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PROGRESS REPORT--February 1983

FWS Contract 14-16-003-82-005

Migration and Survival of MVP Canada geese

PERSONNEL: Donald H. Rusch, Scott R. Craven, Robert E. Trost, Stephen DeStefano

COOPERATORS: U.S. Fish and Wildlife Service

Wisconsin Department of Natural Resources

Wildlife Management Institute

University of Wisconsin, Department of Wildlife Ecology

OBJECTIVES:

(1) To document the variation in numbers, movements, harvest, and survival of MVP Canada geese.

(2) To relate variation in these demographic parameters to distribution of MVP geese and changes in goose management practices, weather, and food supplies.

PROGRESS:

During the fall of 1982, 656 Canada geese were trapped and marked with plastic neckbands at Horicon National Wildlife Refuge (Table 1) by FWS and UW biologists. FWS personnel marked an additional 99 geese on Necedah NWR WDNR staff marked 329 at Grand River, 355 at Pine Island, 157 on Collins Marsh and 222 on other Wildlife Management areas. Additional geese were marked in Ontario in summer of 1982 (268), and in Illinois, Kentucky, Tennessee, Arkansas and Mississippi during fall and winter 1982-83; movements and survival of these will be reported later.

Sex ratios were slightly unbalanced in favor of males in 1982 and during all other years. Percentage of immatures in the sample banded at Horicon NWR in 1982 was 31%. Distribution of Canada geese in Wisconsin and Illinois in 1982 was generally similar to that observed

in 1980 and 1981 (Figs. 1-5). Slightly more geese were counted in east-central Wisconsin and southern Illinois than in 1981 but fewer were tallied in Ballard County, Kentucky. A mild December and January delayed the usual late November departure of the geese from Horicon. The mid-December count (304,000) was up by 21% but the mid-January count (296,000) was down by 31%. The average was thus down by 12%. All 4 of the combined periodic inventories for MVP geese (Fig. 6) in late October, early November, late November, and early December also showed increases of 10-25%. I conclude that the MVP probably experienced a modest increase in 1982. The mid-December count appears to be our best long-term index to population size.

The age ratio observed in the trapped sample at Horicon was 0.44 Immatures/Adult, slightly above the 1974-82 mean. Age ratios from samples of geese bagged in Illinois were slightly lower than average as was the ratio in the flyway harvest sample (0.84).

Population estimates derived from observations of neckbanded geese (Table 8) indicated that the disappearance rates (mortality + migration + marker loss) of marked geese increased from 36% in 1975-76 to 67% in 1978-79, then decreased to 42% in 1979-80 and 1980-81, and in 1981-82.

Preliminary estimates of survival calculated from observations of neck-banded geese suggest that survival rates of marked geese dropped substantially from 1974 to 1978, and then rose again through 1981. The variation in survival rates was probably due mainly to variation in harvest rate; the latter was probably influenced by changes in regulations, including quotas, and variable production of young geese (Table 7).

Table 1. Numbers and percentages of Canada geese of various age-sex cohorts banded at Horicon NWR, 1974-1982.

Year	Adult Males	Adult Females	Immature Males	Immature Females	Totals	Percent Males	Percent Immatures
1974	560	456	284	220	1,520	55.5	33.5
1975	1,027	820	663	624	3,134	53.9	41.1
1976	1,385	1,025	365	329	3,104	56.4	22.4
1977	1,127	891	266	225	2,509	55.5	19.6
1978	603	550	255	144	1,552	55.3	25.7
1979	921	633	274	251	2,079	57.5	25.3
1980	583	434	277	290	1,584	54.3	35.8
1981	438	288	124	159	1,009	50.7	28.0
1982	248	207	88	113	656	51.2	30.6

Table 2. Some age ratios (immatures/adult) as indices to production of young Canada geese of the Mississippi Valley Population, 1979-1979. Sample sizes in parentheses.

Year	Sample			
	FWS parts[a]		Banded at Horicon	Bag check in S. Ill.[b]
	Wis.	Ill.		
1970	0.9(11)	0.6(222)		
1971	1.4(203)	1.1(328)		
1972	1.2(97)	0.4(112)		
1973	1.1(301)	0.8(147)		
1974	2.0(291)	1.6(59)	0.50(1,536)	2.5(1,425)
1975	2.0(503)	2.1(150)	0.70(3,131)	4.1(1,291)
1976	1.3(193)	0.9(192)	0.29(3,104)	2.7(947)
1977	1.3(309)	1.0(198)	0.24(2,509)	1.3(666)
1978	0.9(250)	0.8(215)	0.35(1,552)	1.2(2,468)
1979	1.4(325)	1.7(310)	0.50(2,079)	2.8(2,682)
1980	1.7(310)	1.9(319)	0.56(1,584)	3.4(2,740)
1981	0.5(195)	1.2(147)	0.36(1,109)	2.0(2,448)
1982	0.9(244)	1.2(78)	0.44(656)	1.9(1,734)

[a] From a summary completed by R. A. Hunt, Wis. DNR, from USFWS tail fan collections as reported in FWS Administrative Reports.

[b] From summaries prepared by Dennis Thornburg, Fred Roetker, and Tim Sickmeyer, Illinois Dept. of Conservation.

Table 3. Observations of geese neckbanded at Horicon NWR, 1974-1980.

Year of banding	No. neck-bands	Number of neckband observations (No. of unique neckbands observed) in Wisconsin								
		1974	1975	1976	1977	1978	1979	1980	1981	1982
1974	431	38 (28)	539 (164)	347 (106)	71 (33)	31 (22)	19 (10)	29 (13)	18 (8)	26 (11)
1975	1,499		3,241 (1,145)	2,626 (789)	758 (345)	232 (132)	53 (36)	44 (21)	21 (13)	8 (4)
1976	1,394			3,308 (1,101)	1,155 (503)	316 (177)	136 (72)	104 (49)	37 (22)	36 (15)
1977	1,197				1,437 (732)	688 (317)	238 (131)	266 (107)	129 (58)	104 (38)
1978	937					1,200 (506)	291 (167)	392 (146)	123 (60)	66 (25)
1979	999						1,227 (578)	1,070 (383)	522 (259)	424 (159)
1980	931							1,712 (697)	1,109 (450)	945 (322)
1981	989								1,630 (701)	1,587 (459)
1982	656									1,359 (486)

Table 4. Proportions of Canada geese not seen at or near Horicon NWR in the year following marking or observation at Horicon in the previous year.

Year of	Year of 1st and 2nd observations						
marking	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
1974	.38	.60	--[a]	--	--	--	--
1975	.33	.44	.57	.75	--	--	--
1976		.41	.60	.62	.48	.52	--
1977			.51	.62	.37	.42	.39
1978				.69	.33	.56	.60
1979					.49	.28	.42
1980						.31	.32
1981							.38

[a] Proportions of geese which disappeared were not calculated where the estimated number of marked birds at Horicon was less than 50 geese. Estimated numbers of marked birds were calculated from the numbers of geese actually seen near Horicon (Table 3) and the estimates of percentages of marked birds observed which were 76%, 79%, 61%, 54%, 58%, 75%, 70%, and 74% in 1975-1982, respectively.

Table 5. Estimates of harvest of Canada Geese in selected states of the Mississippi Flyway.

Year	Estimates of retrieved kill[a/]									Total MVP[b/]
	Wis.	Ill.	Kent.	Mich.	Tenn.	Ind.	Ark.	Miss.	La.	
1966	27,903	28,021	3,682	9,549	2,835	3,074	0	35	774	59,013
1967	21,305	35,405	4,684	11,528	4,443	2,815	53	864	0	62,258
1968	25,270	21,170	4,918	19,392	7,228	3,101	0	359	651	57,607
1969	42,805	29,389	6,770	13,270	1,623	4,075	0	0	1,532	79,750
1970	28,592	37,712	11,199	25,063	9,511	1,620	0	0	1,556	82,897
1971	52,534	34,371	9,597	19,594	3,785	3,176	0	1,855	0	97,139
1972	35,837	33,751	4,443	16,448	1,893	3,011	0	0	0	73,823
1973	60,771	28,472	15,170	20,950	7,228	2,141	0	0	0	104,595
1974	76,994	47,133	12,595	26,457	7,118	4,066	0	756	0	136,658
1975	66,390	44,859	12,729	20,549	9,504	6,838	2,008	1,955	0	127,779
1976	45,739	53,729	15,010	27,456	29,757	3,416	8,736	18,023	0	150,012
1977	89,923	76,563	18,846	31,763	8,219	3,694	2,067	2,805	1,482	183,603
1978	85,681	118,703	23,417	23,302	16,521	2,305	4,084	3,903	0	224,814
1979	62,243	68,991	9,764	33,217	5,216	3,636	0	0	0	131,188
1980	57,593	57,705	17,843	31,975	7,442	9,298	0	1,306	1,657	138,435
1981	39,991	53,350	19,209	29,606	5,647	8,028	0	2,243	0	118,438
Mean	51,223	48,083	11,867	22,507	7,998	4,018	1,059	2,131	478	114,681

[a/] Estimates from returns of FWS questionnaires to samples of purchasers of waterfowl stamps; adjusted for % Canada geese among tail fans, exaggeration-memory bias, and junior hunter activity.

[b/] Estimate of MVP harvest = .89 Wis. + .89 Ill. + .89 Kent. + 0.33 Mich. + 0.50 Tenn. + 0.50 Ind. + 0.50 Ark. + .75 Miss.

Table 6. Some age ratios for Canada geese bagged in selected states of the Mississippi Flyway.[a/]

Year	Wis.	Ill.	Kent.	Mich.	Tenn.	Ind.	Ark.	Miss.	La.
1966	1.72(577)	1.32(279)	0.98(57)	0.76(53)	0.47(28)	0.68(37)	--	--(1)	0.0(1)
1967	1.10(311)	1.35(510)	0.59(35)	1.18(63)	1.06(36)	1.08(50)	0.0(1)	2.00(3)	0.88(32)
1968	1.66(293)	1.19(427)	1.52(58)	1.09(67)	0.82(20)	0.82(36)	--	--	0.0(1)
1969	0.81(167)	0.74(204)	0.33(48)	1.03(72)	0.43(11)	0.48(46)	--	--	0.0(1)
1970	0.82(114)	0.75(388)	0.28(138)	1.01(81)	0.15(32)	0.75(15)	--	--	0.0(1)
1971	1.40(205)	1.12(328)	0.45(100)	1.25(59)	0.33(20)	1.00(8)	--	1.00(1)	--
1972	1.21(98)	0.45(114)	0.40(45)	0.97(41)	1.00(4)	0.15(11)	--	--	--
1973	1.13(301)	0.81(148)	0.50(54)	0.86(147)	0.96(10)	0.41(24)	--	--	--
1974	2.00(293)	1.60(162)	1.07(102)	1.14(118)	1.10(16)	3.00(8)	--	0.0(1)	--
1975	1.97(504)	1.97(153)	1.08(30)	0.87(148)	0.93(68)	1.33(28)	0.67(8)	1.00(9)	--
1976	1.30(194)	0.89(192)	1.28(119)	0.68(125)	0.33(16)	0.50(21)	1.36(13)	0.37(57)	--
1977	1.28(311)	1.01(203)	1.51(90)	0.90(99)	0.75(14)	0.63(31)	0.76(3)	1.75(12)	1.00(1)
1978	0.92(252)	0.79(215)	0.72(63)	1.06(97)	0.30(26)	1.60(14)	1.00(4)	0.25(5)	--
1979	1.35(331)	1.15(223)	0.78(18)	1.54(238)	0.18(8)	1.00(24)	--	--	--
1980	1.66(311)	1.86(321)	1.04(60)	0.75(258)	3.00(8)	0.31(44)	--	0.0(1)	1.00(2)
1981	0.50(195)	1.20(147)	0.50(55)	0.60(172)	--(8)	0.50(75)	--	--(3)	--
Mean[b/]	1.30	1.14	0.81	0.98	0.58	0.70	--	--	--

[a/] Estimates from tail fans collected and reported by FWS.

[b/] Unweighted mean calculated from ratios in samples of 20 or more.

Table 7. Some statistics for Canada geese of the Mississippi Valley Population.

Year	Harvest quotas (1,000s)		Estimates of retrieved kill (1,000s)[a/]				Immatures per adult in harvest[c/]	Mid-winter count (1,000s)
	Wis.	Ill.	Wis.	Ill.	Kent.	Total MVP[b/]		
1966	14	20	27.9	28.0	3.7	59.0	1.38	208.9
1967	20	20	21.3	35.4	4.7	62.3	1.47	215.2
1968	20	20	25.3	21.2	4.9	57.6	1.20	250.0
1969	25	25	42.8	29.4	6.8	79.8	0.67	324.4
1970	35	35	28.6	37.7	11.2	82.9	0.89	292.1
1971	28	28	52.5	34.4	9.6	97.1	1.23	293.9
1972	28	28	35.8	33.7	4.4	73.8	0.91	295.8
1973	28	28	60.8	28.5	15.2	104.6	1.04	277.7
1974	28	28	77.0	47.1	12.6	136.7	1.46	304.3
1975	28	28	66.4	44.8	12.7	127.8	1.59	304.9
1976	28	28	45.7	53.7	15.0	150.0	0.81	478.9
1977	35	35	89.9	76.6	18.8	183.6	1.01	575.4
1978	50	50	85.7	118.7	23.4	224.8	0.66	435.5
1979	35	35	62.2	69.0	9.8	131.2	1.08	395.0
1980	30	33	59.5	57.7	17.8	138.4	1.10	367.0
1981	20	30	40.0	53.4	19.2	118.4	0.72	251.0
1982	18	27					0.84	303.7
Mean			51.2	48.1	11.9	114.7		318.8[d/]

[a/] Estimates from returns of FWS questionnaires to samples of those who purchased waterfowl stamps and species composition estimates from FWS tail fan collections.

[b/] Estimate of total MVP harvest ~~= WI + ILL + KENT + 0.5 MICH + 0.5 TENN~~ from 1965

[c/] Age ratios (I/A) from U.S. Fish and Wildlife Service tail fan collections; from summary compiled by R. A. Hunt, Wisconsin DNR from FWS Administrative Reports.

[d/] Includes count of 165,000 in 1965.

Table 8. Preliminary estimates of survival rate for Canada geese banded and/or marked near Horicon Marsh, 1980-1981.

Year	Estimates from band Recoveries[a]	Estimates from observations of neckbands[b]	
		A	B
1960-65	0.89	--	--
1966-1970	0.78	--	--
1970-1975	0.76	--	--
1975	0.75	0.75	0.80
1976	0.70	0.65	0.65
1977	0.60	0.61	0.55
1978	0.59*	0.58	0.41
1979	0.44*	0.61	0.72
1980	--	--	0.72
1981	--	--	0.73

[a] Estimates derived using methods of Brownie et al. (1978), Hypothesis H2, (year and age specific survival and recovery rates; unique first-year recovery rates for adults). Mean estimates are weighted for 30% immatures and 70% adults in banded samples. Samples include both marked and unmarked geese except in 1978 and 1979 when unmarked geese were excluded because they were banded later in the fall than marked geese.

[b] Estimate A was calculated from successive annual population estimates of specific cohorts of neck-banded geese (Jolly 1965, Seber 1973) seen in the Mississippi Flyway during fall and winter. Estimate B was calculated from numbers of neckbanded geese seen corrected for proportions of marked geese observed and proportions of neckbands lost.

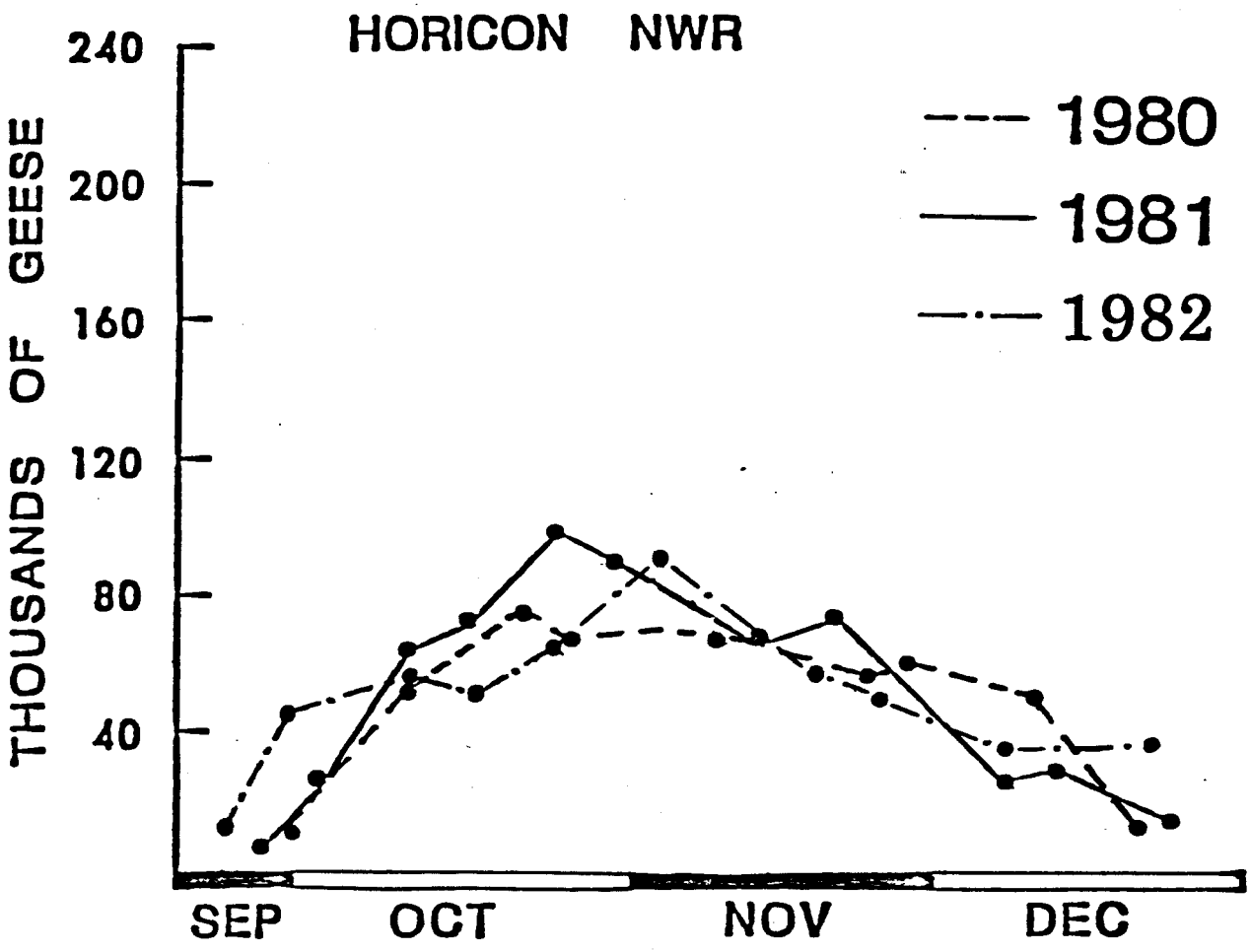

Figure 1. Numbers of Canada geese counted from aircraft on Horicon National Wildlife Refuge, the state-owned portion of the marsh and areas immediately adjacent to the marsh,

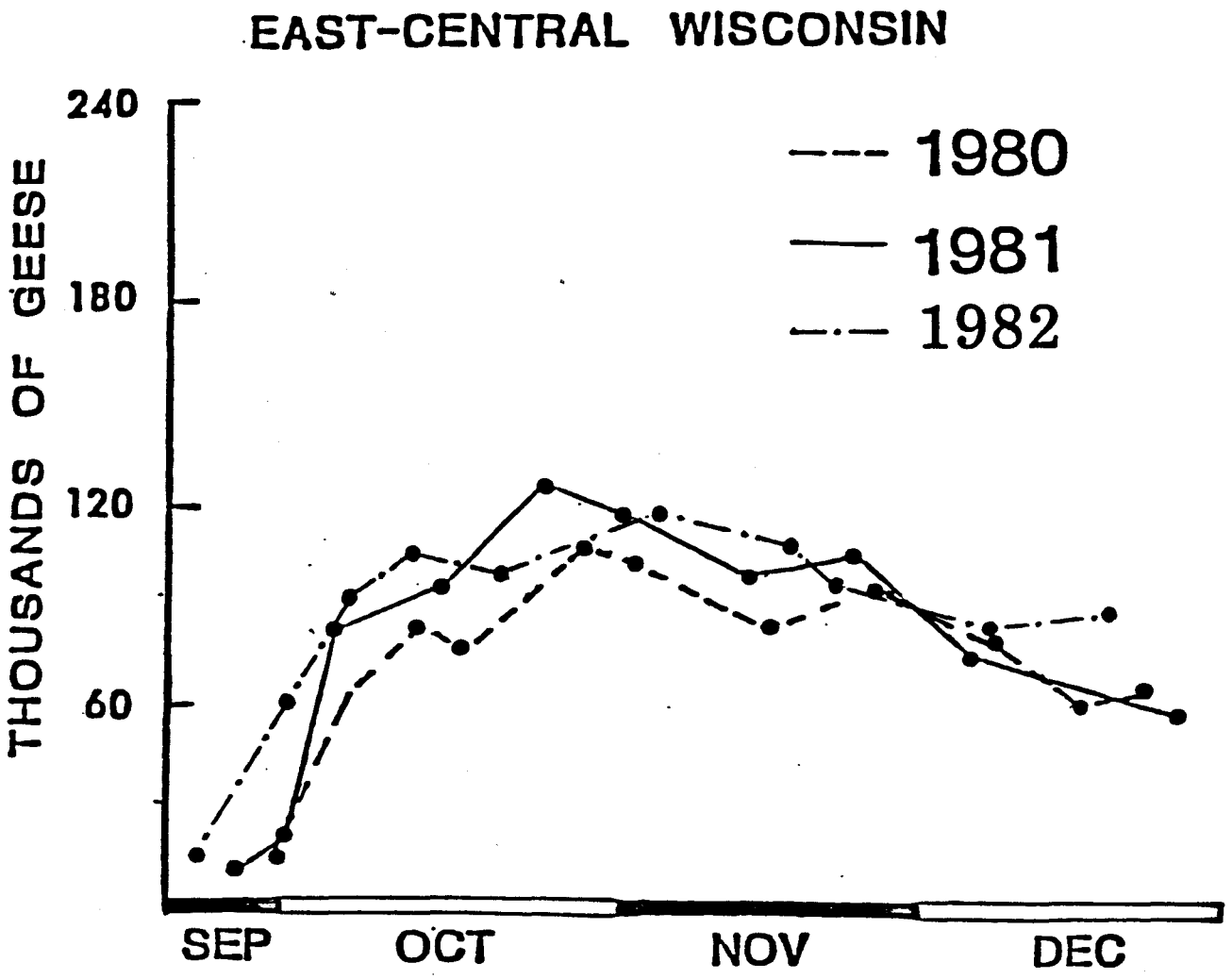

Figure 2. Numbers of Canada geese counted from aircraft in east-central Wisconsin. East-central Wisconsin includes areas depicted in Figure 1 as well as Eldorado, Grand River, Puckaway, Rush Lake, Theresa, Sinissippi, Green Lake, Walker's Pond, Lake Emily, Lake Maria, Fox Lake, Beaver Dam Lake and the Rosendale area.

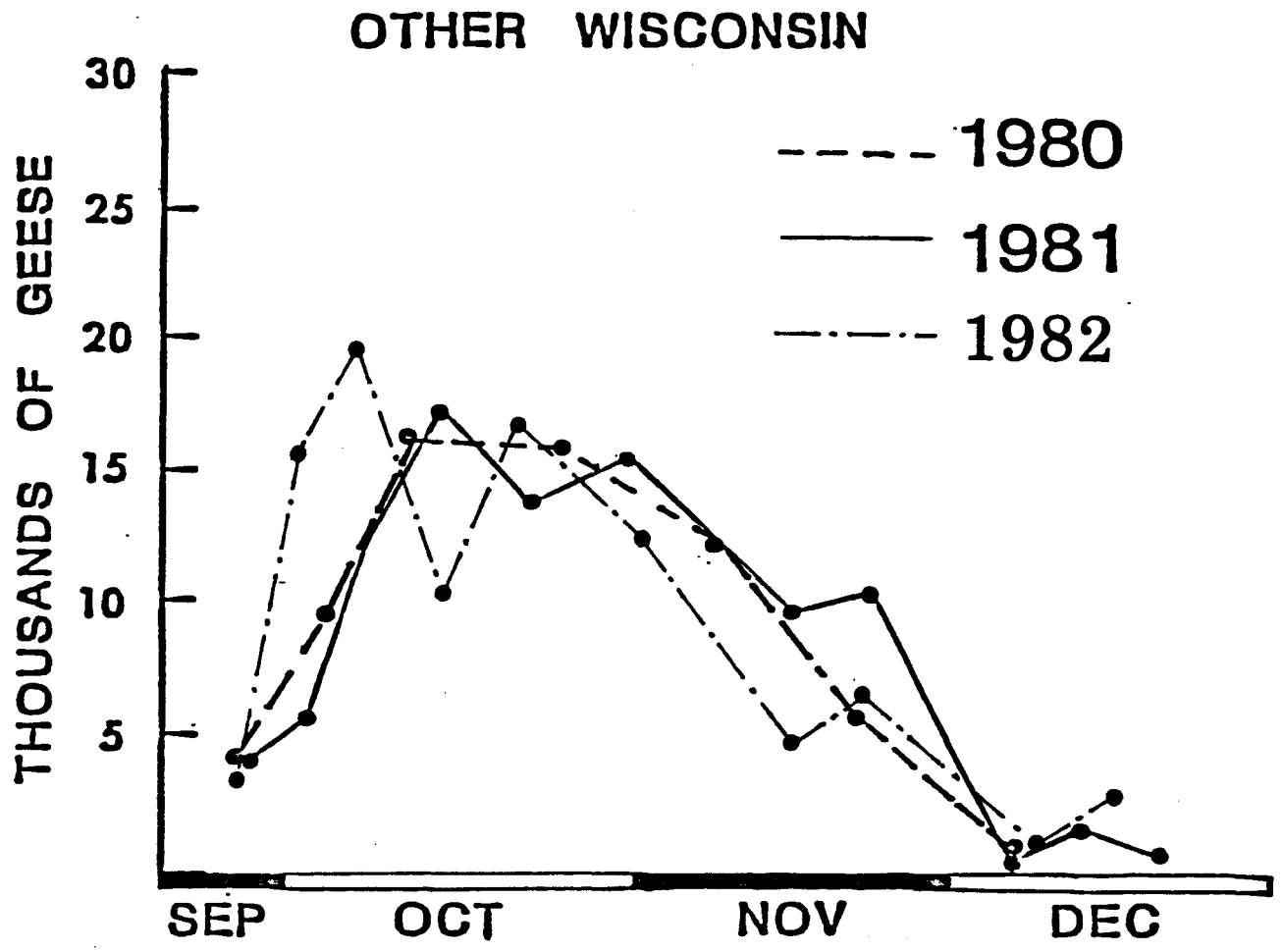

Figure 3. Numbers of Canada geese counted from aircraft in other portions of Wisconsin outside east-central Wisconsin including Sand Hills, Collins, Pine Island and Necedah NWR.

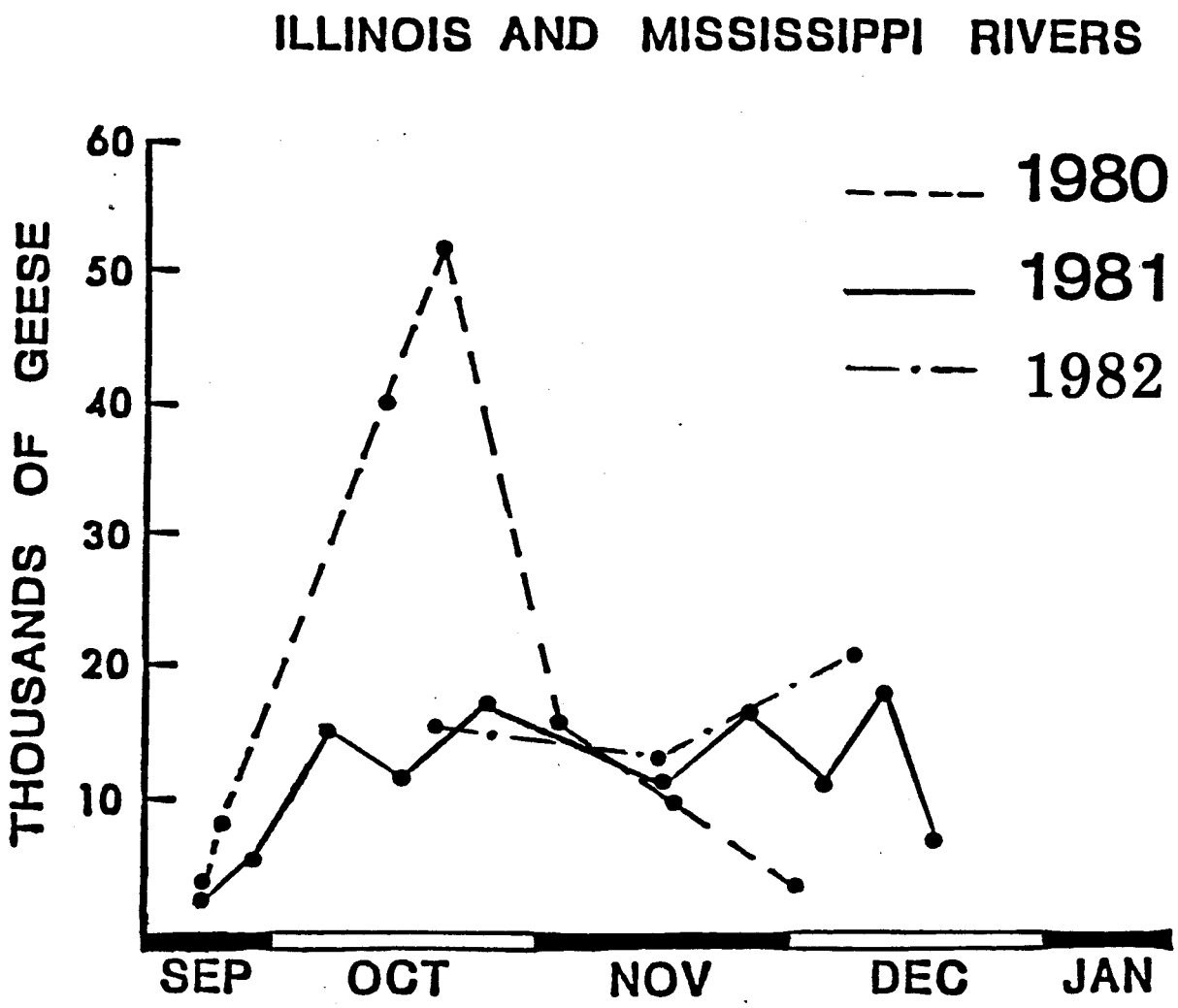

Figure 4. Numbers of Canada geese counted from aircraft along the Illinois and Mississippi Rivers in northern Illinois.

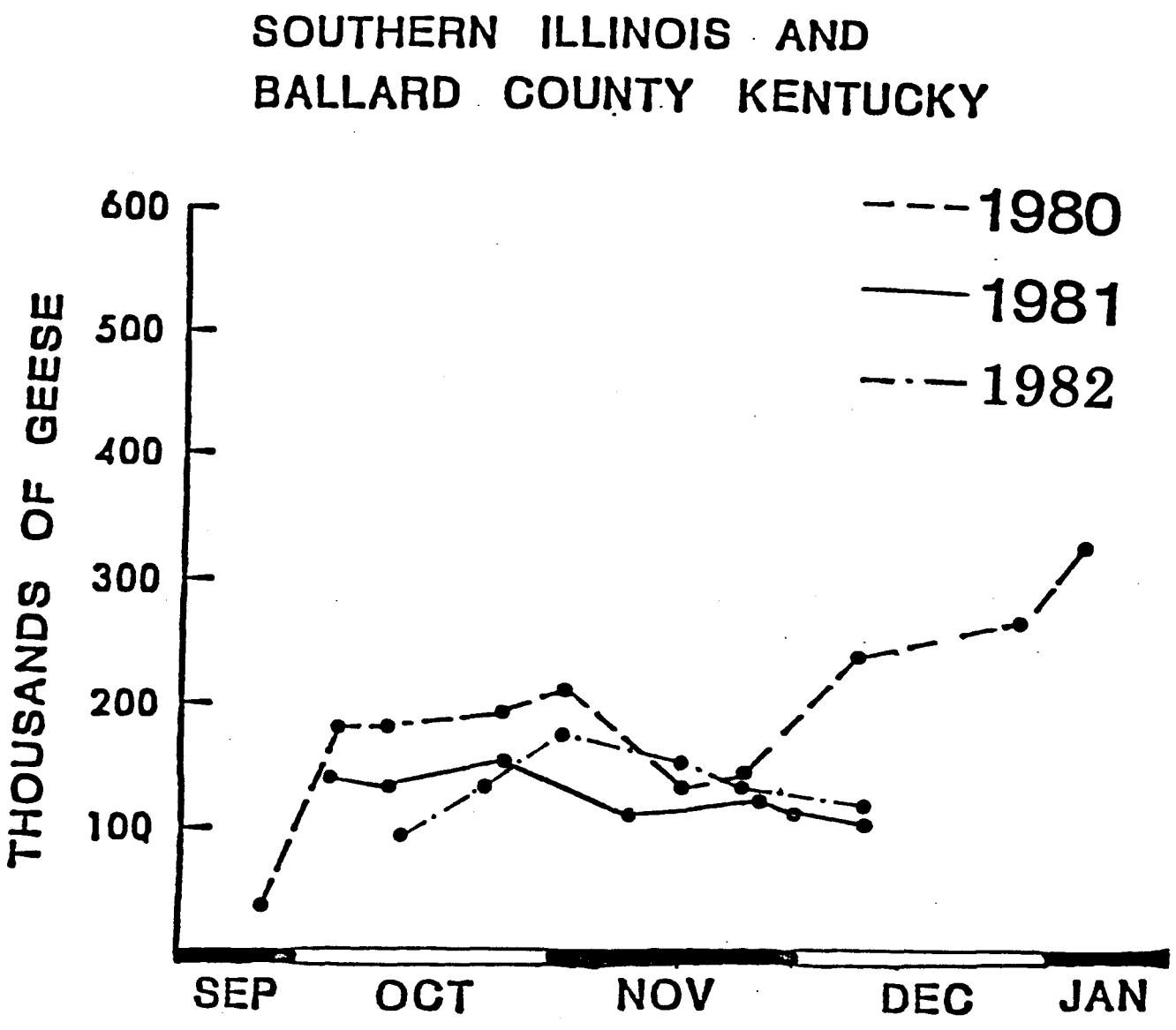

Figure 5. Numbers of Canada geese counted from aircraft in southern Illinois and Ballard County, Kentucky. This area includes Crab Orchard NWR, Horshoe Lake Refuge, Union County Refuge and Ballard Co. WMA but excludes Rend Lake and Campbell's Pond.

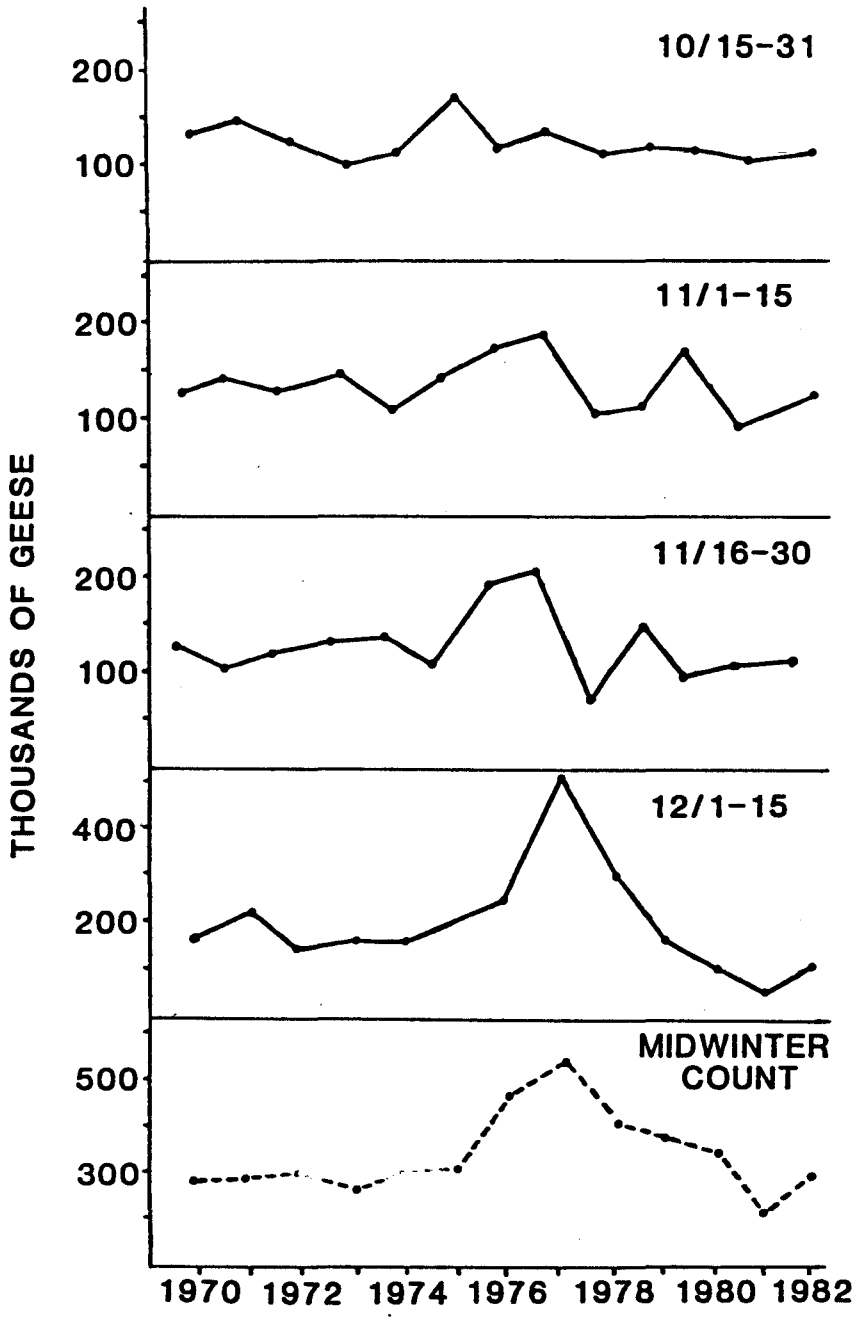

Fig. 6. Averaged aerial counts of Canada geese for combined areas in east-central Wisconsin, southern Illinois, and Ballard County, Kentucky over four time periods (mid-October-mid-December) compared to the midwinter count.