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# AN UPDATE OF THE FLORIDA WHOOPING CRANE RELEASE PROJECT THROUGH JUNE 2000

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# AN UPDATE OF THE FLORIDA WHOOPING CRANE RELEASE PROJECT THROUGH JUNE 2000

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**Abstract:** Whooping cranes (*Grus americana*) reared mostly at the USGS Patuxent Wildlife Research Center (Patuxent) or the International Crane Foundation (ICF) have been released in Florida in an effort to reestablish a nonmigratory population in the southeastern United States. From 1993 through spring of 2000, we released 208 cranes. Modifications to the release procedure instituted in 1995 have greatly reduced mortality from the initial release period. First year mortality has averaged 50%. A long-term drought that began after spring 1998 may have contributed to increased first year mortality in recent years. Most mortality has been from predation, mostly bobcat (*Lynx rufus*) and alligator (*Alligator mississippiensis*). Molt flightlessness may have been a factor in some recent drought-related mortalities. Other health issues regard ingestion of metal and monitoring for EEE. Dispersal range has increased in recent years again perhaps due to ongoing drought conditions. Sixteen pairs of whooping cranes have formed. The first nest with eggs occurred in 1999 and in 2000 the first pair hatched young.

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**Key words:** captive rearing, *Grus americana*, nesting, pairing, releases, survival, whooping cranes.

The primary goal of the project is to establish a self-sustaining population (Fig. 1) of at least 25 pairs of nonmigratory whooping cranes in central Florida. This level of productivity would require a population of 100 to 125 cranes 1-year-old or older. The first release was in 1993 and has continued with annual releases of 20 to 50 cranes 7–10 months of age (Appendix 1). A second goal of the project was to assess the application of a reintroduction technique based on gradual release of captive-produced whooping cranes (Ellis et al. 1992).

## METHODS

The current release procedure is a modification of the standard gradual release techniques developed in previous years (Nesbitt et al. 1997). Three to 5 cohorts of 6 to 8 whooping cranes, captive-reared by ICF, Patuxent, the Calgary Zoo, and the San Antonio Zoo, were transported to Florida between October and April. The birds were transported from the rearing site by private aircraft, the use of which was donated by Windway Capitol Corporation, Sheboygan, Wisconsin. Birds were held in small (18 m x 18



Fig. 1. Week-old whooping crane chicks: central Florida, 23 March 2000. These were the first to hatch in the wild in the United States in over 60 years. (Photo by Martin J. Folk.)

m), portable pens for about 2 weeks (Nesbitt et al. 1997). Release pens were located on areas where Florida sandhill cranes (*G. canadensis pratensis*) were known to frequent and in habitat we believed to be optimal. While in the acclimation pen, the birds were restrained with wing brails (Ellis and Dien 1991). Food was provided with automatic feeders to

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reduce the possibility of the birds making positive association with people.

Prior to release, each crane was uniquely marked and instrumented with leg-band-mounted radio transmitters (Melvin et al. 1983). Released birds were checked daily for the first 90 days after release. After this initial phase, they were checked  $\geq 3$  times a week. We used radiotelemetry to facilitate monitoring. We recaptured birds every 2–3 years to replace failed or defective radios, and we continued monitoring for mortality, dispersal, and reproductive effort. More intense (daily) monitoring was made of all nests that were initiated and young that hatched during the study.

Sick or injured cranes were treated medically. Decisions on the disposition of rehabilitated cranes (release, permanent captivity, etc.) were made in consultation with the U.S. Whooping Crane Coordinator as delineated in the Memorandum of Understanding between the Florida Fish and Wildlife Commission and the U.S. Fish and Wildlife Service. Necropsies were conducted of all dead whooping cranes.

## RESULTS AND DISCUSSION

Results of the first 3 years were reported in Nesbitt et al. (1997). Since then we have released 156 cranes (48 in fall 1996, 28 in 1997, 22 in 1998, 28 in 1999, and 30 in 2000). Mortality during the first year post release averaged 50% (29% in 1997, 64% in 1998, 54% in 1999, and 52% in 2000). The majority of the mortality was from predation by bobcats. There was also an increased level of alligator predation during the last 4 years, with 6 birds taken in 1999. The increase in annual mortality (predation) beginning in 1998 appears to be due, at least in part, to the prolonged drought that has prevailed since February 1998. The majority of the birds taken by alligators were within the first year after release when the birds were still naive. Survival among older birds (those that had been in the wild  $\geq 1$  years) was better, 14.5% average annually mortality (Table 1).

The finding of metal items in the stomachs of many of the birds in the first several years of the study (Spalding et al. 1997) resulted in the addition of radiology to the health protocol of each bird prior to shipment to Florida. We continue to find metal and other unnatural objects in the stomach of the cranes prior to release, but the percentage has decreased. However, the number of birds with such items in their stomachs at the time of death remains high (51% for years 1997–2000). Unnatural objects found most recently (see Folk et al. 2001) were not as toxic as those associated with the construction of metal pens (Spalding et al. 1997).

There has always been concern that mortality associated with eastern equine encephalitis (EEE) could be a factor that would compromise the long-term survival of whooping cranes in Florida. During the current period (1998–2000), there has

**Table 1. Life table analysis of whooping cranes surviving in Florida  $\geq 1$  year post-release.\***

Time since release, interval (yrs)	Conditional probability of failure within the interval	Cumulative probability of survival at start of interval
1-2	0.50	1.00
2-3	0.70	0.83
3-4	0.02	0.70
4-5	0.24	0.69
5-6	no data	0.42
6-7	no data	0.52
7-8	no data	0.52

\*Table begins 1 year after release and survival to 1 year post-release averaged 47% from 1993 through 2000.

been almost no transmission of EEE among sentinel chickens. There is currently no difference in mortality between cranes that have been vaccinated for EEE (Patuxent-raised birds) and those released without vaccination (ICF-raised birds). The prevalence of lesions from disseminated visceral coccidiosis, however, appears to have increased. The drought may force birds to concentrate their foraging and roosting activity causing increased fecal contamination of these sites. For this reason, we have chosen to provide anticoccidial agents in feed at release sites longer than normal.

Dispersal of the released birds was more extensive during the period of drought. The birds ranged over much of peninsular Florida from the Georgia boarder to the latitude of Lake Okeechobee. One pair, that had been in Florida since winter 1996–97, left Florida in April of 2000. They were next seen in central Illinois in May. They remained there for about a week before moving to Michigan. This unprecedented dispersal is unique among the 208 birds that have been released in Florida. With a total of 354.3 whooping crane years spent in Florida between 1993 and spring 2000, this is the first documentation of any of the cranes leaving the state. This unprecedented dispersal was likely exacerbated by the prolonged drought.

Simultaneous molt of wing feathers, resulting in flightlessness, has been observed annually since 1998. We are attempting to identify a pattern and understand the etiology for these molt events. Flightlessness may have contributed to the mortality of some of the older cranes that died since 1998. The majority of the birds that went through a period of flightlessness were 3 years old or older. It is

curious that prior to 1998, no 3-year-old birds were known to experience molt producing flightlessness.

Between 1996 and 2000, we monitored 16 pairs of whooping cranes that showed signs of breeding by maintaining an exclusive territory (Table 2). Nest building was noticed on several occasions, and 2 pairs laid eggs in 1999. In 2000, 3 additional pairs laid eggs, with 1 of these hatching 2 chicks (Fig. 2). Both chicks were lost; 1 between 1–2 weeks of age and the second to a bobcat at 68 days of age. The later chick had a bacterial infection at the time of death. It is suspected that the infection was the consequence of a bite by a snake because snakes were important in the chick's diet the week before it died.

Despite the long-term drought a pair of whooping cranes hatched chicks for the first time in the United States in 60 years. However, the true breeding potential of the Florida whooping crane population cannot be determined until the drought ends and marsh water levels return to normal.

**Table 2. Pairs of whooping cranes monitored in Florida from 1996 through 2000.**

Year	Pairs	Territories	Nests Built	Nests with Egg(s)	Nests that Hatched
1996	1	1	1		
1997	1	1	1		
1998	7	5	5		
1999	10	8	5	2	
2000	15	8	6	3	1



**Fig. 2. Adult whooping crane defending its chick, central Florida, 2000. (Photo by Stephen A. Nesbitt.)**

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## Appendix 1. History of 208 whooping cranes (216 shipped) released in Osceola and Lake Counties Florida, 14 January 1993–June 2000.\*

USFWS Band Number	Origin <sup>b</sup>	Sex	Hatch Date	Rearing Method	Date Released	Source of mortality and notes
1993 Releases: Sunset Ranch, Three Lakes Wildlife Management Area (TLWMA), Osceola County						
629-16779	I	M	5 Jun 92	Costume	10 Feb 93	Missing as of Sep 94.
629-16780	I	M	6 Jun 92	Costume	10 Feb 93	Unknown mortality 17 Jun 97.
629-16783	I	M	12 Jun 92	Costume	10 Feb 93	Bobcat Predation 2 Mar 93.
629-16784	I	M	1 Jun 92	Costume	10 Feb 93	
629-16775	I	F	19 May 92	Parent	10 Feb 93	Bobcat Predation 23 Feb 93.
629-16778	I	F	5 Jun 92	Costume	10 Feb 93	Bobcat Predation 10 May 93.
629-16777	I	F	30 May 92	Costume	10 Feb 93	Bobcat Predation 22 Feb 93.
629-16776	I	F	28 May 92	Costume	10 Feb 93	Bobcat Predation 16 Feb 93.
629-16773	P	M	30 Apr 92	Costume	10 Feb 93	Bobcat Predation 16 May 95.
629-16770	P	M	25 Apr 92	Costume	10 Feb 93	Bobcat predation 4 Jul 93.
629-16769	P	F	4 Apr 92	Costume	10 Feb 93	Bobcat Predation 22 Feb 93.
629-16774	P	F	5 Jun 92	Parent	10 Feb 93	Bobcat predation 3 Jun 93.
629-16782	P	F	11 Apr 92	Costume	10 Feb 93	Bobcat predation 20 Jun 93.
629-16772	P	F	29 Apr 92	Costume	10 Feb 93	Unknown mortality 9 Jan 98.
1994 Releases: Sunset Ranch TLWMA, Osceola County						
629-16785	I	M	18 May 93	Parent	14 Dec 93	Bobcat predation 10 Feb 94.
629-16786	I	F	26 May 93	Parent	14 Dec 93	Bobcat predation 25 Dec 93.

629-16788	P	M	10 May 93	Parent	14 Dec 93	Bobcat predation 16 Dec 93.
629-16789	P	M	9 May 93	Parent	14 Dec 93	Bobcat predation 30 Sep 94.
629-16787	P	F	13 May 93	Parent	14 Dec 93	
629-16790	P	M	23 Apr 93	Costume	15 Feb 94	
629-16791	P	M	4 Jun 93	Costume	15 Feb 94	Bobcat predation 28 Mar 94.
629-16792	P	M	9 May 93	Costume	15 Feb 94	Bobcat predation 17 Feb 94.
629-16793	P	M	1 Jun 93	Costume	15 Feb 94	Bobcat predation 16 Mar 94.
629-16794	P	F	21 Apr 93	Costume	15 Feb 94	Probably dead.
629-16795	P	F	5 Jun 93	Costume	15 Feb 94	Probably dead.
629-16798	P	M	1 Jun 93	Costume	20 Apr 94	Bobcat predation 2 Nov 94.
629-16853	P	M	3 Jun 93	Costume	20 Apr 94	Bobcat predation 6 May 94.
629-16799	P	M	13 May 93	Costume	20 Apr 94	Bobcat predation 6 May 94.
629-16869	P	F	5 Jun 93	Costume	20 Apr 94	Caught in fence.
was 629-16800						
629-16797	P	F	2 Jun 93	Costume	20 Apr 94	
629-16854	P	F	4 Jun 93	Costume	20 Apr 94	Bobcat predation 2 Nov 94.
629-16852	P	F	19 Apr 93	Costume	20 Apr 94	Bobcat predation 6 May 94.
629-16796	P	F	1 Jun 93	Costume	20 Apr 94	Bobcat predation 2 Nov 94.
1995 Releases: Sunset Ranch TLWMA and Overstreet Property, both Osceola County						
629-16865	I	F	3 Jun 94	Costume	23 Dec 94	Bobcat predation 23 Sep 95.
629-16862	I	M	21 May 94	Costume	23 Dec 94	Bobcat predation 4 Jan 95.
629-16868	I	M	14 Jun 94	Costume	24 Dec 94	Bobcat predation 5 Sep 96.
629-16861	I	M	11 May 94	Parent	25 Dec 94	Bobcat predation 21 Feb 95.
629-16863	I	M	27 May 94	Costume	24 Dec 94	
629-16864	I	M	30 May 94	Costume	23 Dec 94	Probably dead.
629-16866	I	F	6 May 94	Costume	23 Dec 94	Bobcat predation 4 Jan 95.
629-16867	I	F	10 Jun 94	Costume	24 Dec 94	Unknown mortality 13 Feb 96.
629-16870 Destroyed	P	M	4 May 94	Costume	Never	Bird died from aspergillosis before release.
629-16871	P	M	12 May 94	Costume	20 Mar 95	
629-16872	P	M	11 Apr 94	Costume	12 Mar 95	Bobcat predation 22 Oct 95.
629-16873	P	M	3 May 94	Costume	20 Mar 95	Bobcat predation 25 Nov 95.
629-16874	P	M	9 Apr 94	Costume	12 Mar 95	Bobcat predation 11 Nov 95.
629-16875	P	M	8 May 94	Costume	20 Mar 95	

629-16876	P	M	21 Apr 94	Costume	13 Apr 95	Bobcat predation 4 Oct 95.
629-16877	P	F	25 Apr 94	Costume	13 Apr 95	
629-16878	P	F	20 Apr 94	Costume	13 Apr 95	Disappeared 22 Aug 96, dead.
629-16879	P	M	11 Apr 94	Costume	13 Apr 95	Bobcat predation 10 Jul 95.
629-16880	P	M	24 Apr 94	Costume	13 Apr 95	Bobcat predation 4 Oct 95.
629-16881	P	F	13 Apr 94	Costume	13 Apr 95	Alligator predation 10 Jun 99.

1996 Releases: Overstreet Property, Smith/Rabbit Ranch, and Escape Ranch, all Osceola County
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629-16882	I	F	30 May 94	Parent	4 Dec 95	Bobcat predation 6 Dec 95.
629-16883	I	F	14 May 94	Parent	4 Dec 95	Bobcat predation 4 Dec 95.
629-16884	P	F	25 May 94	Parent	4 Dec 95	Unknown mortality 20 Jun 00.
629-16885	P	F	13 Apr 94	Isolation	4 Dec 95	Bobcat predation 5 Dec 95.
629-16886	P	F	3 May 94	Costume	4 Dec 95	Bobcat predation 19 Dec 95.
629-16887	I	M	7 Jun 95	Costume	12 Dec 95	Presumed dead, 13 Feb 00.
629-16888	I	M	17 May 95	Parent	12 Dec 95	
629-16889	I	F	2 Jun 95	Costume	12 Dec 95	Bobcat predation 18 Aug 96.
629-16890	I	F	29 May 95	Costume	12 Dec 95	
629-16891	I	M	2 Jun 95	Costume	12 Dec 95	
629-16892	I	F	26 May 95	Costume	12 Dec 95	Bobcat predation 9 Sep 96.
629-16893	I	F	2 Jun 95	Costume	17 Jan 96	Predation 22 Apr 96.
629-16894	I	M	4 Jun 95	Costume	17 Jan 96	Predation 16 Apr 96.
629-16895	I	M	7 Jun 95	Costume	17 Jan 96	Bobcat predation 28 Aug 96.
629-16896	I	F	8 Jun 95	Costume	17 Jan 96	Bobcat predation 18 Aug 96.
629-16897	I	F	10 Jun 95	Costume	17 Jan 96	
629-16898	P	F	5 May 95	Costume	7 Feb 96	
629-16899	P	F	5 May 95	Costume	7 Feb 96	
629-16900	P	F	22 Apr 95	Costume	7 Feb 96	Alligator predation 11 Jan 99.
629-23701	P	M	5 May 95	Costume	7 Feb 96	Predation 27 May 98.
629-23702	P	M	27 Apr 95	Costume	7 Feb 96	Bobcat predation 11 May 98.
629-23703	P	M	8 May 95	Costume	7 Feb 96	
629-23704	P	F	23 Apr 95	Costume	7 Feb 96	
629-23705	P	F	28 Apr 95	Costume	7 Feb 96	
629-23706	P	M	7 Jun 95	Costume	21 Feb 96	Predation 1 Sep 99.
629-23707	P	F	7 Jun 95	Costume	21 Feb 96	Did not fly, removed 20 Mar 96.
629-23708	P	M	4 Jun 95	Costume	21 Feb 96	Bobcat predation 8 Sep 97.

629-23709	P	M	5 Jun 95	Costume	21 Feb 96	
629-23710	P	F	2 Jun 95	Costume	21 Feb 96	
629-23711	P	F	6 Jun 95	Costume	21 Feb 96	
629-23712	P	F	14 Jun 95	Costume	21 Feb 96	
629-23713	P	M	9 May 95	Costume	21 Feb 96	
629-23714	P	F	11 Jun 95	Costume	21 Feb 96	
629-23715	P	F	7 Jun 95	Costume	21 Feb 96	Bobcat predation 18 May 98.
629-23716	P	M	18 May 95	Parent	6 Mar 96	Broken leg, removed 11 Aug 96.
629-23717	P	M	7 May 95	Parent	6 Mar 96	Predation 19 Jun 96.
629-23718	P	M	22 May 95	Parent	6 Mar 96	
629-23719	P	M	20 May 95	Parent	6 Mar 96	Predation 15 Oct 96.
629-23720	P	M	25 May 95	Parent	6 Mar 96	
629-23721	P	F	7 Apr 95	Costume	20 Mar 96	Missing as of 10 Dec 96.
629-23722	P	F	9 Apr 95	Costume	20 Mar 96	Bobcat predation 12 Jul 96.
629-23723	P	M	19 Apr 95	Costume	20 Mar 96	Died 18 Nov 97, power line.
629-23724	P	M	19 Apr 95	Costume	20 Mar 96	Died 18 Nov 97, power line.
629-23725	P	F	9 Apr 95	Costume	20 Mar 96	Bobcat predation 16 Sep 97.
629-23726	P	M	11 Apr 95	Costume	20 Mar 96	
629-23727	P	M	11 Apr 95	Costume	20 Mar 96	Bobcat predation 16 Sep 97.
629-23728	P	F	15 Apr 95	Costume	20 Mar 96	Predation 18 Jan 97.
629-23729	P	M	8 Apr 95	Costume	20 Mar 96	
1997 Releases: Escape Ranch, Osceola County and Sloan Property, Lake County						
629-23747	C	M	14 May 96	Costume	10 Dec 96	No signal 20 Jan 97.
629-23748	C	M	28 May 96	Parent	10 Dec 96	Dead, trauma 2 Jan 97.
629-23749	C	F	12 May 96	Costume	10 Dec 96	No signal 19 Feb 97.
629-23740	I	M	4 Jun 96	Parent	10 Dec 96	Probably dead.
629-23746	I	F	2 May 96	Par/Cost	10 Dec 96	
629-23745	I	M	27 May 96	Costume	10 Dec 96	Died 18 Nov 97, power line.
629-23743	I	F	14 May 96	Costume	10 Dec 96	Bobcat predation 16 Jul 97.
629-23738	I	F	30 Apr 96	Costume	10 Dec 96	Dead 23 Jun 98.
629-23744	I	M	26 May 96	Parent	10 Dec 96	Injured wing, not released.
629-23741	I	M	7 May 96	Costume	10 Dec 96	
629-23739	I	F	2 May 96	Par/Cost	10 Dec 96	Predation 13 Mar 97.
629-23742	I	F	8 May 96	Costume	10 Dec 96	Injured leg not released - dead.



629-23737	I	M	25 Apr 96	Parent	10 Dec 96	Not released.
629-23751	P	F	11 Apr 96	Costume	28 Jan 97	Bobcat predation 7 Apr 97.
629-23752	P	M	10 Apr 96	Costume	28 Jan 97	Died 18 Mar 98, power line.
629-23753	P	M	5 Apr 96	Costume	28 Jan 97	Injured 18 Feb to 31 Mar 97.
629-23754	P	F	13 Apr 96	Costume	28 Jan 97	Bobcat predation 23 Dec 97.
629-23755	P	M	9 Apr 96	Costume	28 Jan 97	
629-23756	P	F	9 Apr 96	Costume	28 Jan 97	Bobcat predation 2 Jul 99.
629-23757	P	M	6 May 96	Costume	18 Mar 97	Missing as of 11 May 98.
629-23758	P	F	25 Apr 96	Costume	18 Mar 97	
629-23759	P	F	3 May 96	Costume	18 Mar 97	
629-23760	P	M	30 Apr 96	Costume	18 Mar 97	
629-23761	P	F	23 Apr 96	Costume	18 Mar 97	Probably dead.
629-23762	P	F	3 May 96	Costume	18 Mar 97	
629-23763	P	F	15 Apr 96	Costume	18 Mar 97	Bobcat predation 24 Mar 97.
629-23764	P	M	8 May 96	Parent	18 Mar 97	Bobcat predation 27 Mar 97.
629-23765	P	F	16 Apr 96	Costume	18 Mar 97	
629-23766	P	F	22 May 96	Parent	18 Mar 97	Alligator predation 22 Mar 97.
629-23767	P	F	16 May 96	Parent	18 Mar 97	
1998 Releases: Smith/Rabbit Ranch and Escape Ranch, both Osceola County						
629-23768	I	M	20 Jun 97	Costume	19 Nov 97	
629-23769	I	M	18 Jun 97	Parent	19 Nov 97	
629-23770	I	M	30 May 97	Costume	19 Nov 97	Bobcat predation 7 May 00.
629-23771	I	M	23 May 97	Costume	19 Nov 97	Bobcat predation 11 May 00.
629-23772	I	M	18 May 97	Parent	19 Nov 97	
629-23773	I	F	4 May 97	Costume	19 Nov 97	Dead 13 Jan 98.
629-23774	I	F	1 May 97	Costume	19 Nov 97	Dead 6 Mar 98.
629-23776	P	F	16 Apr 97	Costume	25 Feb 98	Bobcat predation 5 Mar 98.
629-23777	P	F	22 Apr 97	Costume	25 Feb 98	Bobcat predation 5 Mar 98.
629-23775	P	M	22 Apr 97	Costume	25 Feb 98	Bobcat predation 31 Mar 98.
629-23780	P	F	25 Apr 97	Parent	25 Feb 98	
629-23781	P	M	29 Apr 97	Parent	25 Feb 98	Bobcat predation 2 Apr 98.
629-23782	P	F	21 May 97	Parent	25 Feb 98	Bobcat predation 1 Apr 98.
629-23779	P	M	23 May 97	Parent	25 Feb 98	Bobcat predation 6 Mar 98.
629-23778	P	M	29 May 97	Parent	25 Feb 98	Bobcat predation 28 Sep 98

629-23785	P	M	7 Apr 97	Costume	31 Mar 98	Bobcat predation 10 May 98.
629-23789	P	M	8 Apr 97	Costume	31 Mar 98	Bobcat predation 5 Apr 98.
629-23783	P	F	10 Apr 97	Costume	31 Mar 98	bobcat predation 6 Apr 98.
629-23786	P	F	12 Apr 97	Costume	31 Mar 98	Bobcat predation 4 Apr 98.
629-23788	P	M	12 Apr 97	Costume	31 Mar 98	Bobcat predation 7 Apr 98.
629-23787	P	M	16 Apr 97	Costume	31 Mar 98	
629-23784	P	M	1 May 97	Costume	31 Mar 98	Bobcat predation 10 May 98.

1999 Releases: Sloan Property and Pruitt Property, both Lake County						
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629-23790	I	F	4 May 98	Costume	2 Dec 98	
629-23791	I	F	8 May 98	Costume	2 Dec 98	Bobcat predation 12 Dec 98.
629-23792	I	F	18 May 98	Costume	2 Dec 98	
629-23793	I	F	9 Jun 98	Costume	2 Dec 98	Bobcat predation 24 Dec 98.
629-23794	I	F	17 Jun 98	Costume	2 Dec 98	
629-23795	I	M	23 Jun 98	Costume	2 Dec 98	Died 25 Feb 99, power line.
629-23796	P	F	23 Apr 98	Costume	20 Jan 99	
629-23797	P	F	16 Apr 98	Costume	20 Jan 99	
629-23798	P	F	30 Apr 98	Costume	20 Jan 99	
629-23799	P	M	9 May 98	Costume	20 Jan 99	Bobcat predation 25 Jan 99.
629-23800	P	M	27 Apr 98	Costume	20 Jan 99	
629-23801	P	F	11 Apr 98	Costume	20 Jan 99	
629-23802	P	F	25 Apr 98	Costume	20 Jan 99	
629-23803	P	M	25 Apr 98	Costume	10 Feb 99	Bobcat predation 15 Feb 99.
629-23804	P	F	10 Jun 98	Costume	10 Feb 99	Bobcat predation 20 Jul 99.
629-23805	P	M	12 Apr 98	Costume	10 Feb 99	Bobcat predation 13 Feb 99.
629-23806	C	F	5 Jun 98	Costume	10 Feb 99	Bobcat predation 1 Jul 99.
629-23807	P	F	10 Apr 98	Costume	10 Feb 99	Alligator predation 29 Jan 99.
629-23808	C	M	2 Jun 98	Costume	10 Feb 99	
629-23809	P	F	9 Apr 98	Costume	10 Feb 99	Bobcat predation 14 Feb 99.
629-23816	P	F	10 May 98	Parent	4 Mar 99	
629-23817	P	M	22 May 98	Parent	4 Mar 99	Bobcat predation 8 Oct 99.
629-23818	P	F	19 May 98	Parent	4 Mar 99	
629-23819	P	M	24 May 98	Parent	4 Mar 99	
629-23820	P	F	31 May 98	Parent	4 Mar 99	Bobcat predation 24 Feb 00.
629-23821	P	F	28 May 98	Parent	4 Mar 99	Bobcat predation 18 Oct 99.

629-23822	P	M	29 May 98	Parent	4 Mar 99	Bobcat predation 16 Dec 99.
629-23823	P	F	16 May 98	Parent	4 Mar 99	Alligator predation 25 Jul 99.
2000 Releases: Pruitt Property, Lake County						
599-53901	I	M	2 May 99	Parent	1 Dec 99	
599-53902	I	F	9 May 99	Costume	1 Dec 99	Bobcat predation 6 Dec 99.
599-53903	I	F	9 May 99	Costume	not released	Alligator predation 22 Nov 99.
599-53904	I	M	18 May 99	Costume	1 Dec 99	
599-53905	I	M	19 May 99	Costume	1 Dec 99	
599-53906	I	M	20 Jun 99	Parent	1 Dec 99	
599-53914	P	F	14 May 99	Costume	2 Feb 00	
599-53910	P	F	28 Apr 99	Costume	2 Feb 00	
599-53908	P	M	28 Apr 99	Costume	2 Feb 00	
599-53916	P	M	10 Apr 99	Costume	2 Feb 00	Bobcat predation 3 Jul 00.
599-53912	P	M	11 Apr 99	Costume	2 Feb 00	Bobcat predation 2 Apr 00.
599-53913	P	F	21 Apr 99	Costume	2 Feb 00	
599-53911	P	M	23 Apr 99	Costume	2 Feb 00	
599-53915	P	F	13 Apr 99	Costume	2 Feb 00	
599-53917	SA	F	12 Apr 99	Parent	23 Feb 00	
599-53918	P	M	27 May 99	Parent	23 Feb 00	
599-53919	P	F	29 May 99	Parent	23 Feb 00	
599-53920	P	M	13 May 99	Parent	23 Feb 00	
599-53921	P	M	24 May 99	Parent	23 Feb 00	
599-53922	SA	F	24 Apr 99	Parent	23 Feb 00	
599-53923	P	M	16 May 99	Parent	23 Feb 00	
599-53924	P	M	19 May 00	Parent	23 Feb 00	Bobcat predation 20 Mar 00.
599-53925	P	M	14 May 99	Costume	4 Mar 00	
599-53926	C	M	24 May 99	Costume	4 Mar 00	
599-53927	P	M	3 May 99	Costume	4 Mar 00	
599-53928	P	F	14 May 99	Costume	4 Mar 00	Found dead 20 Jun 00.
599-53929	P	F	23 May 99	Costume	4 Mar 00	

599-53930	P	M	19 Apr 99	Costume	4 Mar 00	Bobcat predation 29 May 00.
599-53931	P	F	22 Apr 99	Costume	4 Mar 00	
599-53932	C	M	22 May 99	Costume	4 Mar 00	Alligator predation 6 Mar 00.
599-53933	P	M	10 Jun 99	Costume	10 Mar 00	Not released.
599-53934	P	M	11 May 99	Costume	10 Mar 00	Not released.
599-53935	P	F	18 Apr 99	Costume	10 Mar 00	Not released.

<sup>a</sup> Horizontal lines within years divide release cohorts.

<sup>b</sup> Rearing location: I = ICF, P = Patuxent, C = Calgary.

Totals released and surviving as of June 2000: 1993 - 14 released, 1 ♂ surviving; 1994 - 19 released; 4 surviving, 1 ♂, 3 ♀; 1995 - 19 released, 4 surviving, 3 ♂, 1 ♀; 1996 - 48 released, 19 surviving, 9 ♂, 10 ♀; 1997 - 28 released; 9 surviving, 3 ♂, 6 ♀; 1998 - 22 released, 6 surviving, 5 ♂, 1 ♀; 1999 - 28 released, 14 surviving, 3 ♂, 10 ♀; 2000 - 30 released, 24 surviving, 15 ♂, 9 ♀. Total surviving: 39 ♂, 40 ♀.

