Wildlife Research Findings – 2009

WILDLIFE RESEARCH PROGRAM

The mission of the MDWFP Wildlife Research Program is to develop meaningful research designed to guide wildlife management decisions. So much of what we know today – species' life histories, ecology, habitat management practices, etc. – was learned because biologists had questions, and we developed experimental and observational research studies to determine answers. Nearly all of our biologists cut their teeth as young graduate students working in the field clipping plants, tracking critters, watching bait sites, or doing a host of other activities – collecting data necessary to answer these questions. What we have learned filled volumes; what we need to know will fill libraries!

Fiscal Year 2009 was a very productive year! We had 11 projects in varying stages of progress – four new projects, five on-going studies, and two projects nearing completion. We hosted the first annual Wildlife Research Summit at MSU and developed the Wildlife Research Program website (home.mdwfp.com/research). And most importantly, our graduate students presented numerous presentations and posters at multiple state, regional, and national conferences. This report summarizes FY09 research projects, and I hope it will keep you informed of answers we learned this year and, hopefully, generate more questions to research in future years!

Respectfully submitted,

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Research Coordinator

Scott L. Edwards is a Certified Wildlife Biologist and serves as a Private Lands Habitat Program biologist and as Coordinator of the Wildlife Research Program for the MDWFP. Scott, his wife Lydia, and son Reed, live in Starkville.

In Mississippi, our advances in wildlife science and management would not be possible without the valuable cooperative relationship the MDWFP has with the Mississippi State University (MSU) Department of Wildlife, Fisheries, and Aquaculture within the Forest and Wildlife Research Center (FWRC). Together, through Federal Aid in Wildlife Restoration funding, we will tackle the questions of the 21st century, train a new crop of wildlife biologists and managers, and more wisely conserve Mississippi's natural resources.

Wildlife Research Findings – 2009
Federal Aid in Wildlife Restoration Project W-48-56
Statewide Wildlife Investigations
Annual Performance Report
July 1, 2008 – June 30, 2009

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This report contains interim results of wildlife research projects. Some of the results and/or interpretations may change due to additional data collection or more comprehensive data evaluation. Respective authors should be contacted regarding any use of their data.

Cover Design by Jim Willcutt

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Waterfowl Banding, Phenology, and Harvest Studies

Project Number W-48-56
Study Number 1
July 1, 2008 - June 30, 2009

Objectives
To determine migration dates and patterns, population peaks, and fluctuations of waterfowl migrating through and wintering in Mississippi.

Job 1-1
Periodic Waterfowl Inventories

The MDWFP conducts aerial waterfowl surveys in the Delta region each year during the months of November, December, and January. The purpose of these surveys is to provide an index of wintering waterfowl numbers and their distributions throughout the Delta. While the surveys do not produce total counts for all waterfowl in the Delta, they do help us to compare general trends in waterfowl abundance and distribution.

Four aerial waterfowl surveys were flown from November through January. The surveys were conducted in the Mississippi Delta Region of Mississippi. Biologists spent 204 hours and drove 1,107 miles (including all inventory work) by agency and cooperating personnel during the 2008-2009 survey period.

Surveys are conducted by randomly assigning East-West transects throughout the Delta using Geographic Information System (GIS) software. These transects are then downloaded to a GPS unit, which directs the pilot during flights. Surveys are flown at 500 feet, and the observer counts and identifies all waterfowl passing through a 250 meter strip, designated by marks on the aircraft wing and window. Ducks are divided into 3 general groups: Mallards, Other Dabbling Ducks, and Diving Ducks. Each time a group of birds is recorded, a GPS point is taken, marking the location of the birds. These GPS points are then entered into a GIS program, along with their associated bird data, and waterfowl distribution and concentration maps are created and posted on our website (www.mdwfp.com/waterfowl).

In general, total duck numbers counted in aerial surveys increased as the waterfowl hunting season began, decreased in early January, and then peaked in late January. The areas with the highest concentrations of ducks were northern Leflore County and Bolivar and Tallahatchie counties. Mallard densities also followed the same general trends as total ducks. Large numbers of ducks seemed to be found in large complexes of water, rather than smaller isolated wetlands. Habitat conditions were fair in November, and habitat quality increased throughout the winter with rainfall events.

Strata	Variable	Nov. 17-19	Dec. 19-21	Jan. 7-12	Jan. 19-21
HD	Mallard	6,821	39,791	25,514	68,034
	Dabbler	10,969	51,479	11,439	108,857
	Diver	461	922	1,290	1,198
	Total Ducks	18,250	92,192	38,243	178,089
NE	Mallard	11,673	78,763	61,880	109,866
	Dabbler	46,907	108,463	140,525	107,677
	Diver	52,170	22,116	23,345	17,774
	Total Ducks	110,749	209,342	225,750	174,846
NW	Mallard	5,096	26,062	73,185	64,307
	Dabbler	12,575	50,960	46,121	56,680
	Diver	9,431	14,075	13,489	177,216
	Total Ducks	27,101	91,097	132,796	285,515
SE	Mallard	4,948	27,550	17,575	14,210
	Dabbler	16,427	66,500	68,098	33,448
	Diver	31,785	21,704	28,068	14,013
	Total Ducks	53,160	115,754	113,741	61,671
SW	Mallard	2,211	51,809	10,556	5,818
	Dabbler	9,368	112,537	11,057	11,976
	Diver	11,241	11,933	0	22,677
	Total Ducks	22,820	176,279	21,613	40,471
Total	Mallard	30,748	223,976	191,236	262,235
	Dabbler	96,245	389,939	278,601	318,638
	Diver	105,089	70,750	66,691	232,878
	Total Ducks	232,081	684,665	536,529	740,591

Area descriptions

High Density: selected sub-sampling area within the NE strata known for waterfowl concentration

Northeast: north of Hwy 82 to state line, east of a line from Indianola to Clarksdale (Highways 3 & 49) and Clarksdale to Helena (Highways 61 & 49) to hill line

Northwest: north of hwy 82, west of a line from Indianola to Clarksdale (Highways 3 & 49) and Clarksdale to Helena (Highways 61 & 49) to state line

Southeast: south of Hwy 82 to Vicksburg, east of Hwy 61 to hill line

Southwest: south of Hwy 82 to Vicksburg, west of Hwy 61 to state line

Recommendations

Periodic aerial waterfowl inventories are an important tool used by resource managers in documenting arrival and population peaks of waterfowl utilizing Mississippi as a wintering ground. These inventories are used by the MDWFP to establish hunting season dates for the state's approximately 33,000 waterfowl hunters. Aerial surveys should continue into the future.

Job 1-5
Mississippi Flyway Council and Technical Section

Attended related meetings in Knoxville, Tennessee; Davenport, Iowa; and Arlington, Virginia.

Recommendations

The MDWFP should continue to participate in Mississippi Flyway Council and Technical Section Activities. Participation by the MDWFP is important to continue to represent the interests of Mississippi's waterfowl hunters.

Mourning Dove Studies

Project Number W-48-56
Study Number 4
July 1, 2008 - June 30, 2009

Objectives
To determine changes in dove breeding populations in Mississippi

Job 1
Mourning Dove Call Routes

Twenty-two routes were run as per U.S. Fish and Wildlife Service instructions. Results of all routes were sent to the Office of Migratory Birds.

Recommendations

The study has been reviewed and found to be of value to the MDWFP and the USFWS to monitor dove populations. We recommend continuation of the study.

Mississippi Hunter and Trapper Surveys

Project Number W-48-56
Study Number 6
July 1, 2008 – June 30, 2009

Job 6-1
Survey of Mississippi Hunters

Objective

To determine a reliable set of statewide hunting indices of harvest and effort and to evaluate hunter attitudes on specific issues.

Four, self-administered mail surveys were completed or implemented during the reporting period which covered the 2006-07 and 2007-08 seasons, respectively. They were the 1) 2006-07 and 2007-08 Surveys of Mississippi Resident Hunters, and 2) 2006-07 and 2007-08 Surveys of Mississippi Non-resident Hunters. The 2006-07 surveys were delayed until Fall 2008 because of the nature of the questions asked in addition to the harvest questions. Approval of questions within the hunter survey which related to the hunter component of the I&E project took longer than expected, and required a pre-test which was implemented in January-February 2008.

Survey 1: The 2006-07 Survey of Mississippi Resident Hunters was sent to 5,000 resident hunters from September – November 2008. They included effort and harvest questions about the 2006-07 season, questions pertaining to the I&E project, and socio-demographic questions. Mail survey methodology for the surveys was based on the Total Design Method developed by Dillman (1978). Of the 5,000 individuals sampled for the 2006-07 survey, 1,690 returned useable surveys, 635 individuals were either non-eligible (they were deceased, they refused the survey, or the questionnaire was not filled out to whom it was addressed) or non-reachable. The overall effective response rate was 38.8%. Every 20th returned survey entered was double-checked to investigate potential problems with data entry personnel and/or question format. Once data were screened for errors the database was exported to the Statistical Analysis Software (SAS). Statistical programs developed and continually refined since the inception of the study in 1974 were used to make effort and harvest projections to the entire population of resident small game hunters (N=178,756), resident big game hunters (N=174,694). Effort and harvest estimates and standard errors for the resident licensed hunter population for the 2006-07 hunting season can be found in Tables 1 and 2.

Survey 2: The 2006-07 Survey of Mississippi Non-resident Hunters was sent to 3,000 non-resident hunters from September – November 2008. It contained effort and harvest questions, questions pertaining to the I&E project, and socio-demographic questions. Mail survey methodology for the survey was based on the Total Design Method developed by Dillman (1978). Of the 3,000 individuals sampled, 996 returned useable surveys, 428 individuals were either non-eligible (they were deceased, they refused the survey, or the questionnaire was not filled out to whom it was addressed) or non-reachable. The overall effective response rate was 38.8%. Every 20th returned survey entered was double-checked to investigate potential problems with data entry personnel and/or question format. Once data were screened for errors the database was exported to the Statistical Analysis Software (SAS). Statistical programs developed and continually refined since the inception of the study in 1974 were used to make effort and harvest projections to the entire population non-resident small game hunters (N=34,646) and non-resident big game hunters (N=24,084). Effort and harvest estimates and standard errors for the respective populations for the 2006-07 hunting season can be found in Tables 3 and 4.

Survey 3: The 2007-08 Survey of Mississippi Resident Hunters was sent to 5,000 resident hunters from September – November 2008. They included effort and harvest questions about the 2007-08 season, questions pertaining to the I&E project, and socio-demographic questions. Mail survey methodology for the surveys was based on the Total Design Method developed by Dillman (1978). Of the 5,000 individuals sampled for the 2007-08 survey, 1,680 returned useable surveys, 569 individuals were either non-eligible (they were deceased, they refused the survey, or the questionnaire was not filled out to whom it was addressed) or non-reachable. The overall effective response rate was 40.0%. Every 20th returned survey entered was double-checked to investigate potential problems with data entry personnel and/or question format. Once data were screened for errors the database was exported to the Statistical Analysis Software (SAS). Statistical programs developed and continually refined since the inception of the study in 1974 were used to make effort and harvest projections to the entire population of resident small game hunters (N=180,739), resident big game hunters (N=176,650). Effort and harvest estimates and standard errors for the resident licensed hunter population for the 2007-08 hunting season can be found in Tables 5 and 6.

Survey 4: The 2007-08 Survey of Mississippi Non-resident Hunters was sent to 3,000 non-resident hunters from September – November 2008. It contained effort and harvest questions, questions pertaining to the I&E project, and socio-demographic questions. Mail survey methodology for the survey was based on the Total Design Method developed by Dillman (1978). Of the 3,000 individuals sampled, 1,092 returned useable surveys, 343 individuals were either non-eligible (they were deceased, they refused the survey, or the questionnaire was not filled out to whom it was addressed) or non-reachable. The overall effective response rate was 41.1%. Every 20th returned survey entered was double-checked to investigate potential problems with data entry personnel and/or question format. Once data were screened for errors the database was exported to the Statistical Analysis Software (SAS). Statistical programs developed and continually refined since the inception of the study in 1974 were used to make effort and harvest projections to the entire population non-resident small game hunters (N=36,317) and non-resident big game hunters (N=25,561). Effort and harvest estimates and standard errors for the respective populations for the 2007-08 hunting season can be found in Tables 7 and 8.

Job 6-2
Survey of Mississippi Trappers

Objective

To determine a reliable set of statewide trapping harvest and effort estimates.

For the 2008-09 Mississippi Trapper Harvest Survey, each licensed trapper (n=538) was sent a self-administered questionnaire in May 2009. The survey was sent with a personalized letter from the investigators and provided them with harvest results from the previous survey. Three questionnaire mailings were made as state law requires that trappers must complete the survey. Of the 538 trappers sent a survey, 416 returned useable data. After taking into account non-deliverables (n=16) an effective response rate of 82.8% was achieved. Data were entered twice to eliminate errors into a Microsoft Access database and analyzed using Version 9.1 of the Statistical Analysis Software (SAS).

The expanded statewide harvest estimates, average catch per trapper, average catch per successful trapper, and percent successful trappers for the 2008-09 season are presented in Table 9. The precision of all estimates is shown as standard errors in the table.

TABLE 1. EXPANDED STATEWIDE COVERAGE OF THE 2006-07 MISSISSIPPI RESIDENT MAIL SURVEY OF GAME HARVEST BASED ON 178,756 SMALL GAME LICENSE HOLDERS AND 174,694 BIG GAME LICENSE HOLDERS.

SPECIES	TOTAL HARVEST	AVERAGE DAILY KILL	AVERAGE SEASONAL HARVEST	PERCENT SUCCESSFUL HUNTERS	TOTAL MAN-DAYS	AVERAGE SEASONAL DAYS HUNTING	TOTAL HUNTERS	PERCENT OF TOTAL LICENCEES (A)
DOVE	1,068,064	6.42	22.10	94.5	162,105	3.44	48,335	27.0
QUAIL	16,928	1.50	9.35	82.4	9,801	5.75	1,810	1.0
WOODCOCK	852	0.89	2.00	100.0	958	2.25	426	0.2
RABBIT	233,266	1.29	9.91	92.3	149,949	6.80	23,529	13.2
SQUIRREL	471,217	2.16	13.29	93.4	210,677	6.36	35,453	19.8
RACCOON	49,613	0.67	6.69	91.1	48,016	10.02	4,791	2.7
TOTAL DUCK	347,611	2.03	21.47	92.2	158,847	10.58	15,012	8.4
MALLARD	142,345	0.84	8.91	71.6				
WOOD DUCK	82,830	0.49	5.14	74.5				
OTHER DUCKS	122,436	0.70	7.41	58.9				
GEESE	11,072	0.67	4.65	85.0	14,799	6.95	2,129	1.2
RED FOX	0	0.18	0.00	0.0	0	0.00	0	0.0
GRAY FOX	745	0.25	2.33	100.0	0	0.00	319	0.2
BOBCAT	5,004	0.11	1.42	93.5	15,549	7.63	3,300	1.8
COYOTE	14,586	0.05	2.43	87.5	35,299	8.63	5,962	3.3
TOTAL DEER	297,107	0.06	2.55	84.7	2,398,844	22.36	116,463	66.7
BUCK	141,115	0.08	1.21	67.3				
DOE	155,992	0.02	1.34	64.4				
ARCHERY DEER	34,429	0.06	1.02	58.3	322,856	10.75	33,897	19.4
BUCK	9,882	0.12	0.29	24.5				
DOE	24,546	0.05	0.72	47.0				
PRIMITIVE DEER	62,163	0.07	1.05	64.9	433,103	8.18	58,975	33.8
BUCK	24,865	0.11	0.41	35.0				
DOE	37,298	0.06	0.63	47.6				
GUN DEER	200,516	0.05	1.80	80.6	1,586,935	15.58	110,937	63.5
BUCK	106,368	0.11	0.96	63.3				
DOE	94,148	0.11	0.84	51.8				
TOTAL TURKEY	33,579	0.13	1.17	63.7	254,672	9.87	28,691	16.4
SPRING 2007	32,729	0.19	1.18	64.8	247,953	9.99	27,734	15.9
FALL 2006	850	1.50	0.73	45.5	6,588	5.64	1,169	0.7
HOG	11,498	0.89	1.90	67.3	50,005	10.17	5,536	3.1

(A) DEER AND TURKEY PERCENTAGES BASED ON BIG GAME LICENSE HOLDERS; ALL OTHERS BASED ON SMALL GAME LICENSE HOLDERS.

TABLE 2. EXPANDED STATEWIDE ESTIMATES OF TOTAL HARVEST (AND VARIABILITY OF THE ESTIMATES) FOR RESIDENTS FOR ALL GAME SPECIES IN MISSISSIPPI DURING THE 2006-07 HUNTING SEASON.

		STANDARD ERROR		95% CONFIDENCE INTERVAL	
SPECIES	TOTAL HARVEST	SE	AS % OF TOTAL (A)	LOWER LIMIT	UPPER LIMIT
DOVE	1,068,064	67,073	6.3	93,919	1,202,209
QUAIL	16,928	6,485	38.3	3,958	29,898
WOODCOCK	852	451	53.0	-51	1,754
RABBIT	233,266	40,490	17.4	152,286	314,247
SQUIRREL	471,217	36,610	7.8	397,997	544,438
RACCOON	49,613	13,743	27.7	22,127	77,099
TOTAL DUCKS	347,611	41,178	11.8	265,255	429,966
MALLARD	142,345	24,692	17.3	92,960	191,729
WOOD DUCK	82,830	10,229	12.3	62,372	103,288
OTHER DUCKS	122,436	16,492	13.5	89,451	155,421
GEESE	11,072	4,535	41.0	2,002	20,143
RED FOX	0	0	0.0	0	0
GRAY FOX	745	553	74.2	-361	1,851
BOBCAT	5,004	963	19.2	3,079	6,929
COYOTE	14,586	3,134	21.5	8,318	20,853
TOTAL DEER	297,107	9,142	3.1	278,824	315,391
BUCK	141,115	4,877	3.5	131,361	150,870
DOE	155,992	5,749	3.7	144,494	167,490
ARCHERY DEER	34,429	2,829	8.2	28,772	40,086
BUCK	9,882	1,173	11.9	7,537	12,228
DOE	24,546	2,231	9.1	20,084	29,008
PRIMITIVE DEER	62,163	3,475	5.6	55,213	69,113
BUCK	24,865	1,874	7.5	21,118	28,612
DOE	37,298	2,348	6.3	32,601	41,994
GUN DEER	200,516	6,375	3.2	187,765	213,266
BUCK	106,368	3,769	3.5	98,829	113,906
DOE	94,148	3,995	4.2	86,158	102,138
TOTAL TURKEY	33,579	2,754	8.2	28,071	39,087
SPRING 2007	32,729	2,715	8.3	27,299	38,158
FALL 2006	850	425	50.0	1	1,699
HOG	11,498	2,934	25.5	5,630	17,367

(A) %=100(SE/TOTAL HARVEST)

TABLE 3. EXPANDED STATEWIDE COVERAGE OF THE 2006-07 MISSISSIPPI NONRESIDENT MAIL SURVEY OF GAME HARVEST BASED ON 34,646 SMALL GAME LICENSE HOLDERS AND 24,084 BIG GAME LICENSE HOLDERS.

SPECIES	TOTAL HARVEST	AVERAGE DAILY KILL	AVERAGE SEASONAL HARVEST	PERCENT SUCCESSFUL HUNTERS	TOTAL MAN-DAYS	AVERAGE SEASONAL DAYS HUNTING	TOTAL HUNTERS	PERCENT OF TOTAL LICENCEES (A)
DOVE	68,031	8.08	23.68	97.56	8,171	2.88	2,873	8.3
QUAIL	6,025	3.00	17.20	100.00	1,052	3.33	350	1.0
WOODCOCK	525	0.65	3.75	75.00	806	5.75	140	0.4
RABBIT	7,076	1.16	6.97	93.10	6,002	6.33	1,016	2.9
SQUIRREL	47,362	3.66	21.46	98.41	12,742	5.95	2,207	6.4
RACCOON	701	1.55	4.25	75.00	385	2.75	140	0.4
TOTAL DUCK	109,403	2.83	25.11	97.48	36,958	8.87	4,169	12.0
MALLARD	46,837	1.18	10.49	83.19				
WOOD DUCK	10,650	0.28	2.51	49.58				
OTHER DUCKS	51,916	1.37	12.11	89.92				
GEESE	3,888	0.77	3.33	85.71	3,188	4.33	736	2.1
RED FOX	0	0.00	0.00	0.00	140	4.00	35	0.1
GRAY FOX	0	0.00	0.00	0.00	140	4.00	35	0.1
BOBCAT	420	0.23	2.40	60.00	1,857	10.60	175	0.5
COYOTE	420	0.12	1.20	80.00	3,573	10.20	350	1.0
TOTAL DEER	26,917	0.08	1.81	75.93	268,957	19.99	14,572	60.5
BUCK	12,784	0.04	0.86	56.48				
DOE	14,133	0.04	0.95	52.55				
ARCHERY DEER	2,462	0.05	0.66	45.00	35,034	11.16	3,373	14.0
BUCK	675	0.02	0.19	16.00				
DOE	1,788	0.04	0.47	34.00				
PRIMITIVE DEER	4,824	0.09	0.79	54.49	43,957	8.10	6,004	24.9
BUCK	1,788	0.03	0.29	26.97				
DOE	3,036	0.05	0.50	39.89				
GUN DEER	19,631	0.09	1.41	72.84	186,009	14.78	13,661	56.7
BUCK	10,322	0.04	0.74	52.59				
DOE	9,310	0.04	0.68	44.44				
TOTAL TURKEY	2,361	0.08	0.78	46.67	23,641	8.36	3,036	12.6
SPRING 2007	2,193	0.08	0.76	47.06	16,996	8.53	2,867	11.9
FALL 2006	169	0.15	1.00	40.00	676	5.00	169	0.7
HOG	1,717	0.17	2.13	69.57	9,503	12.32	806	2.3

(A) DEER AND TURKEY PERCENTAGES BASED ON BIG GAME LICENSE HOLDERS; ALL OTHERS BASED ON SMALL GAME LICENSE HOLDERS.

TABLE 4. EXPANDED STATEWIDE ESTIMATES OF TOTAL HARVEST (AND VARIABILITY OF THE ESTIMATES) FOR NONRESIDENTS FOR ALL GAME SPECIES IN MISSISSIPPI DURING THE 2006-07 HUNTING SEASON.

		STANDARD ERROR		95% CONFIDENCE INTERVAL	
SPECIES	TOTAL HARVEST	SE	AS % OF TOTAL (A)	LOWER LIMIT	UPPER LIMIT
DOVE	68,031	9,999	14.7	48,032	88,029
QUAIL	6,025	3,169	52.6	-312	12,363
WOODCOCK	525	428	81.4	-330	1,380
RABBIT	7,076	2,064	29.2	2,948	11,205
SQUIRREL	47,362	10,401	22.0	26,560	68,165
RACCOON	701	374	53.3	-46	1,448
TOTAL DUCKS	109,403	12,751	11.7	83,901	134,905
MALLARD	46,837	5,889	12.6	35,060	58,614
WOOD DUCK	10,650	1,938	18.2	6,774	14,525
OTHER DUCKS	51,916	6,986	13.5	37,944	65,889
GEESE	3,888	1,323	34.0	1,243	6,534
RED FOX	0	0	0.0	0	0
GRAY FOX	0	0	0.0	0	0
BOBCAT	420	354	84.1	-287	1,128
COYOTE	420	156	37.2	108	733
TOTAL DEER	26,917	1,408	5.2	24,101	29,734
BUCK	12,784	762	6.0	11,260	14,308
DOE	14,133	945	6.7	12,244	16,023
ARCHERY DEER	2,462	416	16.9	1,631	3,293
BUCK	675	170	25.2	334	1,015
DOE	1,788	329	18.4	1,130	2,446
PRIMITIVE DEER	4,824	501	10.4	3,821	5,826
BUCK	1,788	255	14.3	1,278	2,298
DOE	3,036	368	12.1	2,300	3,771
GUN DEER	19,631	1,097	5.6	17,438	21,825
BUCK	10,322	674	6.5	8,973	11,670
DOE	9,310	717	7.7	7,876	10,744
TOTAL TURKEY	2,361	392	16.6	1,576	3,146
SPRING 2007	2,193	374	17.1	1,444	2,941
FALL 2006	169	122	72.1	-74	412
HOG	1,717	506	29.5	704	2,729

(A) %=100(SE/TOTAL HARVEST)

TABLE 5. EXPANDED STATEWIDE COVERAGE OF THE 2007-08 MISSISSIPPI RESIDENT MAIL SURVEY OF GAME HARVEST BASED ON 180,739 SMALL GAME LICENSE HOLDERS AND 176,650 BIG GAME LICENSE HOLDERS.

SPECIES	TOTAL HARVEST	AVERAGE DAILY KILL	AVERAGE SEASONAL HARVEST	PERCENT SUCCESSFUL HUNTERS	TOTAL MAN-DAYS	AVERAGE SEASONAL DAYS HUNTING	TOTAL HUNTERS	PERCENT OF TOTAL LICENCEES (A)
DOVE	1,091,269	7.26	22.55	93.7	147,402	3.08	48.385	26.8
QUAIL	28,641	1.15	8.80	66.7	24,641	7.83	3,255	1.8
WOODCOCK	4,340	0.84	5.00	87.5	4,668	6.14	868	0.5
RABBIT	285,537	1.24	9.90	86.1	222,020	7.97	28,858	16.0
SQUIRREL	504,898	2.19	12.86	90.3	219,877	5.88	39,272	21.7
RACCOON	66,719	0.58	10.24	98.2	105,992	17.76	5,967	3.3
TOTAL DUCK	270,132	1.97	18.12	85.3	121,939	9.21	13,235	7.3
MALLARD	120,095	0.87	8.03	65.6	-	-	-	-
WOOD DUCK	60,210	0.42	3.89	66.4	-	-	-	-
OTHER DUCKS	89,827	0.67	6.20	59.0	-	-	-	-
GEESE	28,858	2.40	12.56	83.3	10,198	5.22	1,953	1.1
RED FOX	1,085	0.12	1.00	77.8	4,671	6.14	976	0.5
GRAY FOX	3,472	0.54	2.58	83.3	5,217	5.33	1,302	0.7
BOBCAT	7,594	0.20	1.35	91.7	27,814	6.54	5,207	2.9
COYOTE	14,103	0.27	1.82	84.5	36,104	6.33	7,703	4.3
TOTAL DEER	264,592	0.09	2.23	79.2	2,545,897	22.92	118,897	67.3
BUCK	125,788	0.04	1.06	61.1	-	-	-	-
DOE	138,804	0.05	1.17	58.6	-	-	-	-
ARCHERY DEER	38,502	0.07	1.06	56.5	426,979	12.90	36,205	20.5
BUCK	10,719	0.02	0.30	23.3	-	-	-	-
DOE	27,783	0.05	0.77	50.2	-	-	-	-
PRIMITIVE DEER	46,159	0.09	0.80	54.8	436,664	8.23	58,081	32.9
BUCK	16,845	0.03	0.29	25.8	-	-	-	-
DOE	29,314	0.06	0.51	39.2	-	-	-	-
GUN DEER	179,931	0.09	1.61	75.3	1,625,814	15.63	111,459	63.1
BUCK	98,224	0.05	0.88	57.7	-	-	-	-
DOE	81,708	0.04	0.73	46.6	-	-	-	-
TOTAL TURKEY	24,501	0.08	0.84	52.1	259,649	9.59	29,205	16.5
SPRING 2008	23,517	0.08	0.83	52.1	253,941	9.66	28,330	16.0
FALL 2007	984	0.12	0.56	43.8	5,476	3.57	1,750	1.0
HOG	65,635	0.48	7.56	78.8	120,202	14.92	8,679	4.8

(A) DEER AND TURKEY PERCENTAGES BASED ON BIG GAME LICENSE HOLDERS; ALL OTHERS BASED ON SMALL GAME LICENSE HOLDERS.

TABLE 6. EXPANDED STATEWIDE ESTIMATES OF TOTAL HARVEST (AND VARIABILITY OF THE ESTIMATES) FOR RESIDENTS FOR ALL GAME SPECIES IN MISSISSIPPI DURING THE 2007-08 HUNTING SEASON.

		STANDARD ERROR		95% CONFIDENCE INTERVAL	
SPECIES	TOTAL HARVEST	SE	AS % OF TOTAL (A)	LOWER LIMIT	UPPER LIMIT
DOVE	1,091,269	69,965	6.4	951,338	1,231,199
QUAIL	28,641	8,229	28.7	12,183	45,099
WOODCOCK	4,340	2,062	47.5	216	8,463
RABBIT	285,537	32,887	11.5	219,764	351,310
SQUIRREL	504,898	43,823	8.7	417,252	592,543
RACCOON	66,719	13,584	20.4	39,552	93,887
TOTAL DUCKS	270,132	37,206	13.8	195,720	344,544
MALLARD	120,095	20,240	16.9	79,614	160,576
WOOD DUCK	60,210	8,358	13.9	43,494	76,927
OTHER DUCKS	89,827	13,716	15.3	62,396	117,259
GEESE	28,858	13,119	45.5	2,621	55,095
RED FOX	1,085	433	39.9	218	1,951
GRAY FOX	3,472	2,212	63.7	-952	7,895
BOBCAT	7,594	1,460	19.2	4,674	10,515
COYOTE	14,103	2,137	15.2	9,829	18,378
TOTAL DEER	264,592	8,825	3.3	246,942	282,243
BUCK	125,788	4,682	3.7	116,424	135,152
DOE	138,804	5,538	4.0	127,728	149,880
ARCHERY DEER	38,502	3,288	8.5	31,925	45,079
BUCK	10,719	1,331	12.4	8,057	13,382
DOE	27,783	2,392	8.6	22,998	32,567
PRIMITIVE DEER	46,159	2,898	6.3	40,362	51,956
BUCK	16,845	1,473	8.7	13,898	19,791
DOE	29,314	2,109	7.2	25,096	33,532
GUN DEER	179,931	6,281	3.5	167,369	192,494
BUCK	98,224	3,848	3.9	90,529	105,919
DOE	81,708	3,767	4.6	74,173	89,242
TOTAL TURKEY	24,501	2,229	9.1	20,044	28,959
SPRING 2008	23,517	2,178	9.3	19,160	27,874
FALL 2007	984	394	40.0	197	1,772
HOG	65,635	19,799	30.2	26,037	105,232

(A) %=100(SE/TOTAL HARVEST)

TABLE 7. EXPANDED STATEWIDE COVERAGE OF THE 2007-08 MISSISSIPPI NONRESIDENT MAIL SURVEY OF GAME HARVEST BASED ON 36,317 SMALL GAME LICENSE HOLDERS AND 25,561 BIG GAME LICENSE HOLDERS.

SPECIES	TOTAL HARVEST	AVERAGE DAILY KILL	AVERAGE SEASONAL HARVEST	PERCENT SUCCESSFUL HUNTERS	TOTAL MAN-DAYS	AVERAGE SEASONAL DAYS HUNTING	TOTAL HUNTERS	PERCENT OF TOTAL LICENCEES (A)
DOVE	91,360	6.67	20.73	93.94	13,569	3.16	4,406	12.1
QUAIL	3,305	6.19	12.38	87.50	534	2.00	267	0.7
WOODCOCK	33	1.00	1.00	100.00	33	1.00	33	0.1
RABBIT	12,684	2.01	8.09	89.36	5,824	3.95	1,569	4.3
SQUIRREL	43,494	3.94	19.45	98.51	10,721	5.08	2,236	6.2
RACCOON	2,570	0.95	8.63	87.50	2,437	9.13	267	0.7
TOTAL DUCK	151,510	2.80	22.42	92.74	47,866	8.01	5,975	16.5
MALLARD	62,019	1.12	9.01	79.33				
WOOD DUCK	16,156	0.27	2.18	43.02				
OTHER DUCKS	73,335	1.40	11.23	82.12				
GEESE	14,253	0.79	8.04	91.11	15,321	10.20	1,502	4.1
RED FOX	0	0.03	1.00	0.00	0	0.00	0	0.0
GRAY FOX	67	0.07	1.00	100.00	1,169	35.00	67	0.2
BOBCAT	234	0.13	1.26	71.43	1,371	8.20	234	0.6
COYOTE	801	0.08	1.63	84.21	2,959	8.00	634	1.7
TOTAL DEER	30,534	0.04	0.78	74.11	318,718	17.97	18,698	73.2
BUCK	14,654	0.04	0.85	54.61				
DOE	15,880	0.07	0.76	49.65				
ARCHERY DEER	3,415	0.02	0.22	51.47	40,918	10.14	4,509	17.6
BUCK	995	0.05	0.54	22.06				
DOE	2,420	0.09	0.75	38.97				
PRIMITIVE DEER	4,973	0.04	0.34	54.27	46,248	7.62	6,597	25.8
BUCK	2,254	0.05	0.41	30.15				
DOE	2,719	0.08	1.29	33.17				
GUN DEER	22,146	0.04	0.67	70.35	221,191	13.83	17,107	66.9
BUCK	11,405	0.04	0.63	51.36				
DOE	10,742	0.07	0.56	41.28				
TOTAL TURKEY	2,188	0.07	0.58	35.90	25,628	7.02	3,879	15.2
SPRING 2008	2,122	0.03	0.20	37.27	17,223	6.89	3,647	14.3
FALL 2007	66	0.32	5.10	10.00	2,055	6.20	332	1.3
HOG	5,274	6.19	12.38	83.87	12,999	14.37	1,035	2.8

(A) DEER AND TURKEY PERCENTAGES BASED ON BIG GAME LICENSE HOLDERS; ALL OTHERS BASED ON SMALL GAME LICENSE HOLDERS.

TABLE 8. EXPANDED STATEWIDE ESTIMATES OF TOTAL HARVEST (AND VARIABILITY OF THE ESTIMATES) FOR NONRESIDENTS FOR ALL GAME SPECIES IN MISSISSIPPI DURING THE 2007-08 HUNTING SEASON.

		STANDARD ERROR		95% CONFIDENCE INTERVAL	
SPECIES	TOTAL HARVEST	SE	AS % OF TOTAL (A)	LOWER LIMIT	UPPER LIMIT
DOVE	91,360	10,948	12.0	69,465	113,255
QUAIL	3,305	1,653	50.0	-1	6,611
WOODCOCK	33	33	100.0	-33	100
RABBIT	12,684	2,804	22.1	7,077	18,292
SQUIRREL	43,494	11,005	25.3	21,484	65,503
RACCOON	2,570	1,718	66.8	-865	6,006
TOTAL DUCKS	151,510	17,129	11.3	117,252	185,768
MALLARD	62,019	7,460	12.0	47,100	76,939
WOOD DUCK	16,156	2,929	18.1	10,298	22,013
OTHER DUCKS	73,335	9,465	12.9	54,405	92,265
GEESE	14,253	3,551	24.9	7,152	21,355
RED FOX	0	0	0.0	0	0
GRAY FOX	67	47	70.7	-28	161
BOBCAT	234	120	51.4	-7	474
COYOTE	801	220	27.5	361	1,241
TOTAL DEER	30,534	1,379	4.5	27,775	33,293
BUCK	14,654	774	5.3	13,105	16,202
DOE	15,880	930	5.9	14,021	17,740
ARCHERY DEER	3,415	439	12.9	2,536	4,293
BUCK	995	178	17.9	638	1,351
DOE	2,420	367	15.1	1,687	3,153
PRIMITIVE DEER	4,973	517	10.4	3,939	6,007
BUCK	2,254	300	13.3	1,654	2,855
DOE	2,719	347	12.8	2,025	3,412
GUN DEER	22,146	1,097	5.0	19,952	24,340
BUCK	11,405	654	5.7	10,097	12,712
DOE	10,742	731	6.8	9,279	12,204
TOTAL TURKEY	2,188	361	16.5	1,466	2,910
SPRING 2008	2,122	355	16.7	1,411	2,832
FALL 2007	66	66	100.0	-66	199
HOG	5,274	2,306	43.7	662	9,886

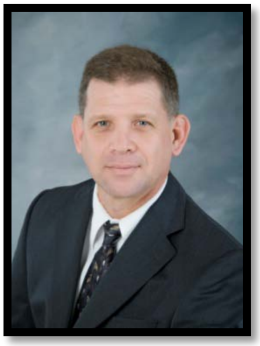
(A) %=100(SE/TOTAL HARVEST)

Table 9. Expanded statewide harvest estimates, average catch per trapper, average catch per successful trappers, and percent successful trappers by furbearer species for the 20008-09 season. There were n=538 licensed trappers in Mississippi in 2008-09.

Species	Harvest[a]	SE	Average Catch Per Trapper[b]	SE	Average Catch Per Successful Trapper	SE	n[c]	Percent Successful Trappers[b]	SE
Mink	105.86	13.36	0.26	0.03	3.27	0.31	26	8.08	0.007
Raccoon	12,916.98	493.48	30.61	1.17	34.23	1.22	303	94.10	0.006
Muskrat	706.13	144.33	1.76	0.36	12.60	2.48	45	13.98	0.009
Red Fox	328.78	30.91	0.63	0.06	3.52	0.29	75	23.29	0.010
Gray Fox	1,555.47	86.20	3.45	0.18	7.66	0.37	163	50.62	0.012
Bobcat	1,753.48	95.72	4.10	0.22	7.91	0.38	178	55.28	0.012
Opossum	7,757.41	513.85	18.01	1.25	24.72	1.58	252	78.26	0.010
Otter	1,689.97	84.55	4.09	0.20	8.03	0.34	169	52.48	0.012
Spotted Skunk	33.63	7.03	0.05	0.01	3.86	0.53	7	2.17	0.004
Striped Skunk	780.85	49.22	1.63	0.10	6.21	0.31	101	31.37	0.012
Coyote	3,442.20	230.48	6.75	0.39	16.26	1.00	170	52.80	0.012
Weasel	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
Nutria	1,560.45	122.63	3.57	0.29	10.53	0.75	119	36.96	0.012
Beaver	10,544.55	466.70	25.39	0.12	36.03	1.43	235	72.98	0.011

[a] n = 432
[b] n = 322
[c] Sample size for average catches per successful trapper

Principal Investigator



Dr. Kevin M. Hunt entered the wildlife and fisheries field with an appreciation of the outdoors and fisheries management. Kevin entered Virginia Tech to seek a degree in Fisheries Science. After working on a James River creel and angler survey, Kevin proceeded to Texas A&M University to obtain a masters degree specializing in the human dimensions of natural resources. As a graduate assistant he coordinated with the Texas Parks & Wildlife for survey research endeavors with agency clientele. Afterwards, Kevin traveled to Florida and became project leader for the Jacksonville Urban Pond Project; the project received numerous awards during his short time as project leader including the Wallop-Breaux Project of the Year Award from the American Fisheries Society Administrator's Section signifying it as the best federally funded project in the nation. Kevin returned to Texas A&M University in 1994 to pursue his doctorate, again specializing in human dimensions. With his experience in urban areas, his research involved the changing clientele of wildlife and fisheries agencies, and his dissertation looked at racial and ethnic differences in participation levels, motivations, and attitudes toward natural resources. Kevin is currently Associate Professor and Director of the Human Dimensions and Conservation Law Enforcement Laboratory in the Forest and Wildlife Research Center at Mississippi State University. He has been conducting social and economic research with the MDWFP Wildlife, Fisheries, and Law Enforcement Bureaus since 2001, notably the Annual Hunter Survey that includes both hunters and wildlife law violators, and a social and economic assessment of Mississippi flood control reservoirs.

Graduate Research Assistants

Clifford Hutt was born and raised in the Chesapeake Bay region of Virginia. He received his B.S. in Forestry and Wildlife with a concentration in Fisheries Science from Virginia Tech in 1999, and his Master's in Biology at Tennessee Technological University in 2002 where he conducted human dimensions research on trout anglers utilizing eight tailwater fisheries in Tennessee. Clifford has also worked as a lab and field technician at Ohio State University's Aquatic Ecology Lab (1999-2000), as an assistant fisheries biologist for Texas Parks and Wildlife Department (2002-2003), and as a research assistant at the University of Arkansas at Pine Bluff (2004-2008). Currently, he is working towards a Ph. D. in Forest Resources at Mississippi State University where he serves as lab coordinator of the Human Dimensions and Conservation Law Enforcement Laboratory.

Vanessa Oquendo was born in Fort Walton Beach, FL. As a young girl, she lived in Honduras for 2 years and went through elementary school in Caracas, Venezuela. She moved back to Fort Walton Beach, FL in 1996 where she completed middle school and high school. Vanessa attended the University of Florida and graduated in May 2007 with a Bachelor of Science in Wildlife Ecology and Conservation. Vanessa is now pursuing a Master of Science in Wildlife and Fisheries Science with emphasis in Human Dimensions at Mississippi State University and works in the Human Dimensions & Conservation Law Enforcement Laboratory conducting survey research on hunters. Her thesis involves studying women's motivations to hunt in Mississippi and the extent to which hunting can be substituted for other outdoor activities.

Southeastern Cooperative Disease Study

Project Number W-48-56
Study Number 19
July 1, 2008 - June 30, 2009

Objectives

To cooperate with the Southeastern Cooperative Wildlife Disease Study

Agency personnel collected data on Bluetongue/EHD from white-tailed deer throughout Mississippi. The MDWFP cooperated with study personnel on CWD monitoring and other wildlife disease issues. Nine biologists attended a disease workshop in Athens.

Recommendations

The Study has been reviewed and found to be of value to the MDWFP and the Southeast Region. All techniques and analysis are considered valid and we recommend continuation of the Study.

Black Bear Habitat Use and Spatial Ecology

Project Number W-48-56
Study Number 37
July 1, 2008 – June 30, 2009

Objectives
1. Estimate resource use (i.e., seasonal habitat, den sites) and spatial ecology (i.e., home range size, movements) by black bears
2. Validate existing black bear habitat suitability model and estimate corridor use

Job 37-1
Estimate resource use (i.e., seasonal habitat, den sites) and spatial ecology (i.e., home range size, movements) by black bears

<u>Field Activities</u>
Although field activities occurred throughout Mississippi, our efforts have been concentrated in two areas identified herein as the Coastal Region and the Delta Region. Nine new bears were captured (6 males, 3 females) statewide during July 2008–June 2009 (Table 1). Two of three females were estimated as yearlings and the third was estimated as a subadult. All captured males were estimated as adults. The most recent capture was a 114 kg male in Bolivar County on 24 June 2009 (Figure 1). No mortalities of radio-collared bears were recorded during the past year. Additionally, 13 tooth samples from 12 bears (10 males, 2 females) handled from October 2005–June 2009 were submitted to Matson's Laboratories for age analysis (Table 2). The first tooth sample from Bear D21 broke during collection; however another sample was collected during a subsequent handling and assigned Bear ID G470.

Twenty bears (8 females and 12 males) are currently radio-collared with either VHF or GPS transmitters (Table 3). Aerial and ground searches conducted for den locations of radio-collared bears resulted in 13 locations of 12 bears (Figures 2 and 3). One bear denned in Arkansas and one bear denned in Alabama. One collar transmitted a mortality signal but was found to be intact on the bear during denning. Thirteen aerial telemetry flights were conducted statewide (n = 9 in the Delta and n = 4 in Coastal Regions) over the past year (1 July 2008–30 June 2009). Four radio-collared bears (2 males and 2 females) have not been located this fiscal year; however two of these individuals (one male and one female) have been observed by various landowners and hunt club members or photographed by trail cameras (Table 3).

Thirty-six bait sites were established in the Delta National Forest, Mahannah Wildlife Management Area (WMA), Sunflower WMA, Red Creek WMA, and private lands throughout the state during fall 2008. Beginning April 2009, all bait sites in the Delta Region were set for the summer field season (Figures 4 and 5). However, due to elevated river stages, many sites became inaccessible during late May and early June 2009. By 30 June 2009, 15 bait sites were actively deployed within the Delta Region. One site resulted in the capture of an unmarked adult male on 24 June 2009 in Bolivar

County (Figure 4). Baiting in the Coastal Region began on 5 May 2009 at Red Creek WMA. Overall, 40 bait sites were placed throughout 3 WMAs in the Coastal Region (Red Creek WMA: n = 25, Ward Bayou WMA: n = 5, Leaf River WMA: n = 11; Figures 6-8). Four additional bait sites were established on private lands within the Coastal Region. Several bait sites were hit by various species including coyotes, wild pigs, and raccoons. However, only 4 sites were hit by bears and all of those sites were at the Red Creek WMA (Figure 6). Traps were set at bait sites with confirmed bear hits. Hair snares were set at sites where it was difficult to determine the species that hit the bait (n = 3). Though no bear hair has been collected from the 3 hair snare locations, coyote and raccoon hair were collected. Cameras were set at two locations that had bear sign (scat, tracks, or bait hit by bear); however, no photos have been taken of bears.

The time between consecutive visits of bait sites by bears at Red Creek WMA was about 3-4 weeks, suggesting that bears in the Coastal Region are moving through areas rather than residing in an area. Therefore, in the Coastal Region, semi-permanent feeding stations were established to encourage bears to remain in an area long enough to be captured.

Feeding stations consisted of barrels (150-225 l) filled with corn and sweet feed (Figure 9). Using tie-down straps, barrels were suspended 1.2-2.0 m above ground and strapped to trees at predetermined locations on each WMA. Twelve potential locations were identified in WMAs (Red Creek: n = 5, Leaf River: n = 4, Ward Bayou: n = 3). Four barrels were placed at Red Creek WMA on 29 June 2009 (Figure 6). An additional 4 barrels will be set during the first week of July 2009 (2 at Leaf River and 2 at Ward Bayou). The remaining 4 barrels will be scheduled for placement as needed.

<u>Administrative Activities</u>
The MSU Institutional Animal Care and Use Committee protocol was amended to permit field work in neighboring states in anticipation that bears may cross state lines. Three pilots were identified and contracted for on-call aerial telemetry flights. Three presentations were given to convey project research objectives to the following audiences: MDWFP wildlife technical staff, MSU students, and members of the BEaR Group.

All MDWFP bear data sheets (n = 52; 1992-2008) were entered into an electronic file to begin developing a statewide, on-line, real-time database to be housed at MSU through the Carnivore Ecology Laboratory.

Additional sources for supplemental funding to support aerial telemetry and GPS collars were investigated and a research proposal was submitted to the Morris Foundation; however, the proposal was not funded.

Job 37- 2
Validate existing black bear habitat suitability model and estimate corridor use

Beginning January 2009, an investigation for raw data from previous habitat research conducted for black bears (2001) and an extensive literature search was conducted to generate supporting data. Meetings with MDWFP staff (biologists, GIS personnel, and area managers) were conducted to discuss objectives and collaboration for necessary data.

Two research proposals were submitted to the Berryman Institute for: 1) graduate research stipend support for the investigation of an alternative hypothesis to support the validation of the existing habitat suitability model and 2) pilot study to utilize observation data collected by MDWFP for inclusion in spatial ecology analysis.

Acknowledgements: We gratefully acknowledge support from the following: MDWFP staff: Doyle Bond, LeDon Cooley, Lynn McCoy, Lee Harvey; Pilot Charlie Darden, Pilot Butch Nygren, Shipley's Donuts Managers: Joe Kenny and Becky Curry, Property owners, leasing parties and managers: Anderson-Tully Corporation, Chris Winter, Davy Hunt, Scott Suber, Jimmy Prossenose and Harold Brown, Student Assistant Alisha Workman, Field Technician Morgan Ihlefeld, and Volunteer Jonathan Flemming.

Table 1. Location, date, sex and estimated age of black bears captured in Mississippi, 1 July 2008- 30 June 2009.

Date	**County**	**Bear ID**	**Sex**	**Weight (kg)**	**Age Estimate**	**Radio Collar**
29 July 2008	Issaquena	Q17	Female	50.80	Yearling	GPS Telonics
16 August 2009	Issaquena	R18	Male	89.91	Adult	GPS Telonics
8 September 2009	Issaquena	S19	Female	39.92	Yearling	VHF Telonics
14 September 2009	Issaquena	C610	Male	171.00	Adult	GPS ATS
5 October 2009	Bolivar	T20	Male	95.25	Adult	GPS ATS
26 October 2009	Warren	U21	Male	121.56	Adult	GPS Telonics
27 October 2009	Warren	V22	Male	190.51	Adult	GPS Telonics
5 November 2009	Warren	W23	Female	103.87	Sub-adult	VHF Telonics
24 June 2009	Bolivar	X49	Male	113.40	Adult	GPS Telonics

Table 2. Tooth samples submitted for age analysis from black bears in Mississippi.

Bear ID	Sex	Age Estimate	Age Class Estimate
W23	F	4-6	Adult
V22	M	-	Sub-adult
U755	M	4-6	Adult
T20	M	6	Adult
R18	M	4-6	Adult
K515	M	4	Adult
G470[1]	F	10-13	Adult
I789	M	7-10	Adult
E050	M	-	Adult
D650	M	11-12	Adult
C610	M	-	Adult
B550	M	-	Adult
D21[2]	F	-	Adult

[1]same bear as D21, however first full tooth specimen
[2]tooth sample broken

Table 3. Radio collared black bears in Mississippi, 2008-2009.

Bear ID	Collar Type	Date Last Located
W23	VHF (TELONICS)	May 2009
V22	GPS (TELONICS)	May 2009
U755	GPS (TELONICS)	May 2009
T20	GPS (ATS)	May 2009
C610	GPS (ATS)	May 2009
S19	GPS (TELONICS)	May 2009
R18	GPS (TELONICS)	May 2009
Q900	GPS (TELONICS)	May 2009
P16	VHF (TELONICS)	April 2009
O800	VHF (TELONICS)	May 2009
N528	GPS (ATS)	July 2008
L12	GPS (ATS)	July 2008
K515	GPS (TELONICS)	April 2009
J320	GPS (ATS)	May 2009
G470	GPS (ATS)	May 2009
D650*	GPS (ATS)	April 2008
E050	GPS (ATS)	May 2009
H910*	GPS (TELONICS)	June 2008
F920	Dropped collar	April 2008
X49	GPS (TELONICS)	June 2009

*Observed in 2009 by landowners but not located through telemetry.

Figure 1. Male black bear captured in Bolivar County, Mississippi, 24 June 2009.

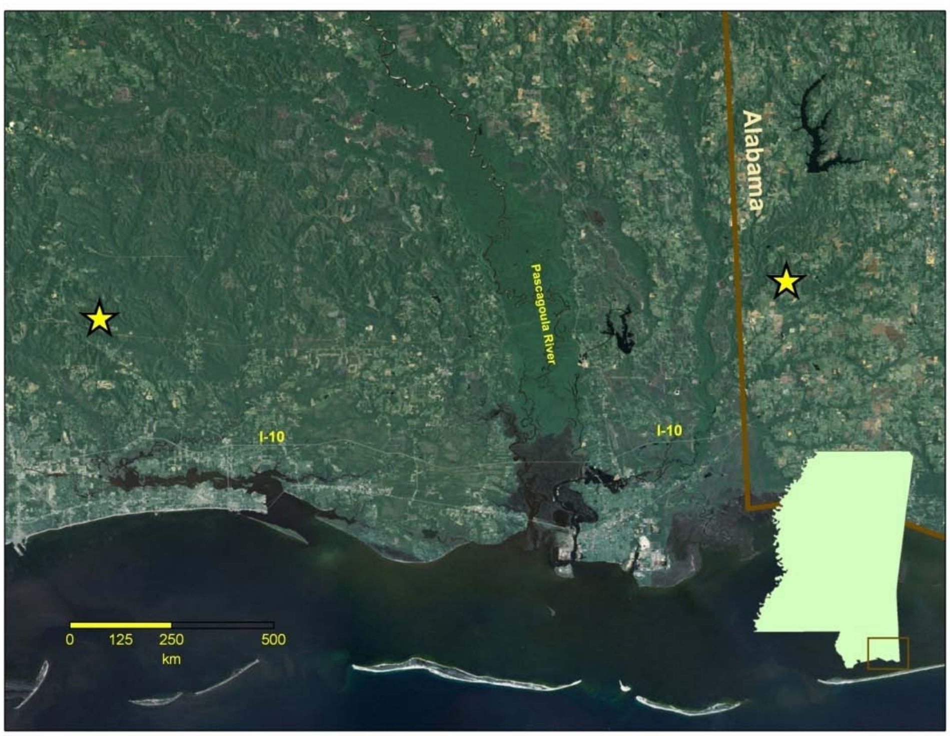


Figure 2. Den locations of radio-collared black bear in the Coastal Region of Mississippi, 2009.

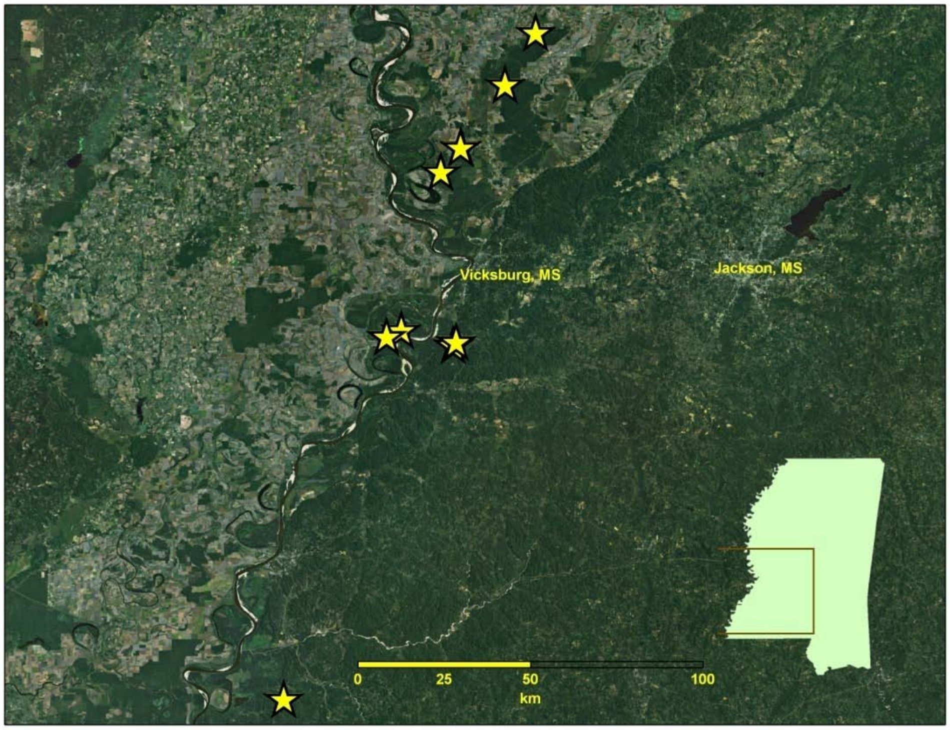


Figure 3. Den locations of radio-collared black bear in the Delta Region of Mississippi, 2009.

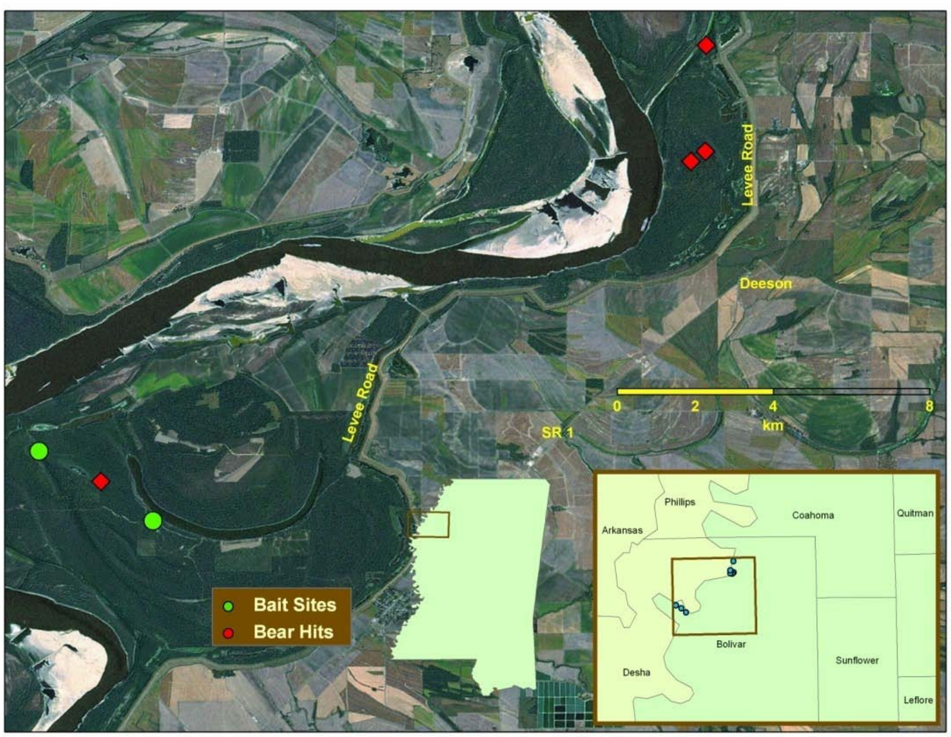


Figure 4. Bear bait locations, Bolivar County, Mississippi 2009.

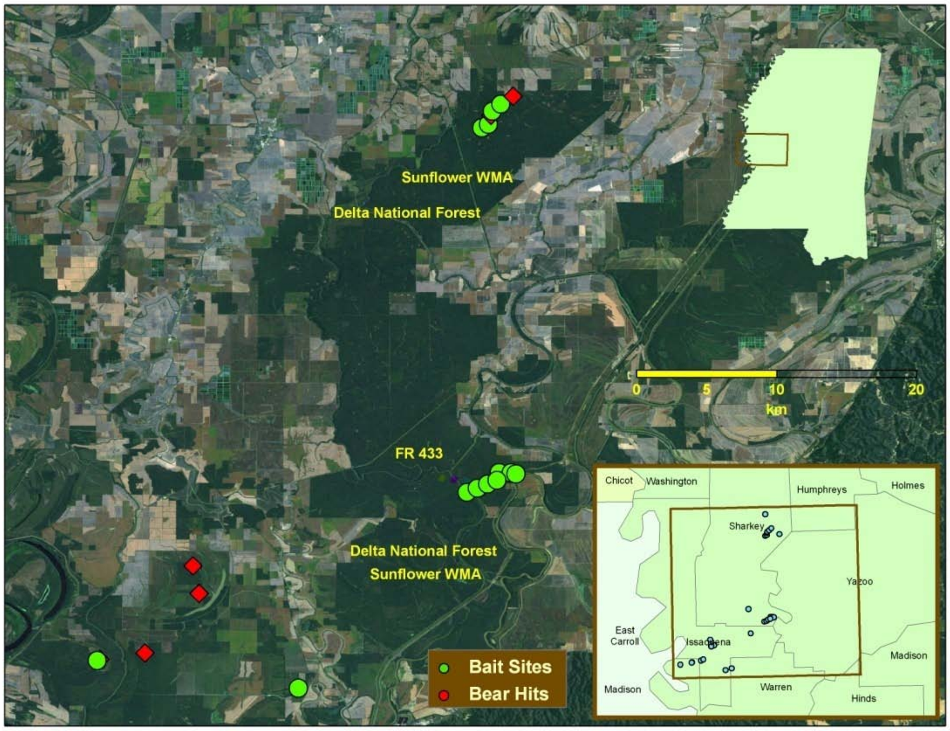


Figure 5. Bear bait locations, east-central Delta, Mississippi, 2009.

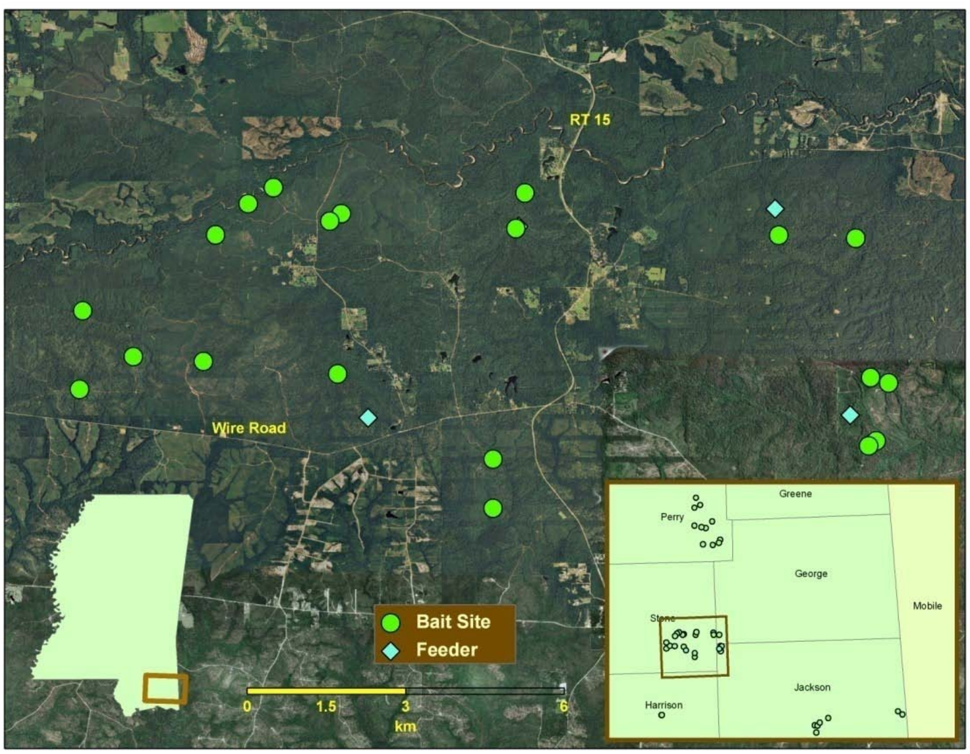


Figure 6. Bear feeder and bait site locations, Red Creek Wildlife Management Area, Mississippi, 2009.

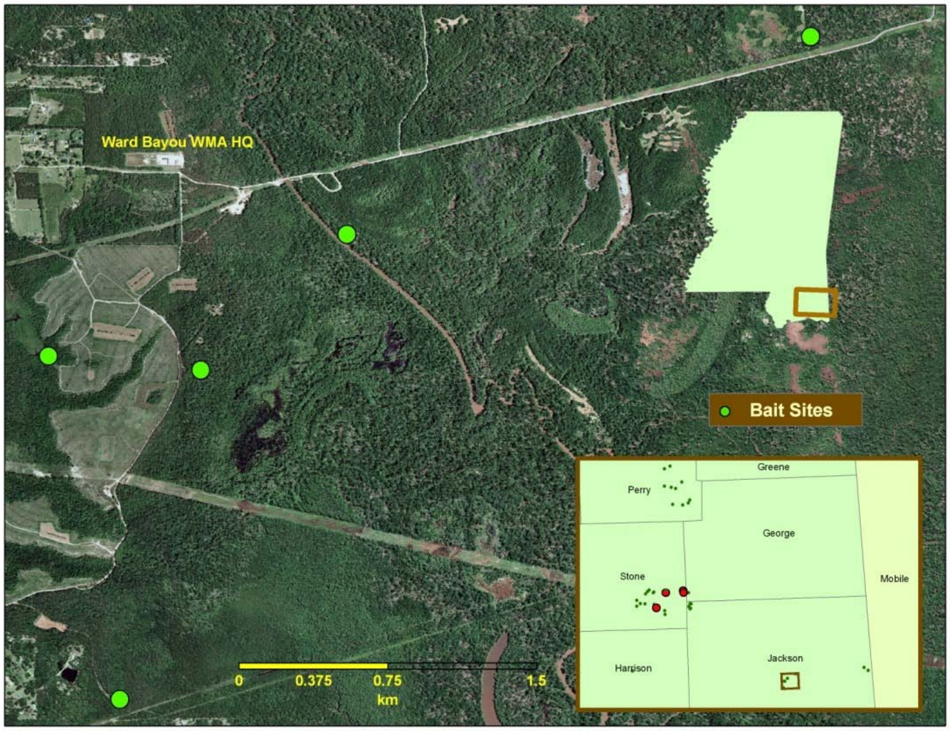


Figure 7. Bear bait site locations, Ward Bayou Wildlife Management Area, Mississippi, 2009.

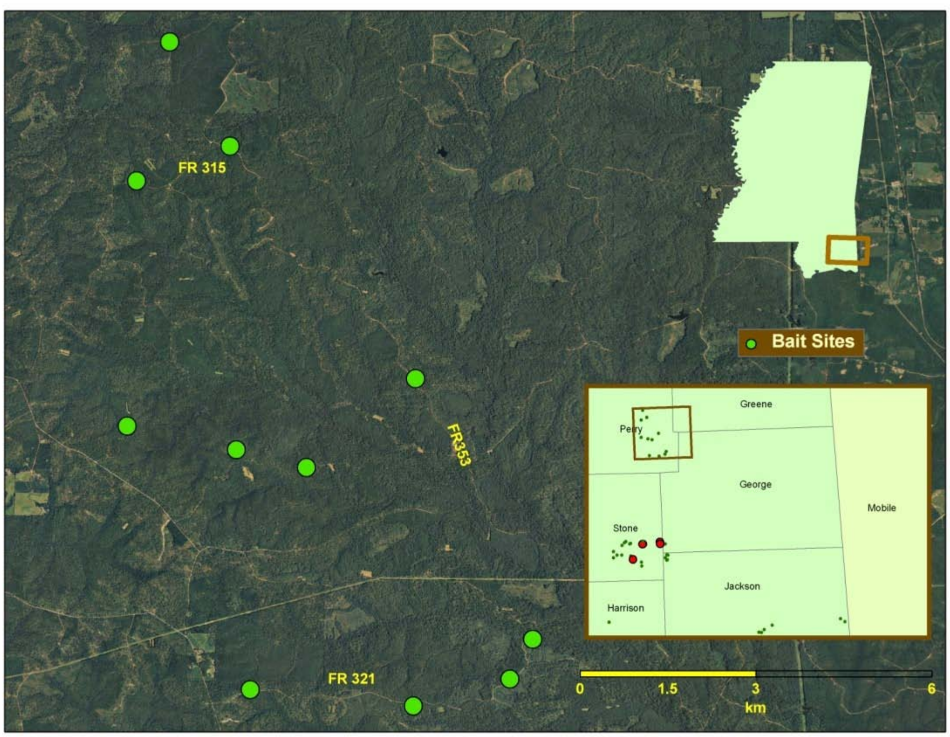


Figure 8. Bear bait site locations, Leaf River Wildlife Management Area, Mississippi, 2009.

Figure 9. Semi-permanent bear feeding station, Red Creek Wildlife Management Area, Mississippi, 2009.

Principal Investigators

Dr. Jerrold L. Belant is an assistant professor in the Department of Wildlife and Fisheries at Mississippi State University. He received his B.S. and M.S. degrees from the University of Wisconsin–Stevens Point and his Ph.D. degree from the University of Alaska Fairbanks. His research interests include carnivore ecology, resource selection, and human–wildlife conflicts.

Brad Young is a wildlife biologist and serves as the Black Bear Program Leader for the MDWFP. He received a B.S. in Wildlife Science from MSU in 1998 and a M.S. in Forestry in 2001. His primary duties include conducting research on the state's growing bear population and working to raise awareness about bear conservation in Mississippi. Young has served in this role since 2002.

Graduate Research Assistants

Stephanie Simek is a Ph.D. student in the Department of Wildlife and Fisheries, Carnivore Ecology Lab working with Dr. Jerrold Belant on the natural colonization of black bear in Mississippi. She earned a B.S. in Wildlife Science at Virginia Tech and M.S. in Environmental Science and Forest Biology at SUNY College of Environmental Science and Forestry. She has spent over 15 years working on American black bear in research and management programs. Stephanie has worked with both captive and free-ranging bears in Virginia, New York, Washington, and Florida. Most recently she was the Black Bear Program Coordinator for Florida Fish and Wildlife Conservation Commission. Stephanie has managed statewide and local level bear research and management efforts.

Brittany Waller is a M.S. student in the Department of Wildlife and Fisheries and works in the Carnivore Ecology Lab under the direction of Dr. Jerrold Belant. Her research focuses primarily on den-site selection by American black bears in Mississippi. Brittany earned a B.S. degree in Wildlife and Fisheries Biology from Clemson University in May 2009. Throughout her time as an undergraduate, she participated in numerous research projects. She has worked with a variety of species including red-cockaded woodpeckers, northern bobwhite quail, and white-tailed deer. Most recently, she worked on a white-tailed deer fawn mortality project in South Carolina.

Wild Turkey Habitat Distribution in the Delta

Project Number W-48-56
Study Number 38
July 1, 2008 – June 30, 2009

Job 38-1
Define study sites

Objective
To define 3 study sites in the Mississippi Delta, which form a low-high gradient of habitat quality. These study sites will not contain wild turkeys. Study areas will be approximately 20,000 ac in size and contain a diversity of hardwood regeneration, established hardwoods, and agriculture.

We have selected 3 study sites in the North Delta based on the areas of forest, active agricultural field, and percent concurrence between the assessment by the National Wildlife Turkey Federation turkey habitat models and expert opinions (Table 1). The 3 sites are located in Coahoma (34^{o}19' N, 90^{o}34' W), Quitman South (34^{o} 10'N, 90^{o}21' W), and Quitman North (34^{o}19 N, 90^{o}17'). Monthly average temperatures range from 8 ^{o}C to 32 ^{o}C and average 22 ^{o}C, and annual precipitation ranges from 98.7 cm to 140.4 cm and averages 140.4 cm.

Study site selection and criteria are described as follows. To identify potential turkey habitat within the Delta Region of Mississippi, several factors were examined. First, the National Wild Turkey Federation has developed a model that defines turkey habitat as any area within 100 m of woods greater than or equal to 15 acres in size. Second, we solicited information on potential turkey habitat from MDWFP Conservation Officers and Wildlife Biologists. Maps of each county were constructed and delivered to MDWFP personnel familiar with these areas. Participants were asked to define areas of potential turkey habitat, if that habitat has any birds, and if so, at what level of density (rated low, medium, or high). Biologists and officers identified 87 areas of potential habitat within the Delta Region. Third, these 2 assessments of turkey habitat were compared to evaluate concurrence between the models. Habitat areas near or adjacent to the Batture Lands or Leoss Hills were excluded because of proximity to established turkey populations. We further removed from consideration turkey habitat in the lower Delta already occupied with birds because of our objective of discerning the quality of unoccupied habitats. Thus, we restricted site selection to those properties north of Hwy 8. Within the region of the North Delta, 9 properties or areas were identified as large areas of potential habitat and currently unoccupied. Examination of habitat within each of these areas, using high resolution satellite photos, indicated that a gradient of quality exists. Based on logistics and the need for a gradient of habitat quality (Table 1), the areas recommended for inclusion in the study are Coahoma (low quality with a few larger blocks of established woods and large areas of very young conservation lands), Quitman south (QS: medium quality with mixed-sized blocks of established woods and large areas of young conservation lands), and Quitman north (QN: high quality with larger blocks of established woods and large areas of older established conservation lands).

Table 1. Wild turkey habitat characteristics within potential study sites of the Mississippi Delta Region.

Item	Coahoma	Quitman north	Quitman south	SE	SW
Total Area (acre)	10134	16306	20484	26957	31468
Established woods (acre)	1720	3352	2375	4392	1635
Conservation lands (acre)	2035	7912	11959	1213	15869
Woods Max (acre)	368	837	457	1623	557
Woods Average (acre)	226	352	108	244	312
Active Agricultural (acre)	7171	4123	5878	18894	8453
Concurrence (%)	51	86	71	91	63

Job 38-2
Translocation of birds and dispersion

Objective
1) To capture and release > 30 wild turkeys at the sex ratio 1:4 (male : female) to initiate wild turkey populations
2) To examine post release movements and home range establishment during release year 1

The MDWFP Biologists led by Mr. Dave Godwin have captured and released 106 wild turkeys in the three selected study sites in Quitman and Coahoma County from January 26, 2009 through March 5, 2009. The sex ratio of released turkeys was about 1:4 (male:female, Table 2). We met our pre-determined objective of 30 released turkeys per study site (Table 2).

Table 2. Numbers and sex composition of released wild turkeys by site from January 26, 2009 to March 5, 2009

Study site	Gobbler	Hen	Total number of birds
Quitman north	7	32	39
Quitman south	7	25	32
Coahoma	7	28	35

Turkey tracking started on January 29, 2009. The objective of turkey tracking from January 29 to June 30 was to locate each tagged turkey twice a week. This objective was basically met. From May to June, tagged turkeys at QN and QS sites were located twice a day. Locations of each tagged turkey were estimated using the triangulation method with 2-3 azimuths taken within 15 minutes. We located a tagged turkey in different times of a day each week.

We used 95% minimum convex polygon (MCP) method to estimate the home range size of radio-tagged turkeys survived till the end of June, 2009 (Fig. 1). Fixes/locations were pooled from the release of a bird to the end of June to estimate home range sizes. The average number of locations used in home range estimation was 27.8 and 28.8, respectively, for QS and QN sites (p = 0.55, Wilcox test). The average home range size (*HR*) of tagged wild turkeys at QS site was 1115.8 ha (n = 21), significantly greater than that of tagged turkeys at QN site (*HR* = 474.4 ha, n = 19; p = 0.01, t-test). Therefore, the home range size of tagged turkeys in low-quality habitat was greater than in high-quality habitat (Fig. 2).

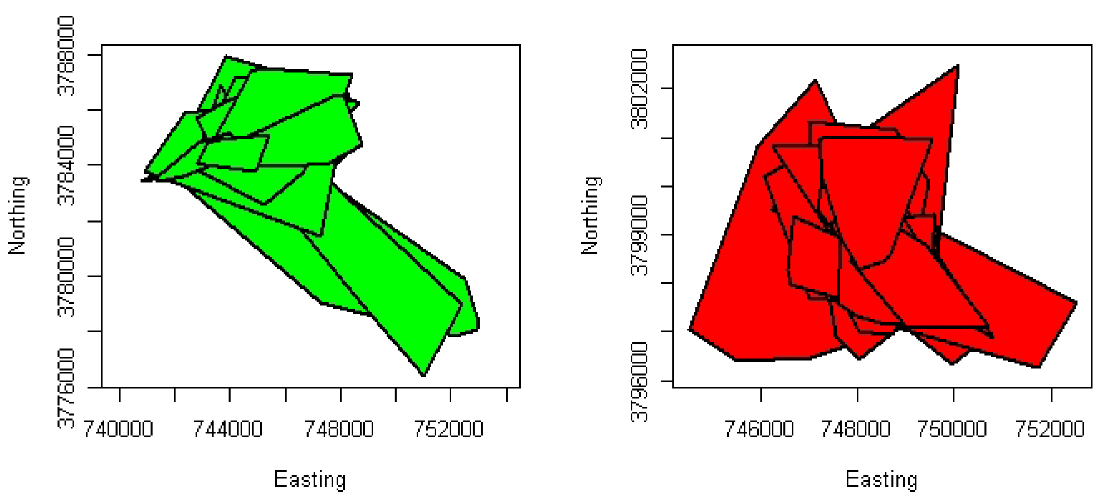


Figure 1. Ninety five percent minimum convex polygon (MCP) estimates of home ranges of radio-tagged wild turkeys in Quitman County, Mississippi. The left panel is for Quitman south site; and the right panel is for Quitman north site.

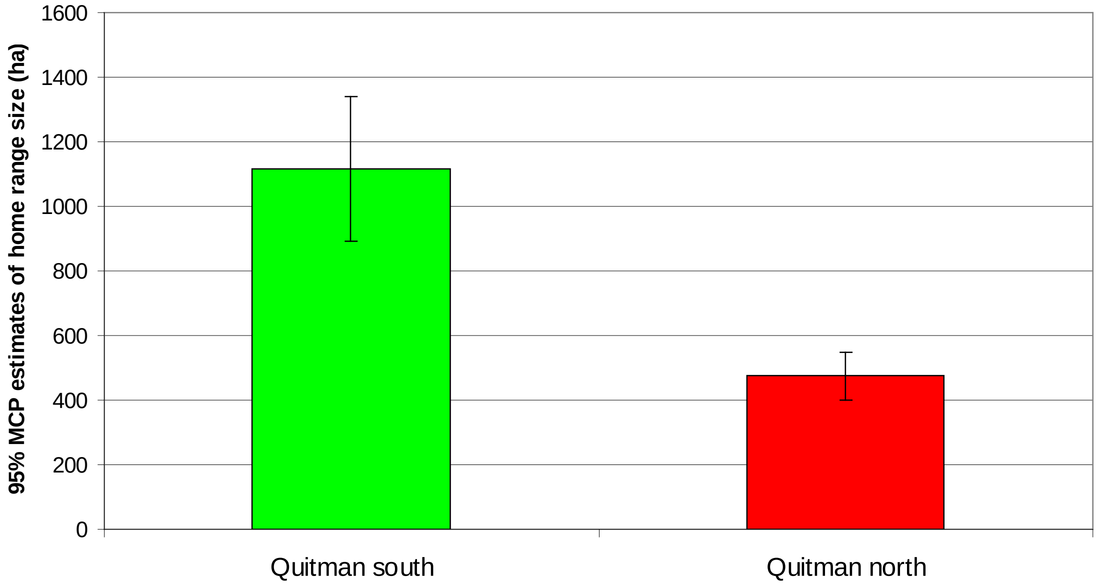


Figure 2. Average home range size of radio-tagged wild turkeys in Quitman County, Mississippi from January, 2009 through June, 2009.

We also used kernel smoothing methods to assess the spatial utilization distribution of radio-tagged wild turkeys with location data (Fig. 3 and 4). A contour line represents the probability to locate a tagged bird within the area delineated by the contour line (i.e., 80%, 90%, etc). The spatial utilization distributions will be used in the analysis of resource/habitat selection.

We have acquired Landsat TM 5 images (at the resolution of 30 m x 30 m) taken in May and June of 2009 for the study sites from the USGS website. We have carried out supervised and unsupervised classification of land cover into deciduous, cotton crop, non-cotton crop, water, roads/other urban area (towns), etc. Ground-truth was carried out in July 2009. Remote sensing data will be used in the analysis of habitat selection by radio-tagged turkeys.

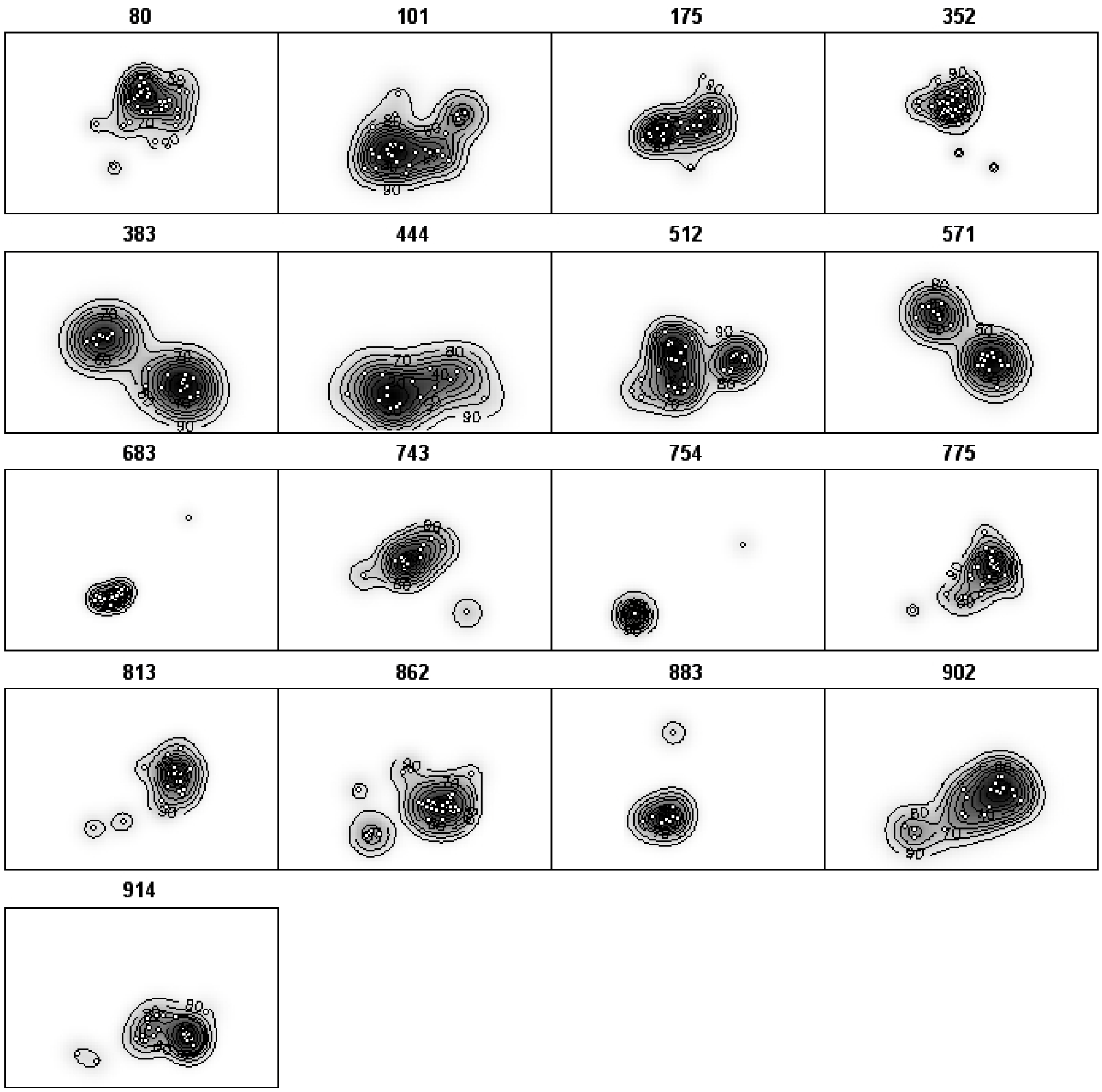


Figure 3. Spatial utilization distributions of radio-tagged wild turkeys at Quitman south site. Contour lines represent the probabilities of locating a bird within the area delineated by the contour line. The number on the top of each panel is the ID number of tagged birds.

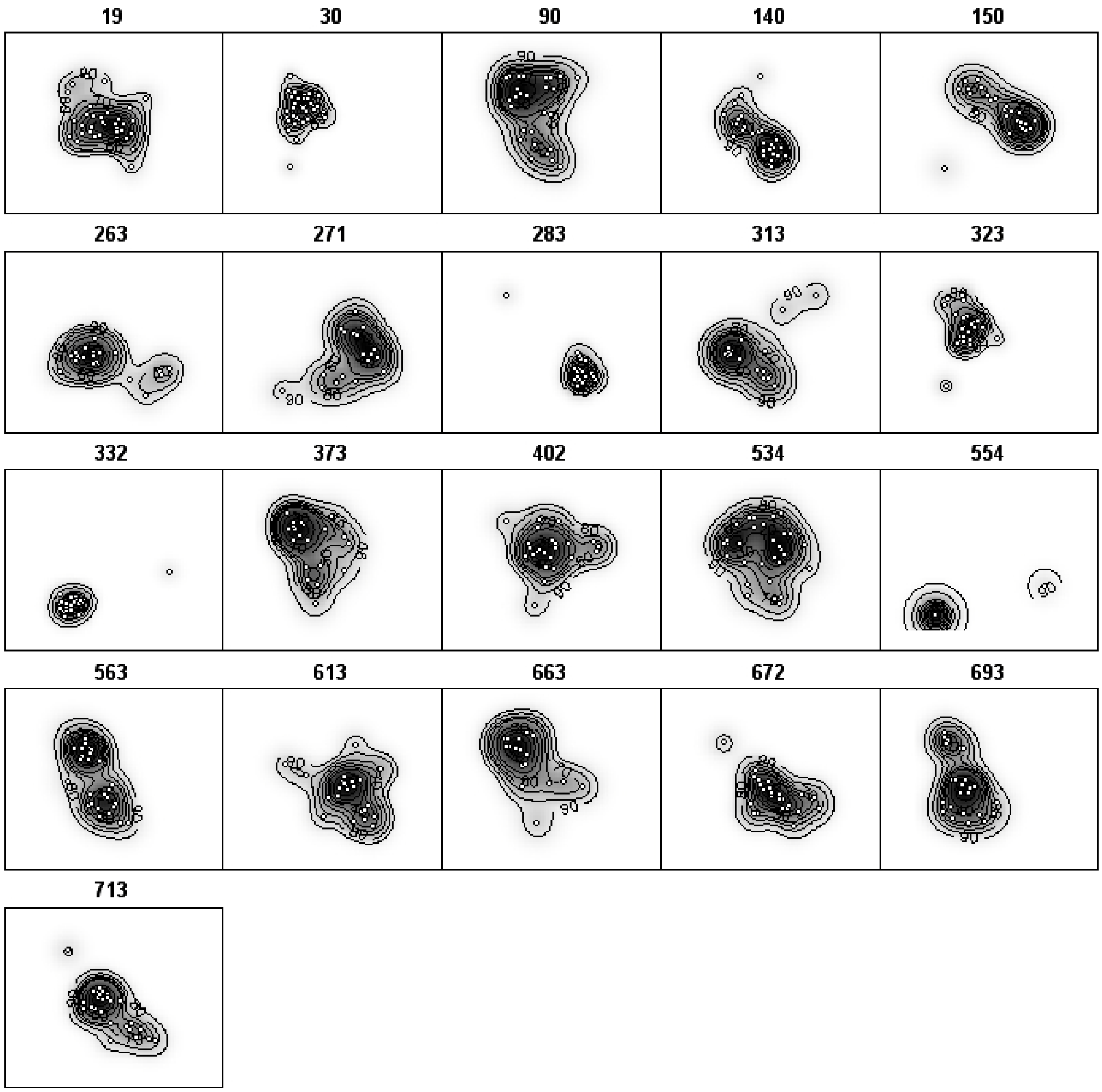


Figure 4. Spatial utilization distributions of radio-tagged wild turkeys at Quitman north site. Contour lines represent the probabilities of locating a bird within the area delineated by the contour line. The number on the top of each panel is the ID number of tagged birds.

Principal Investigators

Dr. Guiming Wang is an Assistant Professor and Wildlife Ecologist in the Department of Wildlife and Fisheries, Mississippi State University. He received his Ph. D. in wildlife science from Oregon State University in 2000. His research assesses the effects of climate, density, and management on the dynamics of wildlife populations. Dr. Wang is also specialized in wildlife biometry and statistical modeling.

Dr. Jerrold L. Belant is an assistant professor in the Department of Wildlife and Fisheries at Mississippi State University. He received his B.S. and M.S. degrees from the University of Wisconsin–Stevens Point and his Ph.D. degree from the University of Alaska Fairbanks. His research interests include carnivore ecology, resource selection, and human–wildlife conflicts.

Dave Godwin is a wildlife biologist for the MDWFP and is coordinator of the small game and wild turkey programs. For 16 years, he has helped lead Wildlife Bureau efforts working with private landowners, developed and helped implement habitat management plans for demonstration areas on several public WMAs, authored or co-authored over 90 publications, and has given numerous public presentations.

Graduate Research Assistant

Kyle Marable is a Graduate Research Assistant pursuing a Master's Degree in Wildlife and Fisheries Science from Mississippi State University. He received his B. S. in Wildlife Sciences from Auburn University in 2007. He then spent two years performing habitat work for Quail Unlimited where he developed a desire to work with game birds. He is now enjoying working with relocated wild turkeys in the Mississippi Delta.

Assessment of the Lactation Index for Managing White-tailed Deer Populations

Project Number W-48-56
Study Number 39
July 1, 2008 – June 30, 2009

Job 65-1
Study site selection and study preparation.

Objective
Identify properties and participants for a study to determine if population-level lactation estimates are related to fawn-recruitment estimates derived from hunter observations and camera surveys on study sites.

We have identified 21 properties as potential study sites. Currently, Kamen Campbell is visiting each site to determine if the area is suitable for research and we will have cooperation from study-site personnel. Study sites are distributed throughout Mississippi and other states with the Batture, Delta, Upper Coastal Plain, Lower Coastal Plain, Coastal Flatwoods, Interior Flatwoods, and Loess soil resource regions represented (Table 1).

Table 1. Property name, county, and soil resource region of potential study areas for a research project to determine if population-level lactation estimates are related to fawn-recruitment estimates derived from hunter observations and camera surveys.

Club Name	County	Region
Davis Island (Palmyra)		Batture
Cotton Branch	Franklin	Lower Thin Loess
Deviney Enclosure	Copiah	Lower Thin Loess
Kenny Allison Enclosure		Coastal Flatwoods
Togo Island	Claiborne	Batture
Walker Brothers	Noxubee	Blackland Prairie
Riverside	Attala	Upper Thick Loess
Bowman Delta Farms	Coahoma	Delta
Smallwood	Winston	Upper Coastal Plain
Big O	Monroe	Upper Coastal Plain
Old Pearl Game Mgmt	Simpson	Lower Coastal Plain

Millbrook	Clarke	Lower Coastal Plain
East MS Sportsman	Kemper	Interior Flatwoods
Luckett	Issaquena	Delta
Triple Creek	Jasper	Upper Coastal Plain
Strong HC	Monroe	Blackland Prairie
Bluff Creek	Jackson	Coastal Flatwoods
Casey Jones	Yazoo	Upper Thick Loess
Willow Break Hunting Club	Warren	Delta
Oxbow Hunting Club	Warren	Lower Thick Loess
Alabama club (Bronson's)	Pickens, AL	Upper Coastal Plain

Principal Investigators

Dr. Bronson Strickland received a bachelor's degree in Forest Resources from the University of Georgia and completed a master's degree from Texas A&M University-Kingsville. In 2005, Bronson earned a doctoral degree from Mississippi State University and then worked as a research wildlife biologist with the National Wildlife Research Center. In 2006, Bronson became the Extension Wildlife Specialist at Mississippi State University. Bronson has served MS TWS previously as an Executive Board Member and chair of the Presentation Selection Committee.

Dr. Steve Demarais is a professor in the Department of Wildlife and Fisheries at Mississippi State University. He received his academic training at the University of Massachusetts and Mississippi State University. His research specialty is deer ecology and management, with a focus on the manipulation of deer populations and their habitat.

Dr. Guiming Wang is an Assistant Professor and Wildlife Ecologist in the Department of Wildlife and Fisheries, Mississippi State University. He received his Ph. D. in wildlife science from Oregon State University in 2000. His research assesses the effects of climate, density, and management on the dynamics of wildlife populations. Dr. Wang is also specialized in wildlife biometry and statistical modeling.

Chad M. Dacus is the White-tailed Deer Program Coordinator for the Mississippi Department of Wildlife, Fisheries, and Parks. He received a B.S. degree in wildlife and fisheries science from MSU in 2000, focusing on law enforcement, forestry, and wildlife science. In 2002, Chad earned a M.S. degree in wildlife and fisheries science from MSU. Currently, Chad and his wife, Lynn, live in Jackson.

Graduate Research Assistant

Kamen Campbell is from Pennsylvania and received his Bachelor's degree from SUNY Cobleskill in New York. He came down to the Magnolia State as a technician on Matt Palumbo’s turkey gobbling project and also spent a summer on the site prep project. He is married to Tamara Paul Campbell, another MSU wildlife graduate student.

Evaluation of Waterfowl Hunt Management and Sanctuaries on Mississippi Wildlife Management Areas

Project Number W-48-56
Study Number 40
July 1, 2008 – June 30, 2009

Job 40-1
Hunt Management Strategies and Initial Index of Habitat Quality

Objective
Determine relative levels of food availability within impoundments.

Hunt Management Strategies
During September 2008, we met with Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) personnel to divide hunting units at Howard Miller, Muscadine, and Trim Cane Wildlife Management Areas (WMAs) between two hunt frequency treatments (2 or 4 days/week). We divided each WMA into two zones of approximately equal area and randomly assigned a hunt frequency to each zone within WMAs. Hunt frequency designations were used throughout the 2008-2009 waterfowl hunting season (December and January). In June 2009, we met with MDWFP personnel to divide hunting units at Howard Miller, Muscadine/Driftwood, and Trim Cane WMAs between the two hunt frequency treatments. Hunt frequencies at Howard Miller and Trim Cane will remain the same as last year. Between study years, Muscadine WMA increased by 291 hectares with the addition of Driftwood WMA. Driftwood and Muscadine WMAs share a refuge, are managed similarly, and are adjacent. For the 2009-10 hunting season, we will analyze Driftwood and Muscadine WMAs as one WMA (Muscadine/Driftwood WMA). Hunt frequencies at Muscadine/Driftwood WMA were determined using the same methods as fall 2008.

Habitat Quality Index
In August and September 2008, we sampled vegetation within hunt units at all WMAs during pre-flooding conditions using line and point-intercept methods to classify a minimum of 50 points/hunting unit into a habitat type (i.e., aquatic bed, crop, moist soil, or forest/scrub-shrub). In 2008, Howard Miller was partially planted in rice. We assumed rice fields would have a 100% occurrence of rice. We used a chi-square test for association to determine if the size (ha) of habitat types were similar between 2 and 4 days/week hunt frequencies.

Composition of habitat types did not differ between areas hunted 2 or 4 days/week at Muscadine or Trim Cane (X^2 = 1.99, P = 0.311; X^2 = 1.745, P = 0.627; respectively; Table 1). However, we did find a difference in composition of habitat types between areas hunted 2 or 4 days/week at Howard Miller (X^2 = 93.40, P < 0.001; Table 1). In our final analyses for Howard Miller we will use habitat type as a covariate to account for differences in habitat availability.

Job 40-2
Measuring Hunter Harvest and Satisfaction

Objective
Determine relationships between (1) waterfowl harvest/hunter hour and hunt treatments, (2) hunter attitudes/satisfaction, treatments, and harvest, and (3) harvest level and distance to sanctuaries.

Hunter Harvest
During the waterfowl hunting season (December 2008 through January 2009), Elizabeth and her technicians performed hunter bag checks as hunters were leaving Howard Miller, Muscadine, and Trim Cane WMAs. Data collected during hunter bag checks included number, species, sex, and age of ducks harvested. For other birds harvested, Elizabeth and her technicians recorded the species and number harvested. Additionally, data were collected on hunter use of the WMAs, including unit hunted, number of hunters per unit, time spent hunting (minutes), and number of shells expended by the hunting party.

Elizabeth and her technicians collected data from 3 December 2008 through 24 January at Trim Cane and 6 December 2008 through 25 January 2009 at Howard Miller and Muscadine. During our study, total hunting participation at Howard Miller was 274 hunting parties and 705 hunters. At Muscadine, there were 72 hunting parties and 219 hunters. At Trim Cane, there were 98 hunting parties and 229 hunters. We used an Analysis of Variance (ANOVA) with repeated measures (hunting week, n = 7) to test the hypothesis of variation in daily harvest of total ducks (ducks/hunter) in response to hunting frequency (2 or 4 day/week treatments) at WMAs, hunting week, and interaction of treatment and hunting week. If the interaction term was not significant ($P > 0.10$) we removed it and conducted the ANOVA with only treatment and hunt week as main effects. All harvest data are reported as mean ducks/hunter.

Generally, we observed an increase in harvest rates throughout the hunting season (Figure 1). Preliminary results suggest no difference in total duck harvest per hunter between hunting frequencies at Howard Miller, Muscadine, or Trim Cane during the 2008-09 waterfowl hunting season ($F_{1, 272} = 0.85$, $P = 0.356$; $F_{1, 70} = 0.04$, $P = 0.837$; $F_{1, 96} = 1.56$, $P = 0.214$; respectively; Figure 1). Hunter satisfaction may be related to the "trophy value" of the harvest (Wildlife Management Institute 2004). Larger-bodied duck species may have a greater trophy value and be preferentially harvested over smaller-bodied duck species. Thus, we analyzed the combined harvest of mallard (*Anas platyrychnos*), gadwall (*A. strepera*), northern pintail (*A. acuta*), and American wigeon (*A. americana*; BIGDUCKS) and American green-winged teal (*A. crecca*), blue-winged teal (*A. discors*), northern shoveler (*A. clypeata*), and wood duck (*Aix sponsa*; SMALLDUCKS) as two separate groups. Harvest of BIGDUCKS was greater at the area hunted 2 days/week ($\bar{x} = 0.46 \pm 0.07$ [SE]) than the area hunted 4 days/week ($\bar{x} = 0.24 \pm 0.04$) at Howard Miller ($F_{1, 266} = 5.28$, $P = 0.022$). We did not find a difference in harvest of BIGDUCKS harvested per hunter at Muscadine or Trim Cane ($P > 0.10$)

between treatment, nor a difference in harvest of SMALLDUCKS between treatments at any of the (*P* > 0.10).

Our preliminary results suggest a 4 day hunt frequency does not decrease ducks harvested/hunter at Howard Miller, Muscadine, or Trim Cane WMAs. However, an understanding of how species bag composition influences hunter satisfaction needs to be incorporated into final management recommendations.

Hunter Satisfaction

Hunter satisfaction data were collected using a subset of questions on the Mississippi Waterfowl Hunting Permit and were provided to us by the MDWFP. Questions used included number of ducks harvested and seen, number of shooting opportunities, and overall hunt quality.

Hunter satisfaction data were collected from 3 December 2008 through 24 January at Trim Cane and 6 December 2008 through 25 January 2009 at Howard Miller and Muscadine WMAs. We only analyzed surveys that were completed (i.e., all questions answered). At Howard Miller, Muscadine, and Trim Cane WMAs, there were 604, 177, and 197 complete surveys, respectively. All hunter satisfaction data were scaled 1-5 (1 = hunters were dissatisfied, 5 = hunters were extremely satisfied). We used an ANOVA with a repeated measure of hunt week to test the null hypothesis of no difference in hunter satisfaction between treatments (2 or 4 days/weekly hunt frequency), hunt week (n = 7) and the interaction of treatment and hunt week. If the interaction term was not significant ($P > 0.10$) we removed it and conducted the ANOVA with only treatment and hunt week as main effects.

We found a difference in hunter satisfaction between hunt frequencies during all weeks except 4 Jan 2009 and 18 Jan 2009 at Howard Miller (treatment x week; $F_{6, 590} = 6.01$, $P < 0.001$; Figure 2). Specifically, hunter satisfaction was greater on areas hunted 2 days/week for 4 of 7 weeks. Hunter satisfaction also differed between hunt frequencies among weeks at Trim Cane (treatment x week; $F_{6, 183} = 1.93$, $P = 0.079$; Figure 2), with 14 December 2008 as the only week with a difference in hunter satisfaction between hunt frequencies ($F_{1, 183} = 10.51$, $P = 0.001$). We did not find a difference in hunter satisfaction between treatments at Muscadine ($F_{1, 169} = 0.01$, $P = 0.912$; Figure 2). We were unable to test for the interaction between hunt treatment and week at Muscadine because of incomplete hunter satisfaction cards for the weeks of 4 January 2009 and 18 January 2009.

Hunter satisfaction and harvest of BIGDUCKS (i.e., mallard, gadwall, northern pintail and American wigeon harvest combined) at Howard Miller were greater in areas hunted 2 days/week, suggesting there may be an influence of harvest composition on hunter satisfaction. In the future, we will complete an analysis to determine if there is an interaction between hunter satisfaction and harvest of BIGDUCKS. Preliminary results suggest hunter satisfaction at Muscadine and Trim Cane WMAs were similar between areas hunted 2 days/week and 4 days/week.

Job 40-3
Measuring Waterfowl Response and Reporting

Objective
Determine (1) relationships between waterfowl behavior/use and hunt treatments, and (2) if sanctuaries serve as habitats for birds harvested on WMAs.

Waterfowl Response
Elizabeth and her technicians conducted ground surveys at each WMA to estimate waterfowl use of sanctuaries and hunt units during the 2008-09 Mississippi waterfowl hunting season. We conducted ground surveys of hunt units to determine waterfowl response to hunting one day and three days after units were hunted (n = 14). We averaged abundance between surveys to calculate the average duck density for each week of the hunting season. We conducted hunt unit surveys and flush counts along levees adjacent to specific hunting units (Kaminski and Prince 1981). We used binoculars to identify and count waterfowl within the hunt units before they flushed. When birds flushed, we noted the number landing in hunt units visible from our position (Kaminski and Prince 1981). Birds flushing into hunt units yet to be surveyed were noted and then subtracted from the count of that hunt unit. We conducted hunt unit surveys mid-morning (1000hrs) because waterfowl exhibit a tendency to be resting (Paulus 1984).

We surveyed sanctuary units 6 times/week (n = 44) to evaluate potential differences in waterfowl use among mornings when the entire (2 and 4 day areas), part (4 day area), or none of the WMA is hunted. We used binoculars and a scan sampling technique from concealed tree stands or ground blinds to observe waterfowl and waterbirds using sanctuary wetlands (Altmann 1974, Havens 2007). We standardized surveys by counting birds within a defined visible area of each sanctuary. We began sanctuary surveys 15 min before sunrise and continue for 1.5 hrs. We conducted sanctuary surveys on hunt and non-hunt days; therefore, we limited surveys to 1.5 hrs so we could perform hunter bag checks. We identified and counted waterfowl and other waterbirds using the sanctuary every 15 min. We also recorded the percentage of ducks feeding (e.g., tipping-up, surface feeding; Havens 2007) to determine if refuges are serving as a resting or foraging location. During sanctuary surveys, we also recorded the number of birds entering and leaving the sanctuary every 10 min for 5 min intervals throughout the survey period to calculate increase or decrease in duck abundance within sanctuaries. We will use this calculation to determine the relationship between sanctuary function (i.e., serving as a source or sink) and proportion of the WMA being hunted. However, data on sanctuary use are ongoing and results are not included in this annual report.

We used an ANOVA with repeated measures (hunting week) test the null hypothesis of no difference in weekly duck density between areas hunted 2 or 4 days/week hunt frequency and hunt week (n = 7). All data on weekly hunt unit duck density are reported as mean ducks/ha.

Overall, we observed that duck densities increased in the hunt units throughout the hunting season at all WMAs (Figure 3). We found a difference in weekly duck density between treatments at Trim Cane ($F_{1,6} = 6.43$, $P = 0.044$; Figure 3), but not at Howard Miller or Muscadine ($F_{1,6} = 0.01$, $P = 0.944$; $F_{1,6} = 0.16$, $P = 0.693$; respectively; Figure 3). Further, we evaluated the effect of hunt frequency on weekly density of BIGDUCKS and SMALLDUCKS. We found weekly density of BIGDUCKS was greater in areas hunted 2 days/week ($\bar{x} = 1.52 \pm 0.32$) when compared to areas hunted 4 days/week ($\bar{x} = 0.57 \pm 0.14$) at Howard Miller ($F_{1,6} = 9.92$, $P = 0.020$). We did not find a difference in weekly density of BIGDUCKS between hunt frequencies at Muscadine or Trim Cane ($P > 0.10$). We found weekly density of SMALLDUCKS was greater in areas hunted 2 days/week ($\bar{x} = 3.11 \pm 1.02$) compared to areas hunted 4 days/week ($\bar{x} = 1.92 \pm 0.80$) at Muscadine ($F_{1,6} = 5.93$, $P = 0.051$). We did not find a difference in weekly density of SMALLDUCKS between hunt frequencies at Howard Miller or Trim Cane ($P > 0.10$).

Our preliminary results suggest a 2-day/week hunt frequency at Howard Miller may provide greater opportunity to observe BIGDUCKS. Harvest and weekly density of BIGDUCKS, and hunter satisfaction were greater in areas hunted 2 days/week at Howard Miller suggesting harvest or weekly hunt unit density of BIGDUCKS may be influencing hunter satisfaction. Our preliminary results suggest duck densities could be sustained at Muscadine and Trim Cane if they were hunted 4 days/week.

Management Presentations

Oral Presentations

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H. Havens. 2008. Initial project overview. Effect of Hunting Frequency (2 or 4 days/week) on Waterfowl Use and Hunt Quality at Mississippi WMAs. Mississippi Department of Wildlife, Fisheries, and Parks, Redwood, Mississippi.

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H. Havens. 2009. Effect of Hunting Frequency (2 or 4 days/week) on Waterfowl Use and Hunt Quality at Mississippi WMAs. Mississippi Department of Wildlife, Fisheries, and Parks Annual Meeting, Mississippi State, Mississippi.

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H. Havens. 2009. Annual project report. Effect of Hunting Frequency on Waterfowl Harvest, Abundance, and Hunter Satisfaction in Mississippi. Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi State, Mississippi.

Scientific Presentations

Oral Presentations

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H. Havens. 2009. Effect of Hunting Frequency on Waterfowl Harvest, Abundance, and Hunter Satisfaction in Mississippi. Southeastern Natural Resources Graduate Student Symposium, Mississippi State, Mississippi.

Poster Presentations

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H.

Havens. 2009. Effect of Hunting Frequency on Waterfowl Harvest, Abundance, and Hunter Satisfaction in Mississippi. 5th North American Duck Symposium Toronto, Ontario, Canada.

St. James, E. A., M. L. Schummer, R. M. Kaminski, E. J. Penny, K. D. Brunke, J. H. Havens. 2008. Effect of Hunting Frequency on Waterfowl Use and Hunt Quality at Mississippi Wildlife Management Areas. Mississippi Chapter of The Wildlife Society Annual Meeting, Jackson, Mississippi.

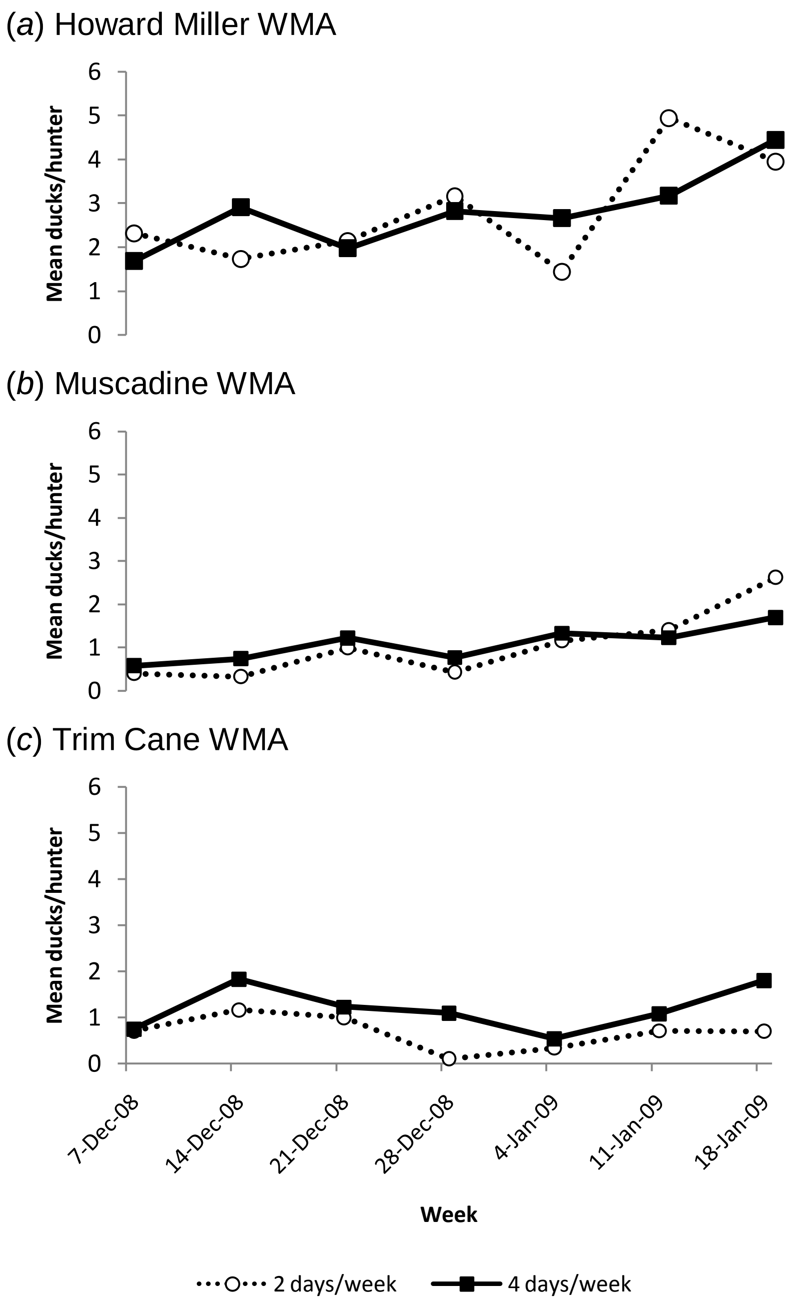


Figure 1. Mean duck harvest per hunter by hunt frequency (2 or 4 days/week) and hunt week[1] on Wildlife Management Areas (WMAs) in Mississippi during the December 2008 through January 2009 waterfowl hunting season.

[1]Hunt week is a period of Sunday to Saturday. Each hunt week is dated using the starting Sunday of the week.

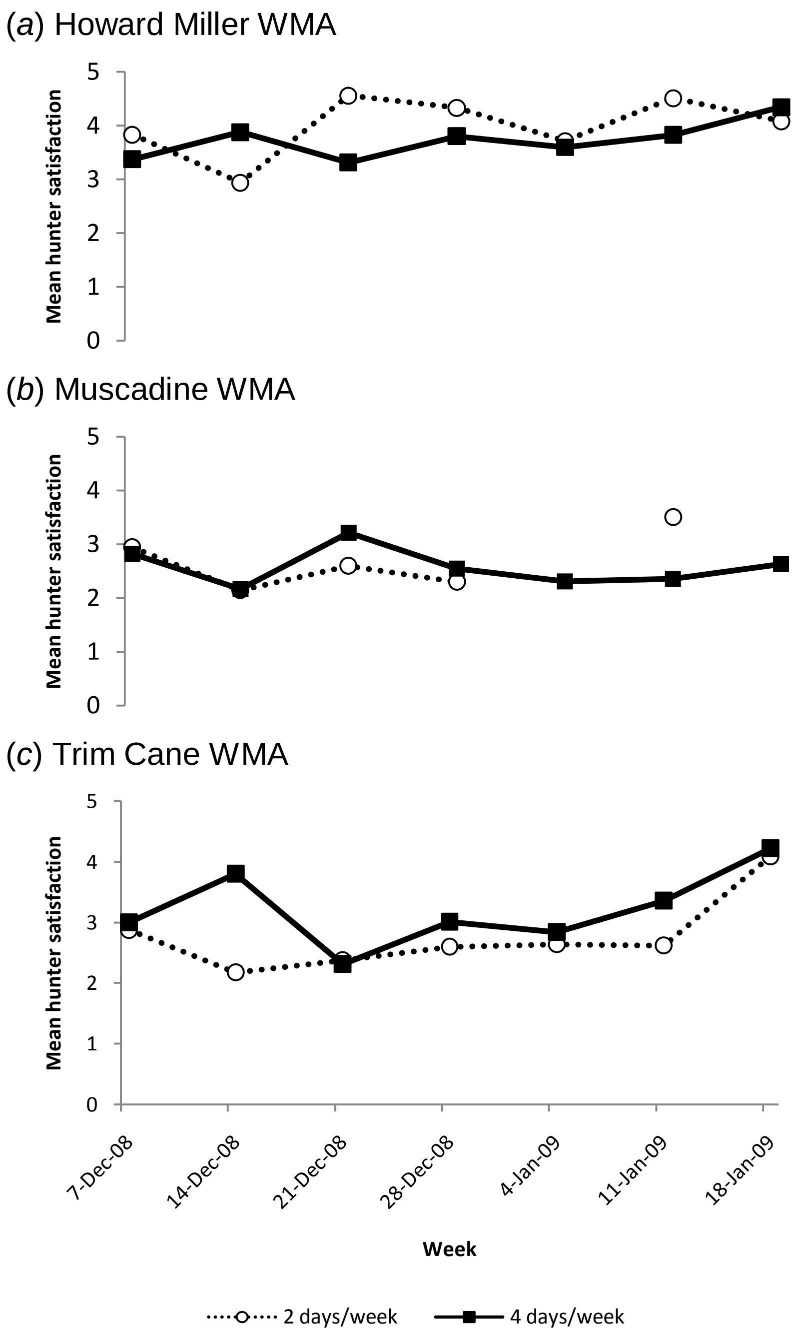


Figure 2. Mean satisfaction level of hunters by hunt frequency (2 or 4 days/week) and hunt week[1] on Wildlife Management Areas (WMAs) in Mississippi during the December 2008 through January 2009 waterfowl hunting season.

[1]Hunt week is a period of Sunday to Saturday. Each hunt week is dated using the starting Sunday of the week.

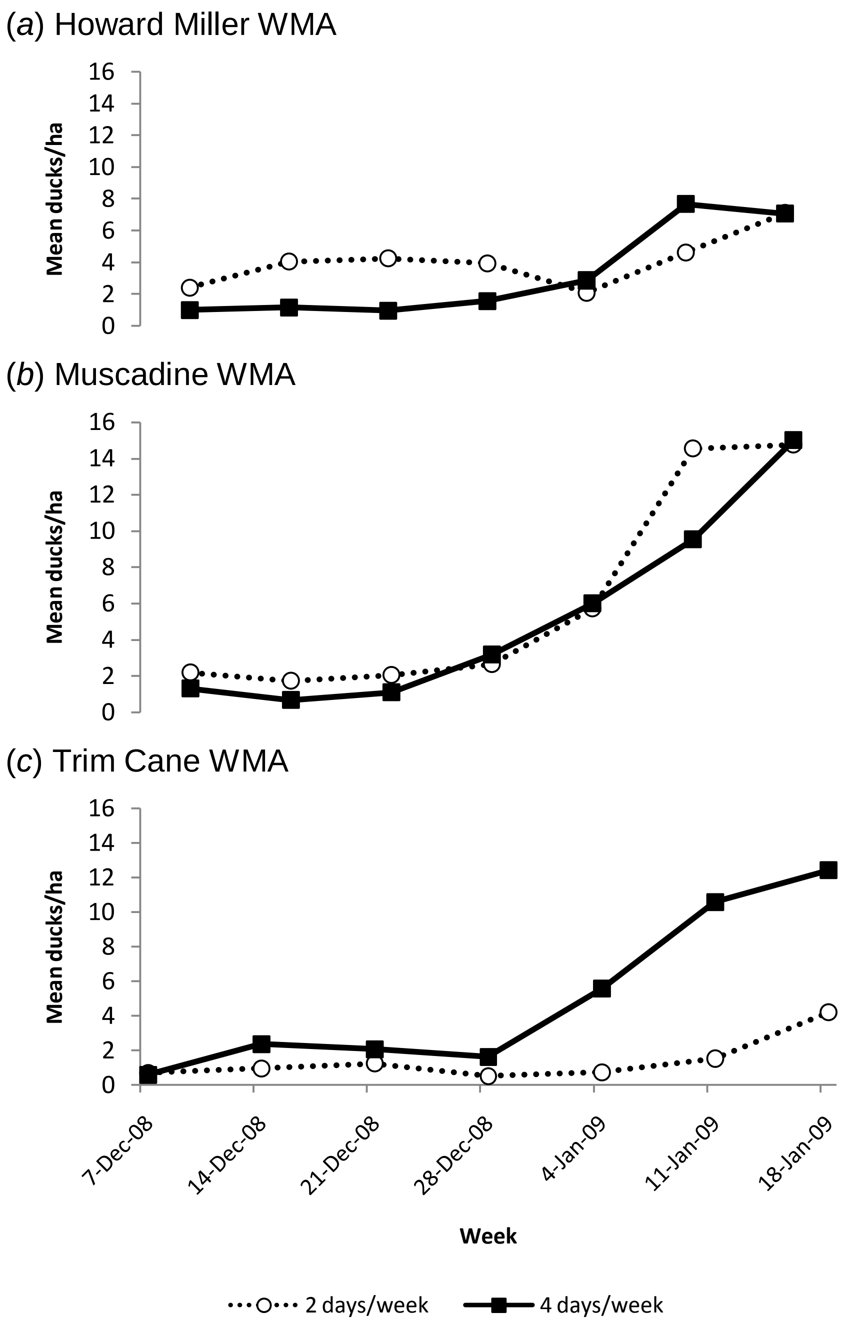


Figure 3. Mean abundance of ducks/ha by hunt frequency (2 or 4 days/week) and hunt week[1] on Wildlife Management Areas (WMAs) in Mississippi during the December 2008 through January 2009 waterfowl hunting season.

[1]Hunt week is a period of Sunday to Saturday. Each hunt week is dated using the starting Sunday of the week.

Table 1. Size and distribution of habitat types (%) by hunt frequency (2 or 4 days/week) at Wildlife Management Areas in Mississippi during the December 2008 through January 2009 waterfowl hunting season.

	Wildlife Management Area					
	Howard Miller		Muscadine		Trim Cane	
Hunt Frequency	2	4	2	4	2	4
Total Hectares	390.57	370.47	145.08	118.48	40.01	43.56
Aquatic Bed	0.00 %	0.00 %	3.45 %	3.39 %	10.00 %	9.09 %
Crop	61.89 %	91.64 %	22.07 %	15.25 %	12.50 %	9.09 %
Moist Soil	38.11 %	8.36 %	74.48 %	81.36 %	30.00 %	20.45 %
Forest/Scrub-Shrub	0.00 %	0.00 %	0.00 %	0.00 %	47.50 %	61.37 %
Total	100%	100%	100%	100%	100%	100%

Principal Investigators

Dr. Michael L. Schummer is a post-doctoral research and teaching associate in the Department of Wildlife & Fisheries since 2007. Mike grew up in Allegany, New York where he learned to hunt and fish in the Alleghany River Valley from his father, mother, grandfather, and local community. His teaching and research interests include waterfowl population dynamics, wetland ecology, avian behavior and global change biology. Mike has an A.A.S. in Pre-professional Forestry from Paul Smith's College in New York; B.S. in Forest Resources from State University of New York, College of Environmental Science and Forestry; a M.S. in Natural Resources, Southeast Missouri State University; and a Ph.D. in Zoology from the University of Western Ontario, Canada. Mike's research has primarily focused on factors influencing spring and autumn migration behavior in birds, influences of changing food resources on waterfowl body condition and diet during winter, and changes in waterfowl abundance within the Great Lakes basin. Mike's current research addresses waterfowl migration and weather events and the effect of weekly hunting frequency on waterfowl use and harvest on state wildlife management areas in Mississippi. Mike previously served on Atlantic Flyway Technical Section as Gamebird Biologist for the State of Maine. Current teaching duties include Wildlife Techniques, Waterfowl Ecology and Management, and Wetlands Ecology and Management. Mike also serves on the Satellite Telemetry Science Committee of the Mississippi Flyway and advises undergraduate and graduate students.

Dr. Richard M. Kaminski is a professor in the Department of Wildlife & Fisheries and associate dean in the College of Forest Resources. He joined the faculty of MSU in 1983 after working four years as a research biologist for Ducks Unlimited-Canada and graduating from Michigan State University (M.S. and Ph.D.; 1975 and 1979) and the University of Wisconsin-Stevens Point (B.S.; 1972). Rick has taught courses at MSU on waterfowl and wetlands ecology and management, wildlife techniques, wildlife management field practices, and professional communications. He and his students have published widely on waterfowl and wetlands ecology and management, which are his primary research interests. The Wildlife Society (TWS) recognized Rick as TWS Fellow in 2007, and Ducks Unlimited awarded him a life-time conservation achievement in 2006. He also was named by *Outdoor Life* magazine in 2008 to a group of 25 North Americans who have made significant contributions to hunting and conservation. In 1994, Rick was selected by the Mississippi Wildlife Federation as Wildlife Conservationist of the Year for his and Dr. Brian Gray's research and outreach on illegal waterfowl hunting in the Mississippi Flyway. In 1990s, Rick served as Associate Editor for *The Journal of Wildlife Management*, and he has been honored for his teaching, research, and service to MSU. Rick relaxes by managing wetlands for waterfowl and other wildlife, assisting with wetlands conservation and education, hunting waterfowl, and supporting MSU athletics especially SEC football and basketball. He and his wife, Loretta, live in Starkville, MS and have two children (Shannon and Matt) and a son-in-law, Neil.

Ed Penny assumed the role of MDWFP Waterfowl Program Coordinator in July 2008. Prior to joining MDWFP, he worked as a Project Biologist with the Ducks Unlimited Western Regional Office and then as a Wetland Biologist with the California Department of Fish and Game Comprehensive Wetland Habitat Program. His work included administering waterfowl habitat incentive programs on private lands in the Central Valley and assisting with delivery of habitat projects on wildlife management areas. He grew up in Columbus and Houston, Mississippi, and spent a lot of time hunting and fishing along Tibbee Creek in Clay

County. He graduated from Mississippi State in 2000 with Bachelor of Science degree in Wildlife Science, and received a Master of Science degree in Wildlife Science from Mississippi State in 2003. His master's research focused on evaluating moist-soil habitat on public lands throughout the Delta of Mississippi, Louisiana, Arkansas, and Missouri. Ed's wife, Mandy (from Port Gibson), and their two-year old son, Charlie, and four-month old son, Robert, live in Jackson, where he works out of the MDWFP Jackson Office.

Graduate Research Assistant

Elizabeth A. St. James graduated from Michigan State University in 2008 with a B.S. in Fisheries and Wildlife Management. While at Mississippi State University, Elizabeth will be studying the effects of hunting frequency on waterfowl use, harvest rate, and hunt quality on Mississippi's Wildlife Management Areas. After the completion of her Master's, Elizabeth hopes gain additional professional experience before pursuing a Ph.D., and later become a professor of human dimensions with a focus on waterfowl and wetlands ecology and management.

Analysis of Long Term Wild Turkey Data Sets and Development of a Statewide Gobbling Call Count Protocol

Project Number W-48-56
Study Number 58
July 1, 2008 - June 30, 2009

Job 58-1
Modeling long-term Wild Turkey population data.

Objective
Model population parameters from the long-term MDWFP Turkey Program data set.

A relational database of 1995-2008 data on brood surveys and number of jakes observed by turkey hunters was developed in Microsoft Access to facilitate data querying and analyses. Our primary objective for this Job was to use these data to determine whether hunter observations could predict gobbling intensity and frequency as related to nest success and recruitment of jakes throughout the state. The MDWFP has divided the state into five turkey management regions based on physiographic characteristics and optimization of logistical resources.

We used hunter observations to calculate the mean number of jakes seen per hour of hunting from 1995-2008 for each management region and statewide. We assumed that this sighting rate would index recruitment from the year-one age class to the year-two age class, when gobblers are typically the most vocal. We used the brood survey data to index nest success by calculating the total poults per total hens observed for each region and statewide from 1995-2008. Previous research in Mississippi had indicated a high correlation between nest success of radio-collared hens two years prior to the number of gobblers heard. We then regressed; 1) mean number of calls and gobblers heard per hour of hunting to the number of poults per hen two years prior, and, 2) mean number of jakes seen per hour of hunting the previous year at regional and statewide scales.

Our regional regression models explained from 4 to 48% of the variation in mean number of gobblers heard, and from 6 to 32% of the variation in the mean number of calls heard. Furthermore, our statewide models only explained 9 and 6% of the variation in mean number of gobblers heard and mean number of calls heard, respectively. Therefore, our analysis assessed the potential for determining gobbling activity from the current data sources MDWFP collects. However, our results suggests the large amount of variation observed in these data warrants caution as to its current use as an application by managers to forecast gobbling activity. We recommend further investigation into potential sources of the observed variation (i.e. observer, habitat, hunter effort, brood survey effort, weather conditions) may begin to better assess this variation and partition differences so that more accurate relationships may be determined.

Job 58-2
Spring gobbling survey for the Wild Turkey.

Objective
Develop and evaluate a standardized gobbling call count technique to assess temporal and regional variance in gobbling activity and relative abundance of wild turkeys.

During 2007 we conducted a pilot analysis using gobbling survey data from the states of Arkansas and Louisiana. The Arkansas Game and Fish Commission divided their state into a north and south region using Interstate 40 as the demarcation line. There were 7 survey routes in the northern region and 10 survey routes in the southern section. Routes were located on non-hunted, lightly-hunted and heavily hunted areas. They surveyed twice a week from March 1 until May 23 (12 weeks). Surveying began 30 minutes before sunrise and observers listened for 5 minutes at each of 10 stops spaced 1 mile apart. Using the data from this survey, we pooled the number of gobbles heard per day by region and used a one-way analysis of variance (ANOVA) to test for differences in the mean Julian date of gobbles heard per day by region. We found a significant difference of 1.5 days ($P < 0.05$) in the means between the two regions with an alpha level of 0.05. The Arkansas approach to survey for gobbling activity was very similar to our approach for spring gobbling surveys in Mississippi.

We developed a Geographic Information System for our gobbling surveys and placed survey routes north of Highway 82 and south of Highway 84 (Fig. 1). We then divided each section of the state into a grid consisting of 250 km^2 cells. In each section, grid cells were randomly chosen to contain survey routes. We placed survey routes in areas characterized by hardwood saw timber, pine saw timber, and pine regeneration throughout the year. Subsequently, we selected 8 routes in the northern section of the state and 7 in the southern section of the state.

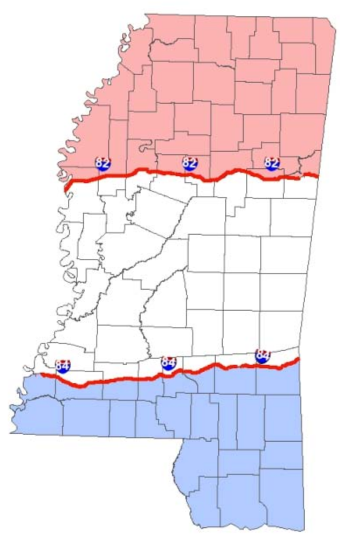


Figure 1. Map of the state of Mississippi indicating northern (red) and southern (blue) regions selected for placement of spring gobbling survey routes.

We conducted a statewide gobbling survey from February 15 to June 1 of 2008 and 2009, to determine if a gradient in gobbling activity existed from south to north across the state. In 2008, peak gobbling activity differed by approximately 10 days between the northern (April 17) and southern (April 7) regions of Mississippi (*P*<0.001). We replicated our design in 2009, keeping the same routes and survey effort as in the preceding year. The results of the 2009 gobbling season were significantly different from what was observed in 2008. The mean Julian date as a frequency of gobbles heard for the northern region of 2008 was 108.25 (April 18) while for 2009 (Fig. 2), this mean date was 99.72 (April 10). A graphical examination of gobbling peaks during both sample years provides a clear distinction in the distribution of total gobbles heard per week when comparing 2008 and 2009. The mean date for the southern region in 2008 was 97.53 (April 8), while for 2009 (Fig. 3) the mean date observed was 100.35 (April 10).

Northern Mississippi Total Gobbles

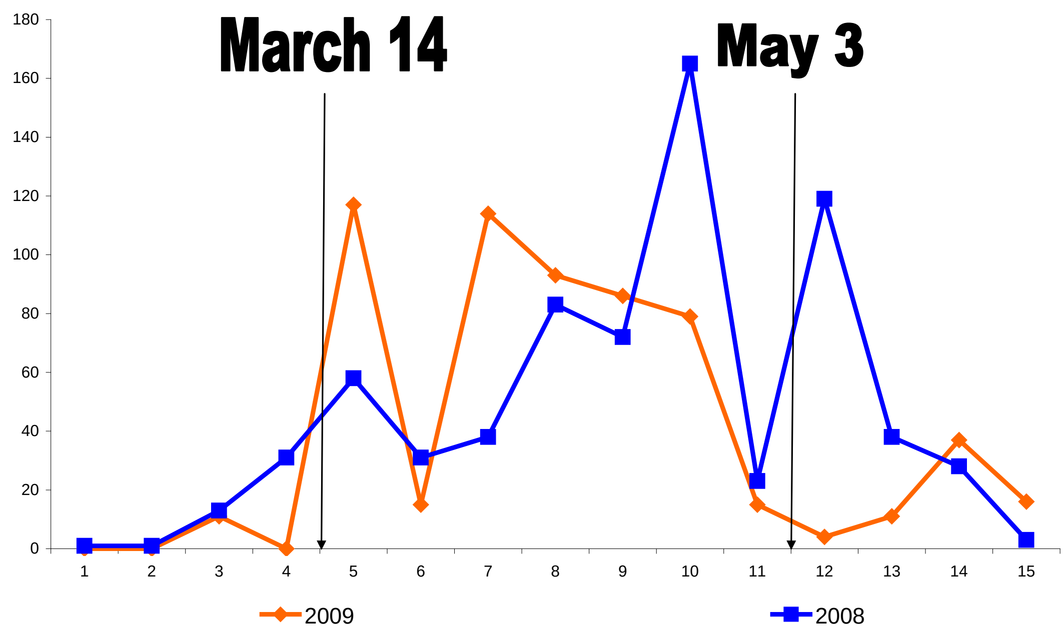


Figure 2. Total gobbles recorded in the northern Mississippi survey region during 2008 and 2009.

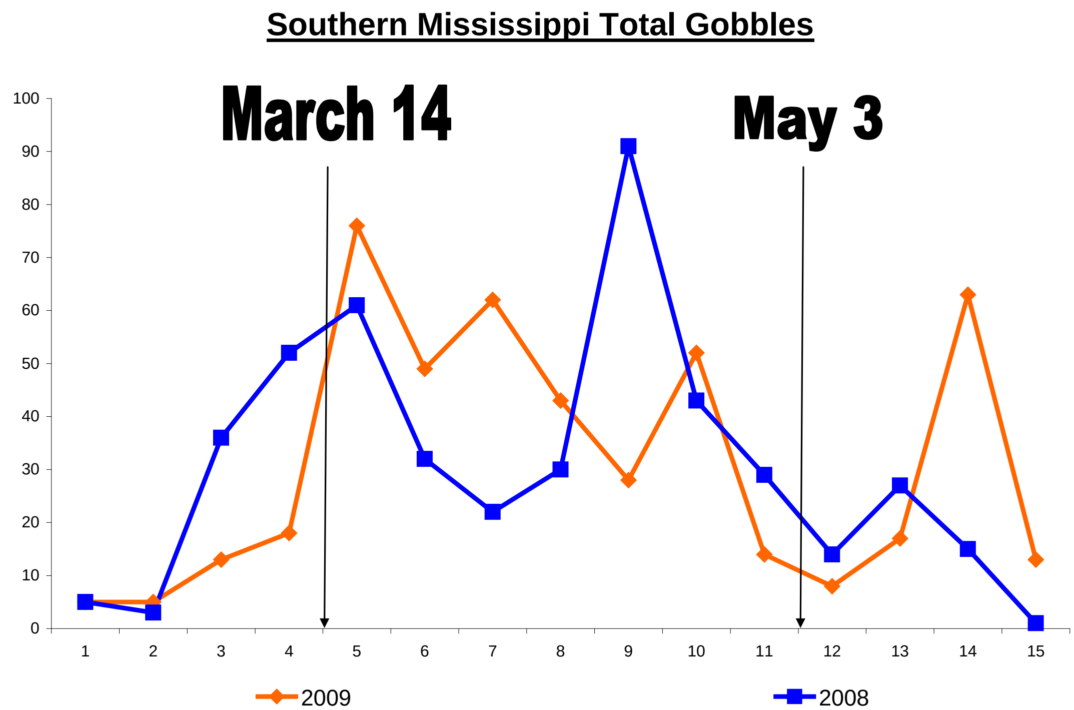


Figure 3. Total gobbles recorded in the southern Mississippi survey region during 2008 and 2009.

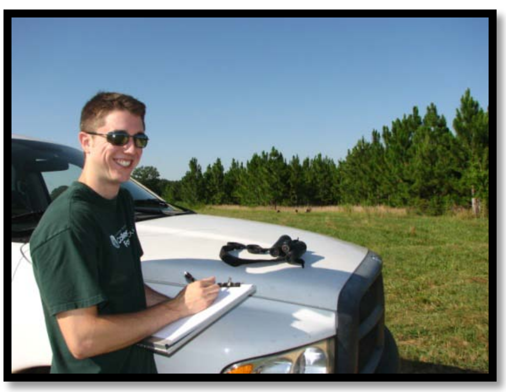
The distribution of gobbling activity from 2008 and 2009 for the southern region look relatively similar but with different intensities. We believe this is may have contributed to finding significant differences between years. The mean dates for the northern and southern regions for 2009 were not statistically different as compared to the significant difference of 10 days that was observed last year. The 2009 distributions of gobbling activity (north vs. south) was very similar but with differences in intensity. This is quite different from what we observed during 2008, which had noticeable differences in the distributions from north to south.

Presently, we continue to examine data for between-year variation. If no significantly different patterns are found, we will pool data for both years. We have gathered climate variables from weather stations located across survey regions of the state. Daily indexes have been created to examine the influence of specific weather variables on the intensity of gobbling activity. We will test gobbling survey data for any climate-related effects. We anticipate our results will provide the Mississippi Department of Wildlife, Fisheries, and Parks with a survey framework for long-term monitoring of gobbling activity across the state. This information will assist state biologists to construct a harvest season that will be both biologically appropriate and maximize hunters' opportunity to pursue wild turkeys when they are most vocal.

Principal Investigator

Dr. Francisco J. Vilella is a Unit Scientist and Adjunct Professor for the Mississippi Cooperative Fish and Wildlife Research Unit at Mississippi State University. He received a B.S. degree from the University of Puerto Rico in zoology, a M.S. degree from Hofstra University in biology, and a Ph.D. from Louisiana State University in wildlife and fisheries science. His areas of research include wildlife ecology, conservation biology, and neotropical wildlife ecology.

Graduate Research Assistant



Matthew D. Palumbo is originally from Lackawanna, NY, just outside of Buffalo. He received a B.S. degree in wildlife science in 2005 from the State University of New York, College of Environmental Science and Forestry. He started his M.S. degree work in January 2007 at MSU, researching influences and variation of gobbling activity of the Eastern Wild Turkey in Mississippi. His research interests are game management, community ecology, and wildlife disease issues.

Evaluation of MDWFP Wildlife Bureau's Information and Education Program

Project Number W-48-56
Study Number 62
July 1, 2008 – June 30, 2009

Job 62-1
Evaluation of MDWFP Bureau of Wildlife's Information & Education Program

Objectives

1) Finalize stakeholder sampling frames for data collection efforts, 2) develop survey instruments, and 3) implement Year 1 surveys of the MDWFP Wildlife Bureau's Information & Education Program Evaluation Survey.

This project continues to operate under a no cost extension and will continue under no-cost extension through 2009-10 fiscal year. Sampling frames were finalized for the below stakeholder groups. Licensed hunters were sampled by mail survey in Fall 2008, the Mississippi general resident population was sampled in March 2009 via a telephone survey, and all other stakeholder groups are currently being sampled by mail survey in summer 2009 with final mailings scheduled for early August 2009.

Survey 1: The General Population I&E Survey was conducted in March 2009 by Responsive Management. Interviews were conducted Monday through Friday from 9:00 a.m. to 9:00 p.m., Saturday noon to 5:00 p.m., and Sunday from 5:00 p.m. to 9:00 p.m., local time. A five-callback design was used to maintain the representativeness of the sample, to avoid bias toward people easy to reach by telephone, and to provide an equal opportunity for all to participate. When a respondent could not be reached on the first call, subsequent calls were placed on different days of the week and at different times of the day. The survey was conducted in March 2009. Responsive Management obtained a total of 1,205 completed interviews. The general public's rankings of seven I&E issues can be found in Table 1. Table 2 shows the percentage of the general public familiar with the MDWFP that believe certain activities are conducted by the Wildlife Bureau.

Survey 2: The Hunter Information and Education Survey was sent to 10,000 licensed resident hunters (5,000 that purchased a license during the 2006-07 season, and 5,000 that did so in the 2007-08 season). Mail survey methodology for the surveys was based on the Total Design Method developed by Dillman (1978). Of the 10,000 individuals sampled for the I&E survey, 3,370 returned useable surveys, 1,204 individuals were either non-eligible (they were deceased, they refused the survey, or the questionnaire was not filled out to whom it was addressed) or non-reachable. The overall effective response rate was 38.3%. Every 20th returned survey entered was double-checked to investigate potential problems with data entry personnel and/or question format. Once data were screened for errors the database was exported to the Statistical Analysis Software (SAS). Hunter's rankings of seven I&E issues can be found in Table 1.

Table 2 shows the percentage of hunters that believe certain activities are conducted by the Wildlife Bureau.

Stakeholder Groups:
1. General population of Mississippi residents
2. Licensed Mississippi resident and non-resident hunters
3. Mississippi legislators
4. Wildlife-related NGOs
5. Other state agencies
6. Federal agencies in Mississippi
7. Wildlife-based management organizations
8. Forestry-based management organizations
9. Wildlife outfitters
10. Mississippi landowners.

Table 1. Rankings of 7 wildlife-related issues by hunters and the general public pertaining to how they feel they should be prioritized for an Information and Education campaign by the MDWFP Wildlife Bureau. Ranks for the general public were based on average scores on a 10-point importance scale (i.e. 1 = 'not at all important'; 10 = 'extremely important') were reported for the general public. Ranks for hunters were based on median scores between 1 and 7 (i.e. 1 = most important; 7 = 'least important') reported for hunters.

	Rankings	
Information & Education Issues	**General Public (n = 1,205)**	**Hunters (n = 4,353)**
Educating hunters on wildlife and management issues	1	3
Habitat protection and restoration	2	2
Wildlife diseases	3	4
The future of hunting in Mississippi	4	1
Providing technical and public guidance	5	6
An improved tagging and reporting system	6	7
Wildlife baiting	7	5

Table 2. Percentages (%) of the general public and hunters who believed each of 15 activities and services were under the direct authority of the MDWFP Wildlife Bureau.

Activity or Service	**General Public* (n = 239)**	**Hunters (n = 4,353)**
Stocking Mississippi waters with fish	92	65
Enforcing fisheries and wildlife laws	90	86
Developing recommendations for statewide hunting regulations	89	77
Managing Mississippi Wildlife Management Areas (WMA)	87	82
Protecting rare, threatened, and endangered species	84	69
Educating the public about wildlife issues	83	80
Providing wildlife management assistance to hunters and landowners	81	80
Managing state park lands	79	57
Controlling nuisance wildlife	76	59
Assisting with natural disaster clean-up	52	22
Implementing prescribed burns	44	23
Controlling forest fires	43	16
Removing dead animal carcasses from the road	34	13
Monitoring air and water quality	30	15
Leasing mineral resources	12	6

* Only members of the general public that could correctly identify MDWFP by name, or a close derivative of the name, were asked this question.

Principal Investigator

Dr. Kevin M. Hunt entered the wildlife and fisheries field with an appreciation of the outdoors and fisheries management. Kevin entered Virginia Tech to seek a degree in Fisheries Science. After working on a James River creel and angler survey, Kevin proceeded to Texas A&M University to obtain a masters degree specializing in the human dimensions of natural resources. As a graduate assistant he coordinated with the Texas Parks & Wildlife for survey research endeavors with agency clientele. Afterwards, Kevin traveled to Florida and became project leader for the Jacksonville Urban Pond Project; the project received numerous awards during his short time as project leader including the Wallop-Breaux Project of the Year Award from the American Fisheries Society Administrator's Section signifying it as the best federally funded project in the nation. Kevin returned to Texas A&M University in 1994 to pursue his doctorate, again specializing in human dimensions. With his experience in urban areas, his research involved the changing clientele of wildlife and fisheries agencies, and his dissertation looked at racial and ethnic differences in participation levels, motivations, and attitudes toward natural resources. Kevin is currently Associate Professor and Director of the Human Dimensions and Conservation Law Enforcement Laboratory in the Forest and Wildlife Research Center at Mississippi State University. He has been conducting social and economic research with the MDWFP Wildlife, Fisheries, and Law Enforcement Bureaus since 2001, notably the Annual Hunter Survey that includes both hunters and wildlife law violators, and a social and economic assessment of Mississippi flood control reservoirs.

Graduate Research Assistant

Vanessa Oquendo was born in Fort Walton Beach, FL. As a young girl, she lived in Honduras for 2 years and went through elementary school in Caracas, Venezuela. She moved back to Fort Walton Beach, FL in 1996 where she completed middle school and high school. Vanessa attended the University of Florida and graduated in May 2007 with a Bachelor of Science in Wildlife Ecology and Conservation. Vanessa is now pursuing a Master of Science in Wildlife and Fisheries Science with emphasis in Human Dimensions at Mississippi State University and works in the Human Dimensions & Conservation Law Enforcement Laboratory conducting survey research on hunters. Her thesis involves studying women's motivations to hunt in Mississippi and the extent to which hunting can be substituted for other outdoor activities.

Environmental and Genetic Effects on Antler Production in Mississippi

Project Number W-48-56
Study Number 65
July 1, 2008 – June 30, 2009

Job 65-1
Growth of first generation male fawns raised on optimum nutrition

Objective
To compare among the 3 regions the body and antler growth of first generation male fawns (produced by wild-caught dams) raised on optimum nutrition through 3 years of age.

Production of first generation fawns ended in the 2007 fawning season, generating no new data for first generation male deer at birth and 5 ½ months of age. Data collected from 1 ½, 2 ½, and 3 ½ year-old first generation males in 2008-09 included body mass, total body length, hind foot length, antler score, and antler mass.

Data from 1 ½ year-old males includes fawns born in 2005-07 to wild dams (Table 1). Body mass of delta yearlings (117 lbs) exceeded thin loess (loess) by 14.2 lbs and lower coastal plain (LCP) by 22.5 lbs. Mean total body length of 1 ½ year-old males also varied among regions, with delta being 79.9 mm and 105.3 mm longer than loess and LCP, respectively. Mean hind foot length also varied among regions, with delta being 21.9 mm and 31 mm longer than loess and LCP, respectively.

Data from 2 ½ year-old males includes fawns born in 2005-06 to wild dams (Table 1). Additional samples will be collected during 2009. Body mass varied among regions, with delta averaging 167.6 lbs, which was 20 lbs and 27.5 lbs heavier than loess and LCP, respectively. Total body length of 2 ½ year-old males varied among regions, with delta being 111.8 mm and 122.1 mm longer than loess and LCP, respectively. Hind foot length varied among all regions. Delta was 19.5 mm and 32.1 mm longer than loess and LCP, and loess was 12.6mm longer than LCP.

Males born in 2005 from wild dams were processed at 3 ½ years of age during 2008 (Table 1). Additional samples will be collected during 2009 and 2010. Body mass of 3 ½ year-old males varied among region, with delta averaging 193.9 lbs, which was 21.6 lbs and 44.7 lbs heavier than loess and LCP, respectively. Loess body mass was 23.1 lbs heavier than LCP. Total body length of 3 ½ year-old males varied among regions with delta being 71.9 mm and 120.6 mm longer than loess and LCP, respectively. Hind foot length varied among regions, with delta being 24.9mm and 34.1mm longer than loess and LCP, respectively (Table 1).

Antler growth of 1 ½, 2 ½, and 3 ½ year-old bucks were measured according to the Boone and Crockett scoring system, except we did not add additional circumference credits for deer which did not have 4 circumferences to measure. Yearling antler score did not vary among regions (Table 1). Antler score for 2 ½ year olds varied among regions, with delta averaging 87.1 inches, which was 13.2 inches larger than LCP. Antler scores for 3 ½ year-old males varied among regions, with LCP averaging 92.1 inches, which was 16.9 inches and 17.5 inches smaller than delta and loess, respectively. Similar antler size of loess and delta males at 3 ½ years of age indicates that loess males exhibited the compensatory growth that allowed them to “catch up” with the delta males.

Antlers were cut off every deer at 2 inches above the base. The cut antlers were weighed in grams (g) as an additional measure of antler production. Yearling antler mass did not differ among regions (P>0.05, Table 1). Antler mass for 2 ½ year-olds varied by region, with delta being 85.9g and 153.9g heavier than loess and LCP, respectively. Antler mass for 3 ½ year-olds varied by region, with LCP being 259.4g and 222.5g smaller than delta and loess, respectively. Similar antler mass of loess and delta males at 3 ½ years of age indicates that loess males exhibited the compensatory growth that allowed them to “catch up” with the delta males.

The cooperator pen status and populations of first generation research deer as of 30 June 2009 are listed in Table 2.

Table 1. Body and antler measurements of first-generation male deer born 2005-07 to wild dams by soil region of origin at 1 ½ years, 2 ½ years, and 3 ½ years of age.

Variable	Delta		Loess		LCP	
	$\bar{X}$ *	SE	$\bar{X}$ *	SE	$\bar{X}$ *	SE
1.5 years						
Mass (lbs)	117.1 A	1.3	102.9 B	1.5	94.6 B	1.4
Total Body Length (mm)	1630.5 A	15.1	1550.6 B	16.9	1525.2 B	15.1
Hind Foot Length (mm)	438.2 A	2.9	416.3 B	3.2	407.2 C	2.9
Antler Score (in)	28.0 A	2.9	27.8 A	3.3	24.8 A	2.9
Antler Mass (g)	78.1 A	24.8	79.6 A	27.8	72.7 A	26.8
2.5 years						
Mass (lbs)	167.6 A	1.5	147.6 B	1.7	140.1 B	2.4
Total Body Length (mm)	1832.3 A	17.2	1720.5 B	18.4	1710.2 B	25.7
Hind Foot Length (mm)	453.8 A	3.3	434.3 B	3.5	421.7 C	4.9
Antler Score (in)	87.1 A	3.3	79.8 AB	3.6	73.2 B	5.0
Antler Mass (g)	503.1 A	29.2	417.2 B	31.0	349.2 B	46.8
3.5 years						
Mass (lbs)	193.9 A	1.8	172.3 B	1.9	149.2C	3.0
Total Body Length (mm)	1872.3 A	20.2	1800.4 B	21.0	1751.7 B	32.2
Hind Foot Length (mm)	454.6 A	3.8	429.7 B	4.0	420.5 B	6.2
Antler Score (in)	109.0 A	4.0	109.6 A	4.2	92.1 B	6.4
Antler Mass (g)	829.6 A	34.9	792.7 A	36.3	570.2 B	56.9

*Means with different letters within a row are significantly different (P<0.05).

Table 2. Population status and location of first generation research deer at Mississippi State University and cooperator deer facilities [a] as of 30 June 2009.

	2005		2006		2007	
	Bucks	Does	Bucks	Does	Bucks	Does
Delta						
Deviney	0	0	2	0	3	0
Oswalt	1	0	2	0	2	0
Yates	7	0	0	0	3	0
MSU	0	4	0	3	0	3
RSP	7	0	0	0	0	0
Loess						
Deviney	0	0	1	0	1	0
Oswalt	0	0	2	0	1	0
Yates	6	0	2	0	2	0
MSU	0	13	0	3	0	1
RSP	5	0	0	0	0	0
LCP						
Deviney	0	0	0	0	9	0
Oswalt	1	0	1	0	8	0
Yates	4	0	0	0	6	0
MSU	0	9	0	3	0	8
RSP	0	0	0	0	0	0
Total	31	26	10	9	35	12

[a] RSP = Roosevelt State Park

Job 65-2
Growth of second generation male fawns raised on optimum nutrition

Objective
To compare among the 3 regions the body and antler growth of second generation male fawns (produced by first generation dams) raised on optimum nutrition through 3 years of age.

First generation deer produced in 2005-06 fawned a second generation at Mississippi State University Rusty Dawkins Memorial Deer Unit (MSU Deer Unit) in the summer of 2008. Thirty-nine first generation adult females were bred with bucks from the same physiographic region of origin. This allowed 8 delta, 19 thin loess (loess), and 12 lower coastal plain (LCP) does to produce fawns.

We processed 7 delta, 19 loess, and 8 LCP second generation male fawns at birth. Mean birth mass, total body length, and hind foot length did not differ among soil regions (P>0.05; Table 3). Mean birth date for the second generation delta males was 3

July with a range of 9 June to 25 July. Mean birth date for the second generation loess males was 22 July with a range of 20 June to 16 August. Mean birth date for the second generation LCP males was 28 July a range of 30 June to 7 September.

Fawns were processed and removed from their dam at approximately 5 ½ months from the mean fawning date for their respective regions. The fawns were processed on 18 December, 6 and14 January, and 21 January for delta, loess, and lower coastal plain, respectively. Data presented in this analysis includes male fawns born in 2007-08 to first generation does. Mean body mass for 5 ½ month-olds varied among regions, with delta averaging 80.3lbs, which was 19.8 lbs and 20.6 lbs heavier than loess and LCP, respectively (Table 3). Total body length of 5 ½ month-old males varied by region, with delta being 67mm and 65.8mm longer than loess and LCP, respectively. Mean hind foot length of 5 ½ month-old male fawns did not differ among regions ($P>0.05$; Table 3).

Male fawns born in 2007 were processed at 1 ½ years of age during October-November, 2008. The data presented in this portion of the analysis includes data from 1 ½ year-old male deer born to first generation dams in 2007 (Table 3). This sample included 4 delta, 9 loess, and 3 LCP second generation males. Current limited sample size precludes valid statistical inference. Sample sizes will increase and improve statistical validity in future years.

The cooperator pen status and populations of second generation research deer as of 30 June 2009 are listed in Table 4.

Table 3. Body and antler measurements of second generation male deer by soil region of origin, born in 2007-08 at birth, 5 ½ months, and 1 ½ years of age.

Variable	Delta		Loess		LCP	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Fawn (birth)						
Mass (lbs)	6.8	2.8	5.8	1.8	5.5	2.7
Total Body Length (mm)	656.4	19.4	626.8	12.5	638.5	18.7
Hind Foot Length (mm)	236.6	10.0	223.1	6.4	222.0	9.6
5.5 month						
Mass (lbs)	80.3	3.0	60.5	1.9	59.7	2.9
Total Body Length (mm)	1424.9	20.3	1357.9	12.9	1359.1	20.2
Hind Foot Length (mm)	391.9	10.4	362.7	6.6	339.0	10.4
1.5 years						
Mass (lbs)	122.4	4.7	108.4	3.1	111.5	5.4
Total Body Length (mm)	1678.6	33.2	1590.9	22.1	1599.0	38.3
Hind Foot Length (mm)	423.2	17.1	414.5	11.4	413.7	19.7
Antler Score (in)	34.1	10.8	38.3	7.2	30.9	12.5
Antler Mass (g)	168.7	57.4	127.4	33.2	90.3	57.4

Table 4. Population status and location of second generation research deer at Mississippi State University and cooperator deer pens [a] as of 30 June 2009.

	2007		2008	
	Bucks	Does	Bucks	Does
Delta				
Deviney	2	0	0	0
Oswalt	1	0	4	0
Yates	1	0	3	0
MSU	0	4	0	5
Loess				
Deviney	3	0	0	0
Oswalt	3	0	9	0
Yates	3	0	7	0
MSU	0	9	0	0
LCP				
Deviney	0	0	0	0
Oswalt	2	0	3	0
Yates	0	0	3	0
MSU	0	3	0	5
Total	15	16	29	10

[a] RSP = Roosevelt State Park

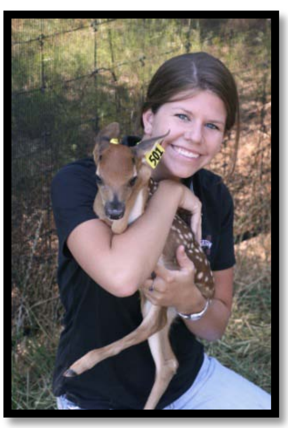
Principal Investigators

Dr. Steve Demarais is a professor in the Department of Wildlife and Fisheries at Mississippi State University. He received his academic training at the University of Massachusetts and Mississippi State University. His research specialty is deer ecology and management, with a focus on the manipulation of deer populations and their habitat.

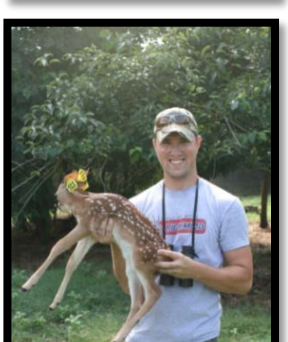
Dr. Bronson Strickland received a bachelor's degree in Forest Resources from the University of Georgia and completed a master's degree from Texas A&M University-Kingsville. In 2005, Bronson earned a doctoral degree from Mississippi State University and then worked as a research wildlife biologist with the National Wildlife Research Center. In 2006, Bronson became the Extension Wildlife Specialist at Mississippi State University. Bronson has served MS TWS previously as an Executive Board Member and chair of the Presentation Selection Committee.

Chad M. Dacus is the White-tailed Deer Program Coordinator for the Mississippi Department of Wildlife, Fisheries, and Parks. He received a B.S. degree in wildlife and fisheries science from MSU in 2000, focusing on law enforcement, forestry, and wildlife science. In 2002, Chad earned a M.S. degree in wildlife and fisheries science from MSU. Currently, Chad and his wife, Lynn, live in Jackson.

Graduate Research Assistants



Emily Clemons is working on his M.S. in Wildlife Science. After growing up near Louisville, Kentucky, she graduated from Eastern Kentucky University with a B.S. in wildlife management in 2007. She enjoys hunting, hiking, photography, and spending time outdoors.



Jeremy Flinn is working on his M.S. in Wildlife Science. After growing up in Manor, Pennsylvania (about 40 minutes SE of Pittsburgh), Jeremy obtained his B.S. from Penn State University in Wildlife and Fisheries Science (Wildlife Option). He enjoys hunting, especially for white-tailed deer and wild turkey, and fishing.