

TRACKING AND DIRECT AUTUMN RELEASE

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This report documents the biology of whooping cranes in the reintroduced eastern migratory population during calendar year 2007 with additional notes from January through mid-February 2008. The third year of direct autumn release (DAR) is also described. The distribution of cranes during this report period, overlaid on total distribution during the course of the reintroduction, appears in Fig. 1. Identification information for all whooping cranes in the eastern migratory population as of 15 February 2008 appears in Appendix A.

WINTER 2006/07

Movements and Distribution

The wintering population as typified by status on 19 February 2007 included 62 individuals (36 males, 26 females) distributed in Florida (45), Georgia (2), South Carolina (4), Tennessee (4), Alabama (2), Louisiana (1), and Indiana (4) (Table 1). A total of 22 individuals wintered in the primary wintering area (PWA) of the population in west-central Florida with an additional 12 individuals just north of this area on or near Paynes Prairie. Two HY2006 DAR juveniles wintered together in Pasco County in the PWA and 2 others wintered together in northern peninsular Florida.

HY2006 Ultralight-led Cohort

The 18 ultralight-led juveniles (9 males, 9 females) had arrived at the holding site on Halpata Tasthanaki Preserve (Halpata), Marion County, on 19 December 2006. They were led by ultralight aircraft to the pensite on Chassahowitzka NWR on 11-12 January. During early AM on 2 February, all members of the cohort except no. 15-06 died as a result of a severe thunderstorm with high winds, resulting high tides, heavy rain, and a lightning strike at the site while they were in a top-netted enclosure. No. 15-06 escaped and moved to Tsala Apopka Lake, near the holding site on Halpata. He was later attracted to a captive crane (no. 5-01, see Human Avoidance section) penned at the site. As a precaution against predation, he was also penned until after 5-01 was released. No. 15-06 was then released on St. Martins Marsh Aquatic Preserve on 3 March. He returned to Halpata on 7 March and remained there until he died from undetermined causes on approximately 21 April.

SPRING MIGRATION

Dates of departure from the winter areas appear in Table 1. Initiation of migration occurred from mid-February and continued through March, and three HY2005-06 males migrated atypically late in late April. By 29 March, 38 whooping cranes were confirmed returned to central Wisconsin.

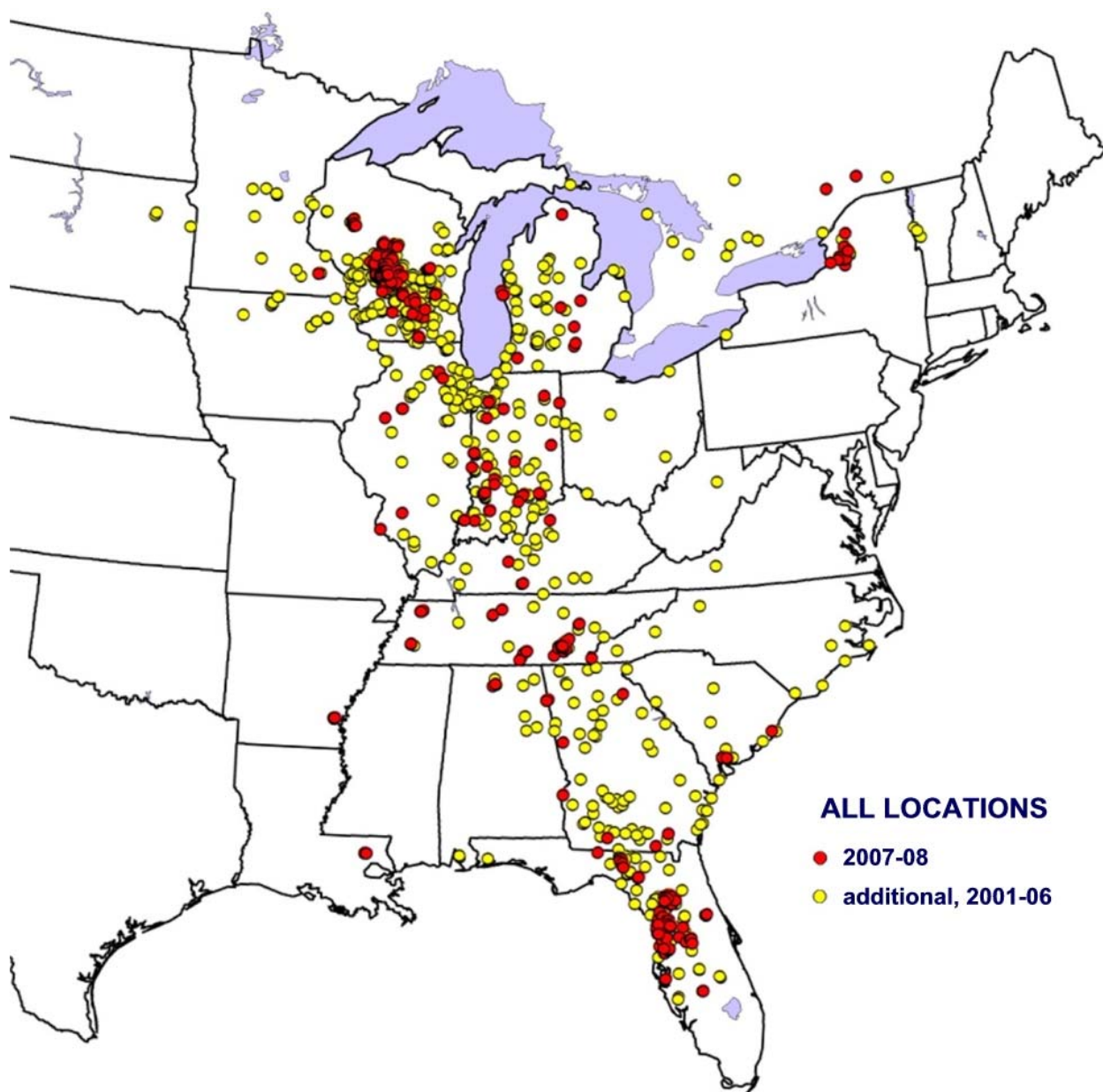


Figure 1. Distribution of whooping cranes in the reintroduced eastern migratory population, 2001-08.

Table 1. Wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2006/07. R = Direct Autumn Release.

Crane nos.	Location	County	Spring departure
Florida			
1-01, 2-02	Shamrock Acres	Citrus	13 Mar
2-01, 16-02	SW of Gowers Corner	Pasco	5 Mar
5-01 (until 1 Feb), 4-02 (died ~9 Jan)	Stafford Lake/Chassahowitzka NWR	Hernando/ Citrus	
5-01 (translocated 26 Feb)	Paynes Prairie	Alachua	
5-01 10-05 11-05 12-05 19-05 (9-27 Mar)	Paynes Prairie	Alachua	
5-01 19-05	Paynes Prairie	Alachua	28 Mar
1-02, 6-03	Lake Woodruff NWR	Volusia	7 Mar
5-02	NE of Gowers Corner	Pasco	22-23 Feb
11-02, 17-02, W1-06	Tooke Lake	Hernando	23 Feb
3-03, 17-03	Mud Lake	Sumter	5 Mar
7-03, 12-05, 19-05 (until 8 Mar)	Paynes Prairie	Alachua	
7-03	Paynes Prairie	Alachua	8 Mar
9-03, 7-04 (until 12 Jan)	Crews Lake	Pasco	
9-03, 7-04	Levy Lake	Alachua	19 Mar
12-03, 16-03	Paynes Prairie	Alachua	5 Mar
1-04, 20-05	Crews Lake	Pasco	13 Mar
2-04, 3-04, 12-04 (until 26 Dec)	Nichols Lake	Lafayette	
2-04, 3-04, 12-04	N San Pedro Bay	Taylor	19-20 Mar
8-04, 1-05, 14-05 (until 15 Jan)	NE of Gowers Corner/Crews Lake	Pasco	
8-04, 1-05, 14-05	Cockroach Bay	Hillsborough	19 Mar
15-04	Hixtown Swamp	Madison	>19 Feb
2-05, 3-05, 7-05	Priest Prairie	Levy	18 Mar
5-05, 6-05, 21-05	Lonesome Point, Tsala Apopka Lake	Citrus	13 Mar
9-05	Cherry Lake	Lake	22-28 Apr
10-05, 11-05 (until 9 Mar)	Paynes Prairie	Alachua	
10-05, 11-05, 12-05 (27 Mar)	Paynes Prairie	Alachua	27 Mar
16-05	Salt Sick Lake	Marion	22-28 Apr
23-05 (died late Mar), 24-05	Big Wolf Arbor	Levy	>16 Feb
15-06 (	St. Martins Marsh Aquatic Preserve	Citrus	
15-06 (died 21 Apr)	Halpata Tastanaki Preserve	Marion	
32-05R	SW of Sebring	Highlands	17-18 Mar
26-06R, 28-06R	Crews Lake	Pasco	24 Mar
27-06R, 32-06R (died by 22 Jan)	Koon Lake	Lafayette	21-22 Apr
Georgia			
12-02, 19-04	Sapling Prairie, Okefenokee NWR	Charlton	>19 Feb
Tennessee			
7-01	Hiwassee Wildlife Refuge/Tennessee River	Meigs	<4 Mar
27-05R	Hiwassee Wildlife Refuge	Meigs	13-21 Feb
28-05R	Hop-In Wildlife Refuge/Mud Creek	Obion/ Weakley	19 Mar
33-05R	Hiwassee Wildlife Refuge	Meigs	<1 Mar

Table 1. Continued.

Crane nos.	Location	County	Spring departure
South Carolina			
1-03, 11-03	Donnelley WMA	Colleton	24 Mar
10-03	Combahee Unit, ACE Basin NWR	Colleton	9-10 Mar
18-03	Kinloch Plantation	Georgetown	19-20 Mar
Alabama			
13-02, 18-02	Wheeler NWR	Morgan/ Limestone	20-21 Mar
Indiana			
9-02, 16-04	East Fork of White River	Jackson	12 Mar
8-02 (died 27 Dec), 13-03	Goose Pond SFWA	Greene	>20 Feb
20-04	East Fork of White River	Jackson	>6 Mar
Louisiana			
8-05	near Loranger	Tangipahoa	5-14 Mar

Nos. 9-03 and 7-04 had paired in Pasco County, Florida, during the winter but separated in Indiana during migration. No. 9-03 then returned to New York for the third consecutive spring.

SPRING, SUMMER, AND AUTUMN

As in previous years, almost all birds except some with a history in Lower Michigan returned to Necedah NWR or adjacent areas at the completion of spring migration (Table 2). Unlike previous years, and because of loss of the HY2006 ultralight-led cohort during the winter, there was no significant spring wandering period. One surviving yearling DAR male returned to Necedah NWR and then spent most of spring near Union Center, Juneau County; the other DAR male migrated to Michigan and was later retrieved. The wild-hatched and naturally reared female returned to Necedah NWR and then spent much of the spring near the Wisconsin River in Columbia County before returning to spend summer on the refuge.

With some exceptions (see below), released whooping cranes generally summered in or near the core reintroduction area in Central Wisconsin (Table 2, Fig. 2). Most birds were settled on summering areas by mid-June.

Autumn distribution was similar to summer distribution for most birds in the population (Tables 2 and 3). The main exceptions were as follows:

Nos. 5-05, 9-05, and 12-05 left Necedah NWR on 24 October and moved to Bass Creek, Rock County, in southern Wisconsin. This site had been used by nos. 5-05 and 6-05 during autumn 2006.

No. 6-05 left Necedah NWR on 6 October and was later found along the Lower Wisconsin River near Arena, Iowa County.

Table 2. Primary summering areas of whooping cranes in the reintroduced eastern migratory population, 2007. R = Direct Autumn Release.

Crane nos.	Location	County
Central Wisconsin Core		
1-01	Site 4/south Upper Rice Pool, Necedah NWR	Juneau
2-01 (until 3 Aug)	E of Cottonville	Adams
2-01 (after 3 Aug)	Site 3, Necedah NWR	Juneau
5-01	mid/northeastern Sprague Pool, Necedah NWR	Juneau
1-02 (missing after 9 June), 6-03 (died ~6 July)	Meadow Valley Flowage, Meadow Valley WMA	Juneau
5-02	Egret/Canfield/N Carter-Woggon Pools, Necedah NWR	Juneau
9-02, 16-04	Dandy Creek/Monroe County Flowages, Meadow Valley WMA	Monroe
11-02, 17-02	eastern East Rynearson Pool, Necedah NWR	Juneau
12-02, 19-04	G and adjacent flowages, Sandhill SWA	Wood
13-02, 18-02	Site 2, Rice/Rynearson Pools, Necedah NWR	Juneau
16-02, 8-05 (until 12 Sep)	Pool 13, Necedah NWR	Juneau
16-02 (after 12 Sep)	Sprague Pool, Necedah NWR	Juneau
1-03 (died 25 Sep), 11-03	northeastern Sprague Pool, Necedah NWR	Juneau
3-03 17-03	Pools 9/18/19, Necedah NWR	Juneau
7-03	N of Site 3/East Rynearson Pool, Necedah NWR	Juneau
10-03, 1-05	West Rynearson and adjacent Pools, Necedah NWR	Juneau
12-03, 16-03	central Sprague Pool, Necedah NWR	Juneau
13-03, 18-03	Carter-Woggon Pool, Necedah NWR	Juneau
1-04 (until 12 Sep)	Pool 18, Necedah NWR	Juneau
1-04, 8-05 (after 12 Sep)	Pool 13, Necedah NWR	Juneau
2-04	southern Necedah NWR; Yellow River Cranberry	Juneau
3-04, W1-06	western East Rynearson Pool, Necedah NWR	Juneau
7-04, 2-05 (until 3 Aug)	Pool 18, Necedah NWR	Juneau
7-04 (died 29-31 Aug), 2-05 (died 17 Aug)	NE Meadow Valley Flowage, Meadow Valley SWA	Juneau
8-04, 19-05	Goose Pool, Necedah NWR	Juneau
12-04, 28-06R (until 3 Aug)	E DU Unit and East Rynearson Pool, Necedah NWR	Juneau
12-04, 28-06R (after 3 Aug)	Sprague Pool, Necedah NWR	Juneau
15-04	Quincy Bluff area	Adams
3-05, 7-05 (missing since 26 May)		
5-05	western Sprague Pool complex, Necedah NWR	Juneau
6-05	undetermined; Pool 27 (by 7 Aug), N of Necedah NWR	Juneau
9-05	Pool 13, Necedah NWR	Juneau
10-05 (died 8 July), 11-05	S of Site 3, Necedah NWR	Juneau
12-05	Pool 13, Necedah NWR	Juneau
14-05	Pool 13, Necedah NWR	Juneau
20-05	Seventeen Flowage, Black River SF	Jackson
24-05	Sprague Pool, Necedah NWR	Juneau
27-06	Pool 13, Necedah NWR	Juneau
32-05R (died 4-14 July)	Cutler Ditch marsh, SW Necedah NWR	Juneau

Table 2. Continued.

Crane nos.	Location	County
Wisconsin Outside of Core		
7-01	Horicon NWR area	Dodge/Fond du Lac
20-04	Chippewa County Forest and vicinity	Chippewa/Rusk
27-05R	Wolf River/N of Lake Poygon	Winnebago
28-05R	McMillan Marsh SWA and vicinity	Marathon
Michigan		
16-05	Near Williamston	Ingham
33-05R	Pine/Knickerbocker Lakes and vicinity	Van Buren
New York		
9-03	Black River and vicinity	Lewis

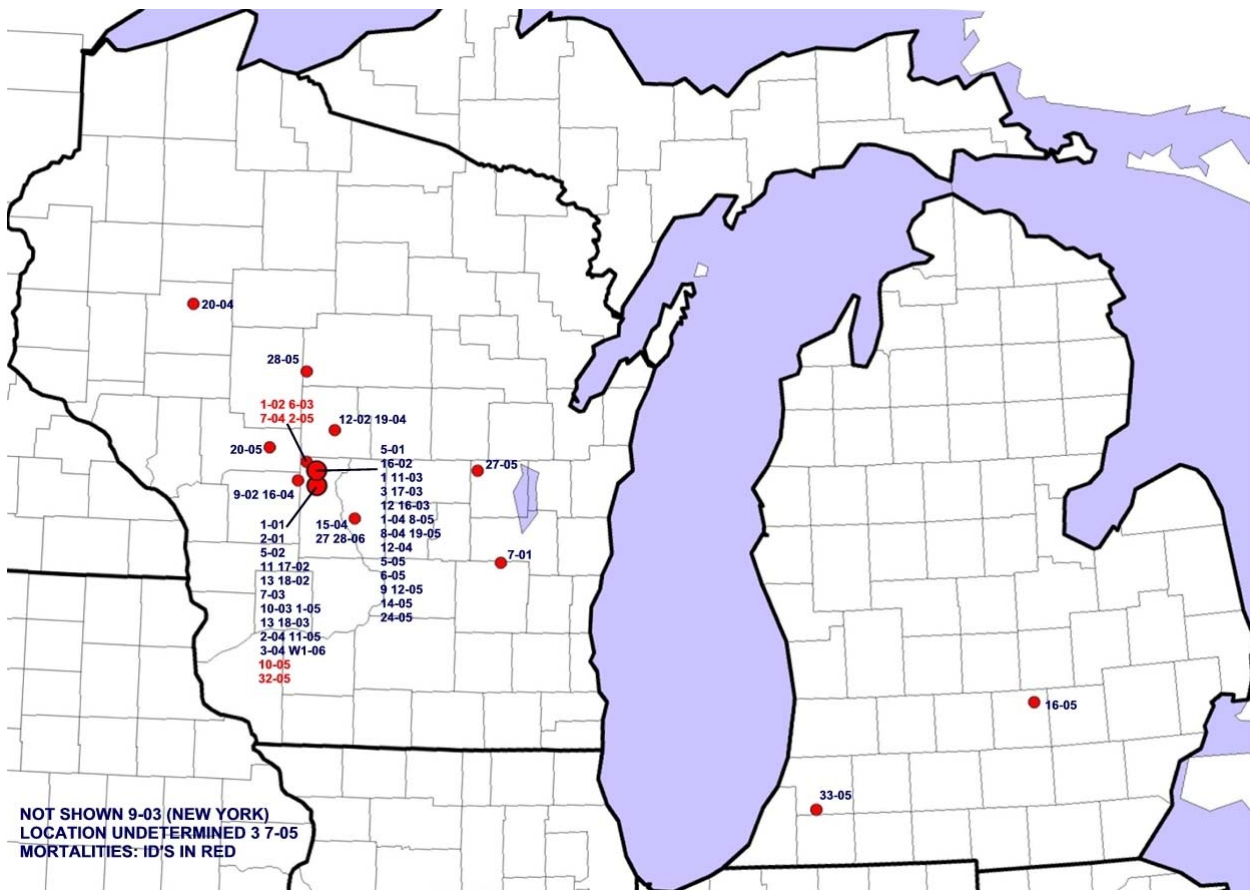


Figure 2. Primary summer use areas of whooping cranes in the eastern migratory population, 2007.

Table 3. Primary autumn use or staging areas of whooping cranes in the reintroduced eastern migratory population, 2007. Only areas different from or in addition to summer areas (Table 2) are listed. R = Direct Autumn Release. SL = summer location also used during autumn.

Crane nos.	Location	County
Central Wisconsin Core		
5-01	Mill Bluff/Volk Field, SL	Juneau
5-02	Sprague Pool, Necedah NWR	Juneau
9-02, 16-04	W of Mill Bluff , SL	Monroe/Juneau
12-02, 19-04	Seneca and vicinity	Wood
16-02	Mill Bluff, SL	Juneau
13-02, 18-02	Mill Bluff, SL	
7-03, 2-04, 12-04, 11-05, 14-05, W1-06	southern Necedah NWR and vicinity	Juneau
9-03 (translocated 3 Oct), 3-04	western Eastern Ryneerson Pool, Necedah NWR, and vicinity	Juneau
11-03, 12-03	northeastern Sprague Pool, Necedah NWR	Juneau
12-04, 14-05 (until 21 Oct)	Sprague Pool complex, Necedah NWR	Juneau
5-05, 9-05, 12-05 (until 24 Oct)	northwestern Sprague Complex, Necedah NWR	Juneau
20-05 (Oct)	near Shortville	Clark
20-05 (Nov)	Tomah	Monroe
27-06R, 28-06R	Quincy Bluff/Juneau County Ditch	Adams/Juneau
Wisconsin Outside of Core		
5-05, 9-05, 12-05 (after 24 Oct)	Bass Creek, SW of Hanover	Rock
6-05	Lower Wisconsin River near Arena	Iowa
Michigan		
16-05	near Munith/Haehnle Sanctuary	Jackson
33-05R	SW of Knickerbocker Lake	Van Buren/Cass
New York		
9-03	near Lacona	Oswego

DAR nos. 27-06 and 28-06 staged with sandhills at Quincy Bluff, Adams County, and near Mauston, Juneau County.

AUTUMN MIGRATION

Migration departures in approximate order by date were as follows:

HY2007 DAR nos. 36, 41, and 46: 31 October

No. 24-05: after 28 October and by 4 November

DAR nos. 27-06 and 28-06: 5 November. Arrived in Citrus County, Florida, on 9 November and by 12 November had completed migration to Crews Lake, Pasco County, where no. 28-06 had wintered the previous year.

HY2007 DAR nos. 37, 39, 40, 42, 43, and 44: 6 November

Nos. 11-03 and 12-03: 12 November

No. 15-04: shortly after 16 November

No. 7-01: shortly after 18 November

No. 33-05: after 19 November

No. 16-05: after 19 November

No. 5-01: 21 November

Nos. 7-03, 2-04, 12-04, 11-05, 14-05, and W1-06: 21 November

Optimal migrating conditions occurred on 22 November, and the following birds began migration on that date:

Nos. 1-01, 2-01, 9-02 and 16-04, 11-02 and 17-02, 12-02 and 19-04, 13-02 and 18-02, 10-03 and 1-05, 13-03 and 18-03, 1-04 and 8-05, 20-04 (by this date), and 28-05

6-05: after 23 November

Another optimal migration day occurred on 27 November and resulted in departure of the remaining birds:

Nos. 16-02, 3-03, and 17-03; 9-03 and 3-04; 8-04 and 19-05; 5-05 and 12-05; 20-05; and 27-05 (on or by this date)

No. 9-05: 23 November

The following cranes passed through Jasper-Pulaski or the vicinity during autumn migration: Nos. 1-01, 5-01, 9-03 and 3-04, 10-03 and 1-05, 20-04, 24-05, and 27-05.

WINTER 2007/08

This was the second consecutive year of severe drought on the wintering areas in Florida and part of widespread drought across southeastern U.S. during the current winter. Arrivals on the wintering areas (major or final as in Table 4 unless specified otherwise) appear below. Wintering areas as of mid-February appear in Fig. 3.

Table 4. Wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2007/08. R = Direct Autumn Release.

Crane nos.	Location	County
Florida		
1-01	Shamrock Acres	Citrus
11-02, 17-02, W1-06	Tooke Lake	Hernando
12-02, 19-04	NE of Gowers Corner	Pasco
16-02	SW of Gowers Corner	Pasco
9-03, 3-04	Cedar Hammock	Levy
16-03, 11-05	Long Pond	Marion
2-04, 12-04	SW of Mascotte	Lake
8-04, 14-05, 19-05	Cockroach Bay	Hillsborough
6-05	Evans Prairie	Sumter
9-05	Cherry Lake (early winter only)	Lake
12-05	Lochloosa/Orange Lakes (early winter only)	Alachua
16-05	Lindsey Lake	Marion
27-06R, 28-06R	Crews Lake	Pasco
Tennessee		
5-01 (translocated 16 Dec), 20-04	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
7-01	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
1-04, 8-05	Bells Bend	Davidson
5-05, 15-04	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
20-05	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
27-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
28-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
33-05R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
37-07R, 46-07R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
HY2007 39R, 42R, 43R, 44R	Hiwassee Wildlife Refuge/Armstrong Bend	Meigs
40-07R	Hop-In Wildlife Refuge	Obion
South Carolina		
10-03, 1-05	Combahee Unit, ACE Basin NWR	Colleton
11-03, 12-03	Donnelley WMA	Colleton
Alabama		
13-02, 18-02	Wheeler NWR	Morgan
Indiana		
2-01	Goose Pond FWA	Greene

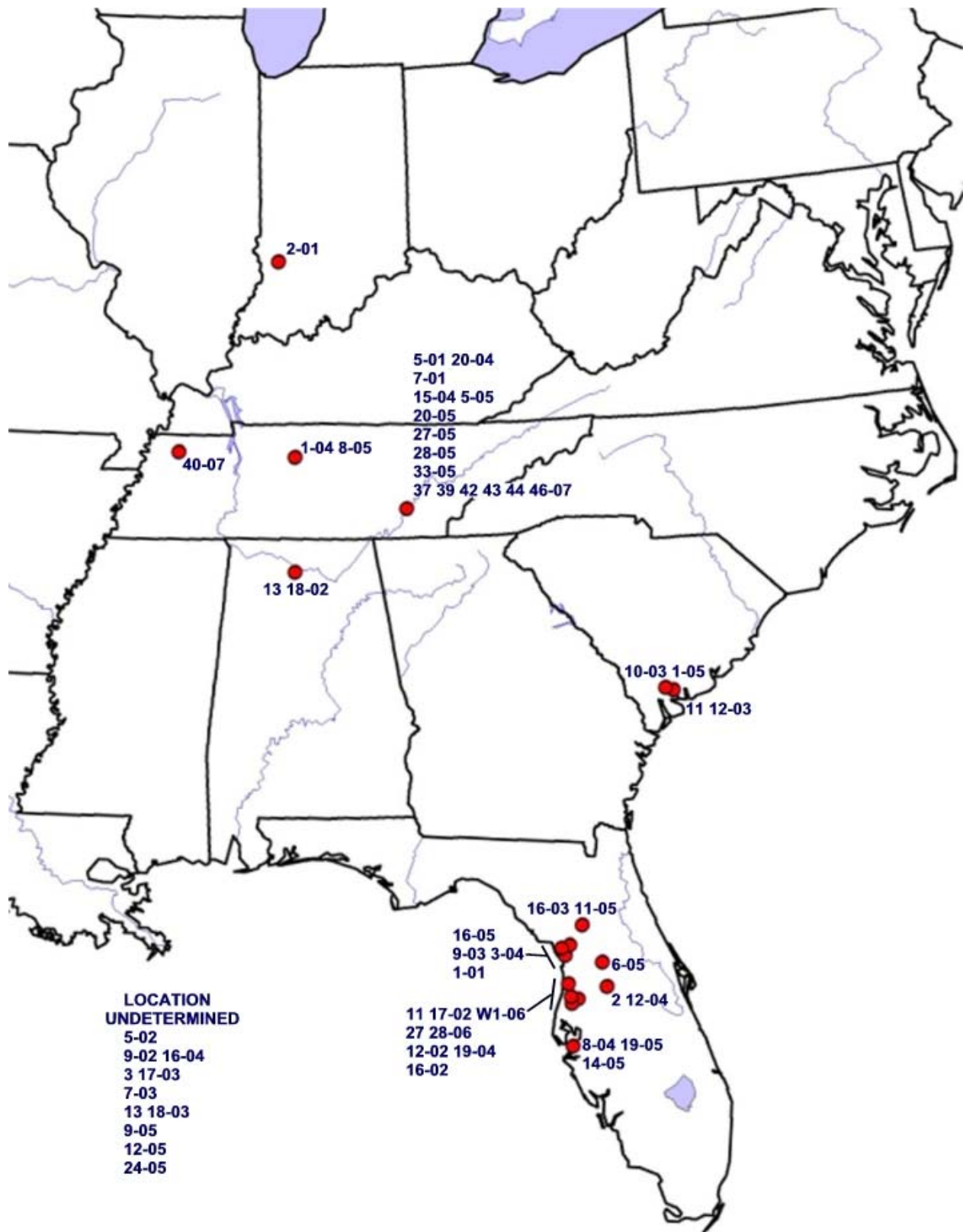


Figure 3. Winter use areas of whooping cranes in the eastern migratory population, winter 2007/08 (distribution in mid-February).

No. 1-01: by 6 December

No. 2-01: 23 or 24 November

No. 5-01: 28 November. Translocated to Hiwassee Wildlife Refuge, Tennessee, on 16 December (see Human Avoidance section)

No. 7-01: by 28 November

Nos. 9-02 and 16-04: Near Carrollton, Carroll County, Georgia, from 11 January to 2 February and then moved to undetermined location.

Nos. 11-02 and 17-02: 4 January

Nos. 12-02 and 19-04: by 6 December

Nos. 13-02 and 18-02: by 28 November

No. 16-02: by 11 December

Nos. 3-03 and 17-03: Arrived at Long Pond, Marion County, Florida, between 30 January and 3 February and moved to undetermined location on 5 or 6 January.

Nos. 9-03 and 3-04: Arrived at Chassahowitzka NWR on 3 January. Several subsequent movements until arriving at Cedar Hammock, Levy County, on 28 January.

Nos. 10-03 and 1-05: by 30 November

Nos. 11-03 and 12-03: by 16 November

Nos. 13-03 and 18-03: Arrived at Chassahowitzka NWR on 5 January. Last recorded in flight in northeastern Florida en route to undetermined location.

No. 16-03: by 6 December

No. 11-05: 2-6 December

Nos. 1-04 and 8-05: by 15 December

Nos. 2-04 and 12-04: by 19 December

Nos. 8-04 and 19-05: Arrived at Paynes Prairie on 4 December. Arrived at Cockroach Bay by 19 December

Nos. 15-04 and 5-05: by 28 November (15-04) and 1 December (5-05)

No. 20-04: 24 November

No. 6-05: Arrived on Chassahowitzka NWR on 5 January. Several subsequent movements, eventually settled on Evans Prairie, Sumter County, by 28 January.

No. 9-05: Arrived in general area of Cherry Lake, Lake County, by 19 December (moved to undetermined area by 9 January)

No. 12-05: 4 December at Paynes Prairie (moved to undetermined location on or after 29 December)

No. 14-05: Arrived at Tooke Lake on 2 December. Arrived at Cockroach Bay by 19 December.

No. 16-05: Arrived at Paynes Prairie on 12 December. On Lindsey Lake by 14 December.

No. 20-05: by 27 November

No. 27-05: 3 December

No. 28-05: by 1 December

No. 33-05: by 1 December

No. W1-06: 2 December

Nos. 27-06 and 28-06: by 12 November

DAR HY2007 nos. 37, 39, 40, 42, 43, and 44: Translocated from Monroe County, Illinois, to Hiwassee Wildlife Refuge, Tennessee, on 11 December. No. 40 later wintered on Hop-In Refuge, Obion County, where she arrived by 2 January.

No. 46-07: Translocated from Desha County, Arkansas, to Hiwassee Wildlife Refuge, Tennessee, on 1 December.

SURVIVAL

Excluding the 17 HY2006 ultralight-led juveniles that died during confinement in a storm, 109 whooping cranes have been released as juveniles since the reintroduction began in 2001. This total also includes the single naturally produced juvenile. As of 15 February 2008, there have been 32 confirmed mortalities among these individuals (Table 5). Primary contributing factors were predation (18), powerline strike (3), gunshot (2), capture myopathy (1), and other or undetermined (8). Mortalities due to predation resulted mainly from bobcats in southeastern U.S. and several possible predators in Wisconsin. The first two cases of apparent alligator predation occurred in 2007 in Florida. High quality wetlands were dewatered due to severe drought, and cranes were diverted to use of areas with normally deeper water that supported large numbers of alligators. During the 16-month period from late May 2006 to late September 2007, the mortality

Table 5. Post-release mortalities of free-flying whooping cranes in the reintroduced eastern migratory population, 2001-07 (2007 mortalities in bold).

Hatch year	Crane no.	Sex	Stud-book no.	BBL Band no.	Mortality date	Location	Primary contributing factor
2001	4	M	1632	659-00216	17 Dec 2001	Chassahowitzka NWR, Fla.	Bobcat predation
2001	6	M	1634	659-00209	~2 May 2005	Jackson Co., Wis.	Predation of injured bird
2001	10	F	1640	659-00217	10 Jan 2002	Chassahowitzka NWR, Fla.	Bobcat predation
2002	2	F	1661	599-32112	late Mar 2007	Unknown (missing)	Unknown (missing)
2002	3	F	1662	599-32116	~21 Jul 2006	Necedah NWR, Wis.	Predation
2002	4	F	1663	599-32117	~9 Jan 2007	Hernando Co., Fla.	Unknown (not predation)
2002	7	F	1667	599-32119	30 Aug 2003	n. a.	Capture myopathy (euthanized)
2002	8	M	1668	599-32113	27 Dec 2006	Greene Co., Ind. (retrieved alive 23 Dec)	Powerline collision (asphyxiated by tube feeding)
2002	14	F	1675	599-32123	2 Feb 2005	Chassahowitzka NWR, Fla.	Bobcat predation
2002	15	F	1676	599-32124	23 Dec 2004	Limestone Co., Ala.	Gunshot
2003	1	F	1696	599-34041	25 Sep 2007	Necedah NWR, Wis.	Eagle predation
2003	2	M	1697	599-34044	~5 Jul 2006	Monroe Co., Wis.	Predation
2003	4	M	1699	599-34045	23 Oct 2005	Necedah NWR, Wis.	Trauma (source unknown)
2003	5	M	1700	599-34046	13 Nov 2004	Cape Romain NWR, S.C.	Bobcat predation
2003	6	M	1701	599-34047	~6 Jul 2007	Juneau Co., Wis.	Predation (possibly canid)
2003	19	M	1714	599-34055	~23 Jul 2004	Oceana Co., Mich.	Gunshot
2004	5	M	1748	599-37452	14 Mar 2005	Chassahowitzka NWR, Fla.	Bobcat predation
2004	7	M	1750	599-37453	~30 Aug 2007	Juneau Co., Wis.	Necropsy pending
2004	14	M	1757	599-37456	3 May 2005	Juneau Co., Wis.	Predation
2004	17	M	1760	599-37458	~25 May 2006	Wood Co., Wis.	Predation
2004	18	M	1761	599-34057	~9 Jul 2005	Green Lake Co., Wis.	Powerline collision
2005	2	F	1783	599-37237	17 Aug 2007	Juneau Co., Wis.	Epicardial hemorrhage (tentative)
2005	10	F	1792	599-37240	8 Jul 2007	Necedah NWR, Wis.	Predation
2005	21	F	1804	599-24697	9-12 Feb 2007	Citrus Co., Fla.	Bobcat predation
2005	22	M	1805	599-24698	Summer 2006	Mason Co., Mich.	Unknown
2005	23	M	1806	599-24699	late Mar 2007	Levy Co., Fla.	Alligator predation
2005	32^{DAR}	M	1817	599-37459	4-14 July 2007	Juneau Co., Wis.	Predation (possibly canid)
2006	15	M	1846	599-55918	~21 Apr 2007	Marion Co., Fla.	Unknown (not predation)
2006	26^{DAR}	M	1862	599-55904	13 Apr 2007	Daviess Co., Ind.	Bobcat predation
2006	32^{DAR}	F	1871	599-55901	~20 Jan 2007	Lafayette Co., Fla.	Alligator predation
2007	36^{DAR}	M	1913	599-55928	4 Nov 2007	Grayson Co., Ky.	Powerline collision
2007	41^{DAR}	M	1920	599-55930	31 Oct 2007	Dane Co., Wis.	Aircraft collision
2007	45^{DAR}	F	1924	599-55926	30 Oct 2007	Necedah NWR, Wis.	Coyote predation

rate in the population was 4.25 deaths/100 bird-days. The mortality rate during the previous history of the reintroduction was only 1.93 deaths/100 bird-days. The increase coincided with drought on both the wintering areas and in Wisconsin.

POPULATION STRUCTURE, SPRING 2007

At the beginning of April, there were 60 individuals (35 males and 25 females) in the population. This total contained 8 previously existing and 2 newly formed pairs. Pairs with females at least 4 years old (8 pairs) and one pair with a 3-year-old female could potentially nest.

Four pairs, all containing at least one member that had nested previously, produced eggs. Two additional pairs built nests but did not lay, and no reproductive activity was noted for the remaining pairs. None of the nests were successful.

NEST ACCOUNTS

Nos. 9-02 and 16-04 nested in sedge/sphagnum marsh in south Dandy Creek Flowage, Meadow Valley SWA, Central Wisconsin Conservation Area, Monroe County (Fig. 4). The nest was found on 15 April. The pair had been reported nest building in this area during an aerial survey on 29 March and observed walking near the site on 8 April. The nest was found abandoned with one broken (fertile) and one intact egg on 21 April. The latter egg was collected and found to be infertile.

Nos. 11-02 and 17-02 began incubation on their territory east of the East Rynearson Pool (ERP) dike, Necedah NWR, on 3 April. On 20 April they left the nest for short periods on several occasions; however, the female returned at dusk and incubated during the night. They discontinued incubation the following morning. Just minutes before the eggs (apparently two) were to be collected, their remains were discovered on the dike west of the nest marsh, apparently destroyed by an avian predator. The pair was observed building another nest on eastern ERP on 15 May and copulating on 31 May but produced no more eggs. The female, no. 17-02, molted on 1 June.

Nos. 13-02 and 18-02 built at least three nests at different locations in their territory at Site 2/Rice Pool, Necedah NWR, during the first 2 weeks of April. They began incubating on the last of these nests on the evening of 16 April. At 0931 on 20 April, the incubating parent left the nest and did not return. The single egg was collected at 1543 and transferred to ICF for incubation. It was later transferred to Patuxent Wildlife Research Center, where it hatched. The resulting chick became no. 17-07 in the ultralight-led cohort. Nos. 13-02 and 18-02 were observed nest building in a sedge marsh northeast of Rice Pool on 15 May, north of Site 2 on 20 May, and on northern ERP on 21 June but produced no more eggs.

Nos. 3-03 and 17-03 began incubation on 19 April. The nest was found during an aerial survey in a marsh north of Pool 9, Necedah NWR. They abandoned the nest on the morning of 21 April. The pair renested on an island in central Pool 9 and began incubating on 14 May. Because members of this pair were siblings, an egg substitution with an egg produced in captivity to improve population genetics was attempted on 9 June. The parents abandoned the nest as a result

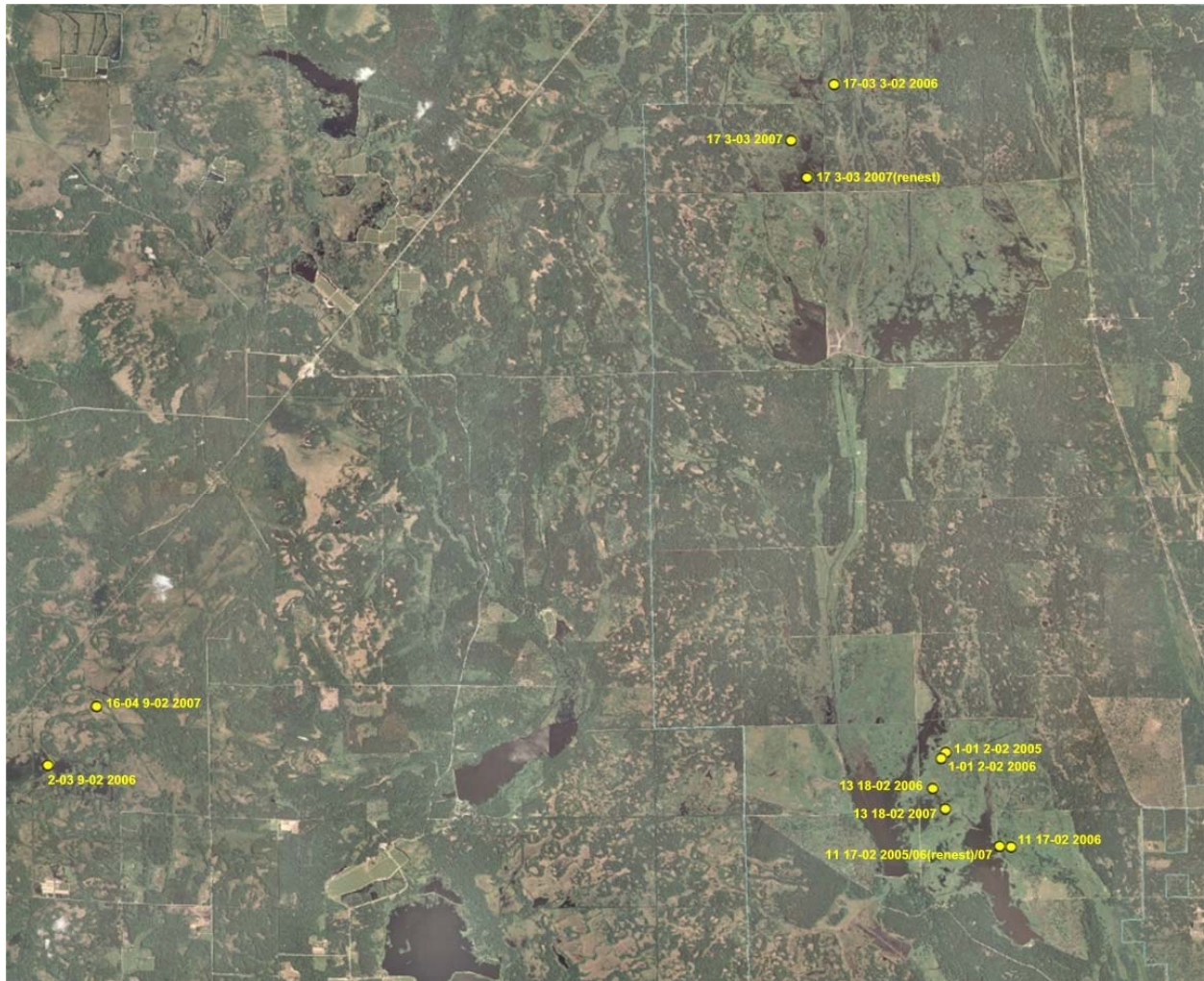


Figure 4. Locations of nests with eggs, eastern migratory whooping crane population, central Wisconsin, 2005-07.

of the intrusion. The substituted egg was later retrieved and returned to captive propagation for use in the direct autumn release project. The single wild-produced egg which had been removed was found to be infertile.

At least three (possibly all four) of the nest desertions occurred during the same short period of time and appeared to be associated with a surge of warm weather on 20 and 21 April.

OTHER PAIRS

Nos. 1-02 and 6-03 were observed nest building on their territory on Meadow Valley Flowage, Central Wisconsin Conservation Area, on 15 May but apparently produced no eggs.

Newly formed pair, nos. 10-03 and 1-05, were observed in rudimentary nest building on several occasions on northeastern West Rynearson Pool, Necedah NWR, but never completed a nest.

No nesting activity was noted for pairs nos. 1-03 and 11-03, 12-03 and 16-03, 12-02 and 19-04, and 5-01 and 19-05.

POSSIBLE CAUSES OF NEST DESERTION

A pattern of nest inattention or abandonment during the latter half of April has become apparent during the past three years (Table 6). In 2007 this behavior occurred in synchrony with a surge of warm weather and drop of barometric pressure. The birds appeared to become more interested in foraging at this time, possibly more so in willow scrub, where the leaves were just beginning to emerge. However, both of the renests, one each in 2006 and 2007, progressed full-term. Theories presented for causes of nest desertion relate to:

(1) Food availability: Necedah NWR and the surrounding area occur on a relatively unproductive sand substrate. On the refuge, whooping cranes feed on animal foods, which may be particularly scarce or difficult to locate in April before the growing season is underway.

(2) Weather events: Passage of a cold front on 15 May resulted in a flurry of nest building. At least three additional pairs (two renesting) built nests; however, no eggs were produced. Cranes were very attentive to incubation when temperatures were cold. Warm weather stimulated cranes to forage instead of incubate. The nearly simultaneous desertion of 3 (possible all 4) of the first nests during 20-21 April was correlated with a significant surge of warm weather and drop in barometric pressure.

(3) Inappropriate nesting phenology: These whooping cranes are reintroduced from captive stock into an area with different habitat and geographic location than their former core range. These factors might promote asynchrony with environmental conditions. The whooping cranes may be nesting too early. Allen (1952) includes 15 nest records containing dates of egg collections in northern (mainly north-central) Iowa from 1868 to 1894. Range was 25 April to 26 May, mean = 8 May. Although stage of incubation is unknown, if collection date is used as the midpoint of incubation, then mean nest initiation was 17 April at this more southern latitude.

(4) Young, inexperienced pairs: The oldest bird in the population in 2007 was only 6 years old, and the oldest nesting birds were only 5 years old. Unlike members of a natural population, both members of pairs in the reintroduced population are roughly the same age and all are novice breeders.

(5) Body condition of returning wintering birds: There is not enough information to assess this possible factor, but since the pairs observed wintered in different geographic areas, this is not a prevailing theory.

(6) Changes in water levels: At least for the 2007 nests, water levels did not appear to vary appreciably during the incubation period, and adequate water remained at the nest site after desertion. This is therefore also not a prevailing theory.

Table 6. Egg production by whooping crane pairs in the reintroduced eastern migratory population, 2005-07.

Male	Female	Territory	Incubation began	No. eggs	Fate of eggs
2005					
1-01	2-02	Necedah NWR, Site 4	16 April	1	Destroyed 17 April
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	18/19 April	1	Destroyed 19/20 April
2006					
1-01	2-02	Necedah NWR, Site 4	7 April	unknown	Destroyed 15/16 April
17-03	3-02	Necedah NWR, Pools 18/19	6/7 April	2	Destroyed 15/16 April
2-03	9-02	Meadow Valley SWA, Monroe County Flowage	12/13 April	unknown	Destroyed 26/27 April
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	10 April	1 found	Destroyed 19/20 April
13-02	18-02	Necedah NWR, Site 2/Rice Pool	5/6 April	2	Unattended/collected 24 April
11-02	17-02	Necedah NWR, East Rynearson Pool- East Dike	23 May	2	Hatched 22 June
2007					
16-04	9-02	Meadow Valley SWA, Dandy Creek Flowage	8-15 April	2	1 destroyed <21 April 1 infertile (coll. 21 April)
11-02	17-02	Necedah NWR, East Rynearson Pool-East Dike	3 April	2	Unattended/destroyed 21 April
13-02	18-02	Necedah NWR, Site 2/Rice Pool	16 April	1	Unattended/collected 20 April
17-03	3-03	Necedah NWR, Pool 9	19 April	1-2	Destroyed 21 April
17-03	3-03	Necedah NWR, Pool 9	14 May	1	Infertile (coll. 9 June)

(7) Predation: This hypothesis was presented in 2006 after failures of all early nests in that year. In 2007, two of the early nests and the reneest were under video surveillance. The desertion of the two early nests was not due to any visible predator presence or disturbance near the nest.

(8) Human disturbance: Repeated observation of the nests from a vehicle and especially frequent attendance of the video equipment to replace batteries and video tapes could not be accomplished out of sight of the birds. Although this disturbance was typically more than 150 m away and had no apparent effect on propensity to desert, this intensive monitoring did have some negative effect on these pairs, even if it was only to further habituate them to human activity.

UNUSUAL AUTUMN NESTING

No. 9-03 was released on east-central ERP, Necedah NWR, after being retrieved from near Lacona, Oswego County, New York, on 3 October. She paired with male no. 3-04 on the western edge of the pool on the following day after displacing female no. W1-06. Nos. 9-03 and 3-04

built a nest on 18 and 19 October and were also nest building at a nearby location on 2 November.

HY2006 WILD-HATCHED WHOOPING CRANE

The only naturally produced crane currently in the population is no. W1-06, produced by nos. 11-02 and 17-02 on their territory on East Ryneerson Pool in 2006. The family migrated successfully in autumn 2006 to the usual wintering area of the parents in Pasco County, Florida. However, because of severe drought, they moved to Tooke Lake, a suboptimal area in Hernando County with a high human presence. The family migrated back to Necedah NWR in spring 2007. No. W1-06 separated from her parents upon arrival and joined several subadults in the southern refuge area. By summer she had paired with no. 3-04, and the pair could usually be found on the western side of ERP. In October, no. W1-06 was displaced by no. 9-03 (see above). No. W1-06 then rejoined the local subadult flock and later migrated with them to Florida. She returned to Tooke Lake with two of these males on 2 December. The males left for other wintering areas on the following day. No. W1-06 remained and was later rejoined by her parents after their arrival on 4 January 2008.

PAIR FORMATION

Pairs formed, dissolved, and reformed among subadults as in past years. The increase in the mortality rate since spring 2006 (Table 5) has also significantly affected pair formation.

Winter 2006/07:

Pairs dissolved:

8-02/13-03 (debilitation and loss of 8-02)

5-01/4-02 (4-02 died ~9 January)

Pairs formed:

16-02/2-01

7-04/9-03

1-04/20-05

5-01/19-05

Spring/Summer 2007:

Pairs dissolved:

7-04/9-03 (separated during migration, 9-03 migrated to New York for third consecutive spring)

1-04/20-05 (separated upon arrival at Necedah)

16-02/2-01 (separated upon arrival at Necedah, 2-01 has chronic socialization problems)

1-01/2-02 (1-01 returned to Necedah alone; 2-02 disappeared during migration, presumed dead)

8-04/13-03

11-05/10-05 (10-05 died during molt 8 July)

6-03/1-02 (1-02 missing after 9 June, 6-03 died during molt ~6 July)

5-01/19-05 (separated after arrival on Necedah)

7-04/2-05 (2-05 died 17 August, 7-04 died ~30 August)

Pairs formed:

8-04/13-03

7-04/2-05

8-04/19-05

16-02/8-05

10-03/1-05

18-03/13-03

3-04/W1-06

3-05/7-05

Autumn 2007:

Pairs dissolved:

16-02/8-05

11-03/1-03 (1-03 died 25 September)

3-04 W1-06

16-03/12-03

Pairs formed:

1-04/8-05

3-04/9-03

11-03/12-03

5-05/15-04

Winter 2007/08:

Pairs formed:

5-01/20-04

CURRENT POPULATION STRUCTURE AS OF FEBRUARY 2008

Total 76 individuals (includes long-term missing 1-02, 3-05, and 7-05)

Males 40

Females 36

Adult, confirmed breeding pairs (i.e., have produced eggs): 4

11-02/17-02

13-02/18-02

16-04/9-02

17-03/3-03

Other currently existing adult pairs on territory in 2007: 2

12-02/19-04

10-03/1-05 (formed in spring)

Subadult or newly formed adult pairs: 8

5-01/20-04 (currently forming)

11-03/12-03

18-03/13-03

1-04/8-05

3-04/9-03

8-04/19-05

3-05/7-05* (not located since May)

5-05/15-04

*Note: Of the preceding 14 pairs, only 17-03/3-03 and 3-05/7-05 are sibling pairs.

Currently unpaired males that summered in central core area containing other whooping cranes:

15

1-01 5-02 16-02 7-03 16-03 2-04 12-04 6-05 9-05 11-05 12-05 14-05 24-05 27-06^{DAR} 28-06^{DAR}

Currently unpaired males that summered in areas with no other whooping cranes: 1

16-05 (summered in Michigan)

Currently unpaired females that summered in central core area containing other whooping cranes: 2 (not including missing 1-02)

2-01 W1-06

Currently unpaired females that summered in areas without other whooping cranes: 5

7-01 20-05 27-05^{DAR} 28-05^{DAR} 33-05^{DAR} (summered in Michigan)

DAR juveniles: 7

HY2007 male: 37 females: 39 40 42 43 44 46

HY2007 DIRECT AUTUMN RELEASE (DAR)

Year 2007 was the third year in which whooping crane chicks were specifically reared for release on the northern reintroduction area. Juveniles were released during the autumn staging period to learn survival skills and the migration route from older, experienced cranes.

Rearing

Eleven whooping crane chicks (3 males and 8 females) were costume/isolation-reared at the International Crane Foundation (ICF), Baraboo, Wisconsin, for DAR. The 10 oldest chicks hatched 25 May - 11 June. Six eggs were produced at ICF, 2 at Calgary Zoo, and 2 at the Species Survival Center, Louisiana. These chicks were transferred to the isolation-rearing field facility (Site 3) at Necedah NWR on 10 July when chicks were 29-46 days of age. The three oldest chicks (43-46 days old) were transferred directly to the top-netted wet pen. The remaining chicks were maintained in the chick building. They were frequently attended by costumed parents in adjacent habitat during the day and locked in their individual compartments in the building at

night. Chick no. 46, hatched on 23 June, was transferred to Necedah NWR on 1 August at age 39 days. No. 38 (female) was removed from the project on 10 August because of a respiratory problem and euthanized after health examination determined her condition to be untreatable. Chicks fledged (cleared 100 m without touching the ground) by mid-August to early-September (74-82 days after hatching). By 21 August all chicks had been moved from the rearing building to the top-netted wet pen. They were allowed to roam freely in the immediate area during daytime with frequent checks by costumed parents, and the group was locked in the wet pen, where they roosted in water, at night.

A resident pair of sandhill cranes was present at the site throughout the summer. Older whooping cranes were present at the Site 3 rearing facility almost every day after the first week that the chicks were transferred to Necedah. Whooping crane no. 2-01 returned to Site 3 on 1 August, 3 weeks later than in 2006, and stayed through the remainder of the summer. She was generally dominant over the chicks but was not as aggressive and less of a nuisance than during the previous 2 years when the DAR cohorts were smaller. By the end of summer, her interactions with the chicks were generally positive. At least 17 different adult or subadult whooping cranes visited the rearing site during the summer or autumn. However, no. 2-01 dominated the site, and none of these other cranes consistently remained for more than a day.

The premigratory health check was performed on 11 September; results were normal. Juveniles were banded and equipped with transmitters on 15 October.

Release

All juveniles were released at sites occupied by older whooping cranes. Nos. 36, 41, 45, and 46 were released on the NE Sprague Pool dike, Necedah NWR, on the evening of 29 October. They flew to the nearby main sandhill crane roost, which was also occupied by nos. 11-03 (suspected identity of male) and 12-03. Early on 30 October, no. 45 was found dead, killed by a predator (apparently a coyote), near the release site. The remaining three released juveniles disassociated but remained in the Sprague Pool area through the day. No. 36 joined a group of ~40 sandhills, no. 41 foraged alone, and no. 46 attempted to associate with the resident adult pair but was met with aggression.

By the following morning, nos. 36, 41, and 46 had rejoined. They spent most of late morning and the afternoon in undirected flight. They landed briefly at Dorro Couche Lake near Rome, Adams County, then flew back over the refuge, and then began southbound migration.

Rearing facilities at Site 3 were closed on 30 October, and nos. 39 and 43 were passively released there with no. 2-01. That evening nos. 37, 40, 42, and 44 were released on the east East Rynearson Pool dike. Nos. 37 and 42 flew to roost on the north sandhill crane roost, also occupied by nos. 13-02 and 18-02, on ERP. No. 40 returned to Site 3 and rejoined nos. 39 and 43 and no. 2-01 roosting in the day pen marsh. No. 44 landed in scrub oak between ERP and Site 3; she was retrieved and released with the roosting cranes at Site 3. Nos. 37 and 42 returned to Site 3 and rejoined the other four juveniles there on the following day. These six DAR juveniles remained together. They roosted each night at Site 3 with no. 2-01 and in addition to using Site 3 also moved to ERP, the East DU Unit, a pond east of the refuge, and local cornfields during the

day. They associated with nos. 11-02 and 17-02, 9-03 and 3-04, and with sandhills, or remained alone. They were met with aggression by the former pair.

On the morning of 6 November, the group of six juveniles moved to the East DU Unit. There they joined whooping cranes nos. 9-03 and 3-04 and sandhill cranes. Whooping cranes nos. 11-02, 17-02, 7-03, 2-04, 12-04, 11-05, 14-05, and W1-06 as well as ~200 sandhill cranes were also nearby in a different part of same impoundment. At 1030 the group of 6 DAR juveniles began migration in 20 mph (gusting to 30 mph) NNW winds under partly cloudy skies. They were not with other cranes.

Migration And Wintering

Group 1: Nos. 36, 41, and 46 began migration on the afternoon of 31 October. Ground trackers lost their signals south of Mauston. PTT data later indicated their roost location north of Madison. No. 41 died on that night after being struck by a landing aircraft at the Dane County Regional Airport. Nos. 36 and 46 continued migration on 1 November and roosted that night at an undetermined location in western Indiana. PTT data for no. 46 indicated that they roosted north of New Goshen, Vigo/Vermillion Counties, Indiana, on the night of 2 November. On 3 November they continued migration and were tracked from the ground to landing in late afternoon at or near Caneyville Reservoir, Grayson County, Kentucky. The birds separated, and PTT data indicated that no. 46 roosted along the Ohio River, northwest of Owensboro, Daviess County, Kentucky, on that night. No. 36 was found dead south of Caneyville on 4 November. He had collided with a powerline in a hayfield after apparently roosting at a nearby reservoir during the previous night. PTT data indicated that No. 46 continued retreating northward and roosted in a power plant reservoir in Gibson County, Indiana, just east of Mt. Carmel, Illinois. She was not with sandhills and remained at that location on 5 November (Fig. 5).

No. 46 remained at Gibson County, Indiana, location until she moved to Hatchie NWR, Haywood County, Tennessee, on 23 November. She was in close proximity to and demonstrated little or no aversion to human activity at this site. On 27 November, just before retrieval was about to be initiated, she continued southward to near McArthur, Desha County, Arkansas. On the morning of 1 December, she was found foraging in a cornfield with one juvenile sandhill crane. She was retrieved and released that evening on Hiwassee Wildlife Refuge, Meigs County, Tennessee. Nine other whooping cranes and thousands of sandhill cranes were present at the latter location at that time.

By 9 January no. 46 had moved to Armstrong Bend. As of 25 January, no. 46 remained at or near Hiwassee Wildlife Refuge. During the winter she occasionally associated with older whooping cranes nos. 20-04, 20-05, 27-05, and 28-05. By mid-January, she was sometimes observed with no. 37.

Group 2: Nos. 37, 39, 40, 42, 43, and 44 began migration alone from the East DU Unit, Necedah NWR, at 1030 on 6 November. They proceeded southbound 214 miles and landed to roost in a small pond in a harvested cornfield near Edelstein, Peoria County, Illinois (Fig. 5). They remained there until 5 December, when they resumed migration after their roost pond became frozen. They proceeded south 167 miles and roosted in an impoundment on a reclaimed coal



Figure 5. Autumn migration of HY2007 DAR juvenile whooping cranes.

mine slurry disposal site near Albers, Clinton County, Illinois. On 6 December they moved to a flooded cornfield on a private conservation area/duck hunting club near Fults, Monroe County, Illinois. They were in close proximity and demonstrated little or no aversion to human activity at this site. They were retrieved and released on Hiwassee Wildlife Refuge, Meigs County, Tennessee, on 11 December.

Nos. 39 and 43 separated from the other four juveniles on 12 December. These former two juveniles departed southbound from Hiwassee WR and moved to Weiss Lake, Cherokee County, Alabama, on 17 December (Fig. 6). They remained at that location until 23 December, when they returned past Hiwassee WR and continued up the Tennessee River to roost on the Emory River E of Harriman, Roane County, Tennessee. By 25 December they had moved downriver to Yellow Creek WMA, Rhea County. They returned to Mud Creek (Rhea County)/Armstrong Bend (Meigs County) on 27 December and then remained in the Hiwassee area. On 31 December nos. 39 and 43 rejoined nos. 37, 42, and 44. No. 37 left the group on 10 January, after which he sometimes associated with no. 46-07.

Nos. 37, 42, and 44 used several sites including Mud Creek and the Cottonport Unit of Chickamauga WMA, Rhea County, and Hiwassee WR and Price Creek, Meigs County. By 12 January, they foraged mainly at Armstrong Bend.

No. 40 separated from nos. 37, 42, and 44 on 13 December and moved with sandhills to nearby Sale Creek Unit, Chickamauga WMA, Hamilton County. On 14 December she moved to near Woods Reservoir, Franklin County, Tennessee, and remained there until the end of the month. By 2 January she had moved to a major sandhill crane wintering area at Hop-In WR, Obion County, where she roosted each night and foraged during the day in local farm fields (Fig. 6).

Patterns In Behavior Of DAR Cranes After Release

Summaries of performance of DAR juveniles from release until initiation of first migration, during autumn migration, and after their first complete autumn migration appear in Tables 7, 8, and 9, respectively. Summering and wintering areas appear in Fig. 7.

Newly released DAR juveniles exhibited a wide range of behaviors including:

- Returning or not returning to the rearing site
- Associating with sandhill or older whooping cranes
- No mortality to high mortality of the group
- Early or late initiation of migration
- Migration with sandhill or older whooping cranes, or self-guiding
- Group remaining together or dissolving during migration

Juveniles released singly returned to the rearing site and reformed their original cohort. Juveniles released as pairs remained so. Juveniles released in larger groups formed self-guiding flocks. However, all of these release groupings and their associated outcomes were specific to release year and were based on small sample sizes.

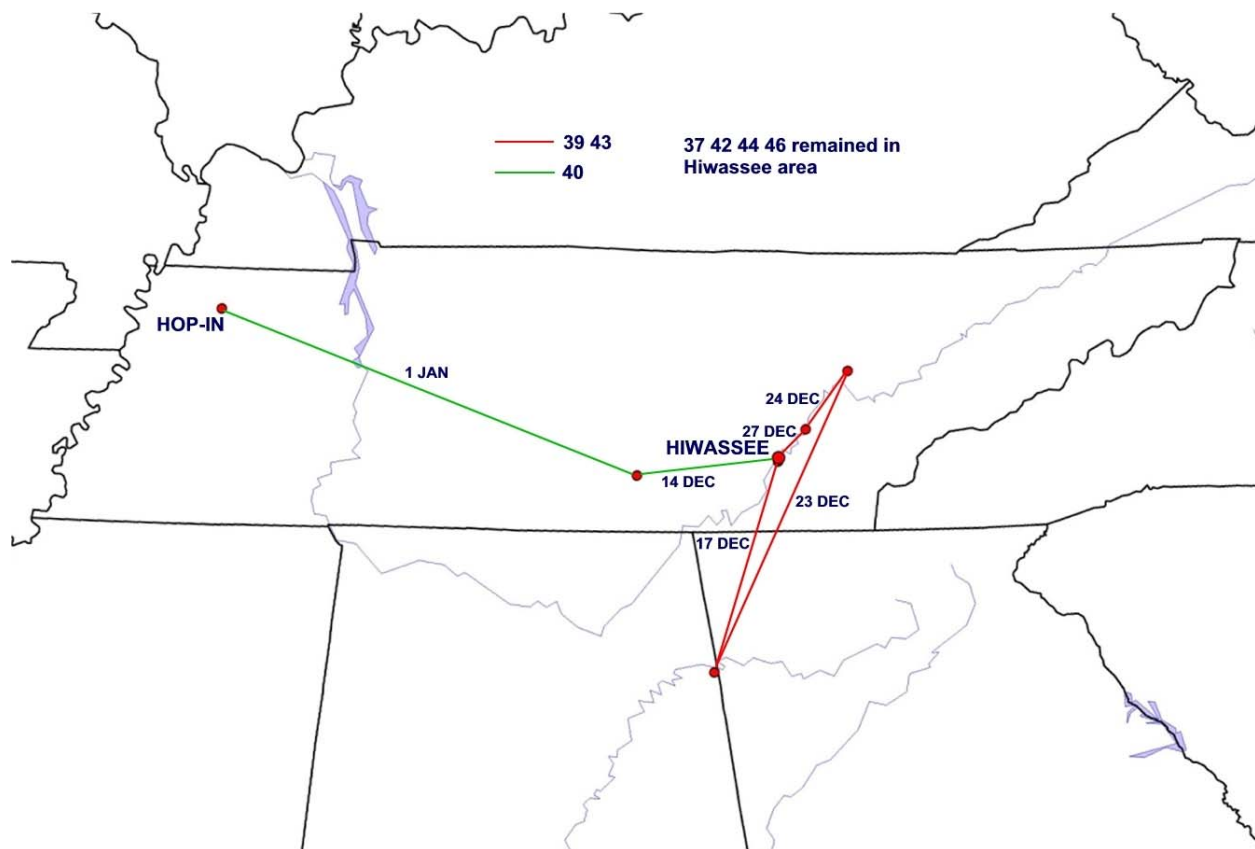


Figure 6. Movements of HY2007 DAR juvenile whooping cranes after translocation to Hiwassee Wildlife Refuge on 1 December (no. 46) and 11 December (nos. 37, 39, 40, 42, 43, and 44).

Selection of roosting and foraging habitat of released juveniles was generally satisfactory except when habitat near human activity but that was otherwise suitable was selected.

Lack of human avoidance often occurred after released cranes disassociated from wild cranes. As expected, some birds had to be retrieved and translocated after they disassociated from experienced guide birds.

Hiwassee WR, Tennessee, is a major sandhill crane migration stopover and wintering area and has appeared as the only major focal point on DAR migration.

Like some other cranes in the population, some returning DAR juveniles encountered Lake Michigan, did not cross, and required (or would require) retrieval to return to Wisconsin.

Of the small number of birds so far released, males homed well to the core reintroduction area in central Wisconsin, but females dispersed widely and remained associated with sandhills.

Table 7. Dynamics of direct autumn releases of juvenile whooping cranes on Necedah NWR, 2005-07.

Crane no.	Sex	Release			Premigration grouping	Migration initiation			
		Date	Site (Pool)	Group		Date	WHCR	SACR	Alone
2005 Problems: Human avoidance									
27	F	25 Oct	Killdeer	27	27 29 32 33	24 Nov	0	52	
28	F	29 Oct	NE Sprague	29					
32	M	27 Oct	E Sprague	32					
33	F	25 Oct	Carter-Woggon	33					
2006 Problems: None									
26	M	21 Oct	East Rynearson	26 28	26 28	28 Oct	0	flock	
28	M								
27	M	20 Oct	E Sprague	27 32	27 32	30 Nov	pair	0	
32	F								
2007 Problems: High mortality (group 1), Self-guided initiation of migration									
36	M	29 Oct	NE Sprague	36 41 45	36 41 46	31 Oct	0	0	Y?
41	M			46					
46	F								
45	F				died n/29 Oct				
37	M	30 Oct	East Rynearson	37 40 42	37 39 40 42	6 Nov	0	0	Y
40	F			44	43 44				
42	F								
44	F								
39	F	30 Oct	Site 3	39 43					
43	F								

A larger sample size, including breeding age birds, will be necessary to evaluate methods, results, and success of the DAR technique as well as integration of DAR whooping cranes into the existing reintroduced population.

HY2007 ULTRALIGHT-LED FLOCK

The ultralight-led migration departed from Necedah NWR on 13 October 2007. The juveniles arrived at the holding site on Halpata Tasthanaki Preserve, Marion County, Florida, on 27 January 2008. Migration of 16 of the HY2007 juveniles was completed when Operation Migration ultralight aircraft led them from Halpata to the release site on Chassahowitzka NWR on 28 January. Because of earlier wing and chest injuries, no. 3-07 did not make the flight and was transported to the pensite on 2 February. Bands and transmitters with permanent color identification codes were attached on 3-4 February. The juveniles were retained during a period of acclimation in a top-netted enclosure until they were released on 5 February.

Table 8. Autumn migrations of direct-autumn released juvenile whooping cranes, 2005-07.

Crane no.	Sex	Start		Retrieval/translocation*			Hiwassee stop	Wintering area	
		Date	With	Date	From	To		Arrival	Location
2005 Problems: Human avoidance (1)									
27	F	24 Nov	SACR	28 Nov	Bullitt Co., Ky.	Anderson Co., Ky.	W	30 Nov	Hiwassee WR, Tenn.
28	F						W	25 Nov	
32	M						Y	mid Dec	Osceola Co., Fla.
33	F						Y	21 Dec	Paynes Prairie, Fla.
2006 Problems: None									
26	M	28 Oct	flock				Y	8+ Dec	Pasco Co., Fla.
28	M								
27	M	30 Nov	WHCR pair				N	9 Dec	Lafayette Co., Fla.
32	F								
2007 Problems: Mortality (group 1), self-guided migration off course, human avoidance									
36	M	31 Oct	Alone	died 4 Nov, Grayson Co., Ky.					
46	F			1 Dec	Desha Co., Ark.	Hiwassee WR, Tenn.	T	1 Dec	Hiwassee WR, Tenn.
41	M			died 31 Oct, Dane Co., Wis.					
37	M	6 Nov	Alone	11 Dec	Monroe Co., Ill.	Hiwassee WR, Tenn.	T	11 Dec	Hiwassee WR, Tenn.
42	F								
44	F								
40	F								
39	F								
43	F								
								1 Jan 08	Hop-In WR, Tenn.
								11 Dec, r/27 Dec	Hiwassee WR, Tenn.

*Retrievals were made when juveniles were not with wild cranes, not avoiding humans, and/or far off course.

HUMAN AVOIDANCE AND CONFLICTS WITH HUMAN ACTIVITY

In general, released whooping cranes satisfactorily avoided close proximity to humans and human structures. However, because they have been reared in captivity, they can be easily tamed after release if precautions are not taken. It remains critical that approach of birds by the public is carefully controlled on areas where this is possible, and that on other areas the public is aware of the need to view these birds only from a distance. The guidelines for viewing (no closer than 200 m for persons on foot or 100 m while in a vehicle on a public road) should continue to be emphasized.

The most serious problem encountered in 2006 was movement of the family (11-02, 17-02, and W1-06) to a wintering area on a lake surrounded by residential development. This relocation was probably related to drought on the parents' usual wintering area on ranchland in Pasco County. Non-migratory sandhill cranes, which tolerate people and do not foster an environment that

Table 9. Distribution and status of HY2005-06 DAR whooping cranes after their first winter.

Crane no.	Sex	2005/06 Winter	2006 Summer	2006/07 Winter	2007 Summer	2007/08 Winter
HY2005 Problems: Female dispersal, Human avoidance (1), Lake Michigan, Mortality						
27	F	Hiwassee WR, Tenn.	Rush Lake, Winnebago Co., Wis.	Hiwassee WR, Tenn.	Zittau, Winnebago Co., Wis.	Hiwassee WR, Tenn.
28	F		McMillan WMA, Wis.	Hop-In WR, Tenn.	McMillan WMA, Wis.	Hiwassee WR, Tenn.
32	M	Osceola Co., Fla.	Mill Bluff/Lemonweir River, Wis.	Sebring, Fla.*	SE of Necedah NWR, Wis. (died July)	
33	F	Paynes Prairie, Fla.	Barry Co., Mich.	Hiwassee WR, Tenn.	Van Buren Co., Mich.	Hiwassee WR, Tenn.
HY2006 Problems: Mortality, Lake Michigan						
26	M			Pasco Co., Fla.	died 13 Apr, Daviess Co., Ind.	
28	M				Necedah NWR, Wis.**	Pasco Co., Fla.
27	M			Lafayette Co., Fla.,	Necedah NWR, Wis.	
32	F			32 died ~20 Jan		

* 32-05: Human avoidance problem.

** 27-06: Retrieved from Oceana Co., Mich., and translocated to Necedah NWR on 14 May.

facilitates avoidance of humans and human activity by reintroduced birds, also occur at the newly occupied site.

Five birds in the population have demonstrated seriously inadequate human avoidance behavior:

No. 1-01: This widowed male has a summer territory at Site 4 and has become habituated to human activity associated with ultralight training operations at that site. During 2007 he was further corrupted by a lengthy construction project on Upper Rice Pool. In addition, he has one of the poorest winter territories, adjacent to a housing development just north of Crystal River, and consistently associates with tame non-migratory sandhill cranes that have been fed by people. The latter problem has been partially remedied by placement of a time-release feeder containing corn in an area of suitable habitat on an adjacent cattle ranch. However, the possible continued benefit or cost of this individual to the population should be considered, especially if he succeeds in repairing or reproducing and then continues to use this wintering site.

Nos. 11-02 and 17-02: This pair is wintering for the second consecutive year on Tooke Lake, Hernando County, Florida, because of drought-related dewatering of wetlands on their former winter area on a cattle ranch in Pasco County. Tooke Lake has been at low water or partially dry

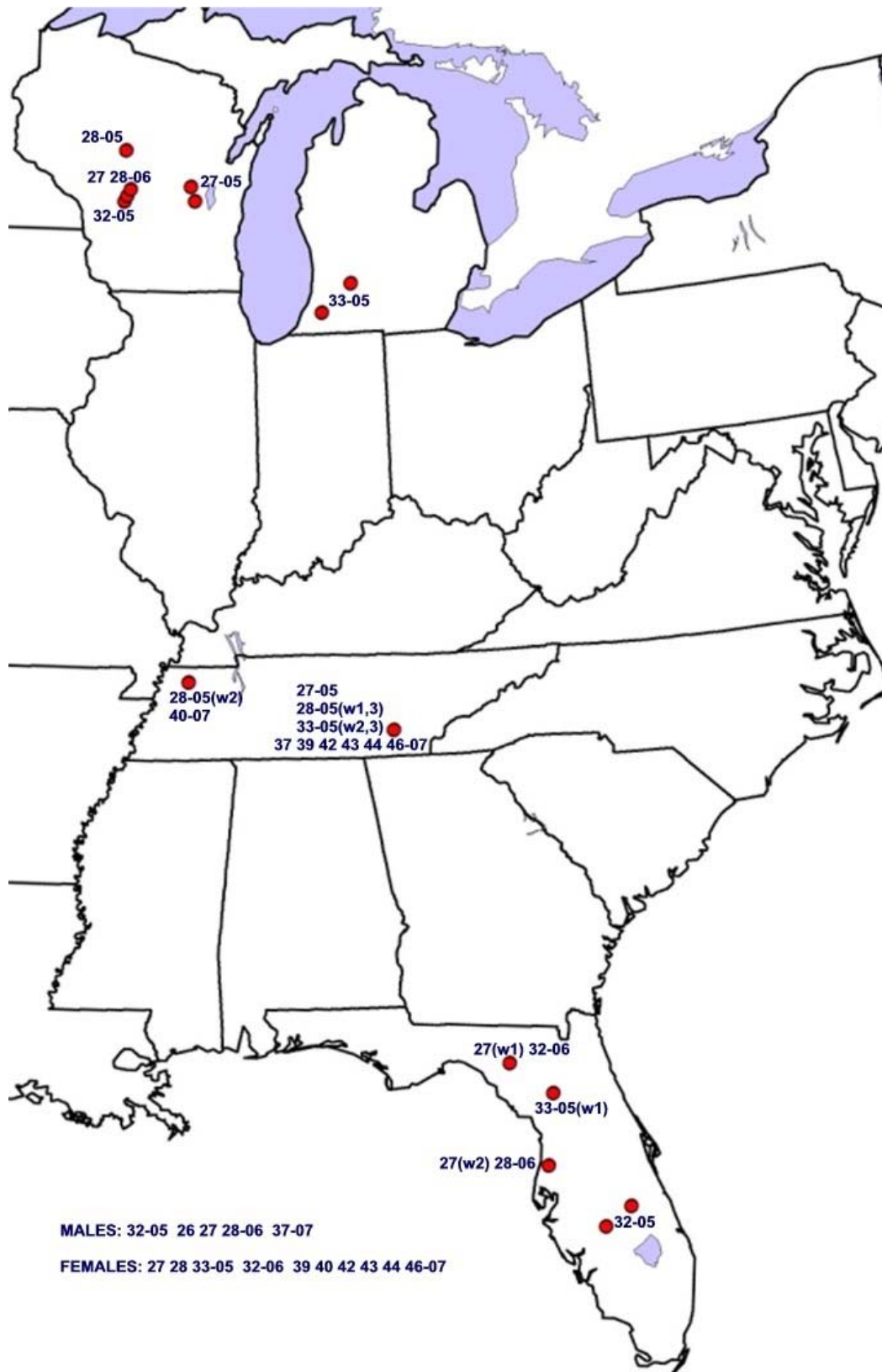


Figure 7. Summer and winter distribution of DAR whooping cranes.

and is surrounded by housing developments. The pair has associated with tame non-migratory sandhill cranes that have been and continue to be fed by people. Habituation of this pair to humans and vehicles has also been facilitated on the summering grounds by occurrence of an ultralight training site in their territory (Site 1) and increased monitoring to record their reproductive activity.

No. W1-06: This is the only naturally produced crane in the population and the HY2006 chick of nos. 11-02 and 17-02. She was exposed to the situation at Tooke Lake during winter 2006/07 and returned there again in winter 2007/08.

No. 5-01: The mate of this male died in January 2007. He then found a captive female in Homosassa Springs Wildlife State Park (HSWSP) (6 miles from the Chassahowitzka NWR release site) and attempted to pair with her. Because removal of the female was not considered a viable option from the standpoint of public relations, the option of repairing him with a wild female was pursued. He was remanded to captivity at Halpata during most of February 2007 and then released at Paynes Prairie Preserve State Park on 26 February. This translocation was successful. He eventually paired with female no. 19-05 and remained at Paynes Prairie until they departed northbound on spring migration. However, the pair dissolved after he migrated back to his territory on Necedah NWR. At the end of autumn migration 2007, he returned to HSWSP and again landed in the park because of attraction to the captive female. No. 5-01 was then captured and penned at Halpata. On 16 December he was translocated to Hiwassee Wildlife Refuge, Tennessee, where most of the unpaired females in the population were wintering. He remained at Hiwassee and subsequently attempted to pair with no. 20-04.

No. 5-01 was responding to a single point stimulus and should be salvageable. The other birds noted above, now routinely habituated to humans and associating them with food, are cause for much greater concern. Efforts to dissuade the public in Florida from feeding birds have been implemented, but full cooperation has yet to be achieved. Persistence of severe drought in Florida will exacerbate human avoidance problems. Efforts to reduce human activity near these birds on Necedah NWR also need to be improved.

INTERACTION WITH NON-MIGRATORY WHOOPING CRANES

There were no significant interactions between reintroduced migratory whooping cranes and members of the non-migratory flock during 2007.

SUMMARY AND CONCLUSIONS

Improvements in the winter management protocol have been implemented at the release site to prevent another catastrophic loss as occurred in February 2007.

Mortality rate of all age groups increased in 2006 and 2007. Drought and resulting effects on wetland habitat have appeared as new factors influencing survival on both wintering and summering grounds.

Social behavior was normal, and pair bond formation was progressing. Four breeding pairs

produced eggs in 2006. Even with dissolution of some pairs because of mortality, at least 14 potentially breeding pairs are expected in 2008.

Loss of all first nests occurred again for the third consecutive year in 2007. Loss was usually a result of desertion. Further study will proceed in 2008.

Habitat use, roosting, and foraging behavior of most birds were generally satisfactory. Only a small portion of suitable habitat has so far been used in the core reintroduction area, and there is much room for expansion by new territorial pairs.

Human avoidance was generally adequate for most birds in the population, but critical exceptions have occurred, and some of these problems will be difficult to solve.

Natal site fidelity remained high. Except for a few birds blocked by Lake Michigan, all yearlings completed spring migration to the core reintroduction area in 2006. Winter site fidelity has also been good but adversely affected by lack of usable high quality wetlands because of drought.

The DAR program produced successfully migrating birds but continued to face challenges with female dispersal, and new problems of mortality and errant migration appeared in 2007. Larger numbers of released birds will facilitate future evaluation and refinement of techniques.

After release of the 17 ultralight-led juveniles in February 2008, the eastern migratory population consisted of 76 individuals. Number of individuals in each year class was as follows: HY2001 (4), HY2002 (9, including 1 long-term missing), HY2003 (10), HY2004 (9), HY2005 (17, including 2 long-term missing), HY2006 (3), and HY2007 (24).

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Appendix A. Whooping cranes in eastern migratory population, 15 February 2008.

Hatch year	Crane no.	Sex	BBL Band no.	Frequency (MHz)	Color code (left:right)		PTT ID	Studbook no.			Mate
					L=long bands with transmitter			Own	Sire	Dam	
2001	1	M	659-00215	164.946	L	G/W:G/R/G		1629	1114/1144	1119	
2001	2	F	659-00201	164.675	L	G/W:R		1630	1147	1142	
2001	5	M	659-00213	165.401	L	G/W:R/G		1633	1147	1142	
2001	7	F	659-00214	--	L	G/W:W/R		1635	1127	1154	
2002	1	F	599-32111	--	L	R/W:L G(PTT)	--	1660	1133	1135	
2002	2	F	599-32112	164.375	L	R/W:G/W		1661	1133	1135	
2002	5	M	599-32118	164.855	L	R/W:G/R/W		1664	1133	1135	
2002	9	F	599-32127	--	G/W:L	R/W		1670	1133	1135	16-04
2002	11	M	599-32114	165.133	L	R/W:R/G		1672	1147	1142	17-02
2002	12	M	599-32121	165.671	L	R/W:W/R/G		1673	1114	1119	19-04
2002	13	M	599-32122	164.264	L	R/W:G/R/G		1674	1127	1154	18-02
2002	16	M	599-32125	164.595	L	R/W:R/G/R		1677	1147	1142	
2002	17	F	599-32115	165.251	L	R/W:G/R		1678	1144	1136	11-02
2002	18	F	599-32126	165.371	G:L	R/W		1679	1128	1101	13-02
2003	3	F	599-34056	--	L	G/R:W		1698	1144	1136	17-03
2003	7	M	599-34048	165.042	R/W/G:L	G/R		1702	1133	1135	
2003	9	F	599-34042	164.845	L	W/G(PTT):L G/R	--	1704	1144	1136	3-04
2003	10	M	599-34049	165.213	W/G/R:L	G/R		1705	1175	1188	1-05
2003	11	M	599-34050	165.545	G/W/R:L	G/R		1706	1127	1154	
2003	12	F	599-34043	164.305	W/R:L	G/R		1707	1133	1135	
2003	13	F	599-34051	164.433	R/W/R:L	G/R		1708	1133	1135	
2003	16	M	599-34052	--	R/G/W:L	G/R		1711	1144	1136	
2003	17	M	599-34053	164.315	W/G/W:L	G/R		1712	1144	1136	3-03
2003	18	M	599-34054	164.355	G/R/W:L	G/R		1713	1147	1142	
2004	1	M	599-37449	--	R/G/W:L	W/G		1744	1133	1135	
2004	2	M	599-37450	164.173	W/R/W:L	W/G		1745	1127	1154	
2004	3	M	599-37451	164.414	G/R/W:L	W/G		1746	1133	1135	9-03
2004	8	M	599-37454	165.084	G/R/G:L	W/G		1751	1133	1135	
2004	12	M	599-37455	164.884	G/W/R:L	W/G		1755	1127	1154	
2004	15	F	599-37446	--	L	R/G(PTT):L W/G	--	1758	1144	1136	
2004	16	M	599-37457	--	W/G/R:L	W/G		1759	1144	1136	9-02
2004	19	F	599-37447	165.495	L	W/R(PTT):L W/G	--	1762	1128/1100	1263	12-02
2004	20	F	599-37448	165.522	L	G/R(PTT):L W/G	--	1763	1133	1135	
2005	1	F	599-37231	164.934	L	G/W:R/G/W		1782	1162	1167	10-03
2005	3	M	599-37232	164.525	L	G/W:W/R/W		1784	1144	1136	
2005	5	M	599-37233	164.564	L	G/W:G/R/W		1786	1133	1135	
2005	6	M	599-37234	164.704	L	G/W:R/W/G		1787	1133	1135	
2005	7	F	599-37235	164.055	L	G/W:W/R/G		1788	1144	1136	
2005	8	F	599-37239	164.995	L	W/R(PTT):L G/W	--	1790	1127	1154	
2005	9	M	599-37236	165.984	L	G/W:R/W/R		1791	1162	1167	
2005	11	M	599-37241	165.163	W/R/W:L	G/W		1793	1041	1197	
2005	12	M	599-37242	164.804	G/R/W:L	G/W		1794	1560	1135	
2005	14	M	599-37243	165.965	R/W/G:L	G/W		1796	1182	1098	
2005	16	M	599-37244	164.775	W/R/G:L	G/W		1799	1189	1195	
2005	19	F	599-24696	164.913	G/R/G:L	G/W		1802	1560	1135	
2005	20	F	599-37238	164.684	L	R/G(PTT):L G/W	--	1803	1182	1098	
2005	24	M	599-24700	--	R/G/R:L	G/W		1807	1560	1135	
2005	27	F	599-32128	164.734	L	G/W:L R/W(PTT)	--	1811	1128	1263	
2005	28	F	599-32129	164.695	L	G/W:L G/R(PTT)	--	1812	1128	1140	
2005	33	F	599-32130	165.935	L	R(PTT):L G/W	--	1819	1128	1140	
2006	W1	F	599-34058	165.622	L	R/G:W/G/W		1874	1672	1678	
2006	27	M	599-55902	164.664	L	R/G:L R/W(PTT)	70396	1864	1182	1219	
2006	28	M	599-55903	165.484	L	R/G:L W/R(PTT)	--	1865	1182	1098	

Appendix A. Continued.

Hatch year	Crane no.	Sex	BBL Band no.	Frequency (MHz)	Color code (left:right) L=long bands with transmitter	PTT ID	Studbook no.			Mate
							Own	Sire	Dam	
2007	3	M	599-55936	164.215	L R/G:R/G/W		1881	1216	1202	
2007	6	M	599-55937	164.245	L R/G:W/R/W		1884	1248/1256	1241	
2007	7	M	599-55938	164.485	L R/G:G/R/W		1885	1165	1164	
2007	9	M	599-55939	164.505	L R/G:G/W/G		1887	1476	1288	
2007	10	M	599-55940	164.515	L R/G:R/W/G		1888	1147/1114	1119	
2007	12	M	599-55941	164.726	L R/G:W/R/G		1890	1237/1386/1267	1261	
2007	13	M	599-55942	164.957	L R/G:G/W/R		1891	1237/1386/1267	1261	
2007	14	F	599-55943	164.716	W/R/W:L R/G		1892	1147/1114	1119	
2007	16	F	599-55933	164.545	L R/G:L W(PTT)	15045	1894	1420	1168	
2007	17	F	599-55944	165.458	L R/G:W/G/R		1895	1674	1679	
2007	21	F	599-55945	164.826	W/G/W:L R/G		1899	1560/1165	1164	
2007	22	F	599-55934	165.323	L R/G:L G/W(PTT)	15331	1900	1216	1202	
2007	24	M	599-55946	165.194	L R/G:R/W/R		1902	1216	1202	
2007	26	F	599-55947	165.994	G/W/G:L R/G		1904	1147/1114	1119	
2007	27	F	599-55948	164.742	R/W/G:L R/G		1905	1254	1156	
2007	33	M	599-55951	165.433	W/R/G:L R/G		1909	1127	1154	
2007	35	F	599-55935	165.470	L R/G:L W/G(PTT)	38637	1911	1422	1366	
2007	37	M	599-55929	164.234	R/G/W:L R/G		1914	1182	1098	
2007	39	F	599-55923	165.152	L W(PTT):L R/G	38634	1917	1216	1202	
2007	40	F	599-55924	164.614	L G/W(PTT):L R/G	38636	1918	1237/1267/1386	1261	
2007	42	F	599-55931	165.693	G/R/W:L R/G		1921	1254	1156	
2007	43	F	599-55925	164.183	L R/W(PTT):L R/G	70398	1922	1128	1263	
2007	44	F	599-55932	165.122	L W/G(PTT):L R/G	72160	1923	1128/1441	1535	
2007	46	F	599-55927	165.446	L W/R(PTT):L R/G	72161	1927	1128	1263	

Note: No. 2-02 has been missing since spring migration 2007 and is presumed dead.