2009 ANNUAL BIOLOGICAL NARRATIVE

MISSISSIPPI SANDHILL CRANE NATIONAL WILDLIFE REFUGE

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7200 Crane Lane
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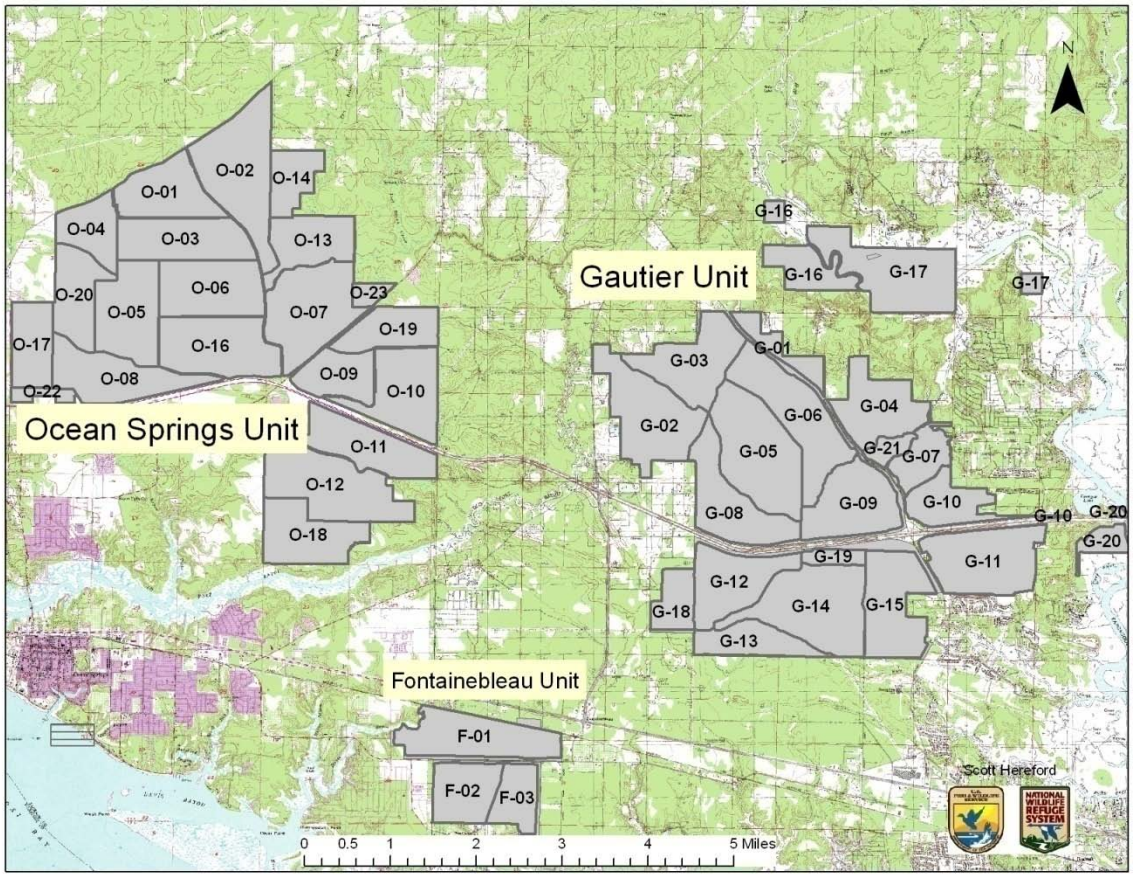
Beasley Pond chick

The Mississippi Sandhill Crane National Wildlife Refuge is one of over 540 refuges in the National Wildlife Refuge System, the largest system of public lands in the world set aside primarily for wildlife, fish and their habitats. It consists of 19,300 acres in three units (Figure 1) and 45 major management compartments in Jackson County in the extreme southeast corner of Mississippi. This refuge was established in 1975, the first under the authority of the recently enacted Endangered Species Act to provide protection and management for the endangered Mississippi sandhill crane, protect and conserve unique savanna habitat, and provide opportunities for environmental education and interpretation and wildlife-dependent recreation.

This report is a narrative of the activities of the refuge biological program during calendar year 2009 and is structured to follow the format of the traditional refuge Annual Narrative. It includes actions by the refuge Fire Management program that fits under the headings of habitat restoration and management.

Figure 1. Mississippi Sandhill Crane National Wildlife Refuge Units



2009 Highlights:

- 31 crane nests; one fledged.
- 1034 acres savanna restored by mechanical treatment, including 460 with hand tools.
- 4385 acres treated with prescribed burning.
- UNO grad students completed research on nest predators, genetic management.
- 1st area searches for winter grassland birds.
- Bat netting, surveys
- Year-end population of 105 cranes.

Weather

The year started out drier than average until plentiful rains in March (Table 1). Late spring and summer turned dry again. In June, there were 25 consecutive days without rain (refuge record), relative humidity significantly was lower than average, and daily maximum temperature was above average after June 9 and record-breaking temperatures after June 17. Until the 1.5" on the 29th, the drought index was in the 90th percentile. Following that came one of the wettest autumns and early winters on record, precluding any habitat work requiring heavy machinery for several months.

Table 1. Monthly weather data for MS Sandhill Crane NWR. (Courtesy of Jeffrey Twiss)

MONTH	AVG HIGH TEMP	DEPARTURE FROM AVG	AVG LOW TEMP	DEPARTURE FROM AVG	PRECIP INCHES	DEPARTURE FROM AVG	AVG KBDI	DEPARTURE FROM AVG
January	67	2	43	1	2.22	-3.32	340	170
February	67	0	44	0	5.07	-0.56	266	123
March	73	0	53	3	13.10	7.07	147	16
April	77	-1	56	0	0.98	-4.05	196	60
May	84	-1	68	4	6.18	1.45	363	-14
June	92	-2	72	2	1.92	-4.91	497	120
July	92	0	72	-1	5.88	-1.94	504	157
August	90	-2	72	0	9.34	1.42	359	-32
September	88	-1	71	2	8.74	2.16	179	-196
October	81	-1	62	3	6.80	3.03	238	-150
November	71	-3	47	-2	3.10	-1.82	249	-94
December	63	-3	44	1	15.31	10.05	27	-192
TOTAL					**78.64**	**8.58**		

1. Monitoring and Studies

1A. SURVEYS AND CENSUS

CRANE SURVEYS

The Year-round Monitoring Survey (including all location monitoring) including visual and radio-telemetric observations were conducted on 246 days. There were 1999 crane observation records (Figure 2) including 771 radio-tracking fixes, 1064 visual only, 88 aural only and 75 camera observations. There was an average of 3.2 cranes per observation; and 2.8 when observations with greater sandhill cranes were excluded. Of the 1999 observations, 1367 (68%) were on the refuge. The total includes 73 observations on 39 days at 39 locations that were considered roost observations.

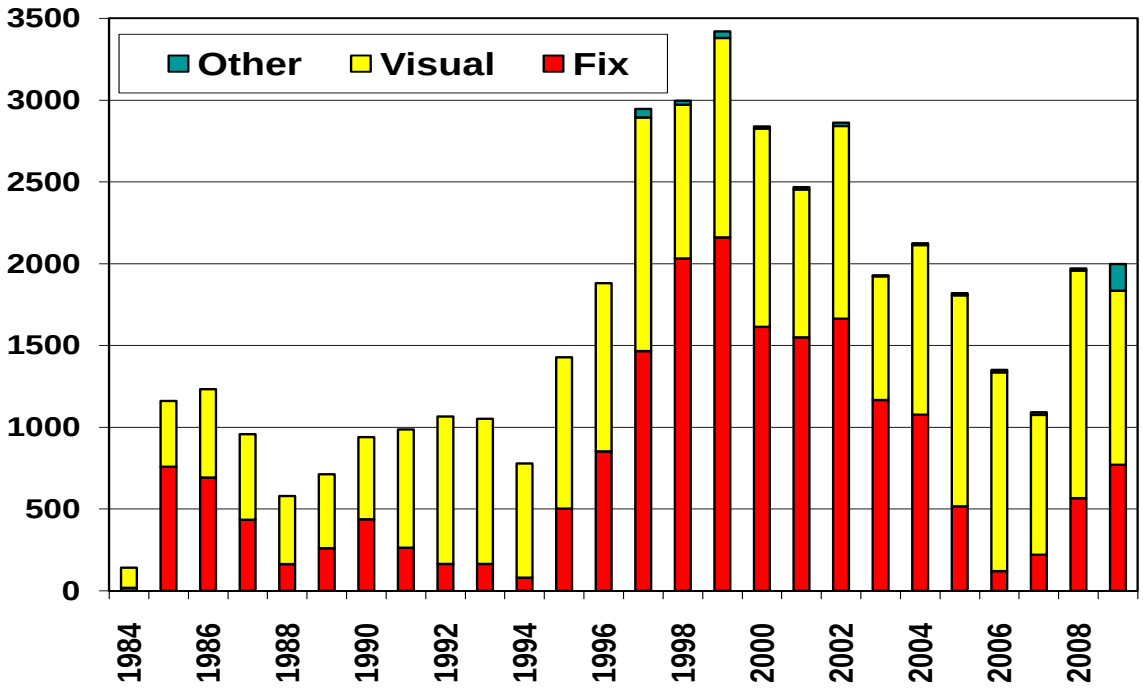


Figure 2. Crane observation records/year

Cranes were observed at several hundred locations (see Figure 3). Using minimum convex polygon analysis, the range used by the crane population in 2009 was over 77,615 acres in south Jackson County. Nearly all the use was west of the Pascagoula except for the pair east of the river, with little movement across. The range west of the Pascagoula was 57,817 acres and east was 297 acres for an adjusted total range of 58,814 acres.

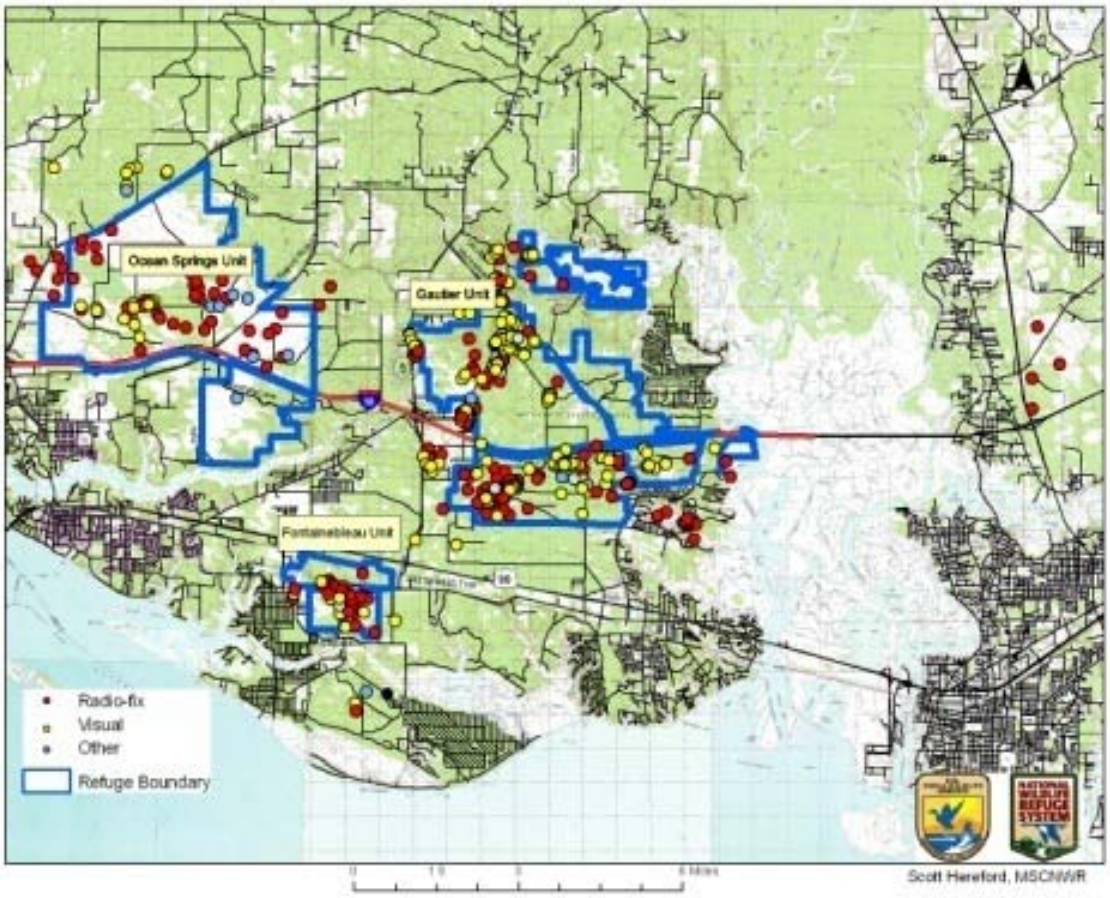


Figure 3. 2009 Crane locations by observation type

Live/dead crane monitoring, using an omni-directional antenna to indicate whether a crane was alive or dead (with no information on direction, only general area), was conducted once or twice weekly year-round. There were 606 records on 140 days. This survey does not collect records for areas surveyed when cranes were not observed.

Intern Stephanie Galla listening for radio signals at Fontainebleau.

Cranes continued to prefer some habitats over others relative to their availability in the area. Of all observations, 43% were in agricultural/yard, 38% in savanna, 5% in marsh and in swamp, 4% in woodland/scrub, 3% in pond, and 2% in road/fireline. On the refuge, where a GIS contractor used December 2003 aerial imagery to classified habitats into seven coarse categories, based on radio-fix locations, cranes used agricultural habitat over 10 times its availability, and woodland/scrub less than 12% of its availability. (Table 2)

Table 2. Crane habitat use (radio-fix) and availability on the refuge

Habitat	% crane locations	% of total habitat	Use/* Availability
Savanna	54	57.8	0.93
Agriculture/Yard	28	2.7	10.4
Swamp	7	2	3.5
Marsh	4	2.3	1.8
Woodland/Scrub	4	31.8	0.12
Road/Fireline/Sand	3	0.7	4.3
Pond	2	2.6	0.77

*1.0= use equal to availability


Crane nest in hydric drain edge

Crane Nesting

Dozens of observations (both visual and telemetric) away from the nest were used to assess nesting status of several crane pairs. The Crane Nest Census survey was conducted on 51 days between March 19 and July 1, a 104-day span. Approximately 80 different areas were visited, including 70 on the refuge**.** There were 146 total ground nest searches and revisits in 50 different areas totaling 275 staff/hours. There were eight helicopter flights totaling 11 hours searching 56 different areas and 74 total area visits**.** There were 27 areas visited and by helicopter and on ground.

Twenty-three pairs laid a record total of 31 nests; there were eight renests (Table 3). There were 15 nests on the Gautier Unit, nine on the Ocean Springs Unit, none on the Fontainebleau Unit, and seven off-refuge. Three nests were first discovered after failure. Another three nests were not found, but nesting was assumed from adult behavioral evidence. Fifteen nests were in small ponds, four in savanna, six in hydric drains, two in brackish marsh, one in pine flatwoods, and three in unknown habitat. Of the 25 nests

where eggs were observed, there were 45 eggs laid for an average clutch size of 1.8 eggs. At least nine eggs hatched from six nests, (20% hatchability). Only one chick survived to fledge (17%). No chicks were fitted with radios in 2009 to evaluate causes of mortality. There were no new Composite Nesting Areas used. There were three new breeding birds (953, 163, and both members of new West Cottonmouth pair, 158 and unbanded mate) and an additional three new pairings (W-19 & 146, W-16 & 954, 057 & W-41).

Table 3. 2009 Crane Nesting

#	TERRITORY	OV	MID	FID	#E	#H	#FL	COMMENTS
1	Vickers*	31	W-02	*953*	2	0	0	flooded
2	North Valentine	23	169	UB	2	0	0	flooded
3	Linda Lee South	31	963	715	2	2	1	
4	Haygood	32	W-39	UB	2	0	0	flooded
5	MDOT Pond	31	436	W-09	1	1	0	
6	Duck Pond	31	W-37	W-35	2	0	0	1 flooded, 1 abandoned
7	16th Section	32	W-25	W-07	2	2	0	
8	Firetower	33	232	956		0	0	found failed
9	South Valentine	32	255	937	2	0	0	abandoned
10	Ben Williams 6C	33	303	024	2	1	0	predation
11	Jordan Pond	41	?	?	2	0	0	abandoned
12	Ben Williams 6A	33	139	W-30	1	0	0	predation
13	Firetower	33	434	136	2	0	0	predation
14	Beasley Pond	33	952	331	2	2	0	
15	West Utah*	43	W-19	146	2	0	0	coyote predation
16	Haygood	42	W-39	UB	2	?		
17	Bobcat Pond	43	255	337	1	0	0	coon predation
18	White Kangaroo	43	435	534	2	0	0	coon predation, 1 nv
19	Perigal 8C*	43	163	707	2	0	0	
20	East Wet Cell	33	148	W-22	1	0	0	predation
21	West Cottonmouth		961	W-28	2	0	0	predation
22	Vickers	43	W-02	953	?	0	0	found failed
23	West Coke*	51	W-16	*954*	2	0	0	
24	Duck Pond	51	W-37	W-35	2	1	0	1 nv
25	?		W-23	920	?	?	0	
26	North Valentine		169	UB	?	?	0	found failed
27	North Valentine	52	169	*UB*	2	0	0	abandoned
28	?		W-23	920	?	?	0	
29	W Cottonmouth*	53	*UB*	*158*	1	0	0	avian predation
30	Jordan*	62	057	W-41	2	0	0	
31	?	61	155	258			0	

Italicized: new territory, breeding adult. *=new pairing
Ov= oviposition date: 31=March 1-10, 32=Mar 11-20, 32=Mar 21-31, etc
MID= male ID, FID=female ID, #E=#eggs, #H=#hatched, #fl=#fledged, nv=non-viable

Egg Collections

Nine non-viable eggs were removed from nine nests (Table 4). No viable eggs were removed from wild nests to bolster captive flock genetic representation. To increase productivity, a second viable egg from Firetower was placed into the East Wet Cell nest to replace a non-viable egg. Two eggs from Ben Williams 6c nest were temporarily replaced with dummy eggs while a prescribed burn was conducted that evening. They were placed back in the nest April 8 – the pair was still incubating and accepted the exchanges.

Table 4. Crane Egg Collections

Nest	**Pair ♂♀**	**# eggs collected**	**Date**	**Comments**
Haygood	W39 UB	1	3/27	NV, flooded, abandoned
Duck Pond	W37 W35	1	3/30	NV, cracked, abandoned
Vickers	W02 953	1	4/03	NV, flooded, abandoned
Jordan	? ?	1	4/09	NV, found abandoned
Firetower	434 136	1	4/27	to refuge nest: East Wet Cell
East Wet Cell	148 W22	1	4/27	NV, replaced with Firetower
Ben Wms 6a	139 W30	1	5/01	NV, abandoned
White Kangaroo	435 534	1	5/07	NV, dead adult
N Valentine	169 UB	1	6/02	NV, off nest
Duck Pond	W37 W35	1	6/05	NV

NV=non-viable.

Ryan Hardman, Kim Colle, and Liz Hanson nest searching Coke Plant Savanna G-02.

Volunteer Kim Colle at Duck Pond nest

Autumn Crane Count [L Billodeaux]

An autumn abundance survey of free-flying Mississippi sandhill cranes was conducted on and adjacent to the Mississippi Sandhill Crane National Wildlife Refuge in Jackson County, Mississippi on November 6, 2009. Twenty-five individuals counted cranes from around 0600h to 1000h CST from stationary blinds, vehicle routes and one walking route. Cranes were observed at 32 locations, including 15 on the refuge or areas under management agreement. A minimum of 77 different cranes were differentiated during the count period, including 58 known banded and 8 unbanded birds. There were 35 (45%) cranes observed exclusively on the refuge. This was 78% of the total population at the time.

Crane 503 dead from powerline entanglement

Crane Mortality

There were 26 cranes that died or disappeared. Sixteen carcasses or remains were recovered (Table 5, Figure 4). Nine (56%) of those whose remains were located were hatch year or early second-year release birds. Eight were located homing in on radio signal. Nine deaths (60% of known) were due to predation, five (33%) by vehicle collision - the highest number of known vehicle collision mortalities in a year, one by powerline entanglement, and one by unknown cause. Crane 435 was taken injured to Audubon Species Survival Center where he was later euthanized.

Table 5. The carcasses of 16 Mississippi sandhill cranes were recovered.

MSC ID	Sex	HY	Source	Carcass Date	Cause	Location
845	F	2008	WOCC	Jan 21*	predation - coyote	Ben Wms CU
835	F	2008	ASSC	Jan 29*	predation - canid	FB Pen savanna
842	M	2008	WOCC	Jan 29 M	trauma-vehicle collision	I-10
841	M	2008	WOCC	Feb 02*	predation	Ben Wms Swamp
837	F	2008	ASSC	Feb 12*	predation	FB pen savanna
843	F	2008	WOCC	Feb 13*	predation	Ben Wms Swamp
844	F	2008	WOCC	Feb 16*	predation	Ben Wms Swamp
435	M	2004	ASSC	May 07 A	trauma-vehicle collision	Highway 63
303	M	1993	PWRC	May 07	predation - dog	Ben Wms 6c Pond
954	F	1999	ASSC	Jun 01*M	predation	Coke Savanna
503	F	1995	PWRC	Jul 20 M	trauma-powerline entanglement	Franklin Pasture
442	M	2004	ASSC	Sep 02	trauma-vehicle collision	FB Road
975	M	2009	WOCC	Nov 10	trauma-vehicle collision	Highway 90
961	M	1999	ASSC	Aug 15	unknown	OS CU
974	M	2009	WOCC	Nov 11*	predation	G-09
W-16	M	1996	MSC-G-02	Dec 26	trauma-vehicle collision	Highway 57

*= located with radio-telemetry, **M**=to National Wildlife Health Center for necropsy, **A**=to Audubon Species Survival Center, CU=refuge crop unit

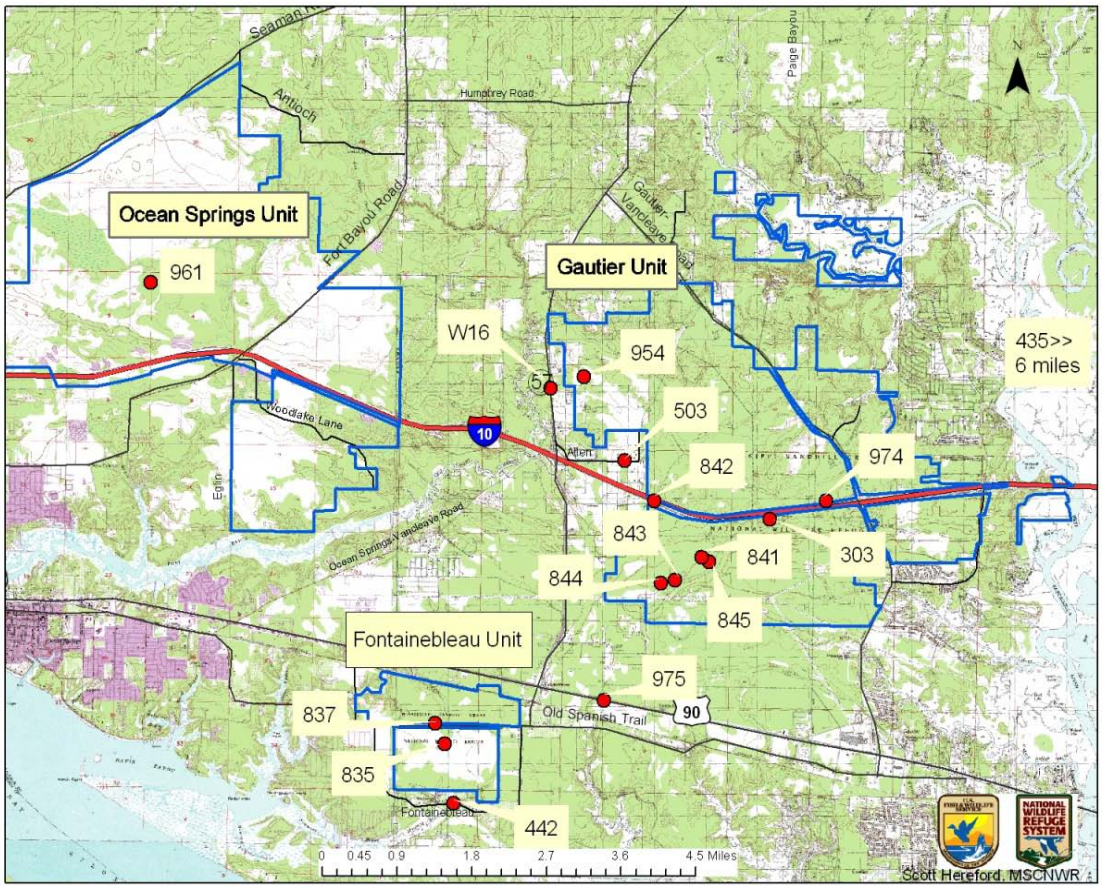


Figure 4. Location of recovered crane remains

Another 10 cranes disappeared and were presumed dead (Table 6). This included 024, who was likely killed at the nest in Ben Williams 6C in the same dog predation incident as her longtime mate 303 and their chick. Two wild-hatched birds, W-20 (2001 North Valentine) and W-36 (2007 Ocean Springs Pen) also disappeared.

Table 6. Cranes disappeared and presumed dead.

MSC ID	Sex	HY	Source	Last Date Observed
344	M	2003	ASSC	9/6/2008
234's mate	F	<2005	MSC - ?	12/1/2008
169's mate	F	?	MSC - ?	1/28/2009
024	F	1990	PWRC	05/02/2009
169's mate	F	<2004	MSC - ?	5/11/2009
139	M	1991	PWRC	7/6/2009
973	M	1999	WOCC	10/27/2009
W-20	F	2001	MSC – N Valentine	10/28/2009
136	F	1991	PWRC	11/6/2009
W-36	F	2007	MSC- OS Pen	11/28/2009

A bird with a partial band combination (missing bands) in the North Sprayfield is listed as 543 but may be 055; they had the same partial band combination. Although the pair 255 and 337 had not been observed since April, they were still considered alive since they are rarely seen in their Bobcat/South Valentine home range outside of the nesting season. Similarly, 346 and W-29 were not observed after August but likely still alive. They are only very infrequently observed, usually along southwest edge of the south Gautier Unit. An August observation of Crane 257, who had not been observed since June 2007, was not verified.

After 234's unbanded mate disappeared, he has new mate 158. After 961 death, W-28 is paired with an unbanded male; likely from the North Sprayfield. The unbanded with 431 and 434 in SE Beasley and Rudkin is likely the fledgling from the Ben Williams 6a territory from 2008. The unbanded bird with 447 at the Fontainebleau pen is likely the 2008 fledgling from southeast Fontainebleau. 459's former unbanded mate associated with 442 until his death and is likely now the single unbanded female seen in Fontainebleau pen area. The unbanded male from Bright's Pasture is likely paired with the light female at East Valentine – they both "paint" their feathers during nesting. The unbanded with 542 and 057 could not be separated from the one observed with W-38, 445, and 547. The unbanded in I-10 Crop Unit observed with 433 and 334, can't be separated from that seen with 536. 169's unbanded mate was not verified with him after May; afterward 169 was seen with W-21 and 721. She (unbanded) disappeared abd could not be separated from the unbanded that is believed to be 911 and observed along Gautier-Vancleave Road, Bright's, and Briarcrest.

Year-End Crane Population

As a result of year-round monitoring, the population at the end of the year was estimated to be 105 cranes (Figure 5, Table 7). This includes 94 banded and 11 unbanded cranes. There were 47 males, 52 females, and six of unknown sex (Figure 6). Eighty (76%) were at least three years old and considered adults. There were 84 (80%) of known origin including 64 captive-reared at Audubon's Species Survival Center, nine from the White Oak Conservation Center, five from Patuxent Wildlife Research Center, five wild-hatched birds that were banded as juveniles, and one juvenile still with their parents. An additional unbanded bird is likely 911, a HY89 Patuxent bird. Fifty-eight cranes (55%) were mostly found in the Gautier Unit area, 37 (35%) in the Ocean Springs Unit area, and 10 (10%) in the Fontainebleau Unit area.

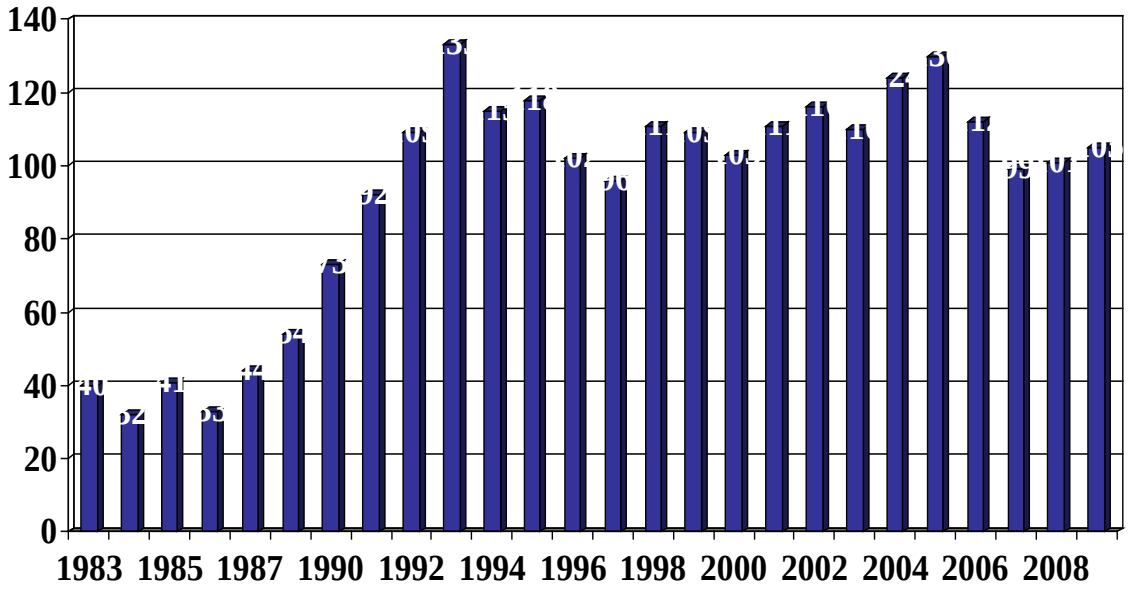


Figure 5. Year-end crane population size

Table 7. December 2009 crane population

ID	Sex	HY	Unit	Area	Associates	Misc	Band
911?	F	1989	g	xg, LG#, haygood	w-39 mate	911?	UB
920	F	1989	g	ga, nturc#	w-23 mate; 718, 721		rr/b/-/a
007	F	1990	o	os, xo jor spr	158 542 545		by/Bt/a/-
010	F	1990	o	os, xg jor, spr ec	155 258		bb/Yt/-/a
232	M	1992	g	bw, FT#	956 mate;		Wt/gl/-/a
234	M	1992	o	os xo, eg/wl#	158 mate?;		go/Gt/a/-
707	F	1997	o	os xo, sull#	163	old 929 mate	ga/-/-/-
711	M	1997	o	os xo, spr saw#	UB mate		ya/-/-/-
715	F	1997	g	ga xg, s turc#, LL2#	963 mate,LL09juv	w/ 963 mate	oa/-/-/-
718	F	1997	g	ga, gacru, xg	w-23 920		-/ya/-/-
818	F	1998	g	xg, bright, raley	165		ww/oy/-/a
952	M	1999	g	bw beas#	331 mate		Wt/wb/-/a
953	F	1999	g	bw xg, dunn, ma vi#	w-2 mate		wg/Wt/a/-
956	F	1999	g	bw, FT, e eagle#	232 mate	inj right leg	Kt/wy/-/a
962	F	1999	g	ga, xg haygood#	alone, 722	paige, dees	Wt/yy/-/a
963	M	1999	g	ga xg, s turc#, LL2#	715 mate, LL09juv		yk/Wt/a/-
054	F	2000	o	xo, jor, spr	541 w-41		Bt/bd/-/a
057	M	2000	o	xo, jor# nspr	542 UB UB	new mate??, former mate 427	bw/Bt/a/-
146	F	2001	o	os, w utah#	w-19 mate	formerly w/ 031, 038 mate	Yt/bw/-/a
148	M	2001	o	xo, gp, e o-03#	w-22 mate;		Rt/bo/-/a
155	M	2001	o	xo, jor, spr, saw#	258 mate;		br/Yt/a/-

ID	Sex	HY	Unit	Area	Associates	Misc	Band
158	F	2001	o	xo, woodlake	new 234 mate		Rt/go/-/a
163	M	2001	o	xo, spr	707's mate	ofb rd, s ut	rw/Wt/a/-
164	F	2001	g	xg,allen-baker, 57			Yt/ry/-/a
165	M	2001	g	ga xg	818	chanlder, g-v rd	ob/Ot/a/-
166	F	2001	g	ga xg, hale, raley	w-39 UB	bright, robert, bt may07 lost R foot, hale	Ot/og/-/a
169	M	2001	g	ga xg, nval#	721 w-21	bright, robert, browns trail	ow/Ot/a/-
255	M	2002	g	ga xg; sv#, wv#,bob#	337 mate	lost 324 mate to predation.	or/Wt/a/-
258	F	2002	o	xo. Spr, saw#	155 mate		Gt/wg/-/a
331	F	2003	g	bw, xg beas#	952 mate		wb/Yt/a/-
332	F	2003	g	bw,xg i-10	536, 735 UB	lds before 11/06	Yt/wg/-/a
333	F	2003	g	bw, xg beas	951 332		wo/Yt/a/-
334	F	2003	g	bw, i-10	433; 232 956	repaired beak	Yt/wr/-/a
337	F	2003	g	ga, wv#	255 mate	meyer; old w-13 mate	wlb/Yt/a/-
342	F	2003	g	xg, bonds	347 mate?	bond, ben moore, whisenant	Ot/bg/-/a
346	M	2003	f	fb, xf sefb#	w-29 mate		Ot/by/-/a
347	M	2003	g	bw xg	342 mate?	bonds, whisenant, ben moore	bl/Ot/a/-
431	F	2004	g	bw,	434 mate?	rudkin, se beasley	ob/bb/a/-
432	M	2004	g	bw, xg, sioux#	533 mate	callie rd, dunns, mcdole yard	bb/og/-/a
433	F	2004	g	bw, I-10	w 334; 232 956	I-10 cru	oo/Bt/a/-
434	M	2004	g	SE beasly, Rudkin	431 mate?, UB	136 last mate; callie rd	bb/or/-/a
436	M	2004	g	bw, xg vi/mdot#	w-9 mate		-/oy/-/a
445	F	2004	o	xo, spr,	542, 055 543		iw/Bt/a/-
447	M	2004	o	fb	UB; 830s	rt leg rotation	ll/Bt/a/-
459	M	2004	f	fb, nfb	661 mate	nfb, os airport	gg/Bt/a/-
533	F	2005	g	xg, sioux#	432 mate; 534		go/Wt/a/-
534	F	2005	g	xg, wkang#	533 432	heart murmur, pasc airport; dunns, 435 wid	Wt/gr/-/a
536	M	2005	g	xg, dunn, I-10	UB; 332 735		Wt/gy/-/a
541	M	2005	o	xo, spr	054 w-41	w >latimer	bb/Wt/a/-
542	F	2005	o	xo, spr	057; UB	limp	Wt/bg/-/a
543	M	2005	o	xo, spr	445 545 w38 UB		bo/Wt/a/-
545	F	2005	o	xo, spr	543 w38 UB		bw/Wt/a/-
547	M	2005	o	xo, spr	541 w38 543	w>latimer	bp/Wt/a/-
661	F	2006	f	fb, nfb#	459 mate	os air, nfb	rb/Rt/a/-
662	M	2006	f	fb, xf	w-14	emerald lake, wilkens	Rt/rg/-/a
721	F	2007	g	ga, bt	169 UB		rb/Gt/a/-
722	M	2007	g	ga, xg	962, UB		Gt/rg/-/a
723	M	2007	g	allen baker. Gv	xbil	rebrailed & put back in Gautier pen 1/23/08	ro/g/a/-
731	M	2007	g	BW	w-30, w-36		yb/Gt/a/-
735	M	2007	g	BW, i-10	536 332 UB		yw/Gt/a/-
821	m	2008	g	ga i10	820's		gb/yy/a/-
822	m	2008	g	ga i10	820's		yy/gg/-/a

ID	Sex	HY	Unit	Area	Associates	Misc	Band
823	f	2008	g	ga i10	820's		go/yy/a/-
824	m	2008	g	ga pen	820's		yy/gr/-/a
825	f	2008	g	ga i10	820's		gw/yy/a/-
826	m	2008	g	ga i10	820's		yy/gy/-/a
827	m	2008	g	ga i10	820's		gm/yy/a/-
828	f	2008	g	ga i10	820's		yy/gbr/-/a
831	m	2008	f	fb xf	830s		ob/yy/a/-
833	m	2008	f	fb xf	830s		oo/yy/a/-
834	f	2008	f	fb xf	830s		yy/or/-/a
836	m	2008	f	fb xf	830s		yy/oy/-/a
971	M	2009	o	os, os pen	980s	direct release at Utah Crop Unit	gb/oo/a/-
981	M	2009	o	ocean springs pen	980s, 971		rb/oo/a/-
982	M	2009	o	ocean springs pen	980s, 971		oo/rg/-/a
983	F	2009	o	ocean springs pen	980s. 971		ro/oo/a/-
984	M	2009	o	ocean springs pen	980s, 971		oo/rr/-/a
985	F	2009	o	ocean springs pen	980s, 971		rw/oo/a/-
986	F	2009	o	ocean springs pen	980s, 971		oo/ry/-/-
w-02	M	1991	g	ga ma, vi#	953 mate	HY91 sval juv, former ma male, w-9 mate [636xUB]	-/a/-/-
w-07	F	<1995	g	ga bw, llee#, 16#	w-25 mate	trap AHY bw nov96; former w-1 mate	Wt/rar/-/-
w-09	F	<1995	g	ga ma#, mdot#	436 mate	trap AHY bw dec96; former w-2 mate	bar/Gt/-/-
w-19	M	<2000	o	os, w utah	146 mate	former 960 mate, trap AHY feb01	-/blabl/-/
w-21	F	2001	g	ga xg, bri hale	169 721	hy01 bw4 juv, c-15 [018xUB]	ga/Ot/-/-
w-22	F	2001	o	os, e0-03# gp	148 mate	HY01 eval juv, c-1 [207xUB]	wa/o/-/-
w-23	M	<1999	g	ga, s turc#	920 mate; 718	trap AHY ga oct01	ab/ww/-/-
w-25	M	2002	g	bw, xg, llee#, 16#	w-7 mate	HY nval 02 juv [511x242] twin	ya/Bt/-/-
w-28	F	<2000	o	os, w cott#	UB mate?	trap as adult 11/02, OS CRU,961 mate . 1st e '03	Rt/rag/-/-
w-30	F	<1999	g	bw, 6a#	731 mate	trap as adult bw nov02. 018's former mate. 1st e '	Rt/bab/-/-
w-35	F	<2004	o	os, xo, dp#	UB mate dp#, old ec mate?	trap as adult 02/2007, moved from e cott?	wao/Gt
W-37	M	<2000	o	os, dp#	mate w-35	duck pond, (f717?) mate, former EC	r/ba
W-38	u	2008	o	os, spr	545 543 Ub	wcott 08 juv, [961x w-28]	Ot/ya/-/-
w-39	M	1992	g	xg, LG#, haygood	UB F (911)	possibly 202?	ao/rg/-/-
W-41	F	<2004	o	spr	054 541	trap as adult 10/2008, UB w doubletree female	aw/rg/-/-
xbil	F	<1996	g	ga, xg, allenbaker	723	trap AHY val feb98	aw/Yt/-/-
lt F	F	<1994	g	GA, eval#, xg	UB mate	painter, light gray former 716 mate, 207 mate	UB
Evm	M	<2004	g	xg, bright	lt f mate		UB
dunF	u	ad	g	xg, dunn	536; 332 735		UB
Mw28	M	<2007	o	o, ospen#	w-28 mate	OS pen, WCott, fomer NSPR	UB
SPRU	U	unk	o	xo, spr	UB mate; 057 542 547	W-38 445	UB
f442	F	<2004	f	bw, fbp#	442	former 459 mate 2007-8, 442 assoc	UB

ID	Sex	HY	Unit	Area	Associates	Misc	Band
f711	F	ad	o	spr, saw#	711 mate		UB
6a08	U	2008	g	bw, bond, rudkin	431 434	08 juv BW6a [139xw-30]	UB
fb08	U	2008	f	fb, xf	447	08 juv SE FB [346xw-29]	UB
LL09	U	2009	g	ga xg Llee	963 715	HY08 LL juv, 963x715	UB

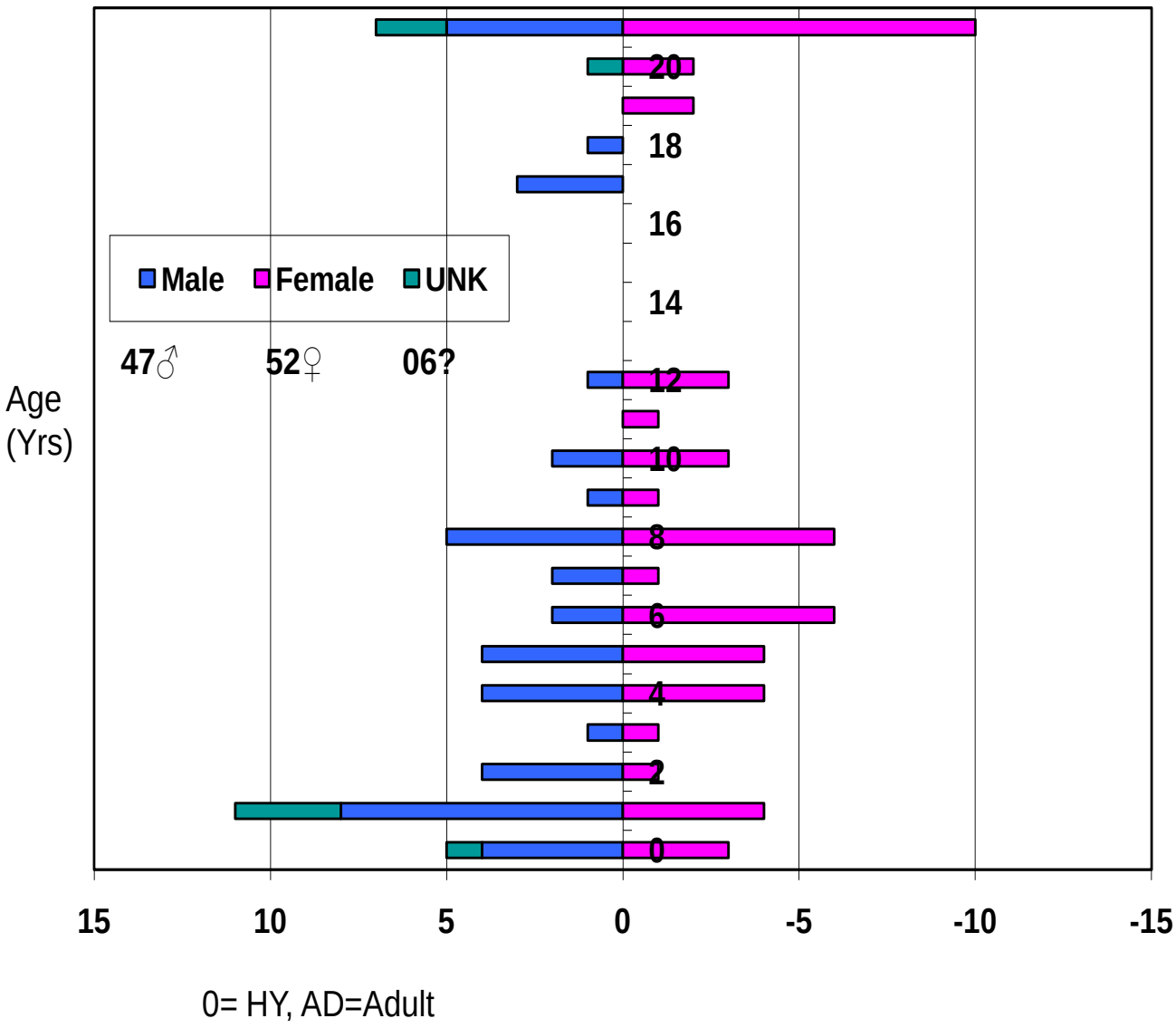


Figure 6. Crane population age and sex distribution

OTHER WILDLIFE SURVEYS

Marshbird Survey

In 2004, we began participating in the National Marsh Bird Monitoring Program (NMBMP) and use their nationwide protocol to monitor secretive marshbirds by setting up 12 stations in compartment G-17 of the Gautier Unit for king rail and black rail. In 2007, we deleted the black rail and added the clapper rail and least bittern to the NMBMP broadcast call sequence. We were not able to distinguish king and clapper rail calls (not unusual in brackish water) so they were grouped together. In 2009, we conducted surveys on March 31, April 29 and May 28, detecting 9, 5, and 5 king/clapper rails, respectively (Figure 7).

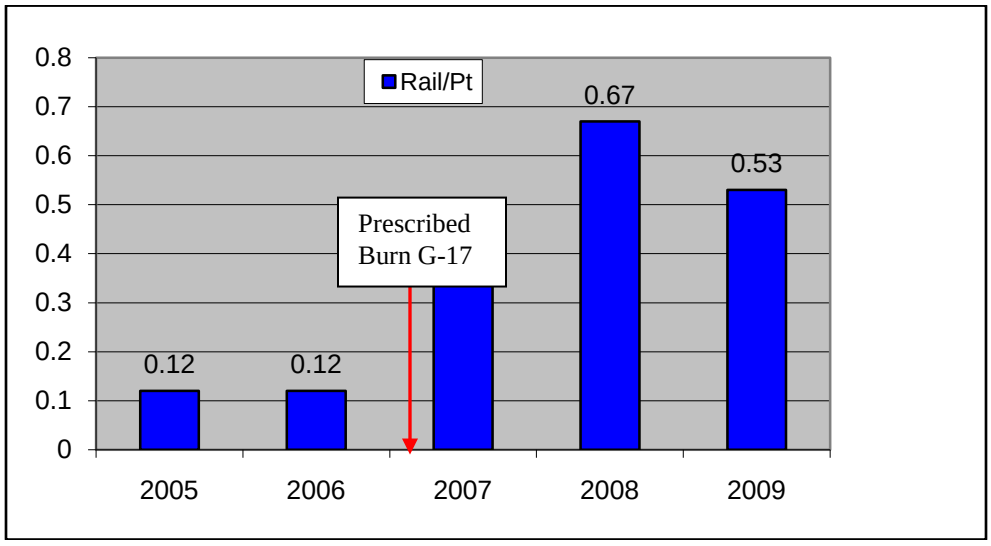


Figure 7. King/Clapper rail detections/point by year

Winter Grassland Bird - Area Search Survey [S Galla]

Volunteer Charley Delmas conducted Winter Abundance Surveys in both the Gautier and Ocean Springs Units for grassland bird diversity, richness, and habitat type use. Area searches were conducted in compartments G-06, G-08, G-11, O-07, O-09, O-11, and O-16. These surveys occurred in the morning to early afternoon on February 19, March 3, March 5, and March 8. He observed 35 total bird species, with swamp sparrows being the most abundant bird in Ocean Springs and American robins in Gautier. In February, Henslow sparrows, LeConte's sparrows, a northern harrier, a loggerhead shrike, brown-headed nuthatches, and Mississippi sandhill cranes were seen in compartments G-06 and G-11. In March, Henslow's sparrows, LeConte's sparrows, brown-headed nuthatches, sedge wrens, and eastern meadowlarks were seen in G-08, OS- 07, OS-09, OS-11, and OS-16 (Figure 8).

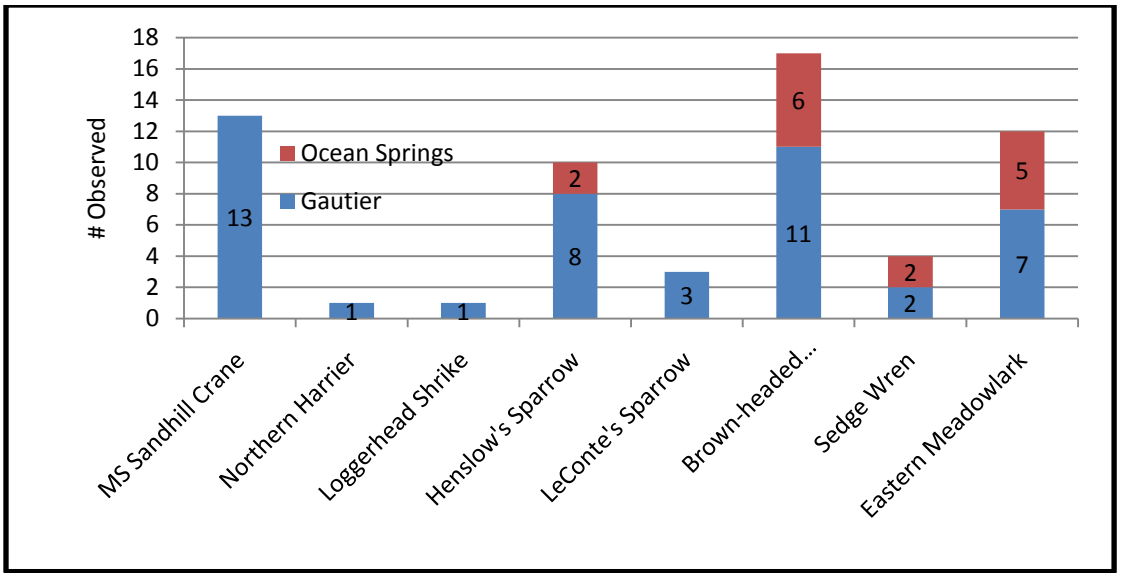


Figure 8. Number of key grassland bird species observed on winter area search surveys

Winter Grassland Bird - Transect Survey [S Galla]

We used the Project Prairie Bird protocols to assess winter grassland bird use of managed savannas in three 20x100 meter transects each in compartments G-05(last burned May 2008), G-15S (April 2007), on December 20, 2008, and in G-05, G-15S, and F-01C (last burned 1999) on January 14, and February 3. A vegetation survey of all transects was conducted in March, 2009 after the final bird survey. The six species and their number detected were: savanna sparrow (14), Henslow's sparrow (6), eastern meadowlark, (2)sedge wren (2), LeConte's sparrow (1), and swamp sparrow (1). There was a drop-off in the overall bird and Henslow sparrow density beyond one year post-burn (Table 8).

Table 8. Grassland birds on transect surveys by compartment

Compartment	Yrs (FY) since Last burn	% grass	% shrub	# Spp	#birds/ac	#HESP /ac	#EAME /ac
G-05	1	75	6	4	4.7	1.1	0
G-15S	2	93	19	3	0.7	0	0.2
F-02C	10	62	17	2	0.7	0	0.2

HESP=Henslow's sparrow, EAME=eastern meadowlark

Casey Cardinal, Charley Delmas and Maureen Durkin conduct grassland bird survey.

Calling Frog Survey [A Stuckert]

A Calling Frog Survey route with 10 points in the Gautier Unit was initiated in 2003 using the North American Amphibian Monitoring Program (NAAMP) protocol to contribute data to assess nationwide frog trends. Hereford passed the online USGS Frog Call test in February. In 2009, we conducted surveys on February 17, May 5 and June 30. Eleven species (Table 9) were detected during the surveys. As was the case in all previous survey years, the cricket frog was by far the most frequently detected. The southern toad, oak toad, and southern chorus frog were the most numerous following the cricket frog (in order of decreasing abundance by points detected).

Table 9. Summary of Three Calling Frog Surveys

Frog/Toad	**# Surveys detected**	**Frequency (# points detected*)**	**Frequency (pts detected /total pts)**	**Average calling index****
Southern toad	2	10	0.333	2.1
Oak toad	2	12	0.4	1
Cricket frog	3	23	0.767	2.0
Green treefrog	2	3	0.1	2.3
Pinewoods treefrog	1	3	0.1	1.3
Spring peeper	1	5	0.167	2.2
Southern chorus frog	1	9	0.3	1.9
Eastern narrow-mouthed toad	1	1	0.033	1
Pig frog	2	6	0.2	1.2
Bronze frog	2	3	0.1	1
Southern leopard frog	1	4	0.133	1
Total				1.7

*30 points possible,

**1=individual calls, 2=overlapping calls. 3=chorus

Cope's gray tree frog

Although not implemented for 2009 NAAMP surveys, recent phylogenetic work has lead to a number of classification changes including both species and names. The NAAMP will be using the names accepted by the Society for the Study of Reptiles and Amphibians (SSAR) in 2008. It should be noted that many of the recently proposed changes are hotly contested and still have not been properly settled. Changes affecting names of anurans found on the MSCNWR during frog call surveys are noted below (Table 10). There are no species splits or lumps for frog call survey anurans on the MSCNWR.

Table 10. Summary of name changes to frog call survey anurans at MSCNWR.

Common Name	**Family**	**Old latin name**	**Name Change**	**New latin name**
Eastern spadefoot	Pelobatidae	*Scaphiopus holbrookii*	No	
Southern toad	Bufonidae	*Bufo terristris*	Yes	*Anaxyrus terristris*
Oak toad	Bufonidae	*Bufo quercicus*	Yes	*Anaxyrus quercicus*
Southern/Northern cricket frog complex	Hylidae	*Acris gryllus/crepitans*	No	
Green treefrog	Hylidae	*Hyla cinerea*	No	
Barking treefrog	Hylidae	*Hyla gratiosa*	No	
Pinewoods treefrog	Hylidae	*Hyla femoralis*	No	
Squirrel treefrog	Hylidae	*Hyla squirrela*	No	
Cope's gray treefrog	Hylidae	*Hyla chrysoscelis*	No	
Spring peeper	Hylidae	*Psuedacris crucifer*	No	
Southern chorus frog	Hylidae	*Pseudacris nigrita*	No	
Eastern narrow-mouthed toad	Microhylidae	*Gastrophryne carolensis*	No	
American bullfrog	Ranidae	*Rana catesbeiana*	Yes	*Lithobates catesbeianus*
Pig frog	Ranidae	*Rana grylio*	Yes	*Lithobates grylio*
Bronze frog	Ranidae	*Rana clamitans*	Yes	*Lithobates clamitans*
Southern leopard frog	Ranidae	*Rana sphenocephala*	Yes	*Lithobates sphenocephalus*

A total of 16 species (see Table 10) have been recorded to date with an average of 11.9 species recorded per year. Average call index over the six years of the survey is 1.95.

Christmas Bird Count:
We conducted Christmas Bird Count Dec 18 with much help from Mark Woodrey and Jake Walker, Grand Bay NERR. We observed 34 species including 44 cranes, 48 Henslow's sparrows, 2 bald eagles, and 144 eastern meadowlarks. The Henslow's sparrow count for the county is usually the highest in the country.

Bald Eagle
A pair was observed at the nest area in Eagle Drain in north G-14 in winter but never laid eggs. Two eaglets were likely fledged from the nest in O-15 on Jackson County Utility Authority land that is part of a management agreement with the refuge.

Black Bear
The male Louisiana black bear (Federally threatened) that was observed on the refuge and captured/tagged just to the east of G-10 in 2008 was not observed in 2009.

Long-term Vegetation Monitoring
Eight long-term monitoring stations were established by Restoration Ecologist Andre Clewell in 1997 to document changes in vegetation structure and diversity related to habitat management efforts. Each station is a rectangle about 0.46 acres, two parallel transects, each 200 feet long and 100 feet apart, are located along the edges. Four plots (F2, F3, G5, O6) are in relatively high quality savannas, the other four (G7, G8, O4, O10) are in former savannas that had degraded to pine scrub. Interns Stuckert and Galla assisted Fire Management and regional Fire Ecologist Sue Grace with collecting fuels/life form data from long-term vegetation monitoring plots.

Bat Surveys (NEW)

We assisted Jackson, Mississippi-based bat biologist Alison McCartney and others, as part of a FWS-funded survey, with bat mist-netting on July 11 at East Valentine Pond, We caught 3 seminole bats; a 4th got away. On July 29, as part of a Mississippi Bat Working Group Network Meeting mist-netting event, 3 evening bats were caught at Dog Pond; another got away (probably a red bat). In September, Alison and her team set up mist nets at North Valentine Pond and caught 1 evening bat. Kathy Shelton and Susan Murray from the MS Museum of Natural Science assisted along with 3 other volunteers.

In August, Alison dropped off the MS Museum of Natural Science's Anabat bat detection system which records bat echolocation signals that will be analyzed in the lab later by Alison to determine species use. We set it out over 18 nights total on the refuge Aug 24-31 at five locations (South Turcotte Drain, Firetower Pond, Perigal Swamp-Gpond Rd), Fontainebleau Pen Pond, Glendale Bluehole) . In November-December, we deployed the Anabat for 41 nights at another five locations (Martin Pond, Eagle Drain, Bayou Castelle, S Brown's Trail Pond, Davis Bayou). Thanks to the MS Museum of Natural Science and BLM biologist Alison McCartney.

Other
Wildlife Interns Hardman and Hanson assisted with turtle surveys and herp trapping at Bon Secour NWR in August. The USFS conducted aerial surveys for Red Bay mortality.

1B STUDIES AND INVESTIGATIONS

Mammalian nest predation and Mississippi sandhill cranes by Rose Butler, University of New Orleans, under Dr. Jerome Howard. (Submitted by Rose Butler)

"I examined sources of nest failure for 54 nests at the Mississippi Sandhill Crane National Wildlife Refuge, 2008-2009. Cameras were deployed at 23/33 nests in 2008 and 20/30 nests in 2009. Nest cameras identified predation as the primary source of failure (17 nests), followed by flooding (11 nests), abandonment (6 nests), and egg inviability (5 nests). Mean daily survival rate (DSR) was 0.72. The best approximating

models of daily survival rate included covariates for season date, temperature and nest age. DSR decreased with increasing season date, increasing nest age, and decreasing temperature. Hypotheses related to effects of renesting, human disturbance, precipitation, flooding, and winter rain were not supported. Because predation has been identified as a primary source of nest failure, I also monitored mammalian predators on the MSCNWR. I set up scent stations and camera traps along transects throughout each of the three refuge units. Coyotes and raccoons were most common, with gray foxes, red foxes, domestic dogs, and bobcats also detected frequently."

Biologist Lauren Billodeaux served on her graduate committee. She participated in Rose's thesis defense at UNO Nov 13.

Genetic analysis of the Mississippi sandhill crane by Jessica Henkel, University of New Orleans, under Dr. Jerome Howard. Submitted by Jessica Henkel
"The genetic status of the critically endangered Mississippi sandhill crane (*Grus canadensis pulla)* was analyzed using 2009 studbook data from the U.S. Fish and Wildlife Service managed captive breeding and release program. Blood and tissues samples from 94 Mississippi sandhill cranes were successfully genotyped at 12 microsatellite DNA loci. This analysis provided information on shared founder genotypes, allowing for refined analysis of genetic variation in the population, and the development of a breeding recommendation chart that incorporates both pedigree and molecular analyses into the recommendations. Results indicate that out of the 412 possible pairing combinations in the captive population, only 18.2% would result in offspring that would increase the gene diversity of the population. The genetic variation observed in the Mississippi sandhill crane was contrasted with variation observed in the Florida sandhill crane (*Grus canadensis pratensis*). Results show far less variation in the Mississippi population. Results also suggest that while gene flow no longer occurs between the two populations, the introduction of cranes from the Florida population may help to increase the observed genetic diversity of the Mississippi sandhill crane population."

Hereford completed revisions to a North American Crane Workshop Proceedings short communication in April.

II. HABITAT MANAGEMENT

2A. HABITAT RESTORATION - MECHANICAL

Using various mechanical techniques to cut woody vegetation, we restored over 1109 acres of savanna in 13 (major) refuge compartments on all three units. (Table 11, Figure 9). Due to wet soil conditions, contractors were unable to conduct any work on the O-17 cut-remove project in the far west end of the Ocean Springs Unit. Using funds through Fire Management, Tony Wilder and Brad Bailey administered cut-and-leave contracts where 257 acres of pine trees were thinned in O-08 and 377 acres of trees cleared in south Fontainebleau. The refuge Fire Crew used the gyrotrack machine to clear 21.3

acres around and near three crane pens. They also began work on a project to cut most of the slash pine in G-19, completing 6.5 acres by the end of the year.

We added a new technique in 2009. To reduce slash pine regeneration in savannas, biology staff and volunteers used hand tools (loppers) to remove small regen. We targeted recently burned areas to remove surviving pine saplings. Wetland areas were treated across both Gautier and Ocean Springs Units totaling 446 acres treated.

Table 10. Acres restored by mechanical treatment.

Date	Compartment	Location	Total Acres	Method
Feb	G-14	Between Beasley Pond & CU	2.5	gyrotrack: Fire Crew
Feb-Mar	O-11E	Woodlake CU N perimeter	10.2	gyrotrack: Fire Crew
Jun	G-07	HQ, Kiosk	108.0	lop
Jun	G-06	E Valentine	38.0	lop
Jun	G-03/6	Brown's Trail	22.3	lop
Jul	G-06	S Valentine CU	3.5	lop
Jul-Aug	O-08 E	South Glendale	133.0	cut/leave: contract
Aug	G-12	Ben Wms CU island	0.2	gyrotrack: Fire Crew
Aug	G-06	North Valentine	27.9	lop
Aug	G-09	S Valentine Sav	24.0	lop
Aug	G-06	E Valentine	6.5	lop
Aug	O-14	St Regis E	66.5	lop
Aug	G-03	E Little German	9.0	lop
Sep	O-05	Utah	51.8	lop
Sep-Dec	G-19	Ben Wms 6C, W	6.5	cut/leave: Fire Crew
Oct	G-12	Ben Wms 6a rd edge, BW4 edge, Shrike Crnr	6.9	gyrotrack: Fire Crew
Oct	G-19	Road edge	0.7	gyrotrack: Fire Crew
Oct	O-06	OS Pen, W edge	1.5	gyrotrack: Fire Crew
Oct	G-15 N	Firetower	41.2	lop
Nov-Dec	F-02	SW Fontainebleau	205.5	cut/leave: contract
Nov-Dec	F-03	SE Fontainebleau	171.4	cut/leave: contract
Dec	G-14	SW Beasley	34.2	lop
Dec	G-14	N Range	13.0	lop

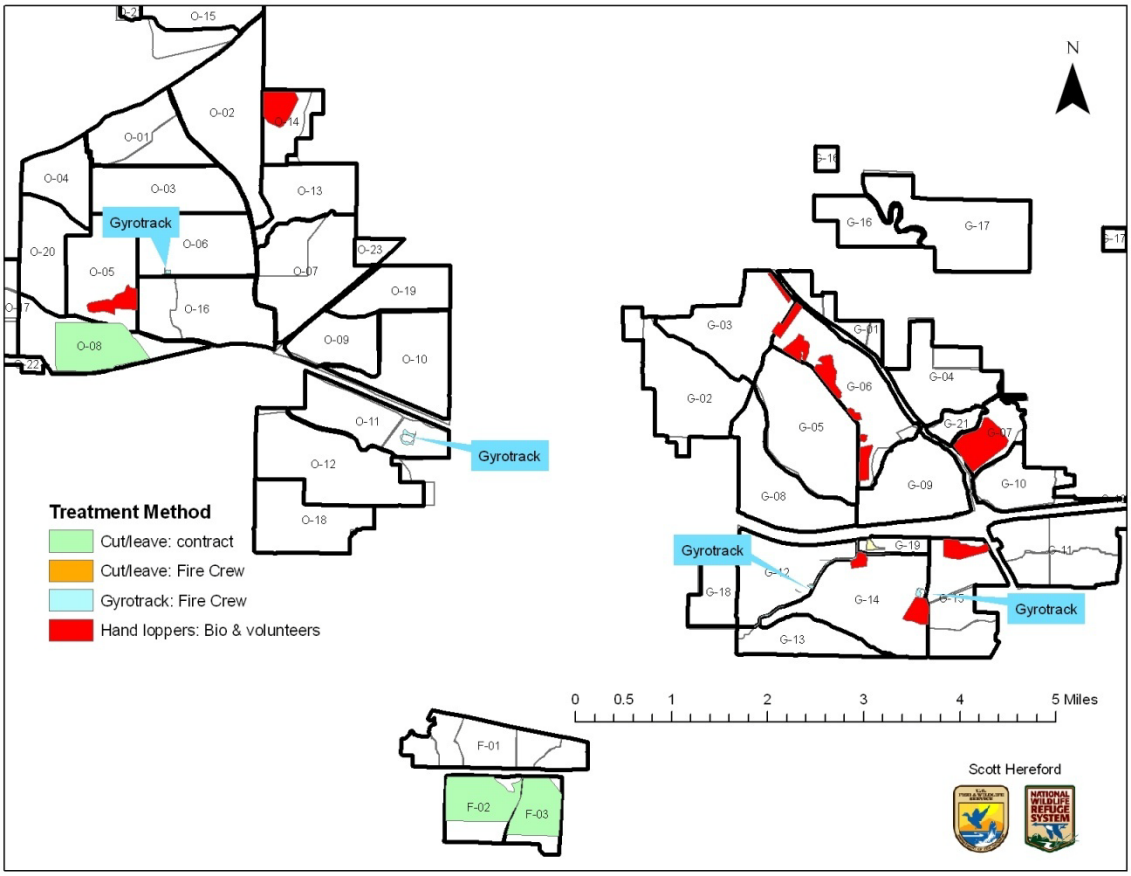


Figure 9. Mechanical habitat treatment areas

2C. WATER MANAGEMENT

As part of the Wildland-Urban Interface cut and leave contract in south Fontainebleau, the Grady (Citronelle) Pond in F-02 southwest of the release pen was restored. Thanks to Brad Bailey and Tony Wilder, Fire Management, for planning and administering.

2.D. FARMING [L Billodeaux]

Cranes use upland pastures for feeding, especially in fall and winter. They have been observed for generations in local pastures. Fourteen refuge crop units and one pasture were created to provide supplemental food and assist in keeping cranes on-refuge. In 2009, we mowed 14 crop units and the pasture in early summer totaling ~150 acres. As we had a very wet fall we were unable to mow the lower areas of our crop units. However, we were able to mow 81.5 acres in 13 crop units and part of the pasture.

When possible, a number of growing-season and winter crops have been planted in refuge food plots or "crop units" for extra food, increasing nitrogen, and supplanting invasive exotic grasses. Crane nest success monitoring indicates a strong correlation between chick fledging success and proximity to a crop unit. Recently, chufa has been our main growing season crop while various cover grasses and legumes have been

planted in late autumn. This summer all the crop units were disked and then due to lack of rain there was a delay in planting. When we did get the conditions right for planting we noticed that in many of the crop units there was resprouting of last year's chufa. Because of this we did not refertilize or replant five crop units and we reduced the acres planted in other crop units as compared to previous years.

- Summer: Disked 14 crop units, fertilized and planted 14 acres of chufa in 9 crop units. (Table 12).
- Fall: No lime was delivered this fall due to very wet conditions in all of the crop units.

Table 12. Planting

Crop Unit	# Chufa Acres planted
Beasley	1.0
Ben Williams	3.0
I-10	3.0
Martin's CrU	1.0
Brown's Trail	0
Gautier	0
Valentine	0
East Cottonmouth	0
Greenpond	0
Ocean Springs	1.0
Utah	1.0
Duck Pond	1.0
Woodlake	1.0
Fontainebleau	2.0
TOTAL	**14.0**

2E. FOREST MANAGEMENT.

See 2A.

2F. FIRE MANAGEMENT

Refuge Complex Fire Management staff conducted 15 prescribed burns (Table 13, Figure 10) totaling 4385 acres, including 3053 on the Gautier Unit and 1332 on the Ocean Springs Unit. No compartments on the Fontainebleau Unit were burned. At least 2580 acres (59%) were burned during the growing season. Biology staff assisted Fire Management as Basic Firefighter, Resource Advisor, and Public Information Officer. We also assisted with wildfire suppression and on weekend suppression standby.

Table 13. Prescribed burns

COMPARTMENT	DATE	D/G	Acres
O-05	Jan 22	D	512
O-02N	Feb 03	D	90
O-16W	Feb 07	D	211
O-04	Feb 19	D	273
G-09	Mar 06	D	497
G-14	Mar 20	D	724
G-15S	Mar 21	D	154
G-15M	Mar 21	D	119
G-19	Apr 06	G	84
G-03	Apr 20	G	508
O-17N	Apr 21	G	246
G-16	Apr 26	G	246
G-07 trail	Apr 30	G	20
G-07	May 07	G	210
G-10	May 13	G	240
G-15N	May 20	G	251
Total acres			**4385**

D=dormant season, G=growing season

Burning G-19

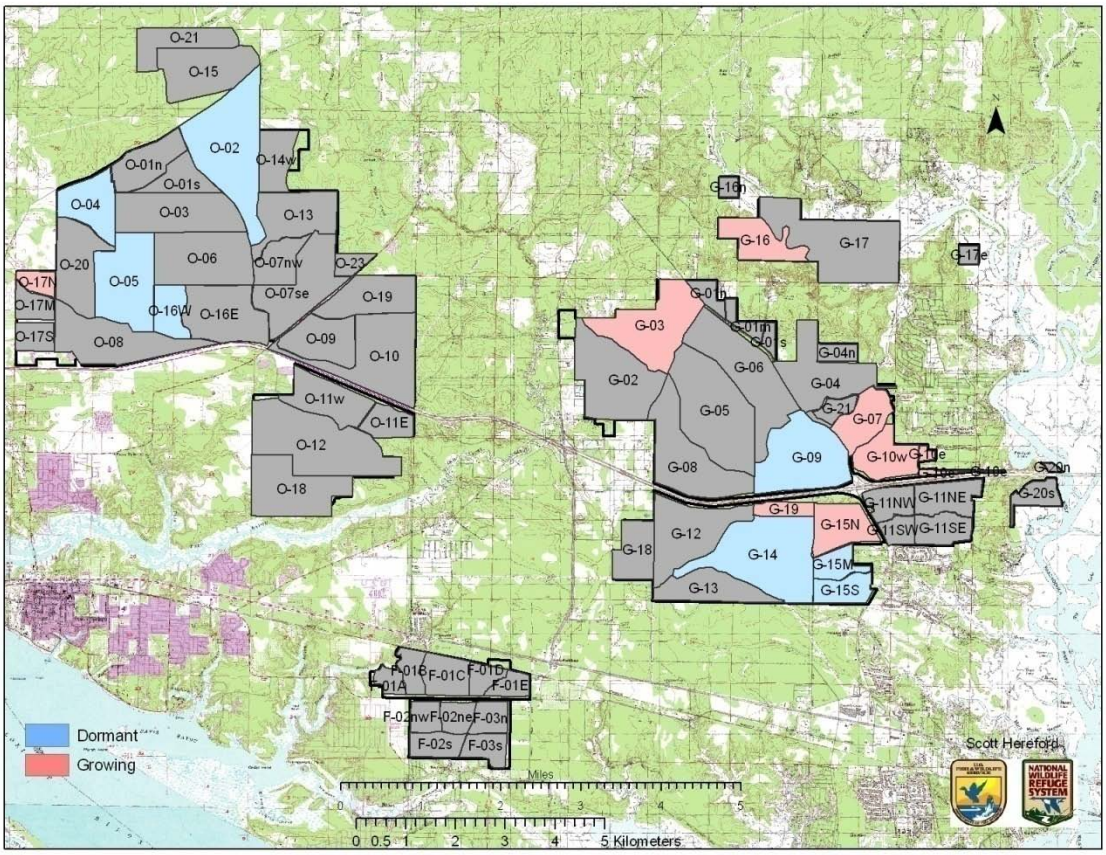


Figure 10. Refuge management compartments treated with prescribed burn.

Burning around cranes

Although there was an active crane nest in April in the northwest corner of G-19, the nest was in a pond and we chose to go ahead with the burn with precautions to reduce disturbance. It was believed the pair (303 024) would be able to tolerate. On the day of the burn, we replaced the two eggs with dummy eggs. That evening, we conducted the burn with reduced activity near the nest, and replaced eggs two days later. The pair eventually hatched one egg.

2G. INVASIVE PLANT MANAGEMENT [L Billodeaux]

The exotic invasive cogongrass (*Imperata cylindrica*) had become a problem by forming monotypic stands in refuge crop units and was beginning to supplant native savanna vegetation. Total acreage exceeded 140 acres by 2000. More aggressive management is finally showing results. This year we applied herbicide to 41.72 acres within crop units and along savanna edges. We also targeted savannas that were recently burned. Herbicide was applied with backpack and ATV sprayers. We applied a first treatment on >95% of our target areas but were unable to get a second treatment done due to fall weather conditions.

Using injectable imazapyr capsules, our interns treated 0.06 acres of Chinese tallow trees along Old Spanish Trail (F-01). Also in November, we had a Boy Scout Hornaday Project that treated 9.95 acres of Chinese tallow using Garlon 3a (hack and squirt treatment) south of the Southeast Sprayfield (O-02).

In addition to our staff and volunteer work on invasives, the local power company contracted out treatment of the powerline right-of-ways for removal of cogongrass and woody vegetation. The crews treated 121.09 acres of powerlines on the refuge by applying herbicide with backpack sprayers.

Billodeaux completed Pesticide Usage reports for 2009 and submitted Pesticide Use Proposals for 2010.

3-FISH AND WILDLIFE MANAGEMENT

3A. BIRD BANDING

To affix or replace bands and radio transmitters, five AHY cranes were captured in 2009 in five successful trapping events on five days. All were captured using nooses. (Table 14)

Table 14. Crane Captures

Date	Location	IDs	Technique	New Radio	Blood Taken
Jan 15	Dunn Yard	435	noose	lb	
Jan 27	Ocean Springs Pen	961	noose		√
Feb 13	Gautier crop Unit	503	noose	bp	√
Feb 19	Raley Pasture	818	noose		√
Mar 25	Ben Williams Crop Unit	139	noose	bp	√

UB=unbanded, bp=backpack, lb=legband mount

A small amount (0.5-3cc) of blood was taken from the leg vein of four birds for the genetic study of the subspecies led by the University of New Orleans. Three birds were fitted with radio-transmitters. There were 10 captive-reared juveniles affixed with backpack-mount radio-transmitters during fall releases.

At least four radios malfunctioned or quit working including 054,169, 962, and W-38. Two other cranes with radios (139 973) were missing by the end of the year. W-36 is missing which may be due to the radio quitting or the bird moving to an unknown location. Working radios were removed from eight carcasses (435 442 503 835 837 954 974 975) and one injured bird (832) that was taken to ACRES. By the end of the year, 34 cranes had working radios, a 17% decrease from a year earlier. [L Billodeaux]

3B. DISEASE MONITORING AND TREATMENT.

See Crane Mortality under 1A.

3C. REINTRODUCTIONS

With continued low natural recruitment, there was a continued need to supplement the free-flying population with captive-reared juveniles from our conservation partners, the Audubon Nature Institute's Species Survival Center and the White Oak Conservation Center. Beginning in 1981, these are the longest and largest crane releases in the world to date. About 468 cranes have been transferred and 448 released over the years.

In the 29th year of the supplementation program with the 2008-9 releases, 20 captive-reared juveniles were transferred into three pens. Eight (821-828) were transferred December 9, 2008 into the Gautier Pen. Seven (831-837) were transferred December 16 into the Fontainebleau Pen and five (841-845) December 18 into the Ben Williams Pen. The new Fontainebleau pen was used for the first time. All three cohorts were debrailled in January 2009: the 820s in Gautier Pen on January 9 and both the 830s in Fontainebleau Pen and 840s in Ben Williams Pen on January 16. Crane 832 sustained a leg injury during acclimation and was not released. The 820s all survived and maintained a cohesive group of eight but moved their core of activity to south Gautier Unit. Four of the 830s survived and they maintained their group and core use areas in south Fontainebleau Unit. Unfortunately, all five of the 840s died within one month of debrailling (see Mortality under Crane 1A). Four were killed by predation one-by-one near their release pen. Due to the loss of that entire cohort, overall 1st year post-release survival for the year was only 63%.

In the 30th year with the 2009-10 releases, 10 captive-reared birds were released onto the refuge by the end of year. On October 27, White Oak transferred four parent-reared juveniles to the refuge for direct release. Two (974 975) were direct released later that day at dusk into Firetower Pond roost to join groups of eight and four subadults. At Brown's Trail Crop Unit about the same time, 973 was direct released towards the North Valentine Pond roost to join a pair and possible subadult. The next morning, October 28, 971 was direct released into Utah Crop Unit after the West Utah pair (W-19 and 146) appeared. Only one of the direct released birds survived – by joining a nearby pen cohort. This technique did not appear to be a viable alternative in the autumn/winter. Six captive-reared juveniles (981 982 983 984 985 986) were transferred to the Ocean Springs Pen for acclimation on October 28. They were debrailled a month later on November 30. An additional cohort of five from Audubon was expected to be transferred to the Gautier Crop Unit in January 2010.

Crane banding crew

Acclimation Day 1: 980s in Ocean Springs pen visited by local pair

3D. PROVIDE NEST STRUCTURES

Near the end of the crane nesting season, we provided nest mounds in Beasley Pond, Fontainebleau Pen Pond and Gautier Pen Pond. In April, we cleaned and prepared 8 of 9 kestrel nest boxes. The boxes were not used by kestrels - none were observed during the nesting season on the refuge. A translocation of the southeastern subspecies (*F.s. paulus*) may be necessary to bring back this native falcon to the refuge.

3E. PEST, PREDATOR AND EXOTIC ANIMAL CONTROL [L Billodeaux]

Predation continues to be the number one known cause of mortality in all age classes of cranes. From 2000-6 we had an Interagency Agreement with USDA APHIS Wildlife Services (WS) for predator management but this was discontinued because of funding constraints.

In winter of 2009, a trapping intern was hired from January through March. During his time here he removed two coyotes, one bobcat, ten raccoons, four opossums (with ~18 babies) and two rabbits (Table 15). These animals were trapped across 1182 foothold trapnights, 241 snare trapnights, and 158 snare trapnights. For the remainder of the nesting season (April-July) refuge staff ran trap lines as time and other duties allowed. The staff ran 480 foothold trapnights, 57 snare trapnights, and 101 cage trapnights to remove three coyotes, one bobcat, two raccoons, two opossums and one barred owl. One raccoon, one red-tailed hawk, two Canada geese, and four geese nests were removed opportunistically by refuge staff.

In preparation for the winter release of captive-reared juveniles, 447 foothold trapnights and 6 conibear trapnights were conducted in November and December by a volunteer and contract trapper. Three coyotes, one gray fox, nine raccoons, and seven opossums were removed due to this trapping effort.

Table 15. Predator trapping effort and number of predators removed.

#Trapnights	Coyote	Bobcat	Fox	Dog	Raccoon	Other
2273	8	2	1	0	21	10

Nest barrier at East Valentine

With the successful fledging of chicks from inside the Ocean Springs Pen in 2007-8, we decided to set up some barriers around selected nesting ponds. We tried three different materials to build 1200' perimeter 2-ac barriers. In February, we set up a 3'silt-fence nest barrier in Woodlake crop unit and adjacent nest pond. In March, we used 4' high weed cloth to set up a barrier in Beasley Pond/Crop Unit. In April, we used 4' high green plastic fencing from the Volm Company and metal t-posts to build a barrier at East Valentine Pond and adjacent savanna. To "entice" pairs to lay eggs in fenced areas we provided hay nest mound material inside pens/barriers at Beasley, Woodlake, Ocean Springs, Fontainebleau, Gautier and Ben Williams. Only the Volm plastic fencing maintained its shape and integrity through the nesting season. The silt fence and weed cloth both quickly and easily sagged, ripped, or otherwise did not maintain an effective barrier. All those materials were removed. At East Valentine, the fencing was removed in late spring but the t-posts were left in place.

IV. COORDINATION ACTIVITIES

4A. INTERAGENCY COORDINATION

- Hereford and Billodeaux met with Leah Bray of National Capital Development to discuss potential cooperative conservation projects.
- Hereford surveyed the north Ocean Springs Unit with restoration ecologist Dr. Andre Clewell.
- We coordinated with the Field Ecology Department of the International Crane Foundation on crane trapping techniques and with the Audubon Species Survival Center and White Oak Conservation Center on crane transfer and release.
- Hereford and Billodeaux coordinated with Federal Highways on planning for refuge roads project. See 8B.
- Hereford and Billodeaux hosted a meeting of Gulf Coast Joint Venture's Mississippi

and Alabama Coast Initiative. (Mar)

- Hereford submitted a Showing Success endangered species proposal to Regional Office.
- We met with TNC staff to discuss potential crane releases.
- Hereford worked with a FWS writer on a MSC article for *Endangered Species Bulletin*.
- Nigel Jarrett of the UK's Wildlife and Wetlands Trust conferred with Hereford regarding the Great Crane Project to reintroduce Eurasian cranes back to England.
- Hereford and Billodeaux hosted visit with Mark Woodrey (Grand Bay National Estuarine Reserve), Catherine Rideout (FWS-East Gulf Joint Venture Coordinator), and Barry Grand (USGS Auburn Coop. Wildl. Research Unit) in the field to discuss grassland bird monitoring.
- Hereford provided letter of support to Audubon SSC application for an AZA Award.
- Hereford completed and submitted a crane habitat model form to the MS Museum of Natural Science as part of the MS Comprehensive Wildlife Strategy.
- Hereford provided comments of fire effects on cranes to the USDA Fire Effects Center in Missoula. (Jul)
- Hereford provided an ArcMap shapefile of off-refuge crane locations since 2000 to Dave Felder in the FWS MS Field Office.
- Hereford provided comments on an annual gopher tortoise management reporting form to the Regional Office.
- Hereford participated in a meeting at Jackson County Utility Authority regarding their proposed northern expansion.
- Hereford completed a request by Megan Savioe to update the studbook with 2009 chick data.
- Hereford completed a survey for MS DWFP on wildlife bureau information.
- Hereford provided crane critical habitat information to EPA's Alanna Conley.
- Hereford provided comments on ES Recovery Data Call for 2008-9.
- Hereford and Billodeaux attended a meeting on Red Bay mortality.
- Hereford and Billodeaux met with Ray Herndon of The Conservation Fund.
- Hereford met with and provided comments to State Ornithologist Nick Winstead on bird research and surveys needs.
- Hereford prepared information on predator trap types and purpose and submitted predator trapping photos per a FOIA request from the Animal Welfare Institute.
- Hereford submitted a 2009 gopher tortoise conservation activity report.
- Hereford gave a tour of crane pens to four biologist/managers of LA Wildlife and Fisheries (Bob Love, Buddy Baker, Jeb Linscombe, and Tom Hess) and discussed acclimated release technique. They are planning a whooping crane reintroduction.
- Hereford and Billodeaux completed an Intra-Service Section 7 for roads project. Hereford attended semi-annual a Gulf Coast Joint Venture Coastal MS &AL Initiative meeting at Grand Bay NERR.
- Hereford and Billodeaux closely coordinated with Fire Mgmt to clear selected compartments for growing season burns, working around active crane nests and completed recommendations for 2009/10 WUI fuels reduction project planning in

Fontainebleau Unit and along I-10.

4B. PRIVATE LANDS

We provided comments on potential impacts of proposed subdivision development on Arguelles.

V. RESOURCE PROTECTION

5A. LAW ENFORCEMENT

In November, trespassers burned and destroyed the observation blind in Martin Crop Unit.

5B. PERMITS AND ECONOMIC USE MANAGEMENT

Biologist Hereford completed the Endangered Species Permit report on 2009 activity and sent to Regional Office.

5C. CONTAMINANTS INVESTIGATIONS AND CLEANUP

Biologist Billodeaux met with John Cambre from Waste Oil Collectors, Inc. for a cost estimate on removal of hazardous waste on the refuge.

VI. OUTREACH AND VISITOR SERVICES

6A.PROVIDE VISITOR SERVICES

In May, Wildlife Interns Hanson and Hardman assisted Refuge Rangers with a program for a St. Martin elementary 5th grade visit. In June, Hereford provided comments on the Visitor Services Plan public use area strategies. In July, we assisted in running the Visitor Center July 21 – 25 while the public use staff was out. In August,
Billodeaux conducted a tour for Audubon SSC interns. We assisted with the Oct 17Crane Fest by giving crane presentation and assisting Audubon personnel with their live crane exhibit. That same weekend, Intern Galla assisted with a refuge booth at the Gautier Mullet Fest. Interns Galla and Stuckert assisted public use staff on Dec 11th with 300 5th graders from a St. Martin school.

6B. OUTREACH

Hereford made comments on a revised draft of an Endangered Species Bulletin article on the MSC by FWS writer Susan Morse. In May, Hereford took the South Beasley chick for a short visit to two science classes at Taconi Elementary school in Ocean Springs.

A Sun Herald newspaper story covering crane banding with a photo story appeared Oct 29. The Crane release and Autumn Crane Count was featured on Animal Planet's Animal News blog for Nov 9. http://blogs.discovery.com/animal_news. The Count was also featured in a story in the Mississippi Press newspaper Nov 11.
http://www.gulflive.com/news/mississippipress/news.ssf?/base/news/1257950712127450.xml&coll=5

VII. PLANNING AND ADMINISTRATION

7A. GENERAL ADMINISTRATION

- We completed biological portion of RAPP report (refuge accomplishments for FY09, targets for FY10). (Aug)
- Hereford completed and submitted a FY08 1113 recovery accomplishment report and an expenditure report to Regional Office.
- Hereford submitted FY10 1113 End.Species Flex Fund proposal to Regional Office.
- Hereford submitted an article for the NACWG Unison Call newsletter.
- Hereford distributed 2008 Annual Biological Narrative.
- We gathered images for National Wildlife refuge System photographer Steve Hillebrand.
- Hereford provided comments to refuge management on impacts of wastewater runoff and recommended actions. (Jul)
- Hereford submitted two RONS project proposals (DP release pen, 5 nest barriers).
- Hereford completed SCA reference for former intern Michelle Ripple.
- Hereford completed graduate school recommendation for Elizabeth Hanson.
- Billodeaux completed recommendation for former intern Lisa Dlugolecki for grad school.
- We prepared for Tropical Storm Ida, including securing tall observation blinds. Luckily, much ado about nothing.
- We completed references for former employee Tracy Grazia and current intern Stephanie Galla.

7B. COMPREHENSIVE CONSERVATION PLANNING

During the summer, we worked on several sections of the Habitat Management Plan, including Background and Environmental Setting. In September, Hereford completed and distributed the Assessment section of the FY09 Annual Habitat Work Plan (AHWP), FY10 Annual Work Plan and FY10 Annual Habitat Plan.

7D. TRAVEL/TRAINING

- Intern Turner completed I-100 and annual fire refresher to be qualified to assist in fire operations. (Jan)
- Biologist Billodeaux & Intern Turner passed the annual arduous duty pack test. (Jan)
- Hereford and Billodeaux attended the USFWS Southeastern Biologist Conference at Calloway Gardens, Georgia focusing on networking and Strategic Habitat Conservation.(Feb)
- Interns Hardman, Hanson, and Turner completed Basic Aviation Training. (Mar)
- Hanson and Hardman traveled to Southeast Louisiana Refuges for Farm Tractor training. (Mar)
- Biologists completed records awareness, security, privacy, discrimination & whistle-blowing online training. (Apr)
- Wildlife Interns Hanson and Hardman completed ATV training, Type 2 Firefighter Training (S-130/190), and passed the pack test for arduous fire duty.

- Biologist Billodeaux attended the annual regional GIS training in Cookville, TN.
- Interns Hanson & Hardman and volunteer Colle visited the Species Survival Center in New Orleans. (Jul)
- Hereford completed Applied Conservation Genetics class at NCTC. (Jul)
- Adam Stuckert passed the pack test to qualify for arduous fire duty. (Sep)
- Hereford completed four hours of online diversity training (Sep)
- Billodeaux traveled to Texas with Q-net for repairs at factory. (Sep)
- Completed Annual Fire Refresher. (Oct)
- Biologists passed examination for state Commercial Pesticide Applicator. (Oct)
- Intern Adam Stuckert completed Basic Firefighter Training Modules. (Oct)
- Biologist Billodeaux traveled to SE LA Refuge Complex and passed the arduous pack test for Fire Fighter Type II qualification. (Dec)

Intern Adam Stuckert

XIII. Equipment and Facilities

8A. NEW CONSTRUCTION

Work began on the refuge Bunkhouse.

8B. REHAB/MAJOR MAINTENANCE

In January, Fire crew removed the destroyed Duck Pond (double "Texas Hunter") blind and the Ocean Springs S scaffold blind.

We participated in a conference call with Federal Highways to comment on plans for OS unit roads and Water Control Structures and effects on cranes. In April, we participated in a conference call with DOT hydrological engineers on road/WCS project. In August and September, Billodeaux mapped road overflow areas for DOT Federal Highways as part of the Post-Katrina refuge road improvement project. In October, we attended the 70% review meeting with Federal highways.

We cleaned out Bio Shed downstairs. In November, we replaced a missing marsh bird survey marker. Interns Galla and Stuckert cleaned and repaired all observation blinds for the Autumn Crane Count.

ACKNOWLEDGEMENTS

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We thank refuge volunteers for their help on the Annual Autumn Crane Count and other surveys, especially Master Birder Charley Delmas for his help with the winter grassland bird surveys, Amy Witt with nest searching, Refuge Ranger Emily Neidigh, volunteer Kim Colle and others assisted with monitoring release cranes. We are especially grateful to Refuge Managers Ted Rentmeister and Lloyd Culp for their continued support.

We thank our many conservation partners including the Audubon Species Survival Center, White Oak Conservation Center, The University of New Orleans Department of Biology, USGS National Wildlife Health Center, USGS Patuxent Wildlife Research Center, the International Crane Foundation and The Nature Conservancy.

Compiled and written by Scott Hereford except for sections where Lauren Billodeaux or other author is indicated in brackets. Unless otherwise noted, all photos: Scott Hereford, USFWS.

Lauren Billodeaux, Rose Butler, Liz Hanson, Ryan Hardman posing after swimming back from a marsh nest.