETERMINATION OF HUMAN SUBJECT RESEARCH

Version 1.2

Updated June 2014, check <http://www.irb.umn.edu> for the latest version

Route this form to:

See instructions below.

U Wide Form:
UM 1571

June 2014

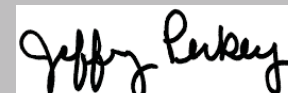
This form is used to help researchers determine if a project requires IRB review. It also provided documentation that the IRB has reviewed the project description and issued a determination.

Additional information that may assist you in determining whether or not to submit an application can be found on the IRB website. See [Does My Research Need IRB Review?](#) and Guidance and FAQs [IRB Review of Exempt Research](#).

Please allow up to five (5) business days for review and response.

Email completed form to irb@umn.edu

Based on the information provided, this project does not meet the regulatory definition of human subjects research. Additional IRB review is NOT required.


Project Title

Provide the grant title below if the project is funded.

Assessing the preferences of stakeholders and waterfowl management professionals to inform the implementation of the North American Waterfowl Management Plan

Section 1 Contact Information

Name (last name, First name MI)

Fulton, David C.

Highest Earned Degree:

PhD

Preferred contact information: dcfulton@umn.edu

Preferred email at which you may be contacted by IRB staff.

Affiliation and contact information

☒ University of Minnesota

Fairview



Gillette

U of M Required Contact information

U of M Internet ID (x.500):

dcfulton

University Department:

FWCB

Section 2 Summary of Activities

2.1 Provide a brief description of your project. Include a description of what any participants will be asked to do and a description of the data accessed and/or collected (1,000 character limit).

Individuals will be asked to complete an online survey focused on waterfowl hunting regulations, conditions that influence the choice of waterfowl hunting or bird viewing recreational trips, importance of hunting and viewing, beliefs about wetland conservation, and some demographics including income within broad categories. We are targeting 10,000 completed surveys nationwide. The data will be aggregated at the regional and national levels and market analysis will be conducted to better understand the preferences for hunting and viewing experiences among different segments of the study population. This information will be used to help set objectives for national level management plans of waterfowl, wetlands, and other bird species related to wetlands.

2.2 Are all of the data used in this project publicly available, e.g. blog, aggregate data, etc.?

Yes ☒ No

Section 3 Is this Project Human Subjects Research as Defined by Federal Regulations?

Research is defined in the [Code of Federal Regulations, 45CFR46.102\(d\)](#), as *a systematic investigation designed to develop or contribute to generalizable knowledge*

The Belmont report states "...the term 'research' designates an activity designed to test a hypothesis or answer a research question(s) [and] permit conclusions to be drawn... Research is usually described in a formal protocol that sets forth an objective and a set of procedures to reach that objective."

Research generally does **not** include operational activities such as routine outbreak investigations and disease monitoring and studies for internal management purposes such as program evaluation, quality assurance, quality improvement, fiscal or program audits, marketing studies or contracted-for services.

Generalizable knowledge is information where the intended use of the research findings can be applied to populations or situations beyond that studied. Note that publishing the results of a project does not automatically meet the definition of generalizable knowledge.

3.1 Do you have a specific research question or hypothesis?

☒ Yes No

3.2 Is your primary intent to generate knowledge that can be applied broadly to the group/condition under study?

☒ Yes No

Human subject is defined in the Code of Federal Regulations, 45CFR46.102(f)(1or2), as a living individual *about whom* an investigator obtains data through intervention or interaction or identifiable private information.

The specimen(s)/data/information must be collected from or be **about** live subjects. Research on cadavers, autopsy specimens or specimens/information from subjects now deceased is not human subjects research.

3.3 Does this project involve intervention or interaction with a living individual or group of individuals? (e.g. confidential surveys, interviews, medical or educational testing)

☒ Yes No

3.4 Does this project involve access to identifiable private data or specimens from living individuals?

Yes ☒ No

3.5 Does this project consist exclusively of interviewing or surveying subjects about his/her area of expertise, with a focus on policies, practices, and/or procedures (e.g. the collected data does not focus on personal opinion or private information)?

☒ Yes No

3.6 Is the project meant to record the stories, knowledge or experiences of individuals? Oral histories typically do not intend to answer a research question or hypothesis.

☐ Yes ☒ No

If a protocol exists for this project it must be submitted for review. Submit this request along with any supplemental documents that may aid in review of your project to the University of Minnesota IRB at irb@umn.edu.