

## 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 2005. Movements and geographic distribution are emphasized. A new reintroduction technique, direct autumn release (DAR), is also described. Identification information for all whooping cranes in the eastern migratory population as of January 2006 appears in Appendix A.

### WINTER 2004/05

Locations of the HY2001-03 cohorts during winter 2004/05 included 20 birds in Florida, 4 in Tennessee, 7 in South Carolina, and 3 in North Carolina (Table 1, Fig. 1). The latter 10 birds were all from the HY2003 cohort. The birds wintering in North Carolina, outside the range of both other project whooping cranes and the wild sandhill population, had summered in Lower Michigan during 2004. No released whooping cranes had wintered in the Carolinas in previous years.

**Table 1. Primary wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2004/05. Location nos. refer to Fig. 1.**

Crane nos.	Location	County
Florida		
1-01, 2-02	(1) Shamrock Acres	Citrus
2-01, 8-02	(2) NE of Gowers Corner	Pasco
5-01, 4-02	(3) Stafford Lake	Hernando
	(4) Chassahowitzka NWR	Citrus
6-01	(5) SW Alachua/NE Levy Counties	Alachua/Levy
1-02, 6-03	(6) Lake Woodruff NWR	Volusia
3-02, 16-02	(7) Big Prairie	Lake
5-02, 18-04	(2) NE of Gowers Corner	Pasco
11-02, 12-02, 17-02	(2) NE of Gowers Corner	Pasco
14-02	(8) E of Rutland	Sumter
3-03, 12-03, 16-03	(9) Long Pond	Marion
Tennessee		
7-01	(10) Hiwassee Wildlife Refuge	Meigs
9-02, 13-02, 18-02	(11) W of Winchester	Franklin
South Carolina		
2-03, 10-03, 13-03	(12) Combahee Unit, ACE Basin NWR	Colleton
4-03, 11-03	(13) Donnelley SWMA	Colleton
7-03	(14) Bull Island	Beaufort
17-03	(15) Waltersboro/Jacksonboro	Colleton
North Carolina		
1-03, 9-03, 18-03	(16) Trent River	Jones

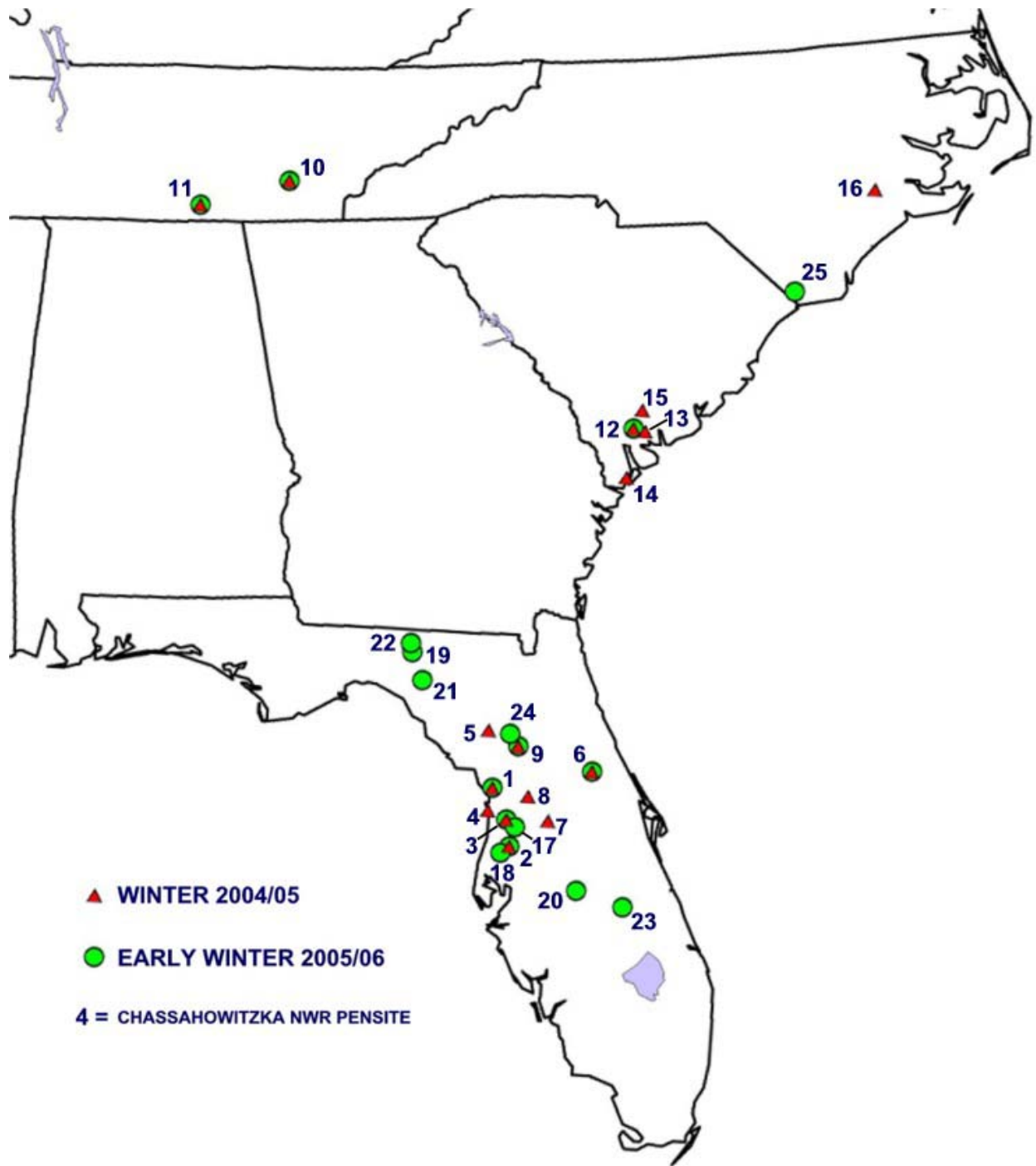


Fig 1. Primary wintering areas of whooping cranes in the reintroduced eastern migratory population, winters 2004/05 and 2005/06. Location nos. refer to Tables 1 and 7.

Autumn migration 2004 was protracted and late. Migration of individual birds or groups to the Central Gulf Coast was completed in 5-58 days with arrival of the last birds on 2 January. The earliest returning crane (no. 14-02) arrived on 15 November (estimated) and moved inland on 25 November. Nos. 5-01 and 4-02 arrived at the Chassahowitzka pensite on the latter date and moved inland on 28 November. The next cranes to return to the pensite (nos. 11-02, 12-02, and 17-02) did not arrive until 15 December. A total of 13 older cranes stopped over at the pensite during early winter. These 13 birds were in groups of 1, 2, 3, 2, 2, and 3. Except for the local territorial pair (nos. 5-01 and 4-02), the last of these cranes left the pensite on 3 February to spend the remainder of the winter inland.

The HY2004 cohort consisted of 14 released birds (11 males and 3 females); 13 juveniles, led by Operation Migration ultralight aircraft, had arrived at the winter release pen on Chassahowitzka NWR on 12 December. All arrivals of the older returning birds occurred after arrival of the ultralight-led cohort except for no. 14-02, who left the site on 25 November and did not return until 29 January, and nos. 5-01 and 4-02, who had an alternate local winter site and frequently returned. Because autumn migration of older birds was late and these latter birds had not yet passed through the salt marsh to winter inland, the juveniles were held in a topnetted enclosure constructed just outside the northwest corner of the main pen. They were allowed out of the enclosure only when costumed caretakers were present or when no older, dominant cranes were present (some exceptions for the resident wintering pair). Older birds were also not given free access to supplied feed and fresh water. This regimen was continued until 2 March, after which no older cranes other than the resident pair appeared at the pensite and the juveniles were always allowed to roam freely.

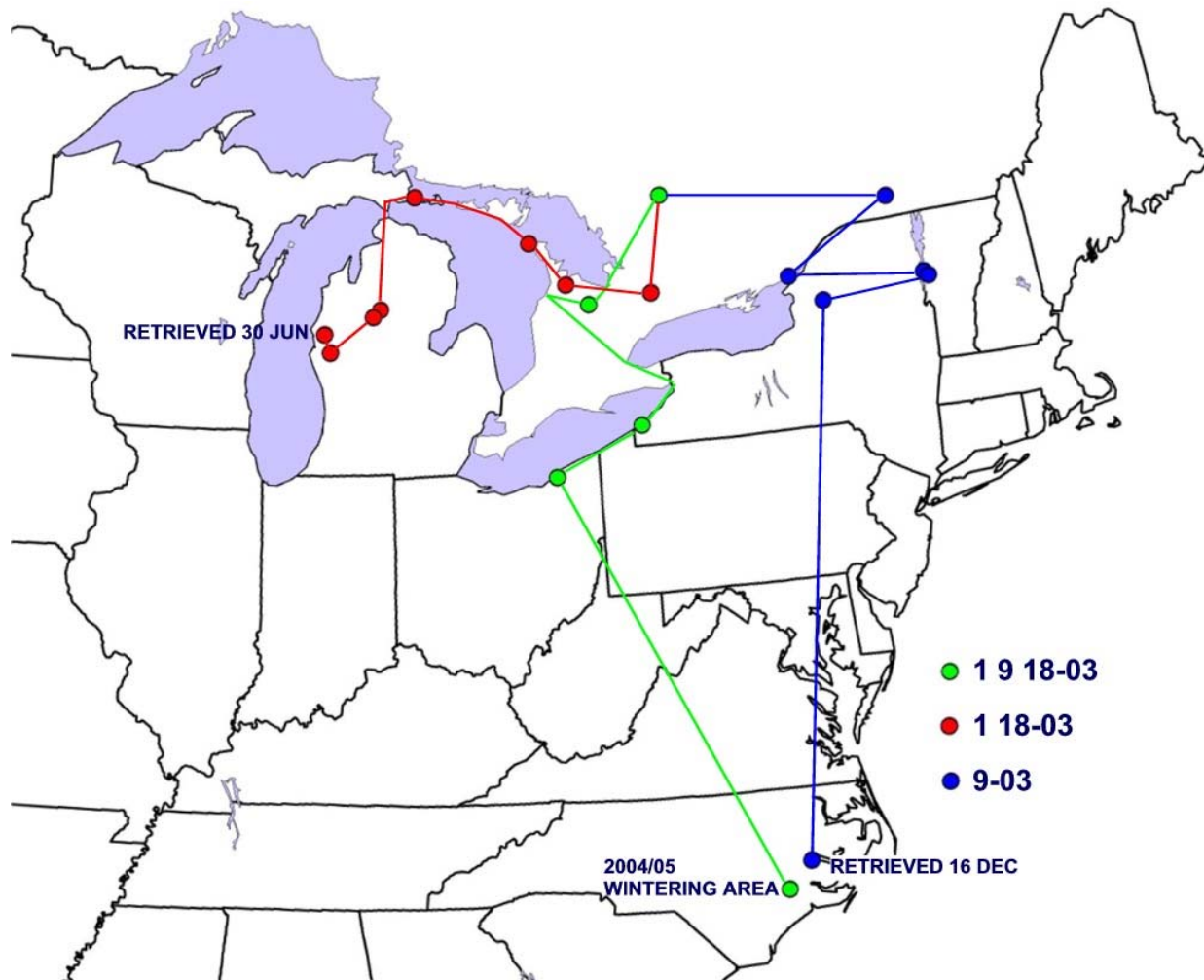
Because of flight feather development problems, one juvenile male (no. 18-04) did not complete training necessary to follow ultralight aircraft on migration. He had been released on Necedah NWR in late October 2004 to migrate with older cranes. He migrated successfully to Florida, where he wintered with an older whooping crane in Pasco County. No. 18-04 became the first reintroduced whooping crane in the eastern migratory flock to complete his first migration by following older cranes rather than ultralight aircraft.

## **SPRING MIGRATION**

### **HY2001-03 Cohorts**

The first of the older birds (HY2001-03) to begin migration were the two adults most closely associated with sandhills: No. 7-01 was reported during migration in north-central Kentucky on 25-26 February. No. 6-01 was reported at Hiwassee Wildlife Refuge, Tennessee, on 7 March after last being observed on 3 March on Kanapaha Prairie, Alachua County, Florida. The earliest departures of the other whooping cranes were a group of four birds from Pasco County during 10-12 March and the pair from Shamrock Acres, Citrus County, Florida, on 12 or 13 March. All adult whooping cranes had begun spring migration by 30 March. Fifteen birds had completed migration back to Wisconsin by 29 March. Three birds that wintered in South Carolina were confirmed in Lower Michigan during spring migration: no. 17-03 in Berrien County on 18 March, and nos. 10-03 and 13-03 in Barry and Kalamazoo Counties on 2-14 April. Except for five birds remaining east of Lake Michigan (HY2003 nos. 10 and 13 and nos. 1, 9, and 18), all other older birds had completed migration back to Wisconsin summering areas by 7 April. Nos. 10-03 and 13-03 were eventually able to circumvent the Lake; they returned to Necedah NWR on 21 May.

The three surviving HY2003 birds that had summered in Lower Michigan in 2004 and wintered in North Carolina in winter 2004/05 were again impeded by geographical barriers during spring migration (Fig. 2). Flightpaths this spring migration were influenced not only by Lake Michigan but also by Lakes Erie, Huron, and Ontario. The group of three separated while in southeastern Ontario. Nos. 1-03 and 18-03 eventually arrived via the Bruce Peninsula and Straits of Mackinac to the same areas they had occupied during the previous summer and autumn in west-central Lower Michigan. No. 9-03 proceeded eastward via Montreal, Quebec, to Vermont.



**Fig. 2. Movements of HY2003 whooping cranes nos. 1, 9, and 18 in 2005 and prior to retrieval and relocation to areas inhabited by other members of the eastern migratory population. These three cranes had summered in Lower Michigan in 2004.**

### **HY2004 Cohort**

Migration began when 11 birds (nos. 1, 2, 3, 7, 8, 14, 15, 16, 17, 19, and 20) left the Chassahowitzka pensite on 25 March (Fig. 3). They soon encountered heavy showers and thunderstorms. After being grounded at one or more coastal salt marsh locations for most of the day, they resumed flight in late afternoon and landed to roost at a pond in a cattle pasture adjacent to Crystal River Preserve State Park, 14 miles north of the Chassahowitzka pen. As rain continued, the group remained at this site through 26 March. They resumed migration and made the following overnight stops: Dixie County, Florida, on 27 March; Evans County, Georgia, on 28 March; Oconee County, South Carolina, on 29 March; and Miami County, Indiana, on 30 March. Amidst unfavorable weather, they remained at the latter stop until resuming migration to Rock County, Wisconsin, on 4 April and southwestern Fond du Lac County on 5 April. On 6 April the flock separated after taking flight. Nos. 1, 7, 8, and 14 returned to the roost site, while nos. 2, 3, 15, 16, 17, 19, and 20 proceeded to roost on Mazomanie Unit of Lower Wisconsin River SWA, Dane County. Nos. 1, 7, 8, and 14 left the site in Fond du Lac County on 7 April. They were later found near Raccoon Creek, Winnebago County, Illinois. On 25 April they proceeded to Adams County National

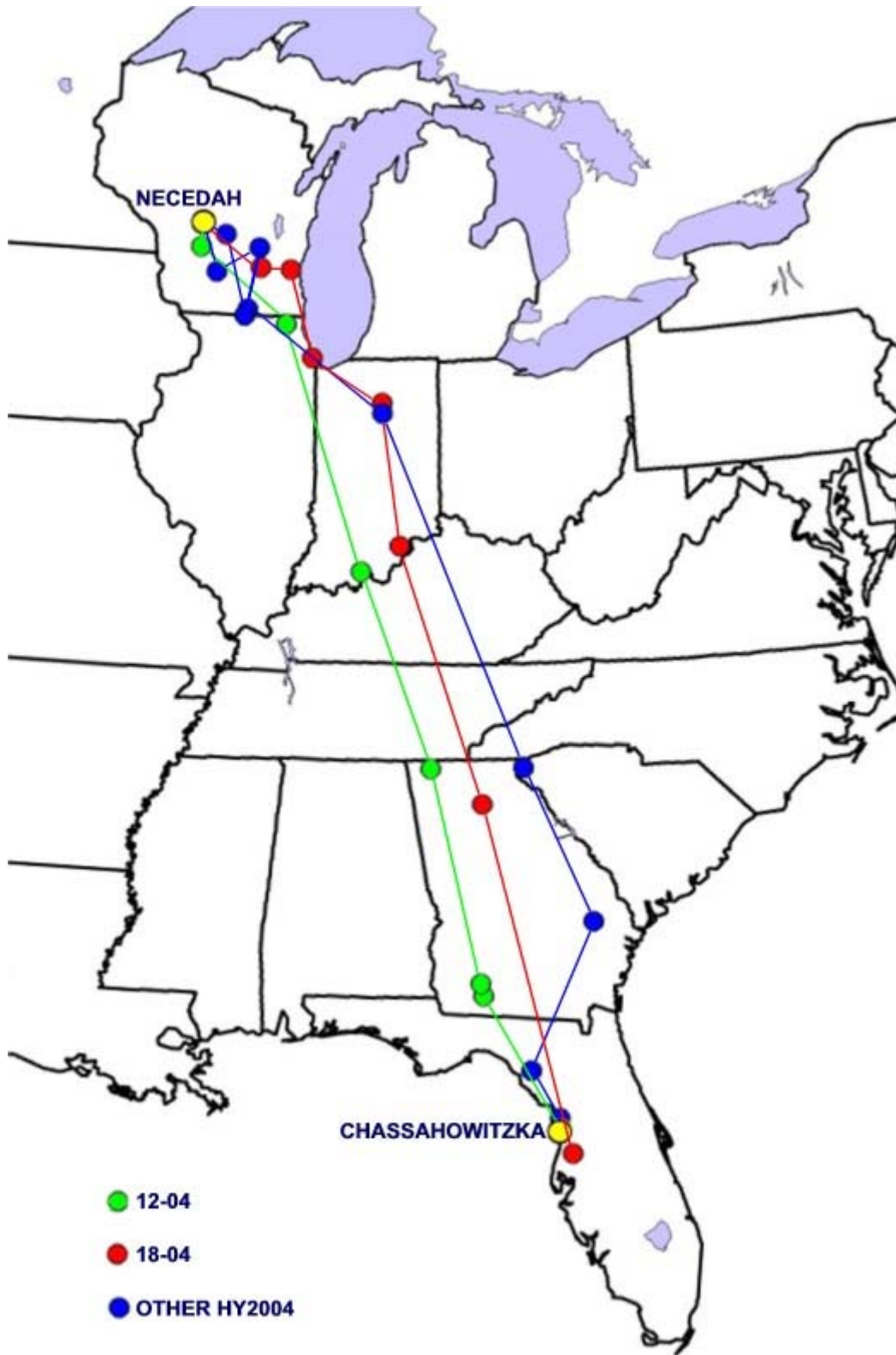


Fig. 3. Migration of HY2004 whooping cranes in the reintroduced eastern migratory population, spring 2005.

Waterfowl Production Area near Brooks, Wisconsin. On 27 April they made the short flight to Yellow River Cranberry, just east of Necedah NWR, thus completing migration. The other group of seven returning yearlings left Mazomanie and completed migration to Necedah NWR on 3 May.

No. 12 remained behind at the Chasshowitzka pensite when his flockmates left on 25 March. He associated with the adult pair nos. 5-01 and 4-02 and began migration with them on 30 March. The group of three birds proceeded to roost in Thomas County, Georgia, on 30 March and moved a short distance to Mitchell County, Georgia, on 31 March (Fig. 3). They remained at the latter site amidst unfavorable migration conditions until resuming migration on 3 April. They roosted that night in Catoosa County, Georgia. On 4 April they proceeded to roost in Perry County, Indiana. The pair separated from no. 12 early the following morning and continued on migration. Later in the morning, no. 12 resumed migration alone. He encountered and joined migrating nos. 4-03 and 11-03 in flight in south-central Indiana and the group proceeded to roost in McHenry County, Illinois. They continued on to roost near Wonewoc, Juneau County, Wisconsin, on 6 April. On 7 April they made the short flight to complete migration to Necedah NWR.

No. 18, the juvenile released during autumn on Necedah NWR, remained at the wintering site in Pasco County after his associate, no. 5-02, began migration on 10-12 March. No. 18 began migration alone on 18 April (Fig. 3). PTT readings and visual sightings indicated that he roosted along the migration route as follows: Forsyth County, Georgia, on 19 April; Scott County, Indiana, on 22-24 April; Fulton County, Indiana, on 28 April-6 May; Cook County, Illinois, on 8-9 May; Washington County, Wisconsin, on 10 May; and near Mud Lake SWA, Dodge County, on 11-15 May. He completed migration to Necedah NWR on 16 May.

### **SPRING, SUMMER, AND AUTUMN**

With some exceptions (see below), released whooping cranes generally migrated within the corridor between Wisconsin and Florida and summered in or near the core reintroduction area in Central Wisconsin (Table 2, Fig. 4). As in previous years, almost all birds returned to Necedah NWR or adjacent areas at the completion of spring migration. The spring wandering period, most pronounced in yearlings, then began (Table 3, Fig. 4). Subsequent summer distribution reflected the strong homing and natal site fidelity by males, while females tended to disperse unless they were associated with males. Spring wandering in 2005 was similar to that in 2004, which was much less than in 2003. This occurred because there were few yearling females in the population, and most older females were associated with males.

Two birds were retrieved from Mason County, Lower Michigan, and relocated to Necedah NWR on 30 June. As of 1 July, there were 43 birds (26 males and 17 females) in the eastern migratory population distributed as follows: core Central Wisconsin reintroduction area (35), southeastern Wisconsin (7), Vermont/New York (1). Approximately 30 whooping cranes roosted regularly on Necedah NWR during the summer. Yearling groups persisted intact more than in past years. This may have been related to establishment and occupation of territories by older birds over much of the refuge. Autumn distribution was similar to summer distribution for most birds in the population. The main exceptions were 3 yearling males that spent most of autumn in central Minnesota and a group of 5 yearling males that moved to southeastern Wisconsin (Table 4, Fig. 4).

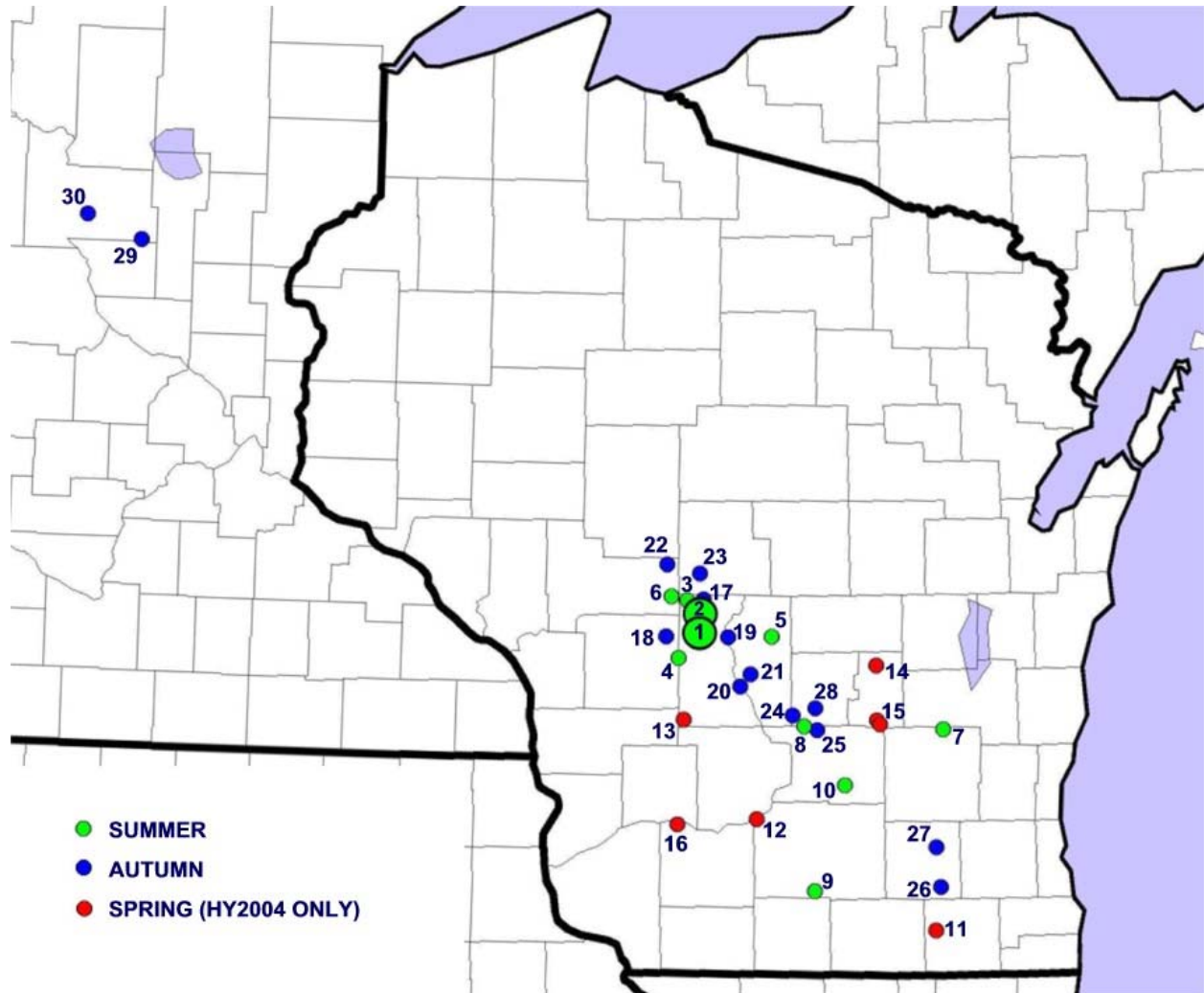
### **PAIRING AND REPRODUCTION**

As had occurred in previous years, the days immediately following return from spring migration were the most intensive period of social reorganization and new pair formation. During spring 2005, the following pairs formed: 11-02 and 17-02, 13-02 and 18-02, 16-02 and 3-03, and 17-03 and 3-02. The former two pairs had formed from autumn/winter triads.

As indicated by copulation and/or nest-building, seven breeding pairs (6 on Necedah NWR and 1 on adjacent Meadow Valley SWA) were apparent during spring 2005 (Table 5). At least five of these pairs built nests, and two pairs each laid one egg. Neither egg was adequately attended by the young, inexperienced pairs, and both eggs were shortly lost. In addition to the existing confirmed pairs, five

**Table 2. Primary summering areas of whooping cranes in the reintroduced eastern migratory population, 2005. Location nos. refer to Fig. 4.**

Crane nos.	Location	County
<b>Central Wisconsin</b>		
1-01, 2-02	(1) south Upper Rice Pool, Necedah NWR	Juneau
2-01	(5) W of Colburn SWMA	Adams
5-01, 4-02	(2) mid/northeastern Sprague Pool, Necedah NWR	Juneau
1-02, 6-03	(3) Meadow Valley Flowage, Meadow Valley SWMA	Juneau
3-02, 17-03	(2) Pool 19, Necedah NWR	Juneau
5-02	(1) Carter-Woggon Pool, Necedah NWR	Juneau
8-02	(1) southern Bee Cut, Necedah NWR	Juneau
9-02, 2-03	(4) Mill Bluff SP	Juneau
11-02, 17-02	(1) eastern East Rynearson Pool, Necedah NWR	Juneau
12-02	(2) Pool 18, Necedah NWR	Juneau
13-02, 18-02	(1) Site 2, northern East Rynearson Pool, Necedah NWR	Juneau
16-02, 13-03	(2) Goose Pool, Necedah NWR	Juneau
1-03, 11-03	(2) northeastern Sprague Pool, Necedah NWR	Juneau
4-03	(2) Rattail/western Sprague Pool, Necedah NWR	Juneau
7-03	(1) West Rynearson Pool, Necedah NWR, and south of refuge	Juneau
10-03	(1) West Rynearson Pool area, Necedah NWR	Juneau
13-03	(1) West Rynearson Pool area, Necedah NWR	Juneau
18-03	(1) Rynearson Pools complex, Necedah NWR	Juneau
	(2) Sprague Pool complex, Necedah NWR	Juneau
	(6) Bear Bluff	Jackson
1-04, 7-04, 8-04	(1) Rynearson Pools complex, Necedah NWR	Juneau
2-04, 3-04, 12-04, 16-04, 17-04	(1) Rynearson Pools complex, Necedah NWR	Juneau
<b>Southeastern Wisconsin</b>		
7-01	(7) Horicon NWR	Dodge
12-03, 16-03	(8) Neenah Creek	Marquette/ Columbia
15-04	(9) Brooklyn SWA	Dane
19-04, 20-04	(10) Leeds Center	Columbia
<b>Vermont/New York</b>		
9-03	Lemon Fair River (refer to Fig. 2)	Addison (Vermont)
	Black River (refer to Fig. 2)	Lewis (New York)



**Fig. 4. Primary summer and autumn use areas of all whooping cranes and primary spring wandering locations of HY2004 cranes in the eastern migratory population, 2005. Location nos. refer to Tables 2, 3, and 4.**

additional pairs formed or persisted during summer and autumn. Prospects are therefore good for reproduction in 2006.

One other whooping crane demonstrated breeding activity in 2005. No. 6-01 was paired with a sandhill crane on his territory in a cranberry wetland in the Crawford Creek watershed, Jackson County. The pair was observed nest-building and copulating on 9-10 April. On 22 April no. 6-01 was discovered with a broken left tarsus. Because of his limited mobility, he roosted on the open floor of a woodland adjacent to the wetland. He was killed by a predator on approximately 2 May.

### **SURVIVAL**

Of 57 whooping cranes released as juveniles during the reintroduction, 45 were alive as of December 2006. The 12 mortalities (Table 6) were due to predation (7), powerline strike (1), capture myopathy (1, euthanized), cause under investigation (2, details cannot be released), and not yet determined (1). Mortalities due to predation resulted from bobcats in southeastern U.S. (5), an undetermined predator in



Wisconsin (1), and predation in Wisconsin of a bird that was roosting on land because of a broken leg. A protective protocol, initiated shortly after two birds in the first cohort were killed just after release, has been effective in reducing potential bobcat predation at the winter release site on Chassahowitzka NWR.

One half of the total mortalities of released birds occurred during 2005 (Table 6). No. 14-02 was killed by a bobcat after being chased from the Chassahowitzka pen by a dominant adult just before dark. No. 5-04 was killed by a bobcat on Chassahowitzka NWR when he roosted in an unsafe area outside the pen. No. 6-01 was killed by a predator after he broke his leg (suspected powerline strike) on his territory on a cranberry farm. No. 14-04 was killed by a predator on a wetland adjacent to a cranberry farm; this yearling had recently returned from spring migration and was roosting in a small, shallow, unsafe wetland. No. 18-04 died as a result of collision with a powerline on a farm in southeastern Wisconsin. He was the juvenile that had been released on Necedah NWR in the preceding autumn. No. 4-03 was found dead in late October on Necedah NWR; necropsy results are pending. This latter death was the only mortality to occur on Necedah NWR of the 12 total mortalities since the reintroduction began in 2001.

**Table 3. Primary spring use locations of whooping cranes in the reintroduced eastern migratory population, 2005. Only spring use areas which were different from summering areas are shown. Summering areas appear in Table 2. \* = used alternately with summer territory during spring. Primary spring wandering location nos. of yearlings refer to Fig. 4.**

Crane nos.	Location	County
Central Wisconsin		
5-01, 4-02	Mill Bluff area*	Juneau
6-01	Crawford Creek	Jackson
7-01	SW of Colburn SWA	Adams
1-02, 6-03	Lemonweir River/New Lisbon*	Juneau
8-02	Brandy Creek*	Monroe
11-02, 17-02	Mauston wastewater plant	Juneau
12-02	Leola area	Adams
4-03	SW of Valley Junction*	Monroe
11-03	Little Yellow River*	Juneau
12-03, 16-03	Yellow River Cranberry	Juneau
Southern/southeastern Wisconsin		
HY2004 1, 7, 8	(11) Turtle Creek SWA	Walworth
HY2004 2, 3, 16, 17	(12) Mazomanie Unit, LWR SWA	Dane
12-04	(13) SW of Union Center	Juneau
15-04	(14) southeastern White River Marsh	Green Lake
18-04	(15) S of Manchester	Green Lake
19-04, 20-04	(16) Avoka Unit, LWR SWA	Iowa
18-04, 19-04, 20-04	(15) S of Manchester	Green Lake
Lower Michigan		
1-03, 18-03	west/north-central Lower Michigan	various
10-03, 13-03	southwestern Lower Michigan	various
Southwestern Ontario		
9-03	widespread locations	various

**Table 4. Primary autumn staging areas of whooping cranes in the reintroduced eastern migratory population, 2005. Cranes which staged only on or near their summer use areas are not shown. Summer use areas appear in Table 2. Location nos. refer to Fig. 4. \* = also staged in summering area (refer to Table 2).**

Crane nos.	Location	County
<b>Central Wisconsin</b>		
2-01	(1) East Ryneerson Pool, Necedah NWR	Juneau
5-01, 4-02	(1) West Ryneerson Pool, Necedah NWR; (4) Mill Bluff area	Juneau
1-02, 6-03	(17) Finley (2) eastern Sprague Pool, Necedah NWR	Juneau
8-02	(18) Valley Junction	Monroe
9-02, 2-03	(1) Upper Rice Pools, Necedah NWR	Juneau
11-02, 17-02	(18) Valley Junction*	Monroe
12-02	(1) southern East Ryneerson Pool, Necedah NWR	Juneau
12-03, 16-03	(1) southeastern Necedah NWR (19) Petenwell Dam (20) Wisconsin River, S of Castle Rock Lake (21) NE of Lone Rock Lake	Juneau Adams Adams
13-03	(18) Valley Junction*	Monroe
18-03	(23) Sandhill SWA	Wood
18-03	(1) West Ryneerson Pool, Necedah NWR	Juneau
<b>Southeastern Wisconsin</b>		
12-03, 16-03	(24) Widow Green Marsh	Marquette
2-04, 3-04, 12-04, 16-04, 17-04	(25) Neenah Creek/Fox River	Marquette
2-04, 3-04, 12-04, 16-04, 17-04	(25) French Creek SWA	Columbia
15-04	(26) Palmyra*	Jefferson
	(27) Farmington*	Jefferson
19-04, 20-04	(28) Endeavor Marsh	Marquette
<b>Central Minnesota</b>		
1-04, 7-04, 8-04	(29) southeastern Morrison County (30) Skunk Lake SWA	Morrison Morrison

**Table 5. Reproductive activity of whooping crane pairs in the reintroduced eastern migratory population, spring 2005.**

Male	Female	Area	Territory	Activity
1-01	2-02	Necedah NWR	Site 4/south Upper Rice Pool	Nest with 1 egg
11-02	17-02	Necedah NWR	East Dike, East Ryneerson Pool	Nest with 1 egg
13-02	18-02	Necedah NWR	Site 2/northern East Ryneerson Pool	Incomplete nest
5-01	4-02	Necedah NWR	NC/NE Sprague Pool	Established territorial pair but not accessible for observation
3-02	17-03	Necedah NWR	Pool 19	Several incomplete nests
16-02	3-03	Necedah NWR	NW Goose Pool	Copulation
6-03	1-02	Meadow Valley SWA	Meadow Valley Flowage	Complete nest

**Table 6. Post-release mortalities of whooping cranes in the reintroduced eastern migratory population, 2001-05.**

Hatch year	Crane no.	Sex	Studbook no.	BBL Band no.	Mortality date	Location	Cause
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	7	F	1667	599-32119	30 Aug 2003	n. a.	Euthanized after capture myopathy
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.	Under investigation
2003	4	M	1699	599-34045	23 Oct 2005	Necedah NWR, Wis.	Necropsy results pending
2003	5	M	1700	599-34046	13 Nov 2004	Cape Romain NWR, S.C.	Bobcat predation
2003	19	M	1714	599-34055	~23 Jul 2004	Oceana Co., Mich.	Under investigation
2004	5	M	1748	599-37452	14 Mar 2005	Chassahowitzka NWR, Fla.	Bobcat predation
2004	14	M	1757	599-37456	3 May 2005	Juneau Co., Wis.	Predation
2004	18	M	1761	599-34057	~9 Jul 2005	Green Lake Co., Wis.	Powerline collision

#### **AUTUMN MIGRATION AND EARLY WINTER**

Departure dates from Wisconsin varied from 9 to 24 November with largest single-day departure (20 birds) on 17 November. The first birds arrived in Florida on 15 November, and the first birds arrived on Chassahowitzka NWR on 17 November. No. 9-03, the female that summered in New York, was retrieved from North Carolina and relocated to Florida on 16 December. Early winter distribution as of 1 January 2006 was as follows: Florida (35), Tennessee (7), South Carolina (1), North Carolina (1), and undetermined (1) (Table 7).

The yearlings migrated earlier than the older cranes. HY2004 nos. 2, 3 12, 16, and 17 began migration with sandhills from French Creek SWA, Columbia County, Wisconsin, and flew to central Indiana on 9 November and to central Tennessee on 10 November. This group of five whooping cranes arrived at the Chassahowitzka pensite on 17 November. They stayed one night and then moved northward to San Pedro Bay, Taylor County, where they remained to winter.

Nos. 19-04 and 20-04 began migration with sandhills from Endeavor Marsh, Marquette County, on 9 November. They were ahead of the group of five noted above and reached central Indiana or farther south on the first day. Tracking of this pair was resumed on 12 November, when they roosted in Washington County, Georgia. They continued on to Bacon County, Georgia, on 13 November and Clinch County on 14 November. They reached Hixtown Swamp, Madison County, Florida, on 15 November and remained to winter in that area.

**Table 7. Early wintering areas of whooping cranes in the reintroduced eastern migratory population, winter 2005/06. Location nos. refer to Fig. 1. Location of no. 7-03 was undetermined as of 1 January 2006.**

Crane nos.	Location	County
Florida		
1-01, 2-02	(1) Shamrock Acres	Citrus
2-01, 12-02	(2) NE of Gowers Corner	Pasco
5-01, 4-02	(17) Bystre Lake	Hernando
1-02, 6-03	(6) Lake Woodruff NWR	Volusia
3-02, 17-03	(3) Stafford Lake	Hernando
5-02, 13-03	(2) NE of Gowers Corner	Pasco
8-02	(2) NE of Gowers Corner	Pasco
11-02, 17-02	(2) NE of Gowers Corner	Pasco
16-02, 3-03	(18) SW of Gowers Corner	Sumter
1-03, 11-03	(3) Stafford Lake	Hernando
9-03, 15-04	(19) Indian Lake (S of Hixtown Swamp)	Madison
12-03, 16-03	(9) Long Pond	Marion
HY2004 1, 7, 8	(20) E of Lake Gordon	Polk
HY2004 2, 3, 12, 16, 17	(21) Fire Pan Sog, San Pedro Bay	Taylor
19-04, 20-04	(22) Hundred Acre Pond	Madison
32-05	(23) Kissimmee Prairie	Osceola
33-05	(24) Levy Lake	Alachua
Tennessee		
7-01	(10) Hiwassee Wildlife Refuge	Meigs
9-02, 2-03	(11) W of Winchester	Franklin
13-02, 18-02	(11) W of Winchester	Franklin
27-05, 28-05	(10) Hiwassee Wildlife Refuge	Meigs
South Carolina		
10-03	(12) Combahee Unit, ACE Basin NWR	Colleton
North Carolina		
18-03	(25) Seven Creeks/Waccamaw River	Columbus

HY2004 nos. 1, 7, and 8 were last reported near Skunk Lake, Morrison County, Minnesota, on 9 November. They were next found in Washington County, Indiana, on 22 November. Local residents indicated that they had been at the site for more than a week. They resumed migration on 24 November and landed to roost on the Tennessee River just northeast of Hiwassee Wildlife Refuge. They continued migration with sandhills on 25 November and roosted near Lake Blackshear, Sumter County, Georgia. They continued on to Florida and roosted in Jefferson County on 26 November and Taylor County on 27 November. After two days of rain, they resumed migration on 30 November and arrived at the Chassahowitzka pensite. They stayed one night and flew the next day to near Lake Gordon, Polk County, where they remained to winter.

No. 15-04 began migration with sandhills from Jefferson County, Wisconsin, and proceeded to Jasper-Pulaski SWFA (J-P), Indiana, on 17 November. She roosted on Kankakee River SFWA just north of J-P on 19 November but returned to J-P the next day. She apparently left J-P on 21 November and then arrived at Armstrong Bend, Hiwassee Wildlife Refuge, Tennessee, on the morning of 23 November. She departed on 25 November. On 26 November she roosted near Blue Sink, Madison County, Florida. By 28

November she had moved to nearby Hixtown Swamp. She remained in this general wintering area through the end of the year.

Autumn migration of most older birds was on a direct course to Florida. Five birds (nos. 7-01, 1-02 and 6-03, and 7-03, plus yearling 15-04) that were flying with sandhills passed through J-P. A group of three pairs (nos. 2-01 and 12-02, 3-02 and 17-03, and 1-03 and 11-03) made an extended stay (18 November-17 December) at their second migration stop near Indianapolis, Indiana. Two birds believed to be nos. 1-03 and 11-03 were sighted at the previous wintering area of no. 11-03 in South Carolina on 20 December. That pair arrived at the Chassahowitzka pensite two days later. Most older birds had either passed through the Chassahowitzka pensite or were already on final wintering areas by 25 December.

Two birds, nos. 10-03 and 18-03, wintered again in South and North Carolina, respectively. In the previous year, 10 birds, all HY2003, had wintered in the Carolinas. In early winter 2005/06, of the nine surviving individuals, five were in Florida, one was in Tennessee, and the wintering area of another had not yet been determined.

### **DIRECT AUTUMN RELEASE (DAR)**

Year 2005 was the first in which whooping crane chicks were specifically reared for release with older cranes on the northern reintroduction area. Rearing and release methods were based on much successful earlier work with sandhill cranes, in which juveniles released during the autumn staging period learned survival skills and the migration route from older, experienced cranes.

#### **Rearing**

Five whooping crane chicks (1 male and 4 females) were costume/isolation-reared at ICF for DAR. They hatched 5-15 June. Three eggs were produced at ICF and two at Patuxent. The chicks were transferred to the isolation-rearing field facility (Site 3) at Necedah NWR on 14 July when chicks were 29-39 days of age. The chicks were frequently attended by costumed parents in the chickyard and surrounding field and marsh during the day and locked in their individual compartments in the building at night. One female (no. 31) was euthanized after sustaining a serious handling injury on 27 July.

Chicks fledged (cleared 100 m without touching the ground) by mid to late August (70-73 days after hatching). They were moved from the rearing building to the topnetted wet pen on 3 September. 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.

The premigratory health check was performed on 23 September; results were normal. Chicks flew regularly by late September, making large loops over the field and often flying over the treetops bordering the rearing site. Five adult whooping cranes (nos. 2-01, 11-02 and 17-02, 12-02, and 7-03) visited the rearing site in late summer/early autumn. The chicks most frequently associated with no. 12-02 and the resident sandhill crane pair.

The male chick (no. 32) left Site 3 on 7 October and spent the day associating with different groups of sandhills on Rynearson Pools. In late afternoon he was retrieved by costumed parents and returned to Site 3. He was kept penned until 9 October. On that date his permanent colorbands and VHF transmitter were attached. He was free to fly after that date but remained with the three females at Site 3. The three females were colorbanded on 21 October. In addition to a VHF transmitter, each female was also fitted with a PTT.

#### **Release**

All juveniles were released at sites occupied by older whooping cranes. Movements and associations of juveniles with other cranes during the process of release and integration into the wild were complex. A much simplified chronology appears below. Unless indicated otherwise, released juvenile whooping

cranes roosted and foraged in appropriate habitats with older whooping cranes and/or large numbers of staging sandhills during the release period. All specified locations other than Mill Bluff and the Lemonweir River site were on Necedah NWR.

24 October: Nos. 27, 28, and 32 left Site 3 voluntarily and roosted on East Rynearson Pool (ERP).

25 October: Nos. 27, 28, and 32 returned to Site 3 during morning. No. 27 was released on Killdeer Pool in late afternoon. No. 33 was released on Carter-Woggon Pool.

26 October: Neither no. 27 nor no. 33 remained with the adult whooping cranes with which they were released. Both joined sandhill flocks. No. 27 joined no. 33 at roost on West Rynearson Pool.

27 October: Nos. 28 and 32 flew to ERP. No. 32 was retrieved and released at eastern Sprague Pool. No. 28 remained to roost on ERP.

28 October: No. 28 returned to Site 3; she roosted there alone that night.

29 October: No. 28 was released at northeastern Sprague Pool. She joined no. 32 at roost.

30 October: All four DAR juveniles (as two pairs) flew back to Site 3 and reunited. They roosted in the marsh north of the wet pen on that night.

31 October: The four DAR juveniles left Site 3 to feed with sandhills in a cornfield south of the refuge. They returned to roost on ERP.

1 November: Nos. 28 and 32 separated from nos. 27 and 33. Nos. 28 and 32 flew to the Mill Bluff area.

3 November: All four DAR juveniles (two pairs) reunited at Mill Bluff. They always remained together as a group after that date until 16 November (see below).

9 November: The group of DAR juveniles began using a site along the Lemonweir River southwest of the refuge. They remained to roost there without other cranes.

10-15 November: The DAR juveniles continued to roost at the Lemonweir River site without other cranes. Older whooping cranes and sandhill cranes foraged in the cornfield at the site during the day.

16 November: No. 32 roosted on West Rynearson Pool. The three females remained to roost at Lemonweir.

17 November: Nos. 27 and 33 roosted on West Rynearson Pool. Nos. 28 and 32 remained at Lemonweir.

18 November: The four DAR juveniles roosted on the frozen surface of West Rynearson Pool in the large flock of staging cranes.

19-21 November: The four DAR juveniles roosted at Lemonweir.

22 November: The four DAR juveniles roosted on Rice Pool.

23 November: The four DAR juveniles attempted to roost at Lemonweir. Because optimal migration conditions were predicted for the following day, project personnel attempted to flush the birds off the Lemonweir roost to rejoin the large crane flock on Necedah NWR. The DAR juveniles did eventually leave the area but only moved a few miles to roost in a cranberry reservoir without other cranes.

24 November: Migration conditions were optimal. Passage of a major cold front during the night resulted in clear skies and a strong tailwind. Many sandhill cranes and the few remaining adult whooping cranes in the area departed early. The four DAR juveniles left their roost and joined sandhill cranes in a cornfield

between the Lemonweir site and Mill Bluff at mid-morning. At 1033 EST they began southbound migration along with approximately 52 sandhills.

## **Migration**

No tracking aircraft were available on 24 November. With a strong tailwind, the juveniles had outdistanced three ground trackers by the time they reached Illinois, and additional tracking detected no signals. A PTT reading that night indicated that no. 27 was roosting just northeast of Speed, Clark County, Indiana, on the north side of the Ohio River across from Louisville, Kentucky. Ground tracking verified her presence in a quarry pond at that location on the following day (Fig. 5). No. 27 had flown 455 miles on the first day of her first autumn migration. She was not with the other whooping cranes, and their roost locations were not determined. On 25 November air tracking found juveniles nos. 33, 32, and 28 on or in the immediate vicinity of Hiwassee Wildlife Refuge, Meigs County, Tennessee (Fig. 5). They arrived separately in the order listed among the large sandhill flocks. They had reached Hiwassee on the second day of migration. Although they reunited as a group on 26 November, they were separate in later observations. The male, no. 32, resumed southbound migration on 30 November but was not tracked; nos. 28 and 33 remained at Hiwassee.

During afternoon on 25 November, no. 27 flew 35 miles southward and landed in Nevin Lake, Bernheim Arboretum and Research Forest, Bullitt County, Kentucky. She was highly visible and exposed at close range to the public at this site. Travel logistics made immediate intervention by project staff difficult. During early afternoon on 28 November, no. 27 was retrieved at Bernheim Forest by costumed personnel, transported 28 miles eastward, and released on Taylorsville Lake SWMA, Anderson County. The release site was a small waterfowl refuge consisting of river and mudflat and was currently closed to the public. A sandhill family (two adults and a juvenile) were also present, but the two species did not associate. No. 27 resumed migration alone on 29 November and proceeded slowly southward while being blown eastward by the wind. She landed to roost in Laurel River Lake, Laurel County, Kentucky, in the Daniel Boone National Forest. On 30 November she continued migration. She flew southward alone and in early afternoon landed at a pond on top of the Cumberland Escarpment 6 miles north of Dayton, Rhea County, Tennessee. She resumed flight in mid-afternoon, having likely heard or seen sandhills, and flew the short distance to land on drawn down Mud Creek, Rhea County, directly across the Tennessee River from Armstrong Bend, Hiwassee Wildlife Refuge. She remained to roost on Mud Creek with more than 300 sandhill cranes. During 29-30 November this juvenile whooping crane had successfully completed the migration segment from north-central Kentucky to the major crane congregation area at Hiwassee in southeastern Tennessee without guidance of other cranes. She and the other two DAR females remained in the Hiwassee area but did not rejoin during the next few weeks.

No. 33 resumed migration from Hiwassee approximately 18-20 December. She arrived on Paynes Prairie, Alachua County, Florida (Fig. 5), on 21 December. She was in a large flock of migratory sandhill cranes using marsh and wet pasture. Nos. 27 and 28 rejoined at Hiwassee at approximately the same time and remained associated.

The search for the DAR male, no. 32, on sandhill crane wintering areas in Florida was temporarily discontinued on 12 December because of unavailability of tracking aircraft. When aircraft again became available on 31 January 2006, he was found in a large flock of migratory sandhill cranes on a cattle ranch on the Kissimmee Prairie, west of Yeehaw Junction, Osceola County, Florida (Fig. 5). Local residents indicated that he had been present at this location since at least mid-December. As of January 2006, nos. 27 and 28 remained together among the thousands of wintering sandhill cranes on Hiwassee, and no. 33 remained with sandhills on cattle pasture and wetlands at Levy Lake or nearby wetlands, Alachua County, Florida.

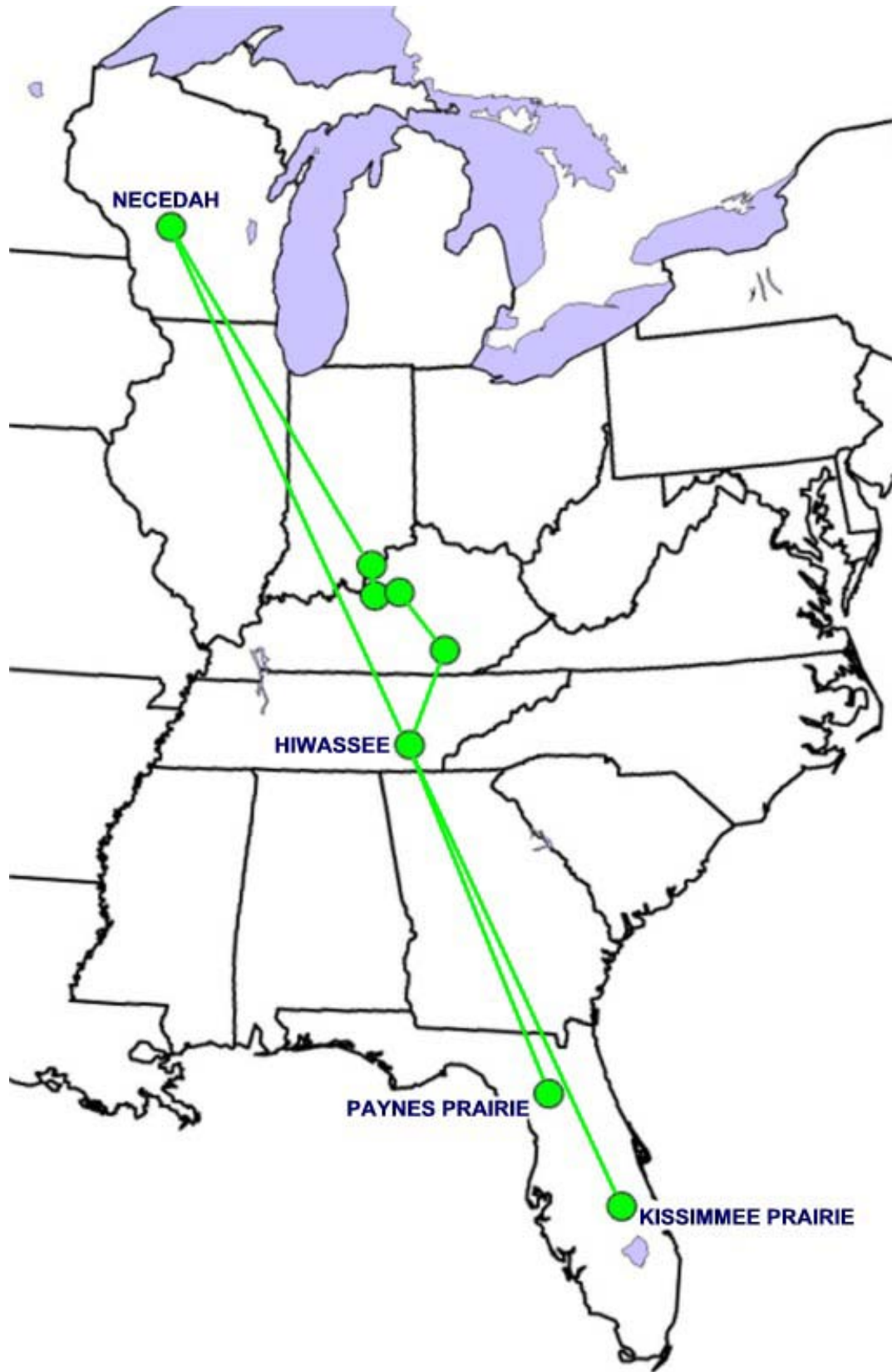


Fig. 5. Migration of direct autumn release (DAR) juvenile whooping cranes, autumn 2005.



## **HY2005 COHORT**

The ultralight-led migration departed from Necedah NWR on 14 October. The flock of 19 juvenile whooping cranes arrived on Halpata Tastanaki Preserve, Marion County, Florida, on 13 December. The latter was a new site established for holding the juveniles until older returning birds had cleared the Chassahowitzka pensite. The juveniles were colorbanded and equipped with permanent transmitters on 19-20 December. The ultralight-led flock remained at Halpata while awaiting transfer to Chassahowitzka in January 2006.

## **HABITAT USE**

### **Summer**

Habitat use by reintroduced whooping cranes in the core reintroduction area (parts of Juneau, Adams, Monroe, Jackson, and Clark Counties) has been relatively uniform and predictable in the early years of the project, with a few exceptions. Birds summering on Necedah NWR typically used the shallow waters and emergent wetland vegetation along the edges of the managed impoundments that comprise the majority of refuge marshes. Small numbers of birds have used the natural sedge meadows of the refuge for significant periods of time. Pairs from earlier release cohorts have established territories around the three ultralight training sites, precluding significant use by HY2003 and HY2004 birds. However, Necedah NWR supported approximately 30 whooping cranes (most of the population) throughout the summer months of 2005. In addition to the emergent vegetation zones, the birds used palustrine and upland scrub-shrub areas associated with the marshes during daytime foraging and loafing activities. Oak savanna habitat was also used, primarily during late spring and early summer. This use often followed prescribed burns which opened the understory and exposed invertebrates. In early and mid-summer, birds were often observed foraging on blueberries and sarsaparilla in the upland scrub areas, most notably the Bee Cut area. Pool drawdowns created ephemeral foraging habitat for cranes, as fish and other aquatic prey became trapped in the receding water. The birds also probed for food items in the mudflats exposed by the drawdowns. This type of foraging also occurred during natural drought conditions. The cranes appeared to shift their daytime movement patterns within the mosaic of habitats at Necedah NWR to take advantage of the shifting abundance of food resources.

Off-refuge summer habitat use within the core reintroduction area has been fairly similar to that on the refuge, although land use patterns were sometimes quite different. The managed wetlands and adjacent pine scrub habitat of Meadow Valley SWA provided a summer territory for a pair of whooping cranes in 2005. This pair built a nest in marsh within one of the managed impoundments. Cranberry beds and reservoirs in the reintroduction area have provided foraging and roosting habitat for many whooping cranes, particularly during the spring and autumn months. Marshes within the unmanaged impoundments of Mill Bluff State Park, along with surrounding agricultural areas, provided summer habitat for small numbers of cranes, and spring and autumn habitat for larger groups of birds. A more atypical habitat preference was shown by two birds of the 2003 cohort. These birds spent significant portions of the spring and summer along sloughs and oxbow ponds associated with the Little Yellow River south of Necedah NWR. During spring birds generally foraged in the previous year's cornfields prior to planting and then briefly in the newly planted fields. A few observations have been made of birds foraging in cornfields greater than 3 feet tall. This may occur more often when there are bare patches or height variations within the field. During autumn birds were again attracted to cornfields after the crop had been harvested. Many birds often left their summer territories and used this rich food source as soon as it was available.

So far returning whooping cranes have attempted to pack tightly into the Rynearson Pools complex of Necedah NWR, the specific natal area where they had been reared and fledged. This behavior has been most beneficial to establishing a population because it has maximized opportunity for social interaction and pair bond formation. As territories have become filled by breeding pairs, new territories have formed in the nearest suitable wetlands, such as those in the Sprague Pool complex, Necedah NWR, and on Meadow Valley Flowage, Meadow Valley SWA. Because of the strong homing, only a small portion (perhaps as little as 10%) of habitat within the core reintroduction area has so far been occupied by

territorial pairs, and much more habitat is available. If reproduction is successful, the area should be able to support a healthy, self-sustaining population.

During spring and early summer, non-nesting birds have often occupied areas outside of the core reintroduction area. Some birds remained in these more distant locations throughout the summer. Females and younger birds exhibited this pattern most often. Wandering juveniles in the spring used many different wetland types throughout Wisconsin and into Minnesota, Iowa, and Illinois, sometimes relocating each day. Wetland habitats along the Lower Wisconsin River and the Mississippi River were most often used during this period of spring wandering. Lacustrine marshes, such as those associated with Puckaway, Rush, Yellowstone, and Poygan Lakes, among others, were also most often used during this time period, though a few of these areas have supported birds during the summer months. Small numbers of birds have used the marshes of the Briggsville area, particularly those associated with Neenah and O'Keefe Creeks during both the summer and autumn.

## **Migration**

The majority of whooping cranes demonstrated a direct migration route with opportunistic stops at whatever wetlands were available in the area they reached by the end of the flight day. These sites included natural or managed palustrine, lacustrine, and riverine wetlands as well as farm ponds, reclaimed surface mines, flooded agricultural fields, catfish production ponds, mountain reservoirs, and river sandbars. They often remained at such stops only overnight or for extended periods during days of poor flying weather, but they sometimes also stayed during longer periods of mild weather. Some whooping cranes, because of their greater association with sandhill cranes, also used large, managed, wetlands at Jasper-Pulaski SFWA, Indiana, and Hiwassee Wildlife Refuge, Tennessee, on the traditional eastern greater sandhill crane migration route.

Throughout the year whooping cranes preferred open country, e.g., grassland and savanna, lacking much woody cover and with numerous shallow wetlands. All whooping cranes roosted in safe wetlands most of the time. The only major exceptions were some yearlings that were not associated with sandhill cranes.

Roost habitat ranged from extensive, permanent wetlands to relatively small stock ponds. Sites used generally satisfied safe, short-term habitat requirements. In general, whooping cranes improved roost site selection in their first unassisted fall migration over that in their first spring migration. Like sandhills, whooping cranes often fed in grain fields, especially harvested cornfields, near the roost sites. Because of the broad range of potentially usable sites and the need to use them for only a few days, adequate stopover habitat does not appear limiting even in mountainous parts of the migration route.

## **Winter**

The salt marshes of Chassahowitzka NWR and surrounding central Gulf Coast were initially selected as wintering habitats for the reintroduced population. Site selection was an attempt to resemble habitat of Aransas NWR on the Gulf Coast of Texas. There, the diet of the natural whooping crane population depends largely on an abundance of blue crabs. This food item is also abundant on Chassahowitzka. However, although Chassahowitzka NWR has served as a high-quality release area, tidal and other habitat conditions there have not been conducive to establishment of winter territories by returning birds. Many of the birds visit the salt marsh upon return from autumn migration but then move inland to winter.

Returning whooping cranes have been fairly consistent in their habitat selection in Florida. After leaving the salt marsh the birds select inland areas containing freshwater marshes. The marshes used by the cranes have included some large highland marshes such as Paynes Prairie, Clermont Marsh, and Hawthorne Prairie. More often, the birds used smaller highland or flatwoods marshes adjacent to dry prairies used for cattle grazing. Many of the birds foraged in these upland cattle or horse pastures during the day, particularly where a nearby water source such as a ditch or pond was present. During winter of 2004/05, one pair of whooping cranes foraged on dairy pastures and roosted on an impoundment at Lake Woodruff NWR, part of the formerly extensive St. John's River Marshes complex. The marshes used by whooping cranes may contain plant assemblages characteristic of flag marshes, wet prairies, saw grass

marshes, or cattail marsh. Most important appears to be the existence of shallow water suitable for roosting. During several winters small numbers of whooping cranes spent all or a significant portion of the season at Hixtown Swamp, a complex of cypress swamps, marshes, and ponds in north-central Florida. Agricultural fields with crops of rye or peanuts provided another foraging habitat opportunistically used by wintering whooping cranes.

During winter 2004/05, 14 of the 34 birds in the population wintered in Tennessee (4), South Carolina (7), or North Carolina (3). No. 7-01 remained at or near Hiwassee Wildlife Refuge, Tennessee, where she roosted along river sandbars and foraged in cornfields. Number 6-01 had spent much of winter of 2002/03 in the same area. The remaining three Tennessee birds roosted together in a pond in an ungrazed pasture and foraged in a harvested cornfield. The seven birds that wintered in South Carolina included two lone birds, one pair of males, and one group of three. The most unique habitat use was likely that of no. 7-03. He spent the winter on Bull Island, a private coastal island just west of Hilton Head. This island was managed primarily for dove hunting. The grain and cornfields planted for this purpose provided foraging habitat for no. 7-03, while the created ponds supplied freshwater. He typically roosted in a brackish impoundment marsh on the edge of the island. The remainder of the South Carolina birds used areas in the ACE Basin project, which consisted of private, state, and federal lands managed for wildlife and human benefits. Much of the area consisted of former rice plantations (converted from intertidal marshes) that now contain, among other habitat types, flooded cornfields and brackish or freshwater marshes. The whooping cranes primarily used each of these latter habitat types. Before settling into their final wintering areas, some of these birds temporarily utilized coastal salt marshes dominated by smooth cordgrass or islands along the Atlantic Coast of Georgia including some islands of the Savannah NWR complex. The three birds who wintered in North Carolina selected a small flooded clearcut in a river bottom for roosting. They also foraged in this flooding, in an adjacent harvested cornfield, and sometimes in farm fields in uplands about 1 mile from this site.

#### **IMPROVEMENTS IN WINTER MANAGEMENT STRATEGY**

Chassahowitzka NWR provides an excellent release site for juveniles because the pensite is not accessible by the public, naive juveniles can be effectively protected from predators, physical facilities are ideal, and movements of juveniles can be controlled because habitat conditions limit dispersal. Because of tidal fluctuations, salinity, unstable or rocky bottom substrates, and general habitat dominance by needlerush, most returning older whooping cranes do not remain at the pensite but instead winter inland. This pattern has been advantageous to the reintroduction by allowing this release site to be used year after year. To remedy the problem of overlap between older birds still passing through Chassahowitzka after arrival of the new juveniles, a holding site has been established on Halpata Tastanaki Preserve, Southwest Florida Water Management District, Marion County, 26 miles north-northeast of the Chassahowitzka pensite. Juveniles will be retained at this site until as many older birds as possible have completed migration and moved inland to winter.

#### **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.

Although the population of whooping cranes has grown and the area near Mill Bluff has continued to be a major use area, there were few incidents of birds on nearby Volk Field during the year. Volk Field, a U.S. Air Force Base used for Air National Guard training, has had problems in the past, mainly associated with nos. 5-01 and 4-02.

There is major concern about wintering sites in Florida. Several cattle ranches in Pasco County have become major wintering areas for project birds. The most heavily used ranch is being sold to be subdivided and converted into residential property by developers. Many ranches face this threat. Another site is marginally close to human residences and contains nonmigratory sandhill cranes that tolerate people and do not foster an environment that facilitates avoidance of humans and human activity by reintroduced birds.

There have been no significant conflicts noted between whooping cranes and farmers. No significant crop damage has been apparent, and most farmers have expressed positive interest in having whooping cranes on their properties.

## **INTERACTION WITH NONMIGRATORY WHOOPING CRANES**

There have been two cases of interaction between reintroduced migratory whooping cranes and members of the nonmigratory flock. In winter 2004/05, no. 6-01 occupied two cattle ranches west of Okahumpka, Lake County. His roost site was one of the primary release sites used for the nonmigratory whooping crane reintroduction. He was the only migratory whooping crane on an area inhabited by nonmigratory whooping cranes. He occasionally associated with the latter birds but more typically remained with wintering migratory sandhills. He left that site during 6-11 January 2005 and moved to a site with wintering migratory sandhill cranes southwest of Gainesville, Alachua County, near the wintering area that he had occupied one year earlier. He had no further associations with nonmigratory whooping cranes during the winter. He later died in Wisconsin during the spring.

HY2004 males nos. 1, 7, and 8 occupied ranchland near Lake Gordon, Polk County, Florida, during early winter 2005/06. They consistently associated with a HY2000 nonmigratory female while at this site.

## **LAND OWNERSHIP**

Whooping cranes have used a mixture of federal, state, and private lands during summer, migration, and winter based on the habitat these areas provide in the geographical area that the birds occupy. Some localities, such as cattle ranches on wintering grounds or cornfields in the north and on migration, are almost all privately owned. Whooping cranes often use areas containing extensive wetlands. These habitats tend to be on public lands such as National Wildlife Refuges and State Wildlife Areas. Wetland Reserve Program wetlands have also been frequently used where they are available.

## **SUMMARY AND CONCLUSIONS**

The winter management protocol, when rigorously implemented, continued to be effective in protecting newly released juvenile whooping cranes from predators and exposure to humans. Problems involving conflicts between newly released and older birds at the release site have been greatly relieved by addition of a new site in which to hold birds until older returning whooping cranes have cleared the Chassahowitzka release site and moved to inland wintering areas.

Although one half of all mortalities of released birds in the population occurred during 2005, total survival since the first birds were released in December 2001 remained high (79%). However, past concerns related to high bobcat densities in Florida, birds encountering geographical barriers during migration, birds off the migration route, and risk of shooting, both intentional and during otherwise legal waterfowl hunting, need to remain foremost in decision-making on management of the population.

Social behavior was normal, and pair bond formation was progressing. Seven breeding pairs had formed by spring 2005. At least five of these pairs built nests and two pairs each laid one egg. More pairs have since formed, and at least 12 breeding pairs are expected in 2006.

Habitat use, roosting, and foraging behavior of most birds were 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 but still a concern, especially for relatively naive yearlings during spring and early summer. Increased visitor interest in viewing released whooping cranes also needs to be carefully managed to ensure that birds of any age in the population remain wild and do not become habituated to people.

Natal site fidelity remained high. All yearlings completed spring migration to the core reintroduction area in 2005. Winter site fidelity has also been good; all yearlings returned to Florida in 2005. Most adults, including several of those in the Carolinas during the previous winter, also returned to Florida in winter 2005/06.

The direct autumn release of four birds in Wisconsin has so far been successful. All four of the juveniles reached major wintering areas of sandhill cranes in Tennessee and Florida.

After release of the 19 ultralight-led juveniles in January 2006, the eastern migratory population will number 64 individuals. Number of individuals in each year class will be as follows: HY2001 (4), HY2002 (13), HY2003 (13), HY2004 (11), and HY2005 (23).

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**Appendix A. Whooping cranes in the reintroduced eastern migratory population, January 2006.**

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	
2001	1	M	659-00215	164.465	L G/W:G/R/G		1629	1114/1144	1119	2-02
2001	2	F	659-00201	164.273	L G/W:R		1630	1147	1142	
2001	5	M	659-00213	164.063	L G/W:R/G		1633	1147	1142	4-02
2001	7	F	659-00214	--	L G/W:W/R		1635	1127	1154	
2002	1	F	599-32111	164.124	L R/W:L G(PTT)	--	1660	1133	1135	6-03
2002	2	F	599-32112	164.225	L R/W:G/W		1661	1133	1135	1-01
2002	3	F	599-32116	164.625	L R/W:W/G/W		1662	1114	1119	17-03
2002	4	F	599-32117	165.133	L R/W:R/G/W		1663	1114	1119	5-01
2002	5	M	599-32118	164.855	L R/W:G/R/W		1664	1133	1135	
2002	8	M	599-32113	164.345	L R/W:W/G		1668	1144	1136	
2002	9	F	599-32127	164.605	G/W:L R/W		1670	1133	1135	
2002	11	M	599-32114	165.222	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	
2002	13	M	599-32122	164.494	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	3-03
2002	17	F	599-32115	164.174	L R/W:G/R		1678	1144	1136	11-02
2002	18	F	599-32126	165.152	G:L R/W		1679	1128	1101	13-02
2003	1	F	599-34041	164.395	W:L G/R		1696	1175	1188	
2003	2	M	599-34044	164.356	G/W:L G/R		1697	1133	1135	
2003	3	F	599-34056	164.535	L G/R:W		1698	1144	1136	16-02
2003	6	M	599-34047	165.421	G/W/G:L G/R		1701	1133	1135	1-02
2003	7	M	599-34048	164.586	R/W/G:L G/R		1702	1133	1135	
2003	9	F	599-34042	164.284	L W/G(PTT):L G/R	62171	1704	1144	1136	
2003	10	M	599-34049	165.175	W/G/R:L G/R		1705	1175	1188	
2003	11	M	599-34050	165.193	G/W/R:L G/R		1706	1127	1154	
2003	12	F	599-34043	165.243	L W/R(PTT):L G/R	--	1707	1133	1135	
2003	13	F	599-34051	165.272	R/W/R:L G/R		1708	1133	1135	
2003	16	M	599-34052	165.304	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	3-02
2003	18	M	599-34054	164.195	G/R/W:L G/R		1713	1147	1142	
2004	1	M	599-37449	165.105	R/G/W:L W/G		1744	1133	1135	
2004	2	M	599-37450	164.334	W/R/W:L W/G		1745	1127	1154	
2004	3	M	599-37451	164.644	G/R/W:L W/G		1746	1133	1135	
2004	7	M	599-37453	165.043	W/R/G:L W/G		1750	1144	1136	
2004	8	M	599-37454	165.064	G/R/G:L W/G		1751	1133	1135	
2004	12	M	599-37455	164.414	G/W/R:L W/G		1755	1127	1154	
2004	15	F	599-37446	165.123	L R/G(PTT):L W/G	38636	1758	1144	1136	
2004	16	M	599-37457	165.593	W/G/R:L W/G		1759	1144	1136	
2004	17	M	599-37458	164.872	R/G/R:L W/G		1760	1133	1135	
2004	19	F	599-37447	165.495	L W/R(PTT):L W/G	38637	1762	1128/1100	1263	
2004	20	F	599-37448	165.522	L G/R(PTT):L W/G	15331	1763	1133	1135	
2005	1	F	599-37231	164.383	L G/W:R/G/W		1782	1162	1167	
2005	2	F	599-37237	164.636	L R/W(PTT):L G/W	62169	1783	1144	1136	
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	44263	1790	1127	1154	
2005	9	M	599-37236	165.984	L G/W:R/W/R		1791	1162	1167	
2005	10	F	599-37240	164.425	R/G/W:L G/W		1792	1560	1135	
2005	11	M	599-37241	164.074	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	164.435	L R/G(PTT):L G/W	62170	1803	1182	1098	
2005	21	F	599-24697	164.245	G/W/R:L G/W		1804	1189	1195	
2005	22	M	599-24698	164.784	R/W/R:L G/W		1805	1130	1292	
2005	23	M	599-24699	165.944	W/G/R:L G/W		1806	1130	1292	
2005	24	M	599-24700	164.405	R/G/R:L G/W		1807	1560	1135	
2005	27	F	599-32128	164.734	L G/W:L R/W(PTT)	15045	1811	1128	1263	
2005	28	F	599-32129	164.695	L G/W:L G/R(PTT)	15050	1812	1128	1140	
2005	32	M	599-37459	165.955	L G/W:G/W/R		1817	1560	1135	
2005	33	F	599-32130	165.935	L R(PTT):L G/W	38635	1819	1128	1140	