SUPPORTING STATEMENT B FOR
PAPERWORK REDUCTION ACT SUBMISSION
OMB CONTROL NUMBER 1018-0023

MIGRATORY BIRD SURVEYS

3-165, 3-165A-E, AND 3-2056J-N

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved.

Migratory Bird Hunter Survey: The potential respondent universe is all licensed migratory bird hunters in the 49 States that have migratory bird hunting seasons, about 3,800,000 individuals. The universe is stratified by: (1) State, and (2) hunters' hunting experience and success the previous season. A systematic sample is selected within each stratum from the names and addresses in the order in which they are received. Stratum-specific universe and sampling data for forms 3-2056J, 3-2056K, 3-2056L, and 3-2056M, are given in Tables 1-4. Response rates for all four form types are about 60% nationally.

Parts Collection Survey: About 94,000 duck wings and 23,000 goose tails are collected and examined by biologists out of a universe of 13,500,000 ducks and 3,800,000 geese harvested. These parts are obtained from about 6,500 successful waterfowl hunters who return form 3-165 out of a universe of 1,135,000 active waterfowl hunters. State figures are given in Table 5. The sample of hunters who are sent form 3-165B consists of about 2,000 successful hunters from a sample universe of about 220,000 active woodcock, snipe, rail, gallinule, and band-tailed pigeon hunters. About 11,000 wings are collected and examined out of a universe of about 500,000 birds harvested.

Experimental Mourning Dove Wing Survey: The sample of hunters who will be sent from 3-165E consists of about 1,800 successful mourning dove hunters from a sample universe of about 1,145,000 active dove hunters. We will be soliciting wings from the first week of the hunting season only. We estimate that we will collect and examine about 25,000 wings out of a universe of about 8,860,000 birds that will be harvest during the first week of the mourning dove hunting season.

Sandhill Crane Harvest Survey:

The universe for sampling is approximately 58,600 individuals who obtain an annual permit to hunt sandhill cranes. Sampling is according to States, with 10% of the permittees randomly selected to receive questionnaires in Texas, 20% of the permittees selected in Colorado and North Dakota, and 50% of the permittees contacted in all other States except Montana and Wyoming. All permittees in Montana and Wyoming are contacted because of the low number of permits issued in those States. Table 6. shows pertinent sampling characteristics by State and Table 7. response rates by response wave.

2. **Describe the procedures for the collection of information including:**
   * **Statistical methodology for stratification and sample selection,**
   * **Estimation procedure,**
   * **Degree of accuracy needed for the purpose described in the justification,**
   * **Unusual problems requiring specialized sampling procedures, and**
   * **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

Parts Collection Survey Procedures: Samples of successful hunters from the previous year's Migratory Bird Hunter Survey are asked to complete and return a postcard (forms 3-165A, C, and E), volunteering to contribute wings and tails during the following hunting season. The samples are randomly selected in proportion to the estimated harvest in each State. Those that volunteer are sent a cover letter with instructions and a supply of pre-addressed, postage-paid return envelopes (forms 3-165, 3-165B, and 3-165E) for mailing in the wings and tails. Inner envelopes to protect other mail from stains and seepage are enclosed with the instructions and return envelopes. These packages are sent to survey volunteers before the hunting season opens in their state. Throughout the hunting season, survey participants mail in parts to four collection points (one in each flyway), where they are stored until they are examined. At the end of the hunting season, biologists examine each part to determine species, age, and sex composition of the sample; hunters can not reliably determine this information. After those data have been compiled, respondents are sent a personalized thank you letter detailing the species, age, and sex of each bird from which they contributed a wing or a tail.

Migratory Bird Hunter Survey Procedures: Survey procedures are based on Dillman's Total Design Method (Dillman, 1978, Mail and Telephone Surveys, the Total Design Method, Wiley). This method has been shown to substantially reduce non-response in many situations.

a. Each State requires all migratory bird hunters to identify themselves as such, and to provide their name, address, and date of birth, as a condition for obtaining authorization to hunt migratory game birds in the State. Most of the name, address, and date of birth information collection is done by the State's hunting license vendors (agents) or by a State contractor.

b. State license agents or contractors ask each migratory game bird hunter to answer the following questions:

1) Do you plan to hunt migratory birds during [season]? [This screening question is needed only if a State asks all hunters to provide the above information. Only migratory bird hunters would be asked the following questions.]

2) How many of these birds did you bag last season in [State]?

	None	1-10	11+
Ducks	___	___	___
Geese	___	___	_____

	None	1-30	31+
Doves	___	___	___
Woodcock	___	___	___

3) Did you hunt coots or snipe last season? Yes__ No__

4) Did you hunt rails or gallinules last season? Yes__ No__

5) Do you plan to hunt band-tailed pigeons this season? Yes__ No__

6) Do you plan to hunt sea ducks this season? Yes__ No__

7 Do you plan to hunt brant this season? Yes__ No__

c. States are responsible for development of adequate control procedures to ensure that agents (1) account for all validated licenses; (2) promptly provide the State with names, addresses, and other information; (3) have a low proportion of incomplete or illegible information; and (4) return information from all migratory game bird hunters.

d. States provide the Service with migratory game bird hunters' names, addresses, birth dates, and their answers to the above questions in an acceptable form (electronic data, or machine-scannable paper form). We receive the first list of hunter names and address in August prior to the migratory bird hunting seasons in each state. The States then send the Service updated lists every 2 weeks until the end of the migratory bird hunting seasons within each respective state. This information is needed in timely fashion for the Service to contact survey participants and ask them to keep records of their migratory game bird hunting throughout the hunting season. This also allow the Service to get survey forms into the hands of selected hunters before the hunting season starts or shortly after the hunter purchased his or her hunting license.

e. To protect hunters' privacy, it is the policy of the Service to use the names and addresses only for conducting hunter surveys and for no other purpose. All

records of hunters' names and addresses are deleted after each year's surveys and no permanent record of names and addresses is maintained by the Service.

f. States provide the Service with a report by April 15 each year of the total numbers of migratory bird hunters, by prior year success and species hunted strata. If that report is not complete, States provide the Service with a corrected report by April 15 the following year.

g. The Service selects samples for surveys of waterfowl hunters, dove and band-tailed pigeon hunters, woodcock hunters, and snipe, rail, gallinule, and coot hunters. Higher sampling rates are needed for successful hunters and for those who hunt less-frequently hunted species. Hunters are not asked to participate in more than one survey per State per year to minimize the burden on individual respondents.

h. Theoretically, there could be up to (3)(3)(3)(3)(2)(2)(2)(2)(2) = 2,592 strata in each State, defined by (maximum response to duck success) X (maximum response to goose success) X (maximum response to dove success) X (maximum response to woodcock success) X (whether or not coots or snipe were hunted) X (whether or not rails or gallinules were hunted) X (whether or not band-tailed pigeon hunting is planned) X (whether sea duck hunting is planned) X (whether brant hunting is planned). However, individual States do not allow hunting of all the species listed; therefore most States have fewer strata. For example only 11 states have sea duck seasons, only 14 states have brant seasons, and only 7 states have band-tailed pigeon seasons.

i. Samples are selected as the names are received in order that migratory bird hunters can be contacted and asked to keep records as soon as possible after hunting starts. A systematic sample is selected within each stratum, repeating every n_h^{th} hunter in stratum h, with (potentially) different sampling rates for each stratum. Sampling without replacement is used, with high priority strata being sampled before lower priority strata. Stratum priority is determined by: (1) biological need, and (2) desired precision levels for the estimates.

j. Double sampling estimates (Hansen and Hurwitz, 1958, JASA) are used to account for non-response (see Groves, 1989, *Survey Errors and Survey Costs,* Wiley, pages 165-169; and Hansen, Hurwitz and Madow, 1953 *Sample Survey Methods and Theory*, Wiley, vol. 1, pages 468-475). Two response strata are defined by the respondents and non-respondents to the first wave of reminder letters. A second wave of reminders and survey replacement forms is sent to all non-respondents to the first wave of reminder letters. Additionally, a third wave of reminder letters and survey replacement forms is sent to all non-respondents to the second wave of reminder letters.

For each species (e.g., mourning dove) or species group (e.g., geese), the number of active hunters, number of hunting days, and number of birds harvested are estimated from the questionnaires using a ratio estimate with the response per hunter and the number of migratory bird hunters reported, by stratum, by the States. Species-, age-,

and sex-specific harvests will be estimated using ratios estimated from the Parts Collection Survey.
Target 95% confidence intervals for harvest estimates at the management unit level (eg., Flyway) are as follows: ducks, ± 5%; geese, ± 5%; mourning doves, ± 5%; brant, woodcock, band-tailed pigeons, and white-winged doves, ± 10%; sea ducks, ± 25%; snipe, rails, gallinules, and coots, ± 50%. These target precision levels were deemed appropriate by the Federal and State biologists who are charged with managing those migratory bird species.

Surveys must be conducted annually because migratory bird harvests can change substantially between years depending on the size of the fall flight and hunting pressure. Estimates are required for annually promulgating hunting regulations.

Sandhill Crane Harvest Survey: Sampling is stratified according to State of permit issuance; sampling rates vary from 15% in States with many crane permittees (Texas, North Dakota) to 100% in States with few crane permittees (e.g., Montana, Wyoming). No specialized sampling procedures are required, and we use the standard estimation methods for stratified random samples. Stratum-specific (State-specific) estimates of the proportion of permittees that actually hunted cranes, the mean number of days hunted, and the mean number of cranes harvested are derived from the responses. Those estimates are expanded by N (number of permits issued) for each State to obtain State totals, which are then combined to provide estimates of the number of active crane hunters, days of hunting, and cranes harvested for all mid-continent sandhill crane hunting in the U.S. The 95% confidence interval for the annual harvest estimate is about $\pm$5%, which is a precision level that is adequate to ensure responsible harvest management (i.e., hunting regulations) decisions.

3. **Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.**

The forms have been designed to be as attractive and as easy to use as possible. The cover letters attempt to motivate the respondent and stress the importance of participation. For the Migratory Bird Hunter Survey, there are three waves of reminders. The first wave includes a postcard and a letter sent by first class mail. Second and third waves of reminders and replacement forms are sent to a all non-respondents, also by first class mail. As described in item B. 2. j. above, double sampling estimates are used to detect and, if necessary, account for non-response. The Parts Collection Survey maximizes response rates by using forms 3-165A and 3-165C to solicit volunteer participants from a randomly selected sample of successful hunters. Similarly, the Experimental Mourning Dove Parts Collection Survey will use form 3-165D to solicit volunteer participants from a randomly selected sample of successful mourning dove hunters.

Recent Investigations of non-response bias and attempts to increase response rates. As requested by OMB in 2004 we conducted several investigations of non-response bias in our surveys. Summaries of those investigations are included in Appendices A-C. We plan to formalize these write-ups and submit them for publications in the future.

Appendix A - Effects of non-response bias in the Waterfowl Parts Collection Survey.
Appendix B - Effects of certified mail on response rates and survey results.
Appendix C - Attempts to increase sandhill crane harvest survey response rates

4. **Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.**

No additional testing of procedures is planned.

5. **Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.**

The individual directly responsible for information collection and analysis is: Dr. Kenneth D. Richkus, Chief, Branch of Harvest Surveys, Division of Migratory Bird Management, Laurel, MD 20708-4028 (301/497-5994).

The following statisticians have reviewed the statistical design and analysis of these surveys:

Ms. Christine M. Bunck, Program Coordinator, Biomonitoring Environmental Status and Trends, 1849 C Street NW, Washington, D.C. 20240 (202/482-3972)

Mr. Grey W. Pendleton, Statistician (Biology), Biometrical Group, Patuxent Environmental Science Center, Laurel, MD (301/497-5632)

Dr. Robert E. Trost, Migratory Bird Management Office, U.S. Fish and Wildlife Service, 911 N.E. 11th Avenue, Portland, OR 97232-4181 (503/231-6162)

Dr. Paul H. Geissler, Biologist, National Ecological Surveys Team, Patuxent Environmental Science Center, Laurel, MD 20708 (301/497-5780)

Table 1. Potentail respondent universe and number of hunters sampled, by stratum, for Form 3-2056J. Each hunter is assigned to a"ducks bagged," "hunt sea ducks," "goose bagged," and a "hunt brant" stratum. Based on 2005 counts.

	Hunters in universe										Hunters in sample									
	Ducks bagged			Hunt sea ducks		Geese bagged			Hunt brant		Ducks bagged			Hunt sea ducks		Geese bagged			Hunt brant	
State	None	1-10	>10	No	Yes	None	1-10	>10	No	Yes	None	1-10	>10	No	Yes	None	1-10	>10	No	Yes
AK	4,916	2,122	1,796	6,615	2,219	7,194	1,289	351	7,078	1,756	229	164	188	218	363	412	125	44	278	303
AL	98,344	4,567	3,057			102,317	2,785	866			664	214	340			884	211	123		
AR	127,197	22,880	24,902			153,321	14,278	7,380			821	584	1,474			1,777	613	489		
AZ	2,675	961	669			3,801	430	74			68	94	31			140	39	14		
CA	101,443	14,955	22,238			118,228	15,896	4,512	138,016	620	485	710	1,347			1,199	933	410	2,306	236
CO	31,323	7,259	2,994			32,596	6,988	1,992			389	423	406			544	367	307		
CT	3,716	1,784	546			4,094	1,522	430			114	259	146			162	247	110		
DE	4,997	1,941	1,213	7,735	416	5,254	2,214	683	7,769	382	187	349	389	745	180	224	446	255	785	140
FL	93,407	7,725	4,172			105,304	0	0			871	345	380			1,596				
GA	131,715	9,387	4,202			137,816	5,443	2,045			745	932	804			1,399	650	432		
IA	29,557	9,870	6,226			33,361	9,171	3,121			216	262	372			323	292	235		
ID	34,284	7,750	5,374			40,172	6,037	1,199			295	577	642			831	493	190		
IL	55,510	14,294	7,490			62,041	12,933	2,320			445	453	407			657	489	159		
IN	21,907	6,387	2,786			22,875	6,632	1,573			332	360	308			469	360	171		
KS	34,090	4,183	5,601			35,869	4,548	3,457			271	131	370			362	162	248		
KY	10,273	1,300	1,235			11,282	1,153	373			249	179	318			383	241	122		
LA	95,103	17,277	18,103			117,397	8,856	4,230			549	891	1,287			1,798	564	365		
MA	4,807	1,710	506	6,246	777	5,407	1,333	283	5,705	1,318	248	269	157	421	253	340	273	61	281	393
MD	30,720	7,933	6,178	40,333	4,498	27,613	11,016	6,202	41,516	3,315	606	736	676	1,443	575	515	866	637	1,667	351
ME	25,129	1,412	452	24,137	2,856	26,328	605	60			570	343	71	545	439	774	179	31		
MI	106,404	25,062	10,850			113,667	22,945	5,704			762	668	535			1,022	637	306		
MN	93,365	53,733	24,524			112,979	47,157	11,486			298	798	507			582	751	270		
MO	50,809	7,930	7,319			56,469	6,276	3,313			326	420	571			696	332	289		
MS	28,538	3,167	2,732			32,466	1,285	686			271	231	393			565	136	194		
MT	29,450	5,245	3,793			31,709	5,100	1,679			255	361	396			386	407	219		
NC	158,807	18,428	8,099			170,217	12,524	2,593	132,563	52,771	894	989	971			1,469	960	425	1,764	1,090
ND	25,616	14,738	15,216			34,192	16,323	5,055			270	771	848			665	850	374		
NE	23,394	7,827	4,926			25,417	9,377	1,353			211	395	419			378	524	123		
NH	4,050	1,366	451	5,631	236	4,742	981	144	5,804	63	189	388	259	692	144	382	361	93	799	37
NJ	6,366	2,739	1,277	9,585	797	7,337	2,199	846	7,745	2,637	333	374	263	676	294	527	294	149	332	638
NM	19,078	1,090	551			19,982	600	137			677	248	137			844	151	67		
NV	6,497	1,287	1,166			7,789	909	252			118	171	333			275	269	78		
NY	21,658	9,062	4,222	32,828	2,114	23,604	8,342	2,996	30,434	4,508	693	845	722	1,577	683	1,041	770	449	1,136	1,124
OH	68,167	14,393	6,966			70,823	14,139	4,564			290	458	425			434	482	257		
OK	34,093	4,057	5,604			38,592	3,681	1,418			359	318	764			722	455	264		
OR	31,771	6,725	7,790			37,697	5,654	2,934	46,150	136	268	260	1,039			629	418	520	1,557	10
PA	80,730	15,095	4,263			79,767	15,538	4,783			506	966	534			669	839	498		
RI	784	394	194	972	400	883	362	127	715	657	51	101	66	111	107	66	101	51	27	191
SC	115,787	9,333	5,815			127,186	3,301	448			796	934	1,152			2,081	594	207		
SD	24,575	6,170	10,709			24,538	8,379	8,537			289	282	745			347	334	635		
TN	137,989	8,513	5,690			143,491	5,816	2,885			474	371	659			739	361	404		
TX	727,075	35,176	30,595			762,584	20,625	9,637			1,237	1,516	1,830			2,751	1,044	788		
UT	18,123	6,670	4,649			24,996	3,830	616			165	409	566			590	449	101		
VA	34,181	6,351	2,940	41,905	1,567	35,637	6,145	1,690	40,660	2,812	422	607	480	1,191	318	597	624	288	1,009	500

VT	2,171	635	429			2,540	523	172			50	153	133			118	136	82			
WA	27,301	7,878	9,846			35,513	6,767	2,745			187	370	1,114			794	553	324			
WI	107,109	34,614	14,968			128,503	25,892	2,296			322	890	720			885	891	156			
WV	2,979	476	173			3,039	450	139			171	79	42			164	92	36			
WY	7,292	1,950	1,133			7,698	2,030	647			150	241	255			213	287	146			
TOTAL	2,935,272	455,801	316,630	175,987	15,880	3,216,327	370,279	121,033	464,155	70,975	19,388	22,889	26,991	7,619	3,356	35,420	21,652	12,196	11,941	5,013	

Table 2. Potentail respondent universe and number of hunters sampled, by stratum, for Form 3-2056K. Based on 2005 counts.

	Hunters in universe					Hunters in sample				
	Doves bagged			Hunt pigeons		Doves bagged			Hunt pigeons	
State	None	1-30	>30	No	Yes	None	1-30	>30	No	Yes
AL	73,811	23,803	8,354			554	439	255		
AR	138,426	25,557	10,996			684	726	467		
AZ	16,248	14,730	5,868			112	440	437		
CA	79,701	48,204	10,731	134,533	4,103	523	969	602	1,496	598
CO	28,979	10,744	1,853	36,827	4,749	898	863	376	730	1,407
DE	5,518	2,071	562			107	180	82		
FL	84,866	15,919	4,519			690	848	362		
GA	100,551	35,328	9,425			571	541	279		
ID	39,797	6,870	741			319	565	120		
IL	50,793	20,994	5,507			492	570	227		
IN	19,427	9,155	2,498			149	373	411		
KS	18,681	14,546	10,647			160	435	629		
KY	8,004	3,285	1,519			86	235	252		
LA	104,747	20,866	4,870			431	541	254		
MD	36,499	6,697	1,635			297	336	227		
MN	171,622	0	0			1,358	0	0		
MO	49,546	11,807	4,705			322	492	259		
MS	24,837	6,901	2,699			171	188	210		
MT	37,211	1,057	220			611	171	77		
NC	129,071	48,670	7,593			378	966	191		
ND	49,702	5,022	846			453	442	142		
NE	21,457	11,262	3,428			220	627	286		
NM	14,765	4,012	1,942	20,591	128	163	375	356	788	106
NV	6,093	2,538	319			96	212	113		
OH	66,809	17,963	4,754			261	333	284		
OK	28,420	11,027	4,307			271	399	633		
OR	41,560	3,761	965	45,601	685	270	328	186	620	164
PA	70,036	25,762	4,290			259	744	259		
RI	1,145	203	24			31	34			
SC	95,771	27,243	7,921			2,061	140	74		
SD	32,440	7,701	1,313			303	465	118		
TN	125,305	18,590	8,297			340	283	237		
TX	530,706	165,107	97,033			624	1,409	1,636		
UT	22,575	6,316	551	28,317	1,125	198	533	86	733	84
VA	24,911	13,821	4,740			200	554	368		
WA	40,898	3,482	645			309	583	102		
WI	147,193	8,639	859			504	363	73		
WV	2,481	987	160			45	149	35		
WY	8,596	1,411	368			117	156	110		
TOTAL	2,549,198	662,051	237,704	265,869	10,790	15,638	18,007	10,815	4,367	2,359

Table 3. Potentail respondent universe and number of hunters sampled, by woodcock stratum, for Form 3-2056L. Based on 2005 counts.

	Hunters in universe		Hunters in sample	
State	No	Yes	No	Yes
AL	104,390	1,578	222	282
AR	170,993	3,986	315	192
CT	5,424	622	205	155
DE	8,043	108	190	54
FL	101,098	4,206	235	390
GA	140,315	4,989	234	211
IA	45,061	592	406	276
IL	76,845	449	329	275
IN	30,547	533	264	271
KA	43,868	6	200	3
KY	12,655	153	135	38
LA	126,264	4,219	380	762
MA	6,397	626	293	198
MD	44,310	521	256	157
ME	25,779	1,214	336	388
MI	118,124	24,192	723	1,138
MN	160,695	10,927	568	965
MO	64,642	1,416	255	311
MS	33,876	561	60	100
NC	176,730	8,604	208	101
NE	35,816	331	193	110
NH	4,619	1,248	92	307
NJ	9,968	414	356	133
NY	33,387	1,555	548	480
OH	86,389	3,137	243	275
OK	43,549	205	191	51
PA	94,273	5,815	560	544
RI	1,288	84	56	42
SC	130,224	711	697	150
TN	149,372	2,820	120	153
TX	786,840	6,006	281	272
VA	42,814	658	250	202
VT	2,844	391	93	94
WI	148,520	8,171	544	745
WV	3,412	216	80	71
TOTAL	3,069,371	101,264	10,118	9,896

Table 4. Potentail respondent universe and number of hunters sampled, by stratum, for Form 3-2056M. Each hunter is assigned to both a "hunted coots/snipe" and a "hunted rails/gallinules" stratum. Based on 2005 counts.

	Hunters in universe				Hunters in sample			
	Hunted coots/snipe		Hunted rails/gallinules		Hunted coots/snipe		Hunted rails/gallinules	
State	No	Yes	No	Yes	No	Yes	No	Yes
AK	6873	1961	8834	0	5	93	98	0
AL	104649	1319	104861	1107	244	252	252	244
AR	169233	5746	170089	4890	190	234	217	207
AZ	38724	409	38690	443	74	107	71	110
CA	135876	2760	138087	549	334	294	506	122
CO	34177	7399	36446	5130	219	240	274	185
CT	6004	42	6019	27	213	18	215	16
DE	7959	192	7989	162	299	135	322	112
FL	93477	11827	96467	8837	370	605	414	561
GA	140460	4844	145304	0	228	204	432	0
IA	45132	521	45381	272	242	153	288	107
ID	39736	7672	47408	0	150	395	545	0
IL	76425	869	77066	228	212	238	338	112
IN	30652	428	30939	141	142	213	262	93
KS	42861	1013	42957	917	223	549	229	543
KY	12689	119	12765	43	167	60	205	22
LA	111453	19030	112612	17871	285	650	309	626
MA	6892	131	6966	57	244	64	278	30
MD	43055	1776	43251	1580	171	420	184	407
ME	24581	2412	24583	2410	99	225	97	227
MI	130596	11720	130596	11720	240	211	240	211
MN	147953	23669	167524	4098	279	603	644	238
MO	64299	1759	65117	941	232	149	268	113
MS	32282	2155	32471	1966	84	149	92	141
MT	38193	295	38488	0	134	56	190	0
NC	155348	29986	158562	26772	189	255	201	243
ND	54857	713	55570	0	210	338	548	0
NE	29790	6357	30871	5276	128	285	162	251
NH	5762	105	5867	0	212	45	257	0
NJ	10212	170	10123	259	223	79	177	125
NM	20655	64	20698	21	188	30	207	11
NV	8833	117	8910	40	171	61	207	25
NY	34235	707	34581	361	274	228	327	175
OH	84577	4949	85032	4494	177	156	182	151
OK	43387	367	43567	187	202	56	206	52
OR	41429	4857	46286	0	203	237	440	0
PA	98498	1590	98654	1434	211	95	230	76
RI	1189	183	1193	179	47	57	50	54
SC	127034	3901	126877	4058	618	155	514	259
SD	41255	199	41454	0	202	97	299	0
TN	149635	2557	149796	2396	99	93	105	87
TX	785666	7180	786968	5878	582	558	651	489
UT	23581	5861	29442	0	223	214	437	0
VA	42748	724	42735	737	258	117	222	153
VT	3182	53	3235	0	102	18	120	0
WA	44380	645	45025	0	222	212	434	0
WI	153988	2703	153958	2733	263	282	301	244
WV	3499	129	3514	114	154	38	158	34
WY	10255	120	10246	129	291	52	284	59
TOTAL	3558226	184305	3624074	118457	10529	10075	13689	6915

Table 5. Potential ample universe for the Parts Survey based on 2005 data - Waterfowl

State	Ducks harvested	Duck wings collected	Geese harvested	Goose tails collected
AK	74,500	1,455	5,500	111
AL	136,300	1,022	17,000	35
AR	1,080,400	2,588	135,300	183
AZ	51,900	679	1,700	25
CA	1,327,200	9,995	146,900	1,051
CO	99,300	1,300	87,100	784
CT	26,000	501	21,600	626
DE	44,600	661	27,100	422
FL	174,700	2,977	100	1
GA	97,300	388	35,100	52
IA	205,200	1,141	79,200	406
ID	258,300	2,024	74,300	529
IL	380,400	1,938	110,800	575
IN	131,000	973	58,900	573
KS	158,000	1,293	108,300	558
KY	187,000	430	35,900	83
LA	877,800	2,868	157,700	213
MA	33,300	847	13,200	780
MD	152,500	1,701	177,500	1,622
ME	58,600	920	8,000	92
MI	284,400	1,541	141,800	589
MN	531,500	2,219	207,500	888
MO	465,400	2,499	79,700	412
MS	303,800	1,340	27,000	66
MT	115,300	2,021	38,900	722
NC	271,700	1,198	81,800	128
ND	519,400	4,498	153,300	840
NE	164,700	1,457	113,700	626
NH	14,300	443	5,300	186
NJ	65,000	1,169	36,200	703
NM	32,800	884	7,500	135
NV	49,600	1,295	6,800	88
NY	194,700	2,482	133,500	1,730
OH	124,000	599	90,100	346
OK	285,100	2,133	42,500	374
OR	357,600	3,717	66,000	780
PA	132,300	1,337	189,300	1,744
RI	11,000	311	3,800	248
SC	166,100	850	27,600	44
SD	179,200	1,917	103,100	654
TN	187,700	574	26,400	59
TX	1,255,400	3,285	457,300	440
UT	269,900	3,197	30,500	289
VA	139,000	1,705	67,600	1,154
VT	25,400	701	9,700	324
WA	396,200	4,156	80,700	702
WI	375,100	1,165	108,000	320
WV	4,000	131	3,900	159
WY	35,900	660	20,100	363
TOTAL	**12,510,800**	**85,185**	**3,660,800**	**23,834**

Table 6. Potentail respondent universe and number of hunters sampled, by sandhill crane stratum, for Form 3-2056N. Based on 2005 counts.

State	No. of Permittees	No. in Contacted	No. Responses	Response Rate
CO	5,766	1,055	763	72%
KS	805	390	307	79%
MT	281	266	234	88%
NM	494	230	159	69%
ND	7,441	1,472	1151	78%
OK	698	661	485	73%
SD	490	233	214	92%
TX	51,511	7,041	4385	62%
WY	68	66	54	82%
TOTAL	**67,554**	**11,414**	**7,752**	**68%**

Table 7. Number of Repeat Contacts and Response Rate by Response Wave for Form3-2056N. Based on 2005 counts.

State	No. Reps to 1st Mailing	Resp Rate 1st Mailing	No. Contacted Reminder 1	No. Reps to Reminder 1	Resp Rate Reminder 1	No Contacted Reminder 2	No. Reps to Reminder 2	Resp Rate Reminder 2
CO	511	48%	544	175	32%	369	77	21%
KS	199	51%	191	76	40%	115	32	28%
MT	196	74%	70	24	34%	46	14	30%
NM	107	47%	123	30	24%	93	22	24%
ND	792	54%	680	243	36%	437	116	27%
OK	336	51%	325	88	27%	237	61	26%
SD	171	73%	62	35	56%	27	8	30%
TX	2611	37%	4,430	1,107	25%	3,323	667	20%
WY	39	59%	27	9	33%	18	6	33%
TOTAL	**4962**	**43%**	**6,452**	**1,787**	**28%**	**4,665**	**1,003**	**22%**

Appendix A. Effects of non-response in the Waterfowl Parts Collection Survey

BACKGROUND

To address questions posed by the Office of Management and Budget, we evaluated potential non-response bias in the Waterfowl Parts Collection Survey (PCS). The PCS is an annual survey that we conduct to estimate the species composition of the duck and goose harvest in the United States. The survey also provides species-specific estimates of the sex and age composition of the duck harvest and the age composition of the goose harvest. Results from this survey provide important inputs into many of the Division of Migratory Bird Management's population, harvest, and productivity models and serve as a way to evaluate the effects of waterfowl hunting regulations.

The sample universe for this survey is all successful duck and goose hunters in the United States. However, we do not select a random sample of hunters directly from that universe. Instead, we select a sample of duck and goose hunters who (1) responded the previous year to our Harvest Information Program mail questionnaire survey (HIP survey) about duck and goose hunting, and (2) reported on that survey that they shot at least one duck or one goose. This sampling scheme for the PCS increases survey efficiency by targeting our sampling effort toward known, successful waterfowl hunters, but we must make the assumption that respondents to the previous year's HIP survey are representative of the sample universe. We addressed the potential issue of non-response bias in the HIP survey with an experiment, using certified mail, the results of which we will report separately. To determine the magnitude of potential non-response bias in the PCS, we examined each stage of the survey's sampling process. We then assessed the potential for non-response bias effects on species, sex and age composition estimates using data from 2003, 2004 and 2005.

PCS SAMPLING PROCEDURE

From the previous year's successful HIP survey respondents, we select a sample of 15,000-20,000 "potential volunteers." We send each selected hunter a letter that describes the PCS and asks them to respond if they are willing to participate in the survey. Those who do respond ("volunteers") are included in the PCS and are sent postage-paid envelopes and instructions for sending in the necessary feathers from the ducks and geese they shoot. Typically, about 35-40% of "potential volunteers" respond. Of those "volunteers," about 50% become "participants" who actually do send in feathers from one or more birds. Thus, there are two stages at which non-response could affect the survey's results: (1) non-response by "potential volunteers," and (2) non-response by "volunteers."

Each year, PCS participants from the previous year are asked to participate again, up to a maximum of three consecutive years. So, there are two other stages of the sampling process at which non-response occurs. One-year participants may either agree to participate another year or not, and likewise, two-year participants may either agree to participate for a third year or not. Oetgen (2002), a Louisiana State University Masters

student, reviewed 10 years of PCS data and indirectly examined the effects of non-response at these stages. He tested for differences in the species, age, and sex composition of harvests among first-, second- and third-year PCS participants. Although he found statistically significant differences, the magnitudes of those differences were small. Oetgen stated that the statistically significant differences were a function of large sample sizes and did not reflect any biologically significant differences. Thus, he concluded that the species, age, and sex composition estimates were relatively unaffected by repeat sampling in the PCS. As a result of this study, we did not revisit non-response at those stages, and limited our effort to examining non-response by "potential volunteers" and "volunteers."

APPROACH

We used the numbers of ducks and geese that sample hunters reported harvesting in the previous year's HIP survey to compare PCS respondents and non-respondents for 2003, 2004 and 2005. We hypothesized that if the mean numbers of ducks and geese harvested by respondents did not differ from non-respondents, then the species, sex and age composition of ducks and geese harvested would likely be similar for both groups of hunters. This would indicate that non-response does not bias the PCS results. On the other hand, large differences between respondents and non-respondents would suggest that the magnitude of the seasonal duck and goose harvest differs and might suggest that there species composition estimates may also differ. To test for differences between respondents and non-respondents, we compared mean duck and goose harvests for (1) "potential volunteers" who did not volunteer vs. those who did volunteer, and (2) "volunteers" who did not participate vs. those who did.

RESULTS AND IMPLICATIONS

Comparisons were based on 12,948 (2003),11,827 (2004) and 16,990 (2005) "potential volunteers," 4,000 (2003), 4,377 (2004) and 5,997 (2005) "volunteers," and 2,067 (2003), 1,990 (2004) and 3,069 (2005) "participants." Although point estimates varied from year to year, the trends were similar across years. In all three years, "volunteers" had significantly greater mean harvest of ducks than did non-respondents, but the magnitudes of the differences were small (Figure 1). Mean goose harvests did not differ between "volunteers" and non-respondents for two of the three years (Figure 2).

"Participants" harvested 25-50% more ducks and geese on average than "volunteers" who did not respond (Figures 1 and 2). Although the magnitudes of these differences are sufficient to cause bias, we think it unlikely that "volunteer" non-response does result in biased species, sex or age composition estimates. Oetgen (2002) found that first-year PCS participants contributed significantly fewer samples than second- and third-year participants did, but the differences in species, sex and age composition of their samples were not great enough to bias the results. Therefore we believe that "volunteer" non-response also has a negligible effect on our species, sex and age composition estimates.

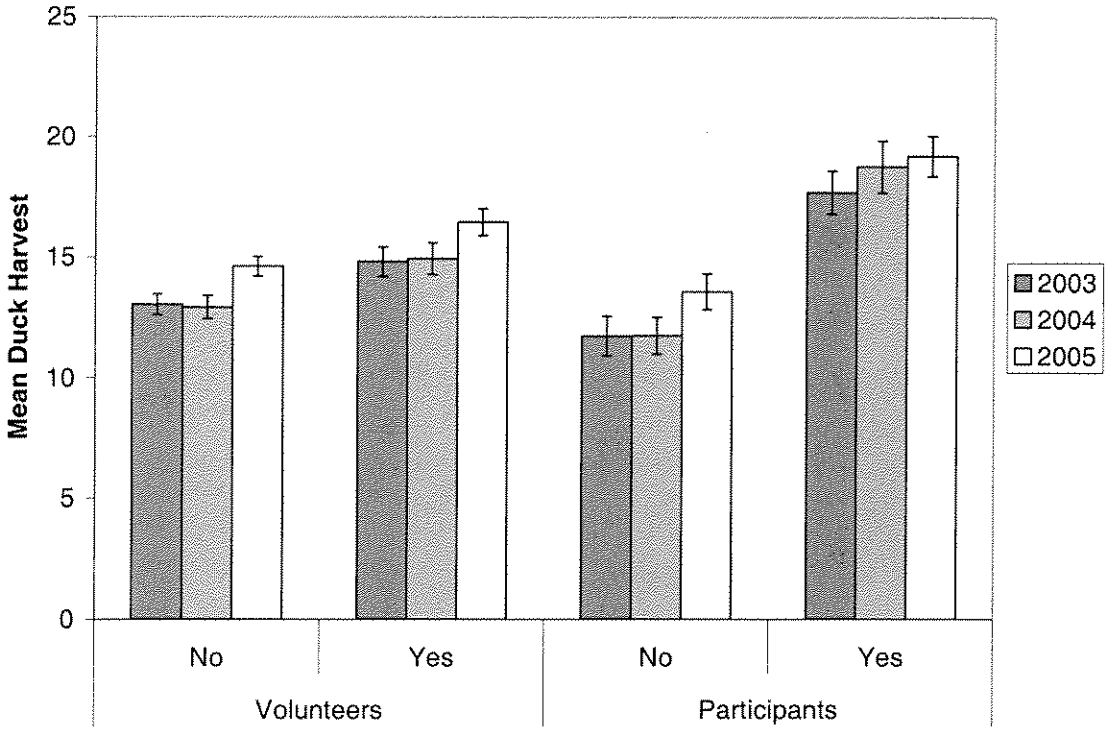

Figure 1. Comparisons of duck harvest for (1) hunters who volunteered to participate in the PCS versus non-respondents, and (2) participating hunters versus non-respondent volunteers.

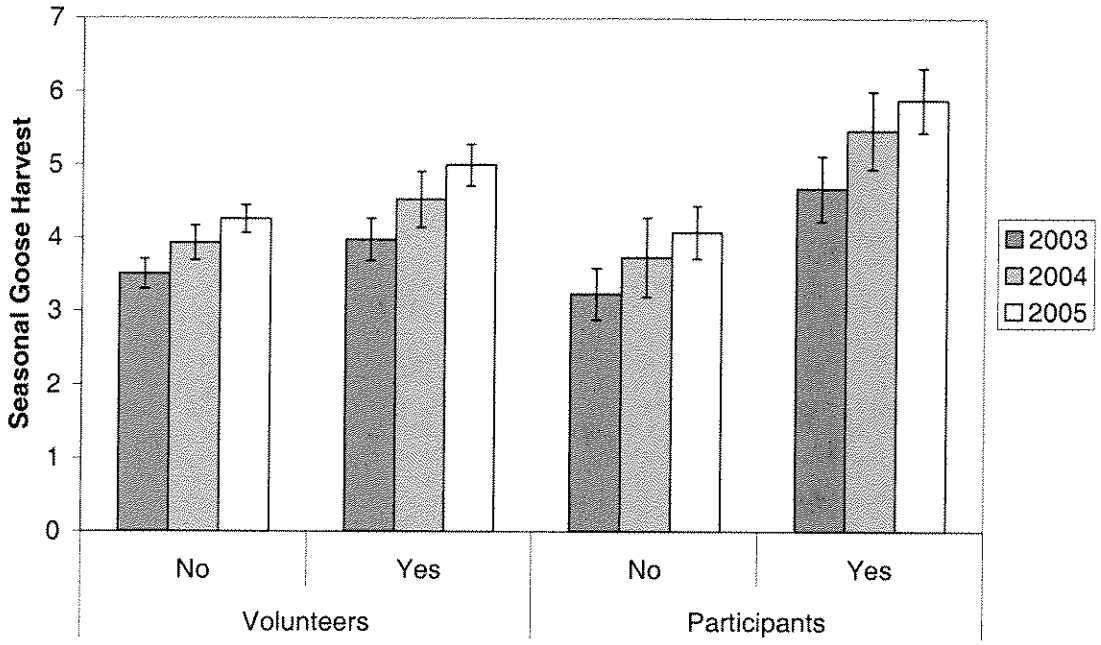

Figure 2. Comparisons of goose harvest for (1) hunters who volunteered to participate in the PCS versus non-respondents, and (2) participating hunters versus non-respondent volunteers.

Appendix B. Effects of certified mail on response rates and survey results

BACKGROUND

This study was conducted as part of our annual surveys of migratory bird hunters during the 2001-02 and 2002-03 hunting seasons. We receive our survey sample frame (complete list of names and addresses of all migratory bird hunters in the United States) each year from the state wildlife agencies, who obtain that information when they issue hunters their annual hunting licenses. The states also ask migratory bird hunters a series of screening questions about the species they hunted and their hunting success the previous year, and provide us with that information as well. We use this prior-year information as a predictor of current-year hunting activity and success. We assign each hunter to success/activity strata for ducks, geese, doves, and woodcock based on his/her responses to the screening questions. We assign hunters to one "duck" stratum and one "goose" stratum, each consisting of three levels: "None" - did not hunt or bagged 0 ducks (geese) last year; "Bagged 1-10" ducks (geese) last year; and "Bagged >10" ducks (geese) last year. Dove survey stratification also is comprised of three levels ("None" - did not hunt or bagged 0 doves last year; "Bagged 1-30" doves last year; and "Bagged >30" doves last year), whereas stratification for woodcock consists of two levels: "Yes" - hunted woodcock last year; and "No" - did not hunt woodcock last year.

All surveys are conducted using Dillman's Total Design Method for mail surveys (Dillman 1978, Dillman 1991). Our survey packet consists of a diary-format survey form; a personalized letter that explains the purpose of the survey, instructions for completing the survey, and why participation is vital to the survey's success; and a postage-paid envelope for returning the survey to the Service at the end of the hunting season. Survey participants are asked to report how many days they hunt for the birds specified on the survey form, and how many of those birds they shoot. The first request is sent to sampled hunters either before or during the hunting season, depending on when we receive the sample frame data from the states. We send reminder postcards at the close of the season asking sampled hunters to return their completed survey forms. Two to three weeks after the reminder postcard, we send a follow-up packet via regular mail to all hunters who have not yet responded. Finally, three to four weeks later, we send an additional follow-up packet to the remaining non-respondents.

During the developmental stages of these surveys (1995-1997), we sent all final mailings by certified mail. However, this was expensive, and it soon became apparent that although certified mail elicits a high response rate, many people have a negative perception of certified letters and they resent getting surveys in that manner. Therefore, when the surveys were expanded to include all states in 1998, we only sent the last mailing (still by certified mail) to a 20% sample of the remaining non-respondents. But this resulted in low overall response rates. So, in 2001 and 2002 we conducted an experiment to determine whether the cost of certified mailings, both financial and in terms of ill will, was offset by higher response rates that would increase the reliability of survey results. We did this by sending our final mailing by certified mail to one group of hunters, and by regular mail to another group.

METHODS

We conducted the comparison on three surveys, using pairs of similar states. The state pairs were selected based on geographic proximity and similarity in hunter numbers and response rate histories. For the 2001-02 surveys, hunters in the first state of each pair listed below were sent the final request by certified mail, and hunters in the other state received the final request by regular mail. We reversed the order for the 2002-03 surveys.

Waterfowl (ducks and geese) survey
West: Oregon and California
Southwest: New Mexico and Oklahoma
Midwest: South Dakota and North Dakota
Midwest: Iowa and Indiana
East: Pennsylvania and New York
Southeast: North Carolina and Georgia

Dove survey
West: Utah and Colorado
Southwest: Oklahoma and New Mexico
Midwest: Kansas and Illinois
Southeast: South Carolina and Alabama

Woodcock survey
Great Lakes: Minnesota and Wisconsin
Mid-Atlantic: Maryland and Virginia
Northeast: Connecticut and New Hampshire
Southeast: Mississippi and Tennessee

Rather than using an analysis where we treated states as paired, we used a crossover design to compare stratum-specific response rates for the final response wave, certified mail versus regular mail. The experimental design effectively allowed each state to act as its own control, and the crossover analysis provided for more statistical power to detect a difference between treatments than using a paired type of analysis. We also obtained stratum-specific estimates of hunter participation (proportion of people who hunted) and hunter success (number of birds they harvested) from the final response wave. This enabled us to compare the effects of certified mail versus regular mail on the estimates that these surveys provide, again using the crossover analysis.

RESULTS AND DISCUSSION

Final requests sent by certified mail consistently elicited significantly greater response rates than requests sent by regular mail. Certified mail response rates for every stratum in every survey were about double the response rates we obtained using regular mail (Figures 1-4). However, when we compared estimates of the proportion of active hunters

(Figure 5-8) and the number of birds harvested (Figures 9-12) generated from the last response wave of certified versus regular mailings, we found no significant differences in any stratum of any survey. Thus, although certified mail increased response rates significantly, the increased response rates did not change the surveys' results. We believe that this suggests there is little or no non-response bias in our estimates, and that this is due to our stratification methods.

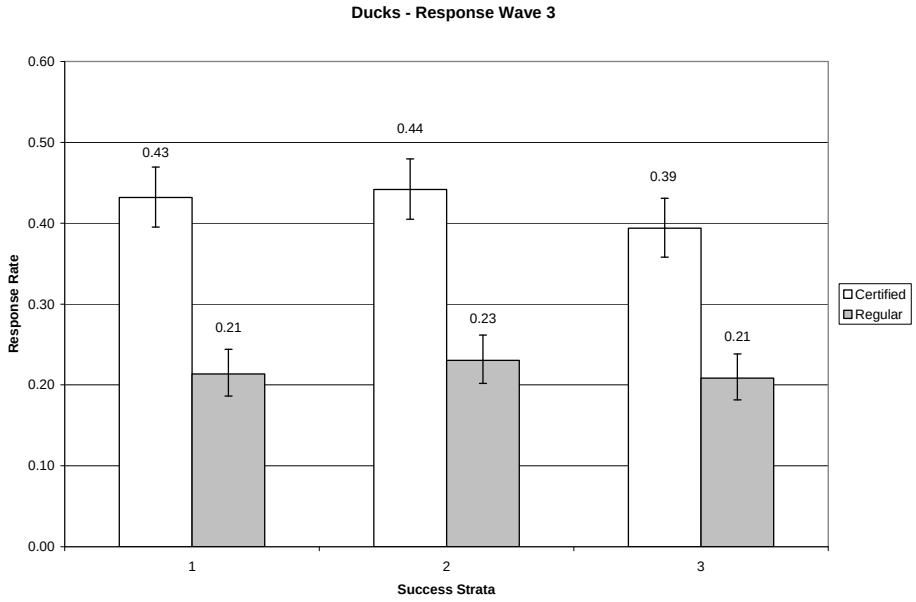

Figure 1. Response rates of duck hunters by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

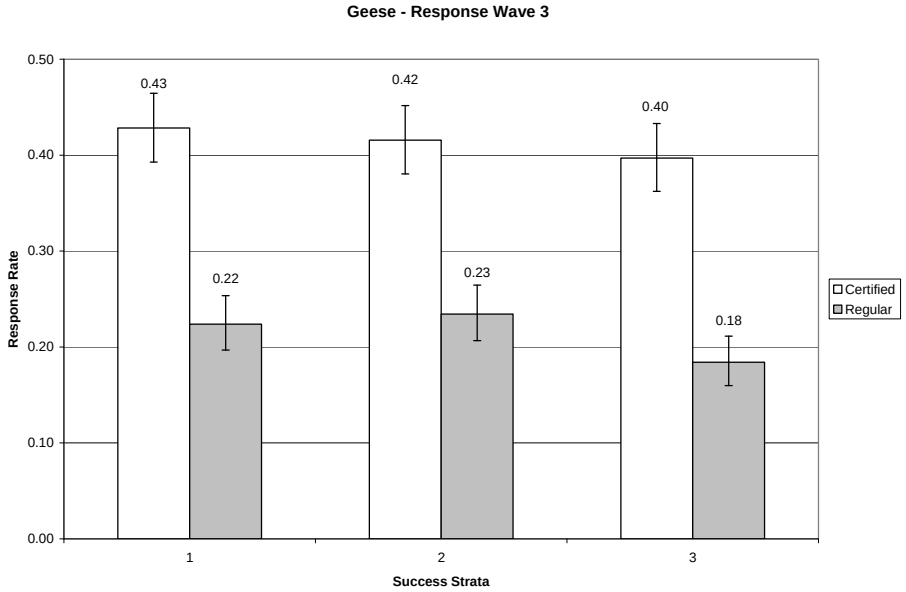

Figure 2. Response rates of goose hunters by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

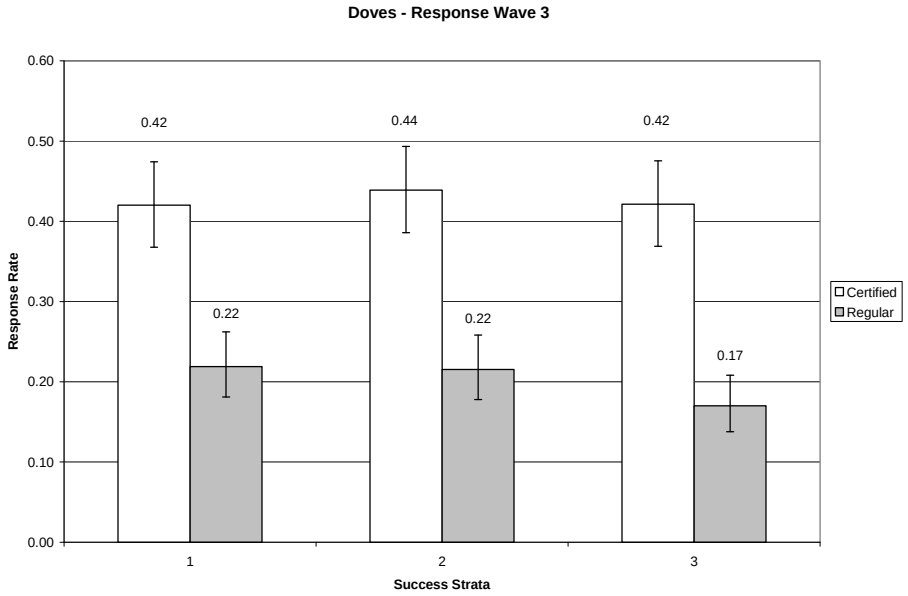

Figure 3. Response rates of dove hunters by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

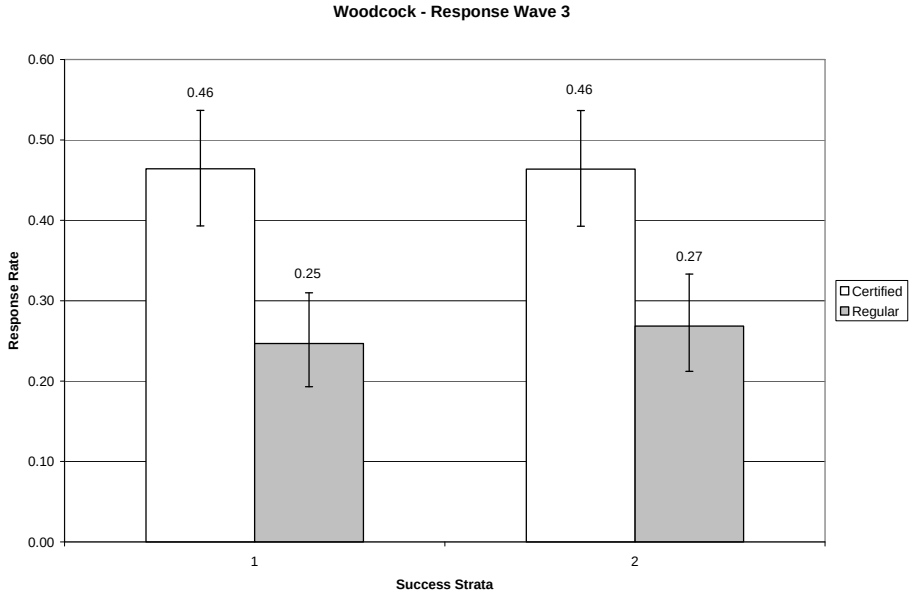

Figure 4. Response rates of woodcock hunters by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

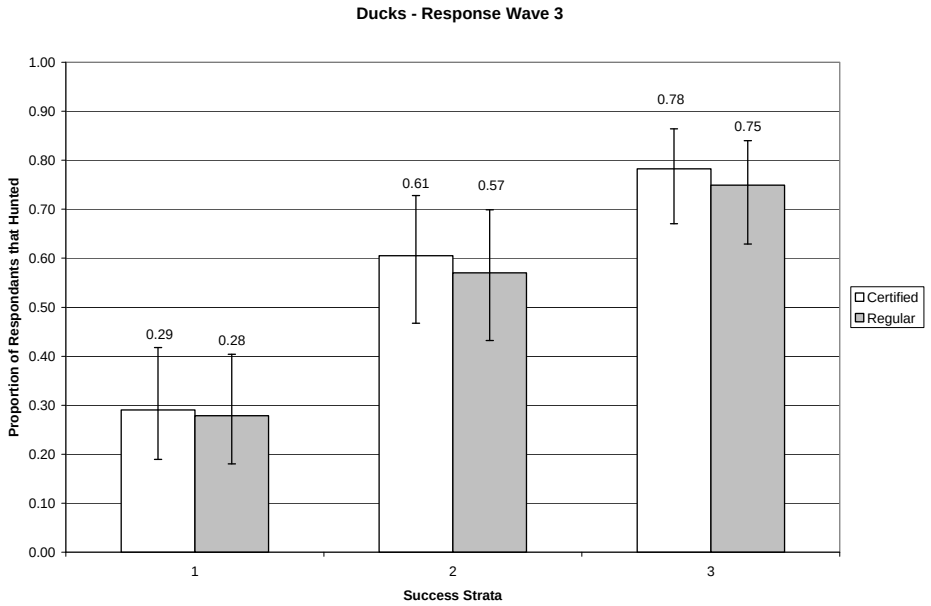

Figure 5. Proportion of respondents that hunted ducks, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

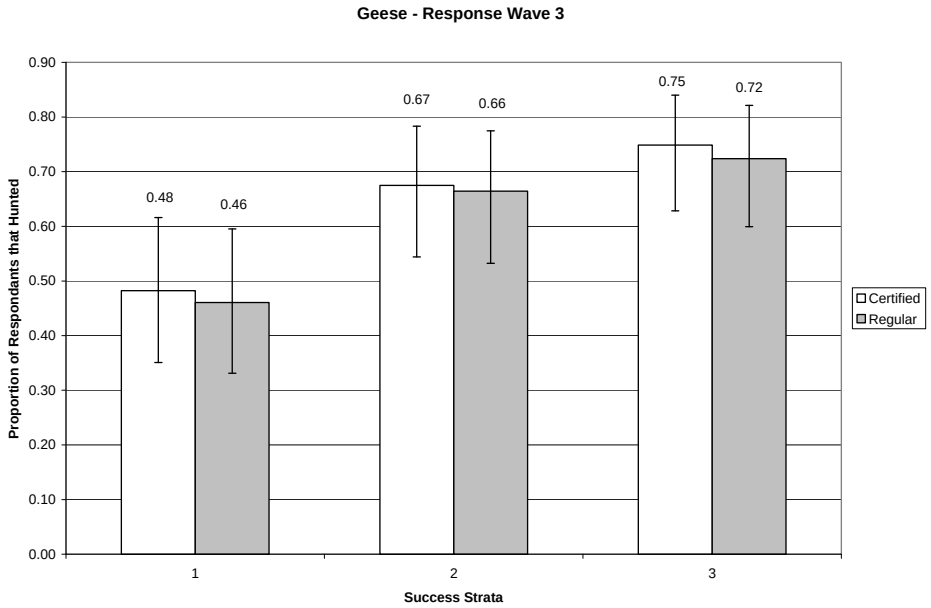

Figure 6. Proportion of respondents that hunted geese, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

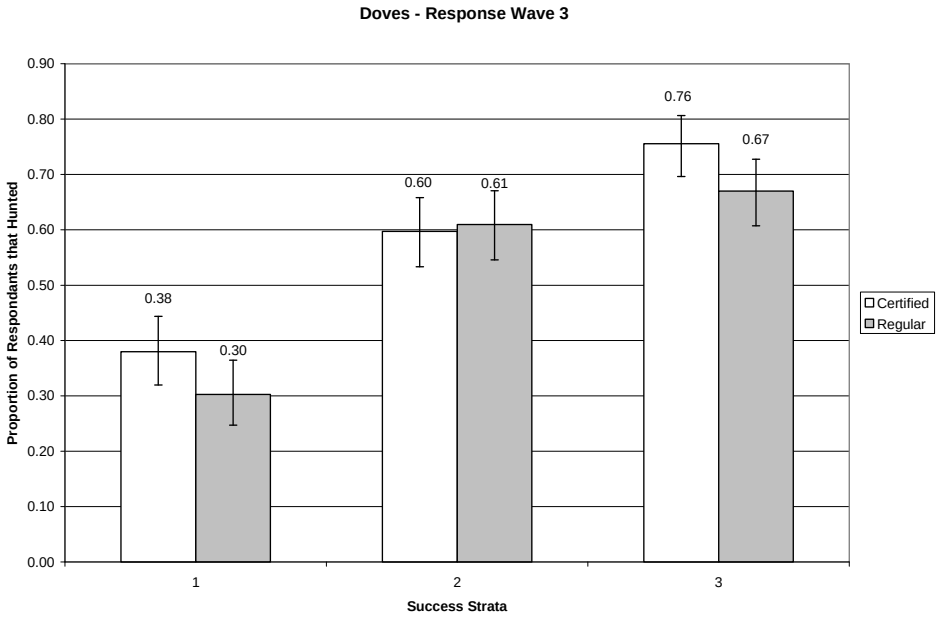

Figure 7. Proportion of respondents that hunted dove, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

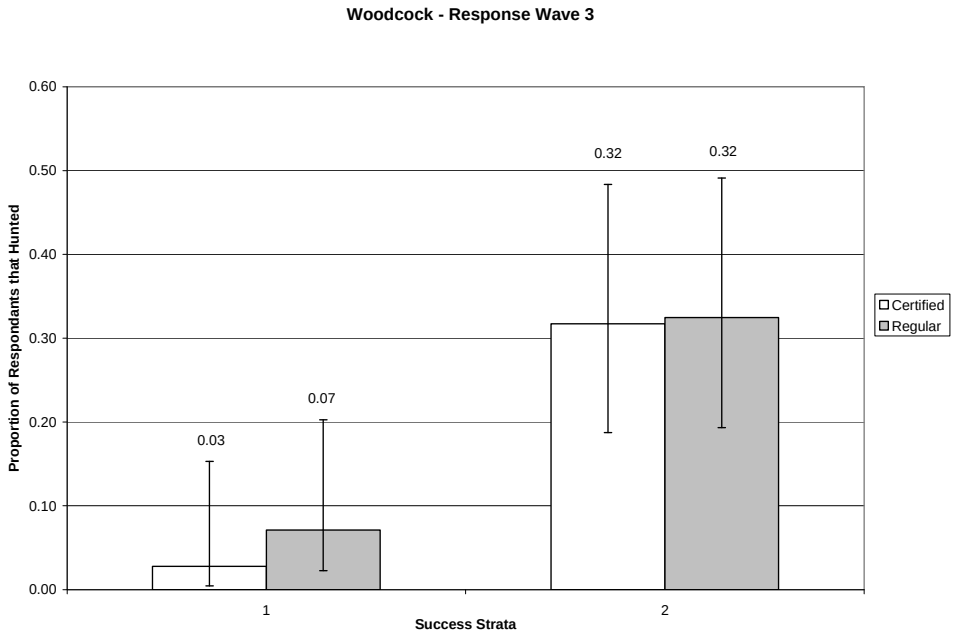

Figure 8. Proportion of respondents that hunted woodcock, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

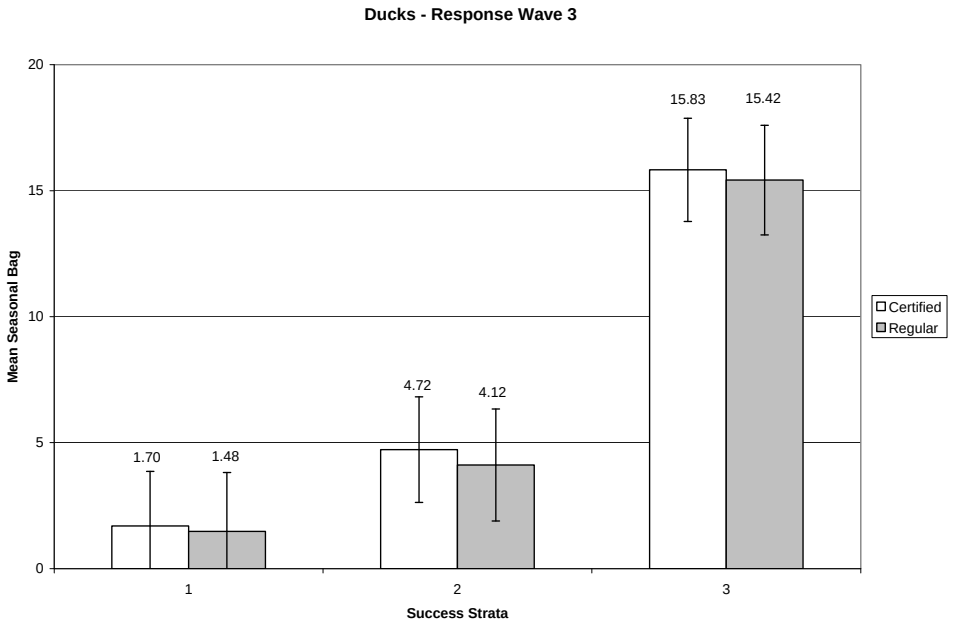

Figure 9. Mean seasonal duck harvest, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

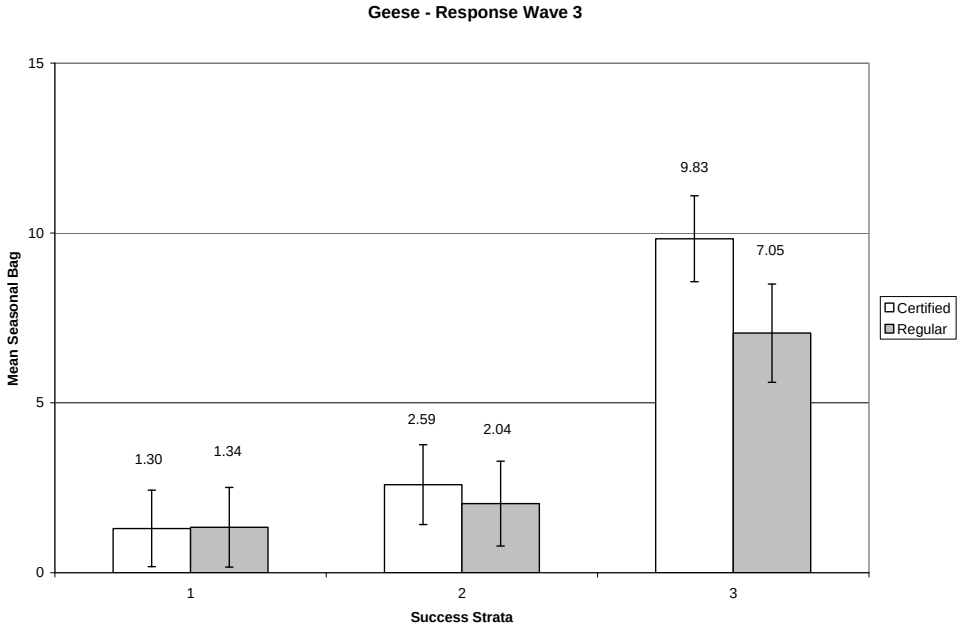

Figure 10. Mean seasonal goose harvest, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

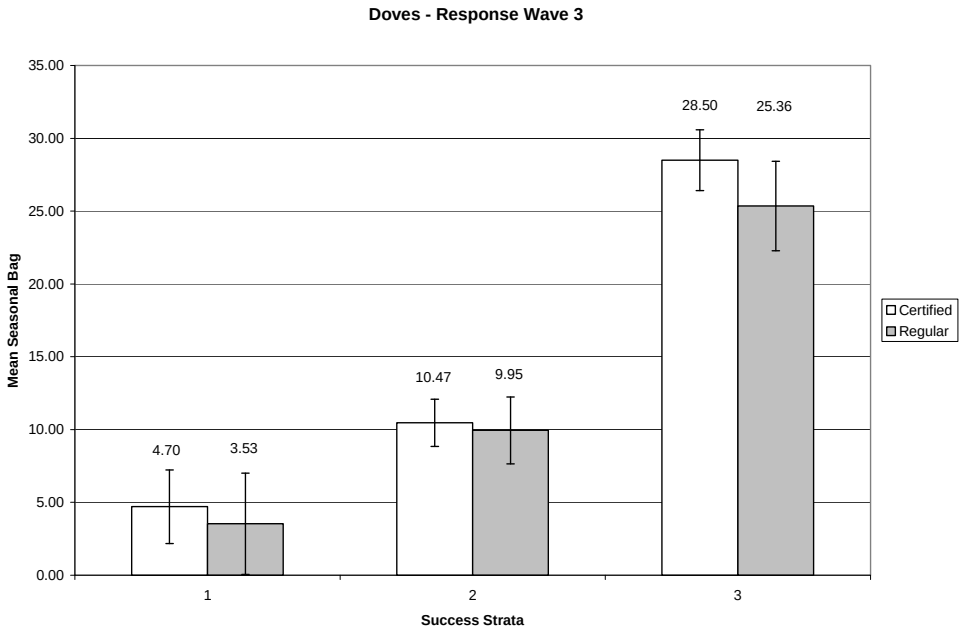

Figure 11. Mean seasonal dove harvest, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

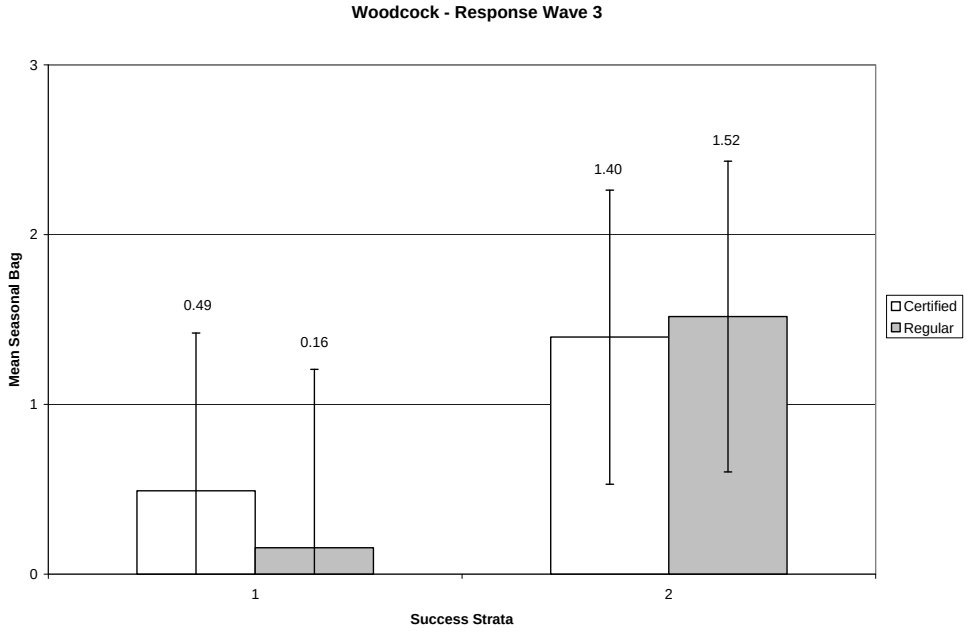

Figure 12. Mean seasonal woodcock harvest, by treatment (certified vs. regular mail) and success stratum. Error bars denote 95% confidence intervals.

Appendix C. Attempts to increase sandhill crane harvest survey response rates

BACKGROUND

This survey has been conducted annually since 1975 in the nine states of the Central Flyway that allow hunting of sandhill cranes. The sample frame consists of all hunters who obtain a sandhill crane hunting permit that is issued by the states and is mandatory for crane hunters. Each of the nine states provides the USFWS with a list of people who obtained a crane permit in their state, and the USFWS conducts a harvest survey after the hunting season is over. Until recently, the survey consisted of a postcard form that asked hunters to record the date, location, and number of cranes harvested during each of their hunts. The overall response rate was about 58% prior to our attempts to increase it.

APPROACHES AND RESULTS

For the 2002-03 hunting season, we conducted a test to compare two form types: the postcard form and a full-sheet diary form that included a personalized cover letter. We conducted the test in the three states that issue the most sandhill crane permits and from which we sample the greatest number of hunters: Colorado, North Dakota and Texas. Half of the sampled hunters in each of the three states received a postcard survey and the other half received the full-sheet diary and cover letter. Response rates for the full-sheet diary and cover letter were higher than those for the postcard form in all three states (73% vs 65% for Colorado, 82% vs 75% for North Dakota, 55% vs 48% for Texas) with an overall average difference of 62% vs 56%.

In 2003, the Office of Management and Budget (OMB) advised us that the response rate for the sandhill crane survey was too low, and suggested several measures for improving response rates. The first suggested measure was to send an advance cover letter, signed by the USFWS Director, that urged sampled hunters to complete the survey. We implemented that measure for the 2003-04 survey. We also again tested the two form types, using the same methods that we did the previous year. The letter did not have any measurable effects on response rates, but the increased response to the full-sheet diary and cover letter in the three test states was again evident (62% vs 54% overall). As a result, we obtained approval from OMB to make the switch to the new form the following year.

Another measure recommended by OMB to improve response rates was to add a third mailing to non-respondents. In addition to converting the entire survey to full-sheet diary forms with cover letters and sending an advance cover letter signed by our Director, we added a third mailing for the 2004-05 survey. The overall response rate for all states combined was 68%, a considerable improvement over the 58% that we obtained under the old crane survey methodology. However, we did not detect any increase over the response rates that we achieved during the 2002-03 test with the full-sheet diary and cover letter but without the advance cover letter. Therefore, we decided to eliminate the advance cover letter for the 2005-06 survey. The resulting response rate (68%) was identical to the rate for the previous year's survey that included the advance cover letter.

CONCLUSIONS

Both the switch to the new form and the addition of a third mailing increased the crane survey response rate, but the advance cover letter had no effect. Thus, we request permission to discontinue that mailing. We are working with the nine Central Flyway crane hunting states with the hope of receiving the names and addresses of crane permit holders early in the hunting season, so that we can sample and send selected hunters their forms while they are still hunting. We believe that this will result in another slight increase in response rate. However, we do not think that we will be able to achieve much more than a 70% overall response rate to this voluntary survey.