2001

ANNUAL REPORT OF THE BROWN-HEADED COWBIRD CONTROL PROGRAM AND KIRTLAND'S WARBLER TOURS ON KIRTLAND'S WARBLER NESTING AREAS OF NORTHERN LOWER MICHIGAN

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January 2002

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INTRODUCTION

Kirtland's warbler (*Dendroica kirtlandii*) is a migratory songbird that nests only in the jack pine (*Pinus banksiana*) forests of the northern lower peninsula and the upper peninsula of Michigan. In 1967, the U.S. Fish and Wildlife Service (USFWS) listed Kirtland's warbler as endangered. Biologists determined that loss of nesting habitat and nest parasitism were causing reproductive rates of Kirtland's warbler to be precariously low.

Kirtland's warblers require specific nesting habitat that consists of large stands of jack pine trees ranging in size from 5 to 20 feet. Nests are built on the ground, using the understory branches of the jack pine tree for protection. Once trees reach approximately 20 feet in height, the low-lying branches die off rendering the tree unsuitable for Kirtland's warbler. Jack pine trees depend on fire for reproduction. The seed cones are activated by intense heat and the seeds germinate in the bare soil left after a forest fire. Historically, forest fires would periodically move through the northern lower peninsula of Michigan creating large stands of young jack pine trees, and consequently, Kirtland's warbler habitat. Modern fire suppression techniques have limited the amount of jack pine of appropriate age to allow Kirtland's warbler reproduction.

The other immediate concern of biologists was the level of Kirtland's warbler nest parasitism by brown-headed cowbirds (*Molothrus ater*). Brown-headed cowbirds are nest parasites that lay eggs in the nests of host birds. The cowbird chicks hatch first and out-compete the host chicks for resources. Brown-headed cowbirds were normally found primarily in prairie ecosystems but after the agriculture expansion and forest clearing of the late 1800's, the cowbird expanded its range into Kirtland's warbler nesting areas. Before the implementation of a brown-headed cowbird control program in 1972, Dr. Larry Walkenshaw (1972) found that between 1966-1971, 69 percent of Kirtland's warbler nests he examined contained cowbird eggs.

To ensure the survival of Kirtland's warbler, cooperative recovery programs between the USFWS, U.S. Forest Service (USFS), Michigan Department of Natural Resources (MDNR), Michigan Audubon Society (MAS), and others, were established to restore populations of the Kirtland's warbler (Baylich et al). Of these programs, continuous habitat management guarantees there are jack pine stands of the appropriate age class to facilitate Kirtland's warbler nesting, an annual brown-headed cowbird control program removes cowbirds from Kirtland's warbler nesting areas, and tours are conducted to inform the public about Kirtland's warbler and provide viewing opportunities of the endangered songbird. This is a report of the 2001 brown-headed cowbird control program and the USFWS Kirtland's warbler tours.

2001 BROWN-HEADED COWBIRD TRAPPING SUMMARY

Beginning in 1972, biologists from the USFWS East Lansing Field Office have trapped brown-headed cowbirds annually in Kirtland's warbler nesting areas to reduce nest parasitism. Sixty-eight cowbird traps were used during the 2001 trapping season (Figure 1, Table 1), located in 37 designated nesting areas in eight counties as follows: Alcona - 6, Clare - 1, Crawford - 17, Iosco - 7, Kalkaska - 5, Montmorency - 1, Ogemaw - 11, Oscoda - 18, Otsego - 1, and Roscommon - 1. Details and methods of cowbird trapping have been provided in earlier annual reports and published accounts.

During March and early April 2001, biologists from the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (USDA-APHIS-WS), Sandusky, Ohio, collected 398 brown-headed cowbirds to be used as start-up decoys. These decoys were transported to northern Michigan by the USFWS. By collecting the cowbirds from Ohio, traps can be opened before the majority of the cowbirds arrive in Kirtland's warbler habitat and have a chance to breed.

In 2001, 3,906 cowbirds were captured, 10.2 % less than last year's total of 4,345 (Figure 2, Table 2), but the number of cowbirds caught was not significantly different than the mean of 4,038 (t-test, $t=0.6468$ $p\approx0.2578$). Since 1972, 121,088 cowbirds have been removed from Kirtland's warbler nesting areas. The average catch per trap in 2001 was 57.4 cowbirds, down from the 30-year mean of 93.7 cowbirds per trap. A total of 4,591 trap days were logged in 2001, and an average of 0.85 cowbirds were caught per trap day (Figure 3, Table 1). Over the 30 years of this program, the number of cowbirds removed each year has increased 14 times and decreased 16 times (Figure 2, Table 2). This is likely due to normal fluctuations in the cowbird population, and does not show any evidence of reducing the number of cowbirds in Kirtland's warbler nesting areas.

Temporal Distribution of Catch

As in previous years, the temporal distribution of the cowbird population showed high catch rates in the second and third weeks, and declining catch rates until the end of trap season (Figure 4, Table 3). The peak catch rate occurred during the first full week of trapping, week two, when 32.6% of all cowbirds were caught. The third week saw 20.1% of all cowbirds trapped and by the end of the fourth week, 73.5% of the total cowbirds had been removed.

Distributions similar to the cowbird catch shown in Figure 4 have existed each year, even with the banding traps operated in the mid 1970's, when cowbirds were banded and released. The pattern may indicate a higher susceptibility to capture early in the season when cowbirds are still flocking and migrating. This is the rationale for opening the traps a few weeks before Kirtland's warblers begin to arrive on their nesting areas.

Figure 1: Brown-headed Cowbird Trap Locations, 2001

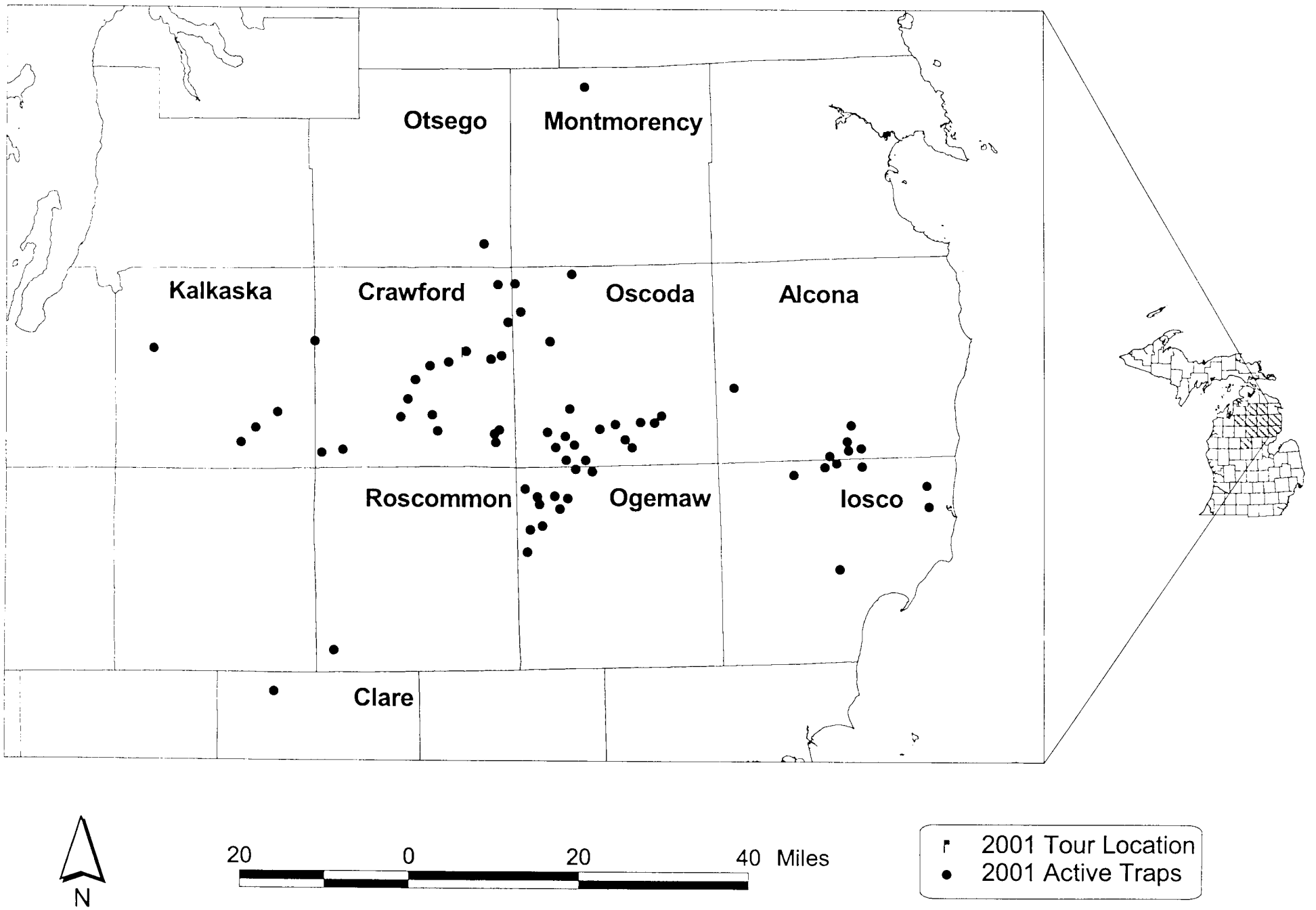

Table 1: Summary of individual brown-headed cowbird traps operated from April 16- June 27, 2001 in Kirtland's warbler nesting areas, northern lower Michigan.

		Brown-Headed Cowbird					*Cowbirds/*	*Other*
Trap #	*Location*[1]	*Male*	*Female*	*Juvenile*	*Total*	*Trap Days*	*Trap Day*	*Species*
102f	MA	73	32	1	106	69	1.536	2
104	MA	59	31	1	91	70	1.300	8
105f	MA	43	23	0	66	71	0.930	6
111	FA	22	17	0	39	64	0.609	9
112f	OG	38	11	1	50	71	0.704	3
119f	EL	14	10	1	25	58	0.431	4
121	FE	26	9	0	35	57	0.614	5
126f	MA	19	7	0	26	70	0.371	3
131	BC	14	9	0	23	53	0.434	15
134	OG	12	8	0	20	72	0.278	11
135	WR	29	20	0	49	63	0.778	17
136f	HI	75	24	0	99	70	1.414	1
140	PI	17	4	1	22	61	0.361	1
144	CR	36	25	0	61	63	0.968	12
148	OG	28	11	0	39	71	0.549	8
149	MP	22	19	0	41	71	0.577	8
153	LA	31	17	0	48	67	0.716	2
154	BC	16	9	0	25	71	0.352	4
159	BE	44	18	1	63	72	0.875	5
161	OG	39	34	1	74	68	1.088	18
164	BA	22	29	0	51	70	0.729	8
165	SL	46	14	0	60	70	0.857	2
166	PE	36	10	1	47	69	0.681	7
168	HE	25	10	0	35	70	0.500	5
169	TR	16	17	0	33	67	0.493	3
171	GP	25	16	0	41	68	0.603	10
172	SH	27	11	0	38	52	0.731	4
173	WC	31	8	0	39	67	0.582	4
174	OR	22	4	0	26	64	0.406	6
175	BC	17	15	0	32	71	0.451	2
178	PI	39	9	0	48	65	0.738	3
179	PI	38	29	0	67	71	0.944	1
180	LE	55	16	0	71	71	1.000	18
183	ST	27	20	0	47	70	0.671	2
184	OB	122	69	0	191	66	2.894	135
185	PI	33	28	1	62	71	0.873	3
186	WU	42	29	0	71	66	1.076	7
187	SN	15	3	0	18	58	0.310	4
189	TS	22	11	0	33	67	0.493	2
193	MC	61	29	1	91	72	1.264	9
194	PI	43	13	0	56	71	0.789	3

Table 1 (cont.): Summary of individual brown-headed cowbird traps operated from April 16- June 27, 2001 in Kirtland's warbler nesting areas, northern lower Michigan.

		Brown-Headed Cowbird					*Cowbirds/*	*Other*
Trap #	*Location*[1]	*Male*	*Female*	*Juvenile*	*Total*	*Trap Days*	*Trap Day*	*Species*
195	PI	45	28	1	74	71	1.042	5
196	EL	25	13	0	38	72	0.528	15
197	MO	37	14	0	51	68	0.750	11
198	FE	72	6	0	78	67	1.164	3
200	PI	71	28	0	99	68	1.456	0
201	OR	44	29	0	73	72	1.014	10
202	RK	23	25	0	48	70	0.686	2
203	LZ	38	25	0	63	71	0.887	8
204	MA	78	36	1	115	71	1.620	5
206	MA	52	25	0	77	70	1.100	7
207	PI	62	25	2	89	72	1.236	1
208	PI	42	27	4	73	71	1.028	10
210	GC	25	17	3	45	67	0.672	3
211	DV	50	16	1	67	71	0.944	10
212	DV	26	8	0	34	71	0.479	5
213	TU	30	9	0	39	72	0.542	8
214	MA	27	14	0	41	71	0.577	3
215	RO	43	27	0	70	67	1.045	3
216	CC	44	12	0	56	71	0.789	2
217	HL	80	23	1	104	57	1.825	3
218	MN	38	5	0	43	64	0.672	2
219	UC	48	36	0	84	68	1.235	19
220	MP	33	27	0	60	71	0.845	6
221	ST	56	17	1	74	61	1.213	5
222	HC	48	28	1	77	70	1.100	3
223	ST	30	6	2	38	61	0.623	7
224	KK	33	4	0	37	58	0.638	2
Total		2621	1258	27	3906	4591	0.851	538
Mean		38.54	18.50	0.40	57.44	67.52		7.91

f- Full size trap (16' x 16'), all others half size traps (8' x 16')

1- Trap location legend:

BA	Bald Hill Burn	HC	Horse Camp	MO	Morely Road	SN	Sharon - North
BC	Big Creek Area	HE	Horse Camp East	MN	Monument Road	ST	Stephan Bridge
BE	Beaver Lake Burn	HI	Hippie Burn	OB	Oscoda Burn		Burn
CC	Canoe Camp	HL	Horsehead Lake	OG	Ogemaw Mngt Area	TR	Townline Road
CR	Crapo Lake	KK	Kalkaska	OR	Ogemaw Refuge	TS	Torched Skidder
DV	Damon Vicinity	LA	LaBelle Lake	PE	Pere Cheney	TU	Turney Ranch Road
EL	Eldorado	LE	Leota	PI	Pine River	UC	Union Corners Unit
FA	Farrington Road	LZ	Luzerne Burn	RK	Rock Cemetery	WC	West Camp
FE	Fletcher Road East	MA	Mack Lake Burn	RO	Red Oak KWMA	WR	Walsh Road
GC	Goose Creek	MC	KcKinley	SH	Sharon	WU	Wurtsmith AFB
GP	Gas Plantation	MP	Mapes Road Unit	SL	Staley Lake		

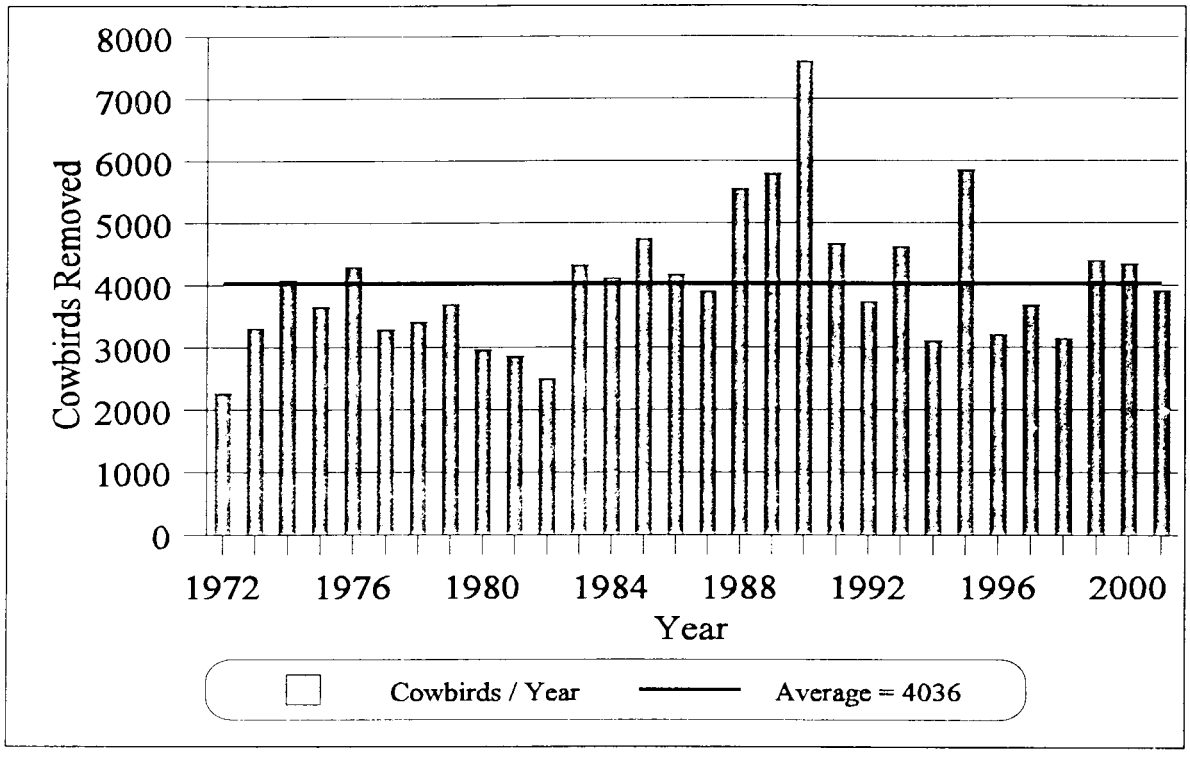

Figure 2: Total and mean numbers of brown-headed cowbirds removed from Kirtland's warbler nesting areas in northern lower Michigan, 1972-2001.

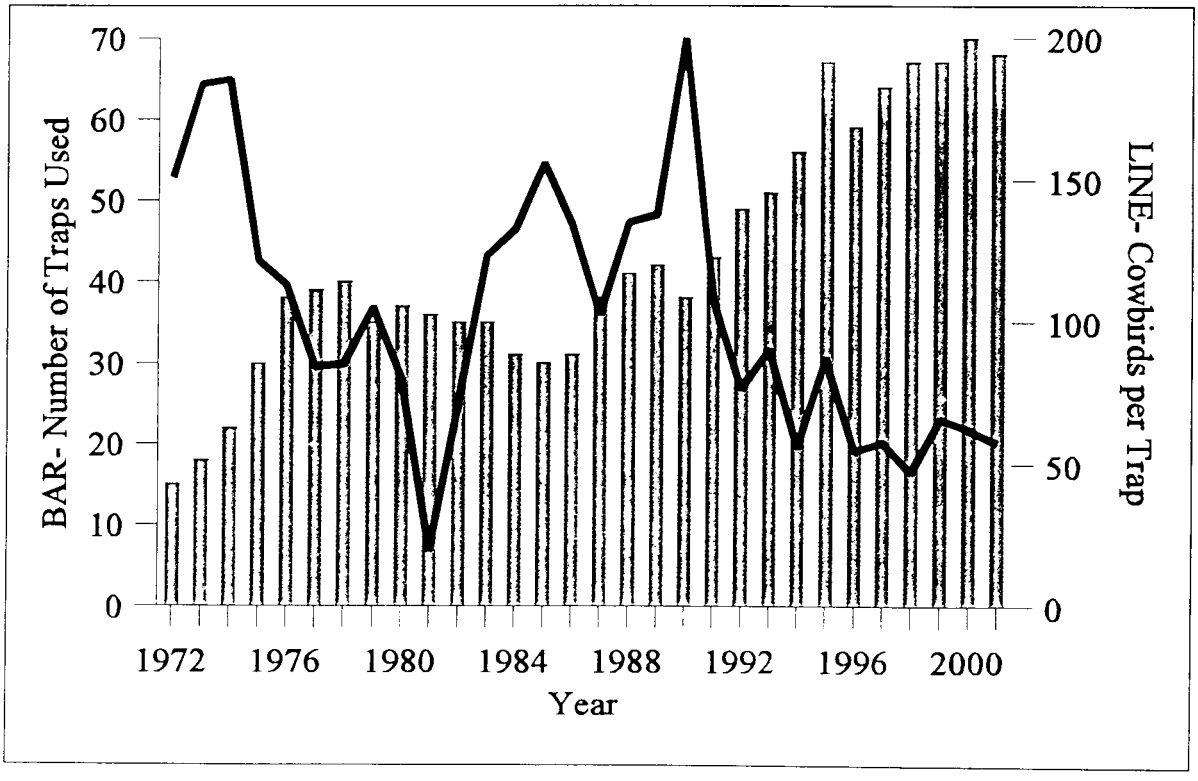

Figure 3: Number of brown-headed cowbirds removed per trap and number of traps used each year during the brown-headed cowbird control program in Kirtland's warbler nesting areas, northern lower Michigan 1972-2001.

Table 2: Yearly summary of cowbirds trapped in Kirtland's warbler nesting areas, northern lower Michigan, 1972-2001

	Brown-Headed Cowbirds						Cowbirds
Year	Male	Female	Juvenile	Total	M/F	Traps	Per Trap
1972	1621	619	21	2261	2.62	15	150.73
1973	1995	1195	115	3305	1.67	18	183.61
1974	2195	1717	163	4075	1.28	22	185.23
1975	2026	1463	161	3648	1.38	30	121.60
1976	2193	1994	112	4299	1.10	38	113.13
1977	1845	1405	34	3284	1.31	39	84.21
1978	1754	1639	18	3411	1.07	40	85.28
1979	1954	1721	16	3691	1.14	37	99.76
1980	1538	1429	0	2967	1.08	37	80.19
1981	1770	1085	1	2856	1.63	36	79.33
1982	1568	893	38	2499	1.76	35	71.40
1983	2128	2196	0	4324	0.97	35	123.54
1984	2183	1936	0	4119	1.13	31	132.87
1985	2584	2082	14	4680	1.24	30	156.00
1986	2328	1781	75	4184	1.31	31	134.97
1987	2291	1549	60	3900	1.48	38	102.63
1988	2932	2589	19	5540	1.13	41	135.12
1989	2907	2881	2	5790	1.01	42	137.86
1990	3818	3771	6	7595	1.01	38	199.87
1991	2576	2088	6	4670	1.23	43	108.60
1992	2003	1730	4	3737	1.16	49	76.27
1993	2361	2246	7	4614	1.05	51	90.47
1994	1862	1242	5	3109	1.50	56	55.52
1995	3070	2782	3	5855	1.10	67	87.39
1996	1844	1357	0	3201	1.36	59	54.25
1997	1962	1717	2	3681	1.14	64	57.52
1998	1937	1154	52	3143	1.68	67	46.91
1999	2608	1745	46	4399	1.49	67	65.66
2000	2801	1510	34	4345	1.85	70	62.07
2001	**2621**	**1258**	27	**3906**	**2.08**	**68**	**57.44**
Total	67275	52774	1041	121088		1294	
Mean	2243	1759	35	4036	1.37	43	93.72

Table 3: Weekly summary of brown-headed cowbird trapping results from Kirtland's warbler nesting sites in northern lower Michigan, 2001

Week	End Date	Trap Days	ASY Male	SY Male	AHY Male	Total Male	Female	Juvenile	Adult	Total	%
1	April 21	247	185	107	0	292	210	0	502	502	12.9
2	April 28	439	383	260	0	643	631	0	1274	1274	32.6
3	May 5	475	308	184	0	492	292	0	784	784	20.1
4	May 12	474	175	77	0	252	60	0	312	312	8.0
5	May 19	466	121	70	2	193	26	0	219	219	5.6
6	May 26	472	128	70	2	200	11	0	211	211	5.4
7	June 2	472	117	67	4	188	6	0	194	194	5.0
8	June 9	470	107	55	1	163	6	0	169	169	4.3
9	June 16	460	56	48	0	104	1	0	105	105	2.7
10	June 23	446	43	11	0	54	9	9	63	72	1.8
11	June 30	170	27	13	0	40	6	18	46	64	1.6
Totals		4591	1650	962	9	2621	1258	27	3879	3906	100

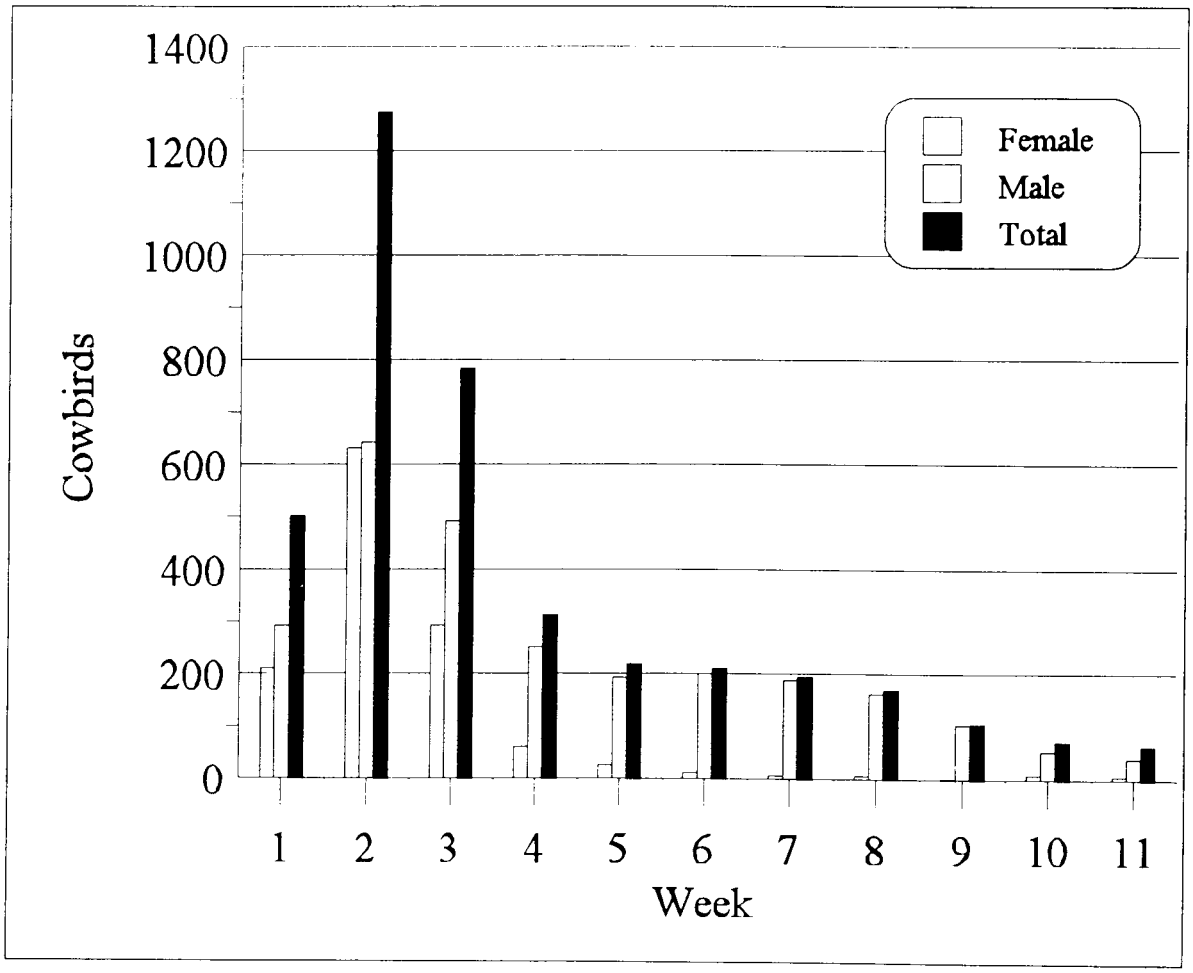

Figure 4: Weekly summary of brown-headed cowbirds removed from Kirtland's warbler nesting sites, northern lower Michigan, April 16 - June 27, 2001.

Male and female temporal relationships were slightly different than previous years. Normally, catch rates for females will be greater than or equal to catch rates for males in the first three weeks. In 2001, male catch rates were continually greater than female catch rates throughout the trapping season (Figure 5, Table 4). Male and female catch distributions were typical with that of past years. After the third week, female catch rates dropped drastically, and male catch rates tapered off. Nevertheless, the cowbirds that are caught in the latter weeks, though relatively few in number, clearly are breeding birds capable of having a significant effect on Kirtland's warblers.

Age and Sex Data

Of the 3,906 cowbirds that were caught and removed from Kirtland's warbler nesting areas, 2,621 were adult males, 1,258 were adult females, and 27 were juveniles (Table 3). Male and female catch rates were significantly different than their respective means (t-test, male: $t=4.0424$ $p<0.0005$, female: $t=4.2517$ $p<0.0005$) while juvenile catch rates were not significantly different (t-test, $t=0.90898$ $p\approx0.1814$). All juvenile cowbirds were caught during the last two weeks of trapping. It is reasonable to assume that low capture rates for juveniles results from low levels of cowbird production in the vicinity of the traps or that not all adult cowbirds are caught. Conversely, low numbers of juveniles indicate the majority of adults were removed.

As in previous years, the sex ratio favored males over females. The sex ratio in 2001 was 2.08, which is significantly different than the expected ratio of 1.00 (proportion test, $z=21.884$, $p<0.0001$). This year's sex ratio was the second highest ever (Table 2). Of the 120,047 adult cowbirds trapped, 55.6 % were male, which is significantly different than the expected 50% (proportion test, $z=41.858$, $p<0.0001$). Our results are consistent with many other reports that indicate cowbird trapping programs have a tendency to trap more males than females (DeCapita 2000, Griffith and Griffith 2000, Hahn et al 1999, Whitfield et al 1999).

One theory for the skewed sex ratio is that when female cowbirds leave the migratory phase and become fully reproductive, they apparently disperse and may become somewhat territorial. As a result, fewer female cowbirds are available in the vicinity of each trap. Only once in 1983, was the sex ratio skewed towards females (Table 2).

All male cowbirds were aged by examining the underwing coverts. They were divided into three categories: after second year male (ASYM), second year male (SYM), and after hatch year male (AHYM). A second year male's underwing coverts will be black with a grey/buff tip, while after second year males will have black underwing coverts (Ortega et. al. 1996, Selander and Giller 1960). The after hatch year male category is only used when it was not clear whether or not there were grey/buff tips on the underwing coverts. In 2001, 2,621 adult male brown-headed cowbirds were caught, of which 1,650 (62.9%) were SYM, 962 (36.7%) were ASYM, and 9 (0.34%) were AHYM (Table 3).

Table 4: Weekly cumulative results of brown-headed cowbird trapping on Kirtland's warbler nesting areas, northern lower Michigan, 2001.

Week	End Date	Trap Days	% Trap Days	Male	% Male	Female	% Female	Juvenile	% Juvenile	Total
1	April 21	247	5.4	292	11.1	210	16.7	0	0.0	502
2	April 28	686	14.9	935	35.7	841	66.9	0	0.0	1776
3	May 5	1161	25.3	1427	54.4	1133	90.1	0	0.0	2560
4	May 12	1635	35.6	1679	64.1	1193	94.8	0	0.0	2872
5	May 19	2101	45.8	1872	71.4	1219	96.9	0	0.0	3091
6	May 26	2573	56.0	2072	79.1	1230	97.8	0	0.0	3302
7	June 2	3045	66.3	2260	86.2	1236	98.3	0	0.0	3496
8	June 9	3515	76.6	2423	92.4	1242	98.7	0	0.0	3665
9	June 16	3975	86.6	2527	96.4	1243	98.8	0	0.0	3770
10	June 23	4421	96.3	2581	98.5	1252	99.5	9	33.3	3842
11	June 30	4591	100.0	2621	100.0	1258	100.0	27	100.0	3906

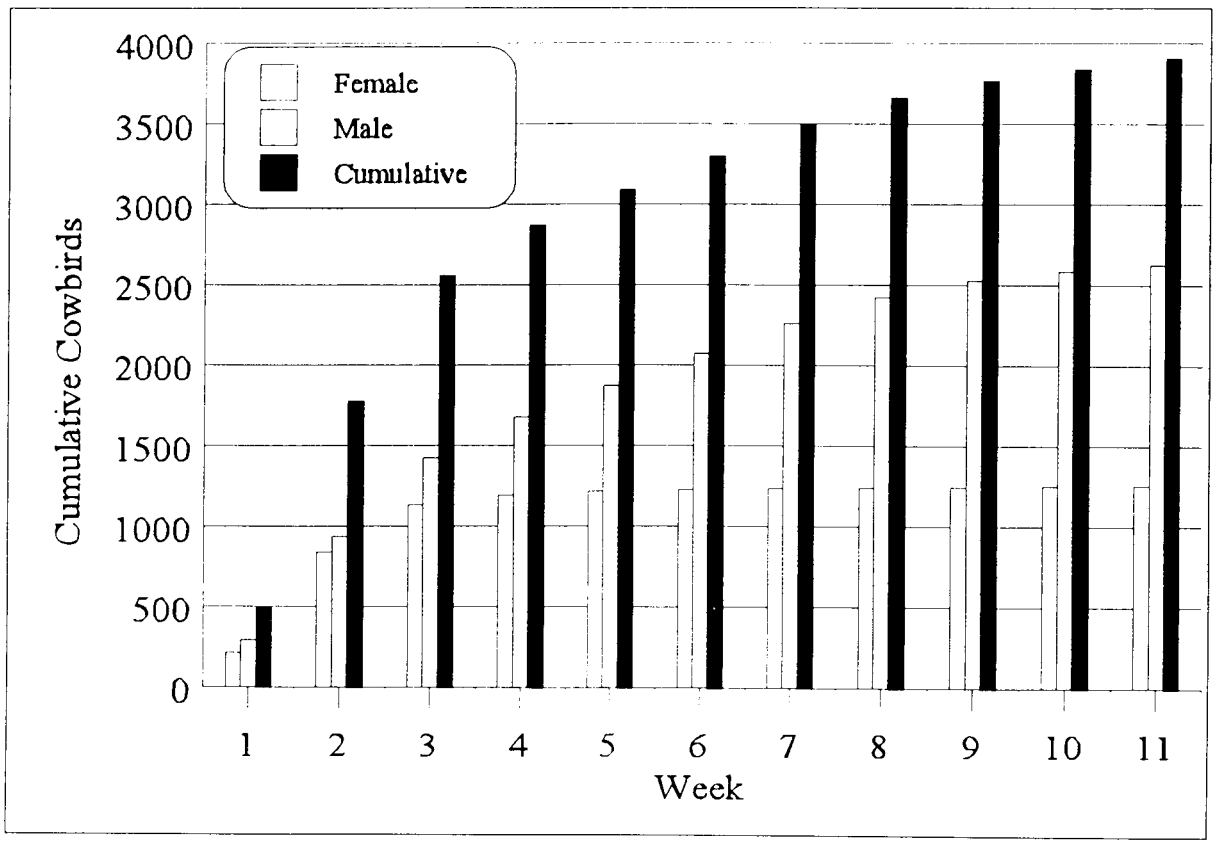

Figure 5: Cumulative weekly summary of adult brown-headed cowbirds removed from Kirtland's warbler nesting sites, northern lower Michigan, April 16 - June 27, 2001.

Non-target Species Captured

Eighteen species other than brown-headed cowbirds were captured in 2001 (Table 5). 538 total non-target birds were caught, up 9.8% from last year's total of 490. The three most often captured birds were blue jays (178), European starlings (169), and red-winged blackbirds (120). The majority of starlings were caught in a single trap day when one trap captured 105 starlings, most of which were juvenile. Two American kestrels and four sharp-shinned hawks that were caught were banded and released.

Table 5: Non-target species captured in brown-headed cowbird traps, northern lower Michigan, 2000-2001

Species	1999	2000	2001	Species	1999	2000	2001
American Kestrel	5	6	2	Purple Finch	1	2	0
American Robin	2	2	1	Rose-Breasted Grosbeak	4	3	3
Baltimore Oriole	0	0	1	Red-Bellied Woodpecker	1	0	0
Blue Jay	261	86	178	Red-Headed Woodpecker	1	0	0
Brewer's Blackbird	2	4	2	Red-Winged Blackbird	129	93	120
Brown Thrasher	5	2	2	Slate-Colored Junco	9	47	1
Cedar Waxwing	0	2	0	Sharp-Shinned Hawk	4	5	4
Chipping Sparrow	10	6	0	Vesper Sparrow	5	4	0
Common Grackle	36	32	35	White-Crowned Sparrow	0	3	3
Eastern Bluebird	0	13	2	Wood Thrush	0	2	0
Eastern Kingbird	8	3	7	White-Throated Sparrow	0	5	0
European Starling	33	160	169	Yellow-Shafted Flicker	1	2	0
House Finch	1	2	3	Unidentified Sparrow	0	5	0
Great-Crested Flycatcher	1	0	1	Savannah Sparrow	8	0	0
Mourning Dove	7	1	2	Total	543	490	536

Missing and Escaped Cowbirds

Cowbird decoys are marked with colored cloth tape to distinguish decoys from newly captured cowbirds. During the daily operations of the trap, it was determined whether or not any decoys had been predated upon or had escaped the trap. It was also possible to determine if any decoys that had previously escaped were recaptured. A total of 1,281 cowbird decoys escaped from traps in 2001 and 268 of those escaped cowbirds were recaptured. The net total of 1,013 escaped decoy cowbirds from traps in 2001 compares with 1,142 in 2000, 986 in 1999, and 933 in 1998 (Table 6). Many factors accounted for the high number of escaped cowbirds including vandalism, holes created by bears and raccoons, and holes created as a result of poor trap conditions. Previous annual reports presented inaccurate numbers of escaped decoys for 1998 and 1999. In those years, cowbird decoys were only listed as missing if the method of escape was not known. In 2000 and 2001, any cowbird decoy that was missing from a trap with no evidence of predation,

was considered an escaped cowbird. For example, decoys that were presumed to be missing as a result of a hole in the trap were not counted as escaped in 1998 or 1999 whereas in 2000 and 2001 the missing decoys were considered escaped. Although the number of escaped cowbird decoys appears to be high, it does not appear that these cowbirds are jeopardizing Kirtland's warbler survival.

Table 6: Escaped and recaptured brown-headed cowbird decoys from cowbird traps, northern lower Michigan, 1998-2001

	Escaped			Recaptured			
Year	Males	Females	Sub-total	Males	Females	Sub-total	Net total
1998	733	624	1397	302	162	464	933
1999	760	585	1345	258	101	359	986
2000	733	654	1427	213	72	285	1142
2001	765	516	1281	187	81	268	1013

2001 KIRTLAND'S WARBLER CENSUS

The annual Kirtland's warbler census showed an increase in the number of singing males from 904 in 2000, to 1085 in 2001 (Figure 6). This is the largest single-year increase of Kirtland's warblers since 1951 when the census was first conducted, and is also the highest number of Kirtland's warblers counted. Kirtland's warblers continue to use the upper peninsula of Michigan for nesting as eight singing males were counted in three upper peninsula counties. Even with record numbers, it is uncertain that the Kirtland's warbler could remain in existence without cowbird control or habitat management. The local cowbird population has not been affected by the 30 years of trapping, and nest parasitism of Kirtland's warblers would definitely increase without continued removal of brown-headed cowbirds from nesting sites. Similarly, adequate habitat must continue to be available to provide ample nesting sites for the increased number of breeding birds. The survival and recovery of Kirtland's warbler depends on continued habitat management and annual cowbird control.

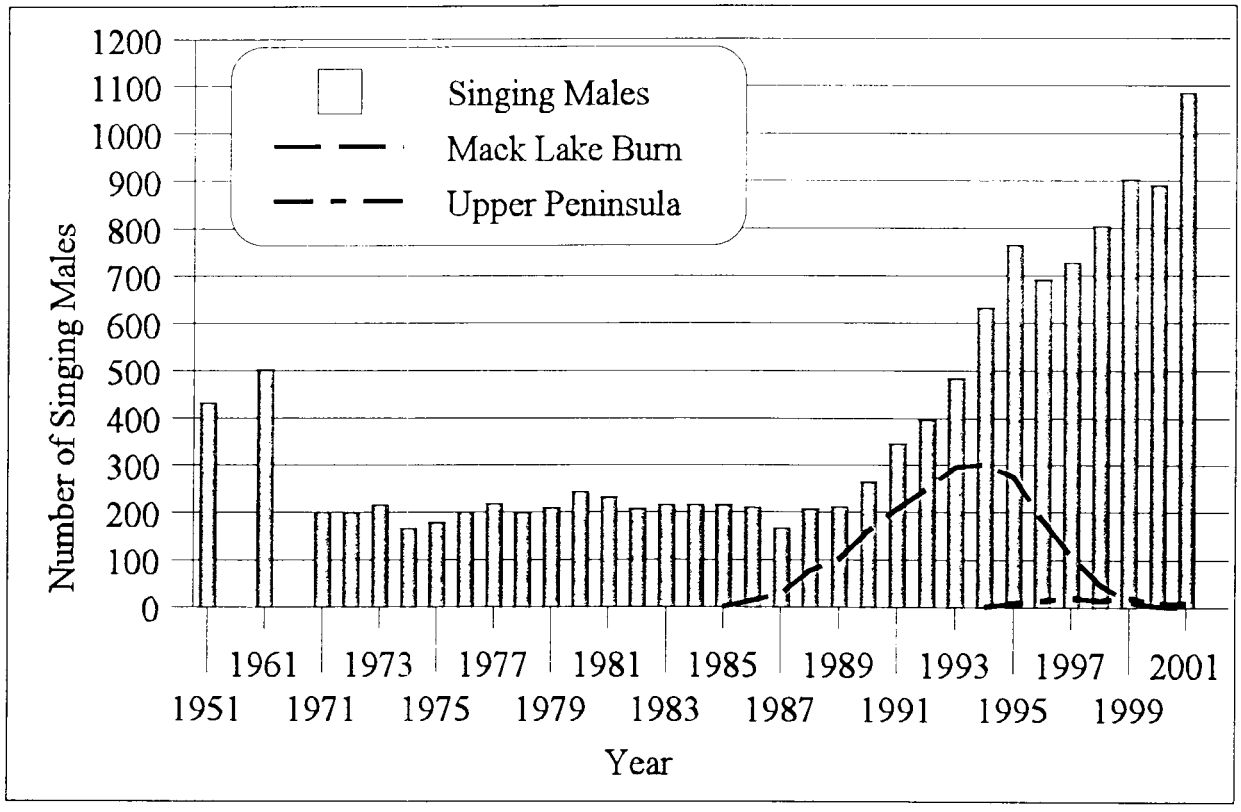

Figure 6: Census of singing male Kirtland's warbler, 1951-2001 (MDNR Data)

2001 KIRTLAND'S WARBLER TOURS

Every year since 1974, the USFWS and USFS have conducted daily tours to allow the public to enter Kirtland's warbler nesting areas and view one of the nation's rarest songbirds. Nesting areas are otherwise posted and prohibited from public entry from May 1 to September 30 to protect critical nesting habitat.

Between May 15 and July 4, 2001, biologists from the U.S. Fish and Wildlife Service East Lansing Field Office conducted tours to allow the public the opportunity to observe Kirtland's warbler. Two tours were offered daily at 7:00 and 11:00 a.m. from Grayling, Michigan. These guided tours were used by 662 people from 36 states, 3 Canadian provinces, England, Germany, Hungary, Kenya, and Korea. An additional 459 people attended tours conducted by the USFS in Mio, Michigan. From 1976 to 2001, 17,723 people have taken advantage of USFWS Kirtland's warbler tours with an average of 682 participants per year (Figure 7, Table 7).

Tours were held in the vicinity of the Bald Hill Burn in central Crawford County (Figure 1). A Kirtland's warbler was observed during all but one of the 84 tours, resulting in a 98.8% success rate. Fifty-nine additional bird species were observed throughout the tours (Table 8).

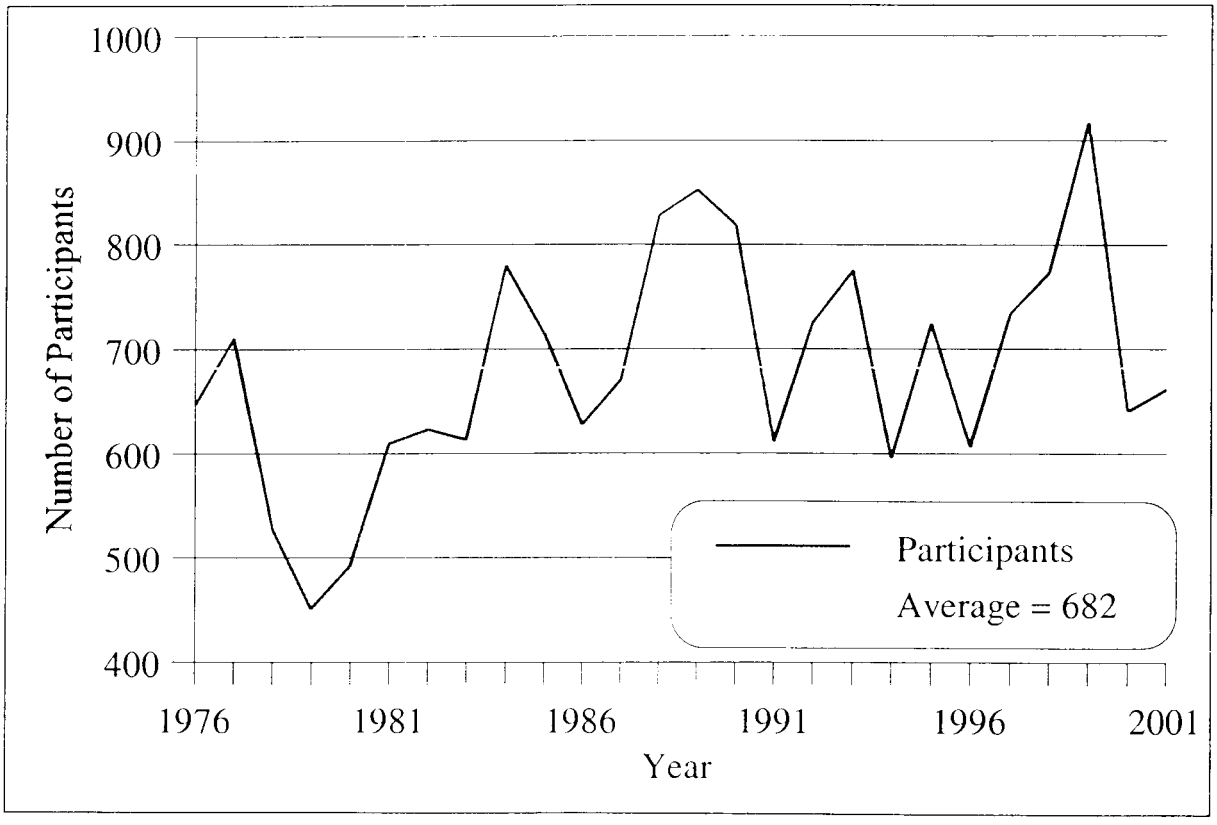

Figure 7: Public participation in the U.S. Fish and Wildlife Service Kirtland's warbler tour in Grayling, Michigan, 1976-2001. Data from 1974 and 1975 are not included due to incomplete reports.

Table 7: Participation in the USFWS Kirtland's warbler tours, Grayling, Michigan, 1974-2001.

Year	Participants	States	Foreign Countries	Percent Change in Participants From Previous Year
1974	250	??	??	NA
1975	1386[1]	34	4	??
1976	647	31	2	??
1977	711	30	4	9.9
1978	528	28	2	-25.7
1979	450	26	4	-14.8
1980	491	27	3	9.1
1981	609	25	3	24.0
1982	623	32	3	2.3
1983	613	34	2	-1.6
1984	780	29	2	27.2
1985	715	37	2	-8.3
1986	627	34	2	-12.3
1987	670	35	2	6.9
1988	828	33	3	23.6
1989	852	32	3	2.9
1990	818	32	6	-4.0
1991	610	40	2	-25.4
1992	725	35	5	18.9
1993	775	38	6	6.9
1994	595	39	5	-23.2
1995	724	39	7	21.7
1996	606	38	3	-16.3
1997	733	40	6	21.0
1998	773	41	9	5.5
1999	917	42	5	18.6
2000	641	40	4	-30.1
2001	636	36	5	3.3
Total[2]	17723			
Mean[2]	682			

[1] 1975 attendance figure combines USFWS and USFS, Mio, Michigan tours.

[2] Total and mean are from 1976-2001 data only, due to uncertainty of 1974 and 1975 data.

Table 8: Bird species observed and frequency of observation during U.S. Fish and Wildlife Service's Kirtland's warbler tours near Grayling, Michigan, 1999-2001

Species	2001	2000	1999	Species	2001	2000	1999
American Crow	4	4	4	Killdeer	0	4	2
American Goldfinch	14	18	8	Kirtland's Warbler	83	70	93
American Kestrel	6	8	6	Lark Sparrow	1	0	0
American Redstart	1	0	1	Lincoln's Sparrow	3	0	5
American Robin	2	3	2	Magnolia Warbler	0	1	0
American Woodcock	0	0	1	Mallard	0	1	0
Baltimore Oriole	1	i	1	Mourning Dove	5	22	22
Black-Billed Cuckoo	0	3	4	Nashville Warbler	63	47	71
Black-Capped Chickadee	22	12	26	Northern Flicker	23	18	36
Blue Jay	54	40	47	Northern Harrier	3	1	2
Brewer's Blackbird	0	0	1	Palm Warbler	0	6	7
Brown Thrasher	33	37	27	Pine Siskin	0	0	1
Brown-Headed Cowbird	2	0	1	Pine Warbler	10	1	2
Canada Goose	6	2	13	Red-Breasted Nuthatch	0	1	0
Cedar Waxwing	5	4	29	Red-Headed Woodpecker	1	4	1
Chipping Sparrow	24	44	46	Red-Tailed Hawk	2	2	2
Clay-Colored Sparrow	8	2	23	Red-Winged Blackbird	2	7	1
Common Grackle	16	3	3	Rose-Breasted Grosbeak	1	4	2
Common Loon	2	0	1	Ruby-Throated Hummingbird	1	2	0
Common Nighthawk	0	2	18	Scarlet Tanager	1	2	3
Common Raven	10	6	9	Sharp-Shinned Hawk	0	0	4
Dark-Eyed Junco	11	4	24	Song Sparrow	6	7	0
Downy Woodpecker	0	1	0	Swainson's Thrush	1	3	0
Eastern Bluebird	11	24	63	Swamp Sparrow	0	1	0
Eastern Kingbird	7	5	11	Tree Swallow	6	11	1
Eastern Meadowlark	0	0	1	Trumpeter Swan	1	1	0
Eastern Phoebe	1	0	0	Turkey Vulture	6	5	6
Eastern Towhee	14	13	48	Upland Sandpiper	0	6	29
Evening Grosbeak	0	0	1	Veery	1	1	0
Field Sparrow	35	23	73	Vesper Sparrow	11	14	27
Great Blue Heron	21	20	5	White-Breasted Nuthatch	0	1	4
Great-Crested Flycatcher	2	1	4	White-Crowned Sparrow	0	0	2
Hairy Woodpecker	0	1	0	Wood Duck	1	0	0
Hermit Thrush	45	34	46	Yellow Warbler	2	0	0
Hooded Merganser	1	0	0	Yellow-Billed Cuckoo	1	0	0
Indigo Bunting	4	2	15	Yellow-Rumped Warbler	16	15	23

ACKNOWLEDGMENTS

The United States Fish and Wildlife Service would like to thank the following individuals and groups whose time, effort, and dedication ensure continued survival for Kirtland's warbler.

Leah Berkman, Matt Courtney, Tameka Dandridge, George Falkenhagen, Paul Keenlance, John Rohm, and Chris Williams for the operation and maintenance of the cowbird traps and for leading the tours,

Frank Call, Burr Fisher, Tom Karnath, Terry Papple, Bob Seppala, and Lawrence Zellar for help in constructing traps,

Mike DeCapita and Mark Hodgkins for their assistance in training the cowbird trappers,

Christine Lousias for planning and preparing for the field season,

The Holiday Inn of Grayling for providing a meeting place for the Kirtland's warbler tours,

Richard Dolbeer and the staff from USDA, Animal and Plant Health Inspection Service, Wildlife Services, Sandusky, Ohio, for trapping decoy cowbirds,

and The Michigan Audubon Society for their financial support of the Kirtland's warbler tours.

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