



ILLINOIS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

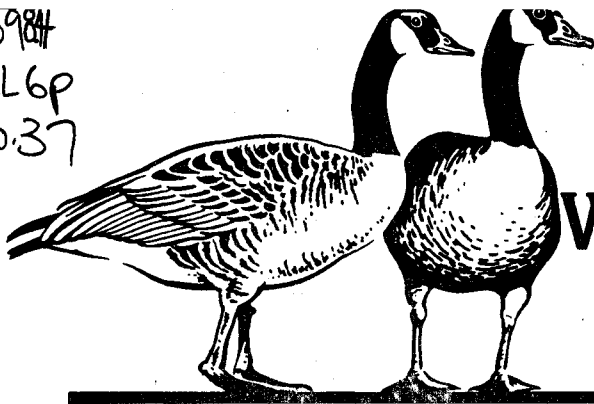
PRODUCTION NOTE

University of Illinois at
Urbana-Champaign Library
Large-scale Digitization Project, 2007.

5984
IL6p
No.37

NHX

February, 1983



WATERFOWL PROGRAM



ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISH AND WILDLIFE RESOURCES

NATURAL HISTORY SURVEY

APR 14 1983

LIBRARY

CANADA GOOSE HARVEST AND HUNTER ACTIVITY IN THE SOUTHERN ILLINOIS QUOTA ZONE DURING THE 1981 SEASON

Dennis Thornburg, Waterfowl Program Manager
Bridgett L. Estel, Waterfowl Technician

Abstract: The quota zone goose season opened 9 November and closed 50 days later on 28 December. The season length in MVP harvest areas in the Mississippi Flyway was reduced from 70 days to 50 days in 1981. The quota for 1981 was set at 24,000 and was exceeded only slightly with a harvest of 25,328 geese. Goose hunters made 56,964 trips to the field which resulted in a .44 success rate for the season. The mean number of hunters per day was 1,134. Hunter success was good early in the season but declined sharply in December. Union County reported the highest hunter success rate (.56). Hunters in Union County accounted for 22 percent of the total hunting effort (12,682 trips) and 28 percent of the total quota zone harvest (7,133 geese). Hunting effort in Alexander County comprised 33 percent of the total effort (18,424 trips) and a harvest of 7,766 geese represented 31 percent of the quota zone harvest. Hunters in Williamson-Jackson Counties reported 45 percent of the total hunting effort (25,858 trips) and 41 percent of the harvest (10,429 geese). A total of 109 commercial licenses and 358 free permits were issued in the quota zone. The Canada goose population wintering on areas in the quota zone peaked at 180,000 in late January. This represented a decline from the 207,000 peak in 1980 and the 248,000 peak reported in 1979. Mild weather and scattered geese again made accurate inventories difficult in 1981. Tail fans collected from geese harvested in Union County throughout the season revealed a low immature to adult ratio of 1.4:1. In Alexander County the age ratio for the 1981 season was 2.4:1. Low age ratios in the 1981 harvest confirmed predictions of below average production in the spring of 1981.

INTRODUCTION

The Southern Illinois Quota Zone is composed of the four counties of Alexander, Union, Williamson, and Jackson. The three major goose wintering areas within these counties are the Horseshoe Lake Refuge, a state-owned 7,900 acre area in Alexander County, the Union County Refuge, a 6,200 acre state-owned area in Union County, and the 44,000 acre Crab Orchard National Wildlife Refuge in Williamson and Jackson Counties.

The quota zone system requires that all goose hunters register daily and report their daily harvest. The quota zone system has been in effect in southern Illinois since 1960 and provides a high degree of precision in monitoring the harvest of Canada geese.

The Canada Goose Harvest and Population Study in Illinois is a part of a Federal Aid, Pittman-Robertson Project, Number W-43-R-30.

METHODS

As in the past, registration packets containing daily registration sheets, club permit, administrative order, and self addressed envelopes were prepared and distributed to all landowners in the quota zone applying for a free or commercial goose license. All clubs in the quota zone submitted daily registration sheets twice weekly throughout the season, and harvest inventories were updated each time by Union County field office personnel. A commercial license was required for all areas where any type of reimbursement was accepted in return for the privilege to hunt on that property. Free licenses were issued for all other areas where hunting rights were free.

An automatic answering service was again provided in the phone system at the Union County office. Harvest data and other season information such as Canada goose population levels on each of the refuges were updated on the recording each time a harvest count and aerial inventory were made. This service has proven to be very useful to interested hunters throughout the state and club operators in the quota zone region. Media services also find this to be helpful as a source of immediate information on the progress of the goose season in southern Illinois.

Canada goose populations on the three wintering areas in the quota zone, Rend Lake, and Ballard County, Kentucky were monitored by weekly aerial inventories. Biologists with the Illinois Department of Conservation and the U.S. Fish and Wildlife Service conducted the weekly inventories using the Department Cessna 337 or Cessna 210.

Age ratio information was gathered from examination of tail fans collected from geese harvested on the Union County and Horseshoe Lake Public Hunting Areas and private clubs from both Union and Alexander Counties. Tail fans from geese harvested on private clubs were collected from local commercial pickers and stored individually in envelopes for future examination by biologists.

RESULTS AND DISCUSSION

The 1981 goose season in the quota zone opened 9 November and closed 28 December for a 50-day season. The quota for 1981 was set at 24,000 and was barely exceeded with a total harvest of 24,328. In 1979 and 1980, the quotas were set at 29,000 and 27,000 respectively. The 1979 season spanned 70 days and the 1980 season was 31 days long.

In 1981 the season length for hunting Canada geese in MVP harvest areas in the Mississippi Flyway was reduced from 70 days to 50 days. Extremely good hunter success early in the season led to prediction of a short season similar

to 1980. After the initial early migration, mild weather conditions resulted in a slow migration of Canada geese to southern Illinois. This, combined with fewer immatures in the flock because of below average production, caused a sharp decline in hunter success following the first three weeks of the season. As a result, the season continued unexpectedly to the 50-day limit.

Hunting Pressure

Goose hunters reported a total of 56,964 trips to the quota zone during the 1981 season. The average daily number of hunters was 1,139. This figure is slightly below the 1980 season daily average of 1,319. There was a minor shift in hunting intensity from Williamson/Jackson Counties to Alexander and Union Counties. Williamson/Jackson Counties experienced 45 percent of the hunter-trips during the 1981 season, Alexander County 33 percent, and Union County 22 percent (Table 1).

Commercial licenses were issued to 109 clubs and 358 free permits were issued. There was an increase in the total number of hunting areas in the quota zone from an average of 444 for the 1979 and 1980 seasons to 467 in 1981. Total number of hunters (56,964) increased also by slightly over 16,000 from the 1980 season figures. The Crab Orchard area registered the greatest number of licensed clubs and more than nine times more free permits than recorded for Alexander or Union Counties. The number of hunter-trips to Williamson/Jackson Counties, however, was not nearly as disproportionate in comparison to the other two counties (Table 1).

Hunter intensity on public hunting areas in the quota zone remained relatively constant for Alexander and Williamson/Jackson Counties but decreased for Union County from 34 percent of the county total during the 1980 season to 29 percent in 1981 (Table 2). During the 1981 season a total of 11,815 hunter-trips were made to public hunting areas in the quota zone. This represented 29 percent of the total hunting effort in the zone.

Hunter Success

Goose hunters in the quota zone reported an overall success rate of .44 birds per trip. This was down 35 percent from the near record 1980 season figures but comparable to the 1979 success rate of .42 (Table 3). Union County hunters reported the highest success rate in the quota zone with a success rate of .56. Alexander and Williamson/Jackson Counties followed with .42 and .40 respectively. Hunter success on commercial clubs in the four county zone averaged 89 percent higher than on free areas in the counties. Union County commercial clubs were the most successful at .60 birds per trip. Commercial clubs in Williamson/Jackson Counties reported a success rate of .54 and Alexander County commercial clubs reported .43 birds per trip.

Success rates for free permit hunters averaged .33 in Alexander County, .27 in Williamson/Jackson Counties, and .25 in Union County.

The Union County Public Hunting Area reported the highest success rate on public lands in the quota zone with a success rate of .53. This figure more than doubles the Horseshoe Lake Public Hunting Area success rate of .25 and far surpasses Crab Orchard's success rate of .12 for the 1981 goose season.

Hunter success on both the Union County and Horseshoe Lake Public Hunting Areas was far below the near-record success experienced by hunters during the 1980 season (Tables 4 and 5). Table 6 compares the 1981 goose season on the Union County and Horseshoe Lake Public Hunting Areas with the previous 5-year season average. Poor hunter success on the Horseshoe Lake Public Hunting Area in recent years continues to discourage hunter interest in this area.

Harvest

The final harvest in the quota zone for the 1981 season reached 25,328 geese. This was 1,328 geese over the assigned 24,000 quota. Licensed commercial clubs harvested 21,057, or 83 percent of the overall total. This was down 3 percent from the 1980 season and 4 percent below the 1979 season.

County harvests by number and percent are compared for the last 5 seasons in Table 7. Hunters in Williamson/Jackson Counties harvested 10,429 geese or 41 percent of the total harvest in the quota zone. In Alexander County, 7,766 geese were harvested or 31 percent of the total. Union County hunters followed with 28 percent of the overall harvest or 7,133 geese. Goose harvest in the quota zone during the 1981 season shifted slightly from Alexander and Williamson/Jackson Counties to Union County.

The average number of geese harvested per day during the 1981 season was 506. This was down 44 percent from the 1980 season average but up 21 percent from the average calculated for the 1979 goose season.

The largest number of geese harvested during a single report period was 5,496. This occurred during the first report period from 9 November to 12 November. Harvest rates per report period for the rest of the season fluctuated greatly from a low of 537 to a high of 2,707 geese (Table 8).

Six percent of the harvests in Alexander and Union Counties occurred under free permits. Thirty-three percent of the geese harvested in Williamson/Jackson Counties were taken by free permit holders.

In the quota zone, 10 percent of the total harvest was from public hunting areas. This figure is down 8 percent from the 1980 season. Williamson/Jackson Counties and Union County have shown a decline in harvest on public hunting areas since 1979. Goose harvest on the public hunting area at Crab Orchard NWR has dropped 90 percent since the 1979 season. Harvest on the Union County Public Hunting Area has shown a 31 percent decline when comparing the 1981 and 1979 seasons. Alexander County figures showed a 173 percent increase in total harvest on the Horseshoe Lake Public Hunting Area from the 1979 to 1980 season but an almost equal decline of 59 percent from the 1980 to 1981 season (Table 4).

Population Status

The season peak in the Canada goose population in the quota zone was 180,000 geese in late January 1982. This peak occurred later and was lower than the 207,000 peak in 1980 and the 248,000 peak of 1979 (Figure 1; Table 9). There has been a steady decline in the peak population in recent years since 1977.

Inventory totals taken on the first aerial flight in mid-October have increased every year from 1978 to 1980 in the quota zone. The 1981 initial inventory total was 144,000 geese. This number was down nearly to the 1978 level of 142,000 geese.

Total numbers of Canada geese on wintering areas in southern Illinois and west Kentucky were consistently lower in 1981 than 1980 until late in the season (Figure 2). This was undoubtedly due to mild weather conditions and a slow migration to the wintering areas following the initial early migration. Accurate inventories were again difficult in 1981 because of the dispersed nature of the population. The 1981 late-winter population peak of 369,000 geese only slightly exceeded the 1980 late-winter peak of 339,000.

Peak populations on the various wintering areas were achieved at different times of the season (Figure 3). Crab Orchard NWR peaked early in the season at 74,000 geese on 27 October 1981. The population at Horseshoe Lake peaked late in the winter at 85,000 on 11 February 1982 and Union County peaked at 60,000 geese in late January.

Rend Lake once again attracted over 100,000 geese late in the winter. It is interesting to note that when the population at Rend Lake on 29 January was 110,000, the flock at Ballard County, Kentucky numbered 60,000. During the next week 100,000 geese left Rend Lake and the population at Ballard County increased by nearly the same number. Both Ballard County and Rend Lake held far more geese in late winter 1981 than in 1980.

Table 10 compares age ratios of Canada geese harvested from two counties in the quota zone and one area outside the quota zone during the 1981 season. Rend Lake and Alexander County show equal age ratios of 2.4 immatures per adult goose harvested. Union County ratios were lower with only 1.4 immature geese per adult goose harvested. The average ratio for all three areas was 2.0 immatures per adult for the 50-day season.

These 1981 ratios for Alexander and Union Counties are considerably lower than those calculated for the 1980 season. In 1980, 4.0 immature geese were harvested per every adult in Alexander County and 2.6 immatures per adult goose in Union County. Lower age ratios in the 1981 fall harvest confirmed predictions of below average reproduction in the spring of 1981.

Age ratios in the harvest on the public hunting areas started out high but declined rapidly later in the season (Table 11). Final age ratios for the season on the public hunting areas were 2.6 immature geese harvested per adult at Horseshoe Lake and 2.2 immatures per adult goose at Union County. These figures show a decline from the 1980 season (Table 12) when Horseshoe Lake harvested 3.2 immatures per adult goose and Union County harvested 4.5 immature geese per adult. Comparison of the 1980 and 1981 seasons again confirms predictions of lower Canada goose production in the spring of 1981.

LITERATURE CITED

- Thornburg, D. D., V. Hamer, and N. J. Foltz. 1976. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1975 season. Illinois Dept. of Conservation, Migratory Bird Sect., Periodic Rpt. No. 15. 12pp.
- Roetker, F., N. J. Foltz, and W. L. Anderson. 1976. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1976 season. Illinois Dept. of Conservation, Migratory Bird Sect., Periodic Rpt. No. 19. 12pp.
- Roetker, F., N. J. Foltz, and W. L. Anderson. 1978. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1977 season. Illinois Dept. of Conservation, Migratory Bird Sect., Periodic Rpt. No. 23. 12pp.
- Thornburg, D. D., W. Allen, and N. J. Foltz. 1979. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1978 season. Illinois Dept. of Conservation, Migratory Bird Sect., Periodic Rpt. No. 26. 12pp.
- Thornburg, D. D., N. J. Foltz. 1980. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1979 season. Illinois Dept. of Conservation, Migratory Bird Sect., Periodic Rpt. No. 28. 17pp.
- Thornburg, D. D., N. J. Foltz, and T. Sickmeyer. 1981. Canada goose harvest and hunter activity in the southern Illinois quota zone during the 1980 season. Illinois Dept. of Conservation, Waterfowl Program, Periodic Rpt. No. 30. 18pp.

Table 1. Hunter-trips and harvest of Canada geese in the southern Illinois quota zone during the 1981 season.

County	Hunter Trips	Percent By		Harvest	Percent By		Success Rate
		Permit	Counties		Permit	Counties	
<u>Alexander (Horseshoe Lake)</u>							
Licensed Club ^a	16,994	92		7,292	94		.43
Free Permit	1,430	08		474	06		.33
Total	18,424	100	33	7,766	100	31	.42
<u>Union County</u>							
Licensed Club ^a	11,097	88		6,731	94		.60
Free Permit	1,585	12		402	06		.25
Total	12,682	100	22	7,133	100	28	.56
<u>Williamson/Jackson (Crab Orchard NWR)</u>							
Licensed Club ^a	13,134	51		7,034	67		.54
Free Permit	12,724	49		3,395	33		.27
Total	25,858	100	45	10,429	100	41	.40
Grand Total	56,964		100	25,328		100	.44

a. Licensed clubs are those areas that charge a daily fee for hunting and areas covered by lease or other monetary agreement. Free permits represent all other areas where goose hunting takes place. Each type of permit requires the same type of registration.

b. Numbers of permits issued.

Table 2. Contribution of public hunting areas to the hunting effort and harvest of Canada geese during the 1981 season.

County	Hunter Trips	Percent of Total County	Harvest	Percent of Total County	Success Rate
Alexander ^a	1,986	11	494	6	.25
Union ^b	3,647	29	1,927	27	.53
Union ^c	938	7	86	1	.09
Williamson/Jackson ^d	1,945	8	227	2	.12
Williamson/Jackson ^e	3,299	13	647	6	.20
All counties	11,815	21	3,381	13	.29

- a. Horseshoe Lake Public Hunting Area, a licensed club.
- b. Union County Public Hunting Area, a licensed club.
- c. "Firing Line" on Dept. of Conservation land, a free permit.
- d. Crab Orchard NWR Public Hunting Area, a licensed club.
- e. "Free-Lance Hunting" on Crab Orchard NWR land, a free permit.

Table 3. Success rates for Canada goose hunters in the southern Illinois quota zones, years 1974-1981.

COUNTY	1974	1975	1976	1977	1978	1979	1980	1981
Alexander	.57	.55	.49	.56	.64	.37	.79	.42
Union	.56	.80	.62	.35	.66	.50	.72	.56
Williamson/Jackson	.40	.43	.65	.59	.46	.41	.60	.40
All counties	.49	.57	.59	.53	.57	.42	.68	.44

Table 4. Hunter use, harvest and hunter success on the Horseshoe Lake Public Hunting Area 1973-1981.

Year	Season Length	Number Hunters	Average Number Hunters Per Day	Geese Harvested	Success Rate
1973	63	3,857	54	875	.31
1974	38	2,624	82	1,527	.58
1975	30	2,373	91	960	.40
1976	27	2,154	94	562	.26
1977	44	2,439	66	678	.28
1978	69	3,381	56	1,457	.43
1979	70	2,514	37	434	.17
1980	31	1,427	46	1,194	.84
1981	50	1,986	40	494	.25

Table 5. Hunter use, harvest and hunter success on the Union County Public Hunting Area 1973-1981.

Year	Season Length	Number Hunters	Average Number Hunters Per Day	Geese Harvested	Success Rate
1973	63	4,266	80	1,593	.37
1974	38	2,980	93	1,964	.66
1975	30	2,489	96	2,292	.92
1976	27	2,302	99	1,832	.80
1977	44	3,045	82	962	.32
1978	69	4,998	83	3,441	.69
1979	70	5,524	81	2,800	.51
1980	31	2,681	86	2,325	.87
1981	50	3,647	73	1,927	.53

Table 6. Comparison of the 1981 season on the Union County and Horseshoe Lake Public Hunting Areas with the 1976-1980, 5-year average.

	Union County Public Hunting Area		Horseshoe Lake Public Hunting Area	
	5-year Average (76-80)	1981	5-year Average (76-80)	1981
Percent of Total County Hunters	32	29	12	11
Percent of Total County Harvest	33	27	10	06
Number of Hunters	3,888	3,647	2,383	1,986
Average Number Hunters Per Day	85	73	53	40
Harvest	2,290	1,927	65	494
Success Rate	.60	.53	.40	.25

Table 7. Harvest of Canada geese by county in the Southern Illinois Quota Zone, 1977 to 1981^a

County	1977		1978		1979		1980		1981	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Alexander	11,111	36	16,348	40	8,331	28	9,810	35	7,766	31
Union	3,927	13	10,915	27	7,480	26	5,733	21	7,133	28
Williamson/Jackson	15,709	51	13,227	33	13,382	46	12,292	44	10,429	41
Total:	30,747	100	40,490	100	29,193	100	27,835	100	25,328	100

^a These harvest data are from daily registers of licensed clubs and free permit areas, and regulations pertaining to these have changed through the years. Beginning in 1974, licensed clubs were only those areas that charged a daily fee and all others were required to have a free permit. Beginning in 1978 a licensed club was any area for which money changed hands for hunting either daily or annually. All other goose hunting areas were required to have a free permit and register hunters and harvest in the same manner as licensed clubs.

Table 8. Goose harvest in the quota zone throughout the 1981 season.

	Canada Goose Harvest on Commercial Areas						*Total Harvest		*Harvest Per	
	Alexander		Union		Will./Jackson		in Quota Zone		Report Period	
	Hunters	Geese	Hunters	Geese	Hunters	Geese	Hunters	Geese	Hunters	Geese
11/12/81	2,202	1,380	1,176	987	2,220	2,001	8,097	5,496	8,097	5,496
11/15/81	3,587	1,710	1,952	1,429	3,346	2,413	12,097	6,949	4,647	1,453
11/19/81	5,059	2,482	3,095	2,308	4,609	3,054	18,082	9,649	5,338	2,707
11/22/81	6,481	2,916	4,005	2,841	5,753	3,619	22,960	11,524	4,878	1,868
11/26/81	8,120	3,633	5,203	3,534	7,005	4,190	28,894	14,012	5,934	2,488
11/29/81	9,731	3,930	6,231	3,752	8,032	4,410	34,214	15,022	5,320	1,010
12/03/81	11,341	4,470	7,207	4,188	9,016	4,793	38,747	16,505	4,533	1,483
12/06/81	12,626	4,675	7,869	4,338	9,725	5,011	42,253	17,180	3,506	675
12/10/81	13,569	4,924	8,521	4,643	10,352	5,319	45,057	18,137	2,804	957
12/13/81	14,255	5,186	9,044	4,883	10,859	5,533	47,406	18,987	2,349	850
12/17/81	14,990	5,747	9,635	5,313	11,575	6,010	50,251	20,748	2,845	1,761
12/20/81	15,512	5,950	10,005	5,567	11,955	6,266	51,896	21,594	1,645	846
12/24/81	16,224	6,747	10,533	6,226	12,544	6,692	54,346	23,698	2,450	2,104
12/27/81	16,761	7,099	10,876	6,516	12,961	6,965	56,143	24,791	1,797	1,093
12/28/81	16,994	7,292	11,097	6,731	13,134	7,034	56,964	25,328	821	537

* Includes harvest on non-commercial areas

Table 9. Canada goose populations on wintering areas throughout the fall and winter of 1981-82.

DATE:	BALLARD COUNTY	HORSESHOE LAKE	UNION COUNTY	CRAB ORCHARD*	REND LAKE	TOTAL
10-13-81	1,000	55,000	25,000	64,000	1,500	146,500
10-19-81	1,500	40,000	23,000	65,000	3,000	132,500
10-27-81	3,000	42,000	26,000	74,000	8,000	153,000
11-03-81	3,000	42,000	23,000	64,000	10,000	142,000
11-17-81	3,500	38,000	18,000	53,500	15,000	128,000
12-02-81	10,000	40,000	31,000	38,000	18,000	137,000
12-07-81	7,000	37,000	23,000	45,000	17,000	129,000
12-14-81	8,000	34,000	26,000	27,000	16,000	111,000
01-07-82	18,000	62,000	33,000	42,000	110,000	265,000
01-18-82	70,000	75,000	45,000	59,000	120,000	369,000
01-29-82	60,000	68,000	60,000	52,000	110,000	350,000
02-11-82	140,000	85,000	55,000	18,500	4,000	302,500
02-22-82	3,000	42,000	20,000	22,000	75,000	162,000

* Includes Campbell Pond

Table 10. Age ratio in the Illinois Canada goose harvest during the 1981 season. Data gathered from tail fans collected through the season from commercial pickers in Union County, Alexander County and the Rend Lake Area.

	<u>Immatures</u>	<u>Adults</u>	<u>Ratio</u>
Alexander County	1,083	460	2.4:1
Union County	367	267	1.4:1
Rend Lake	<u>192</u>	<u>79</u>	<u>2.4:1</u>
Total	1,642	806	2.03

Table 11. Age ratio in the Canada goose harvest on the Union County and Horseshoe Lake Public Hunting Areas during the 1981 season.

Date	<u>Horseshoe Lake PHA</u>		<u>Union County PHA</u>	
	Age Ratio	Sample Size	Age Ratio	Sample Size
Nov. 09*	5.7:1	74	6.2:1	186
Nov. 10 - Nov. 19	9.9:1	120	3.5:1	455
Nov. 20 - Nov. 29	2.1:1	72	2.3:1	292
Nov. 30 - Dec. 09	3.2:1	93	1.1:1	199
Dec. 10 - Dec. 19	3.5:1	45	1.8:1	269
Dec. 20 - Dec. 28	.9:1	71	1.5:1	311
For the 50-Day Season	2.6:1	475	2.2:1	1712

* Opening day

Table 12. Age ratios, expressed as immatures per adult, among Canada geese harvested on the Horseshoe Lake and Union County Public Hunting Areas, 1965 to 1981.

Year	Horseshoe Lake	Union County
1965	---	3.7
1966	1.1	2.6
1967	0.8	1.7
1968	1.2	2.2
1969	0.9	1.2
1970	0.9	3.4
1971	1.4	2.8
1972	0.8	1.1
1973	0.8	1.6
1974	1.8	2.5
1975	2.6	4.1
1976	2.5	2.7
1977	1.7	1.3
1978	1.2	1.2
1979	---	2.8
1980	3.2	4.5
1981	<u>2.6</u>	<u>2.2</u>
MEAN	1.6	2.5

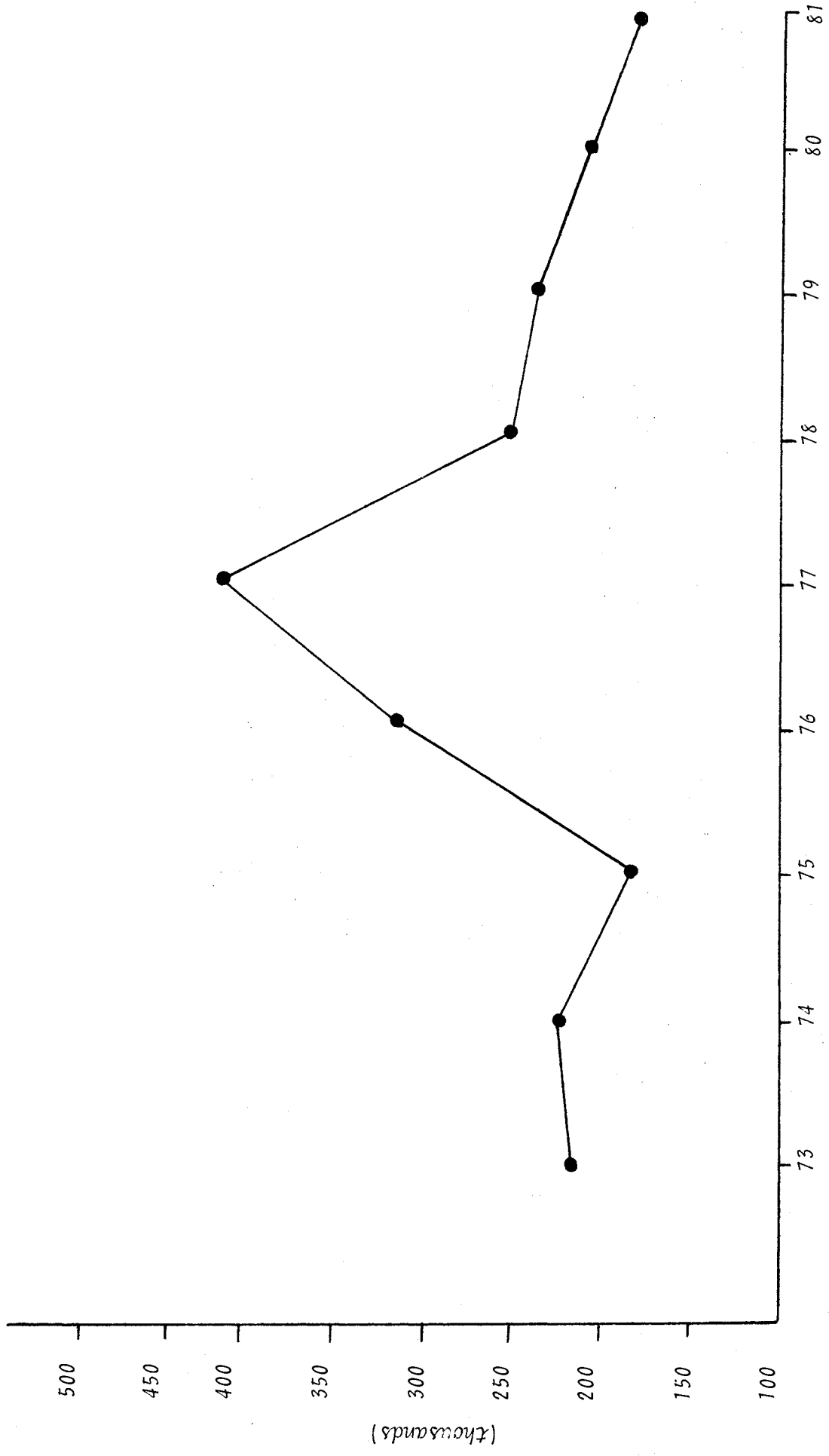


FIGURE 1. Peak populations of Canada geese in the southern Illinois quota zone, 1973 to 1981.

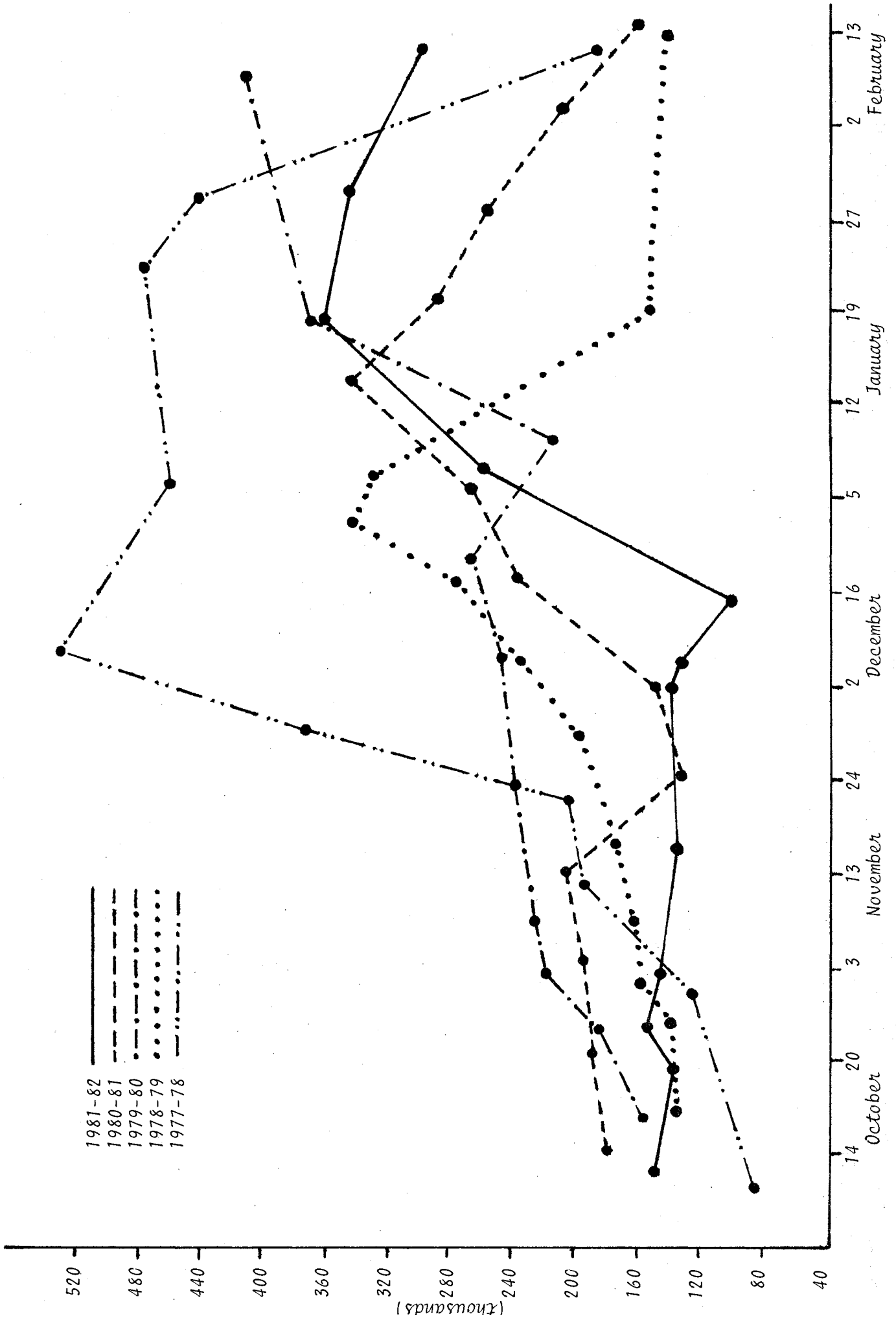


Figure 2. Numbers of Canada geese in southern Illinois (quota zone, Rend Lake and Ballard County, Kentucky combined) DURING THE FALL AND WINTER, 1977-78 to 1981-82.

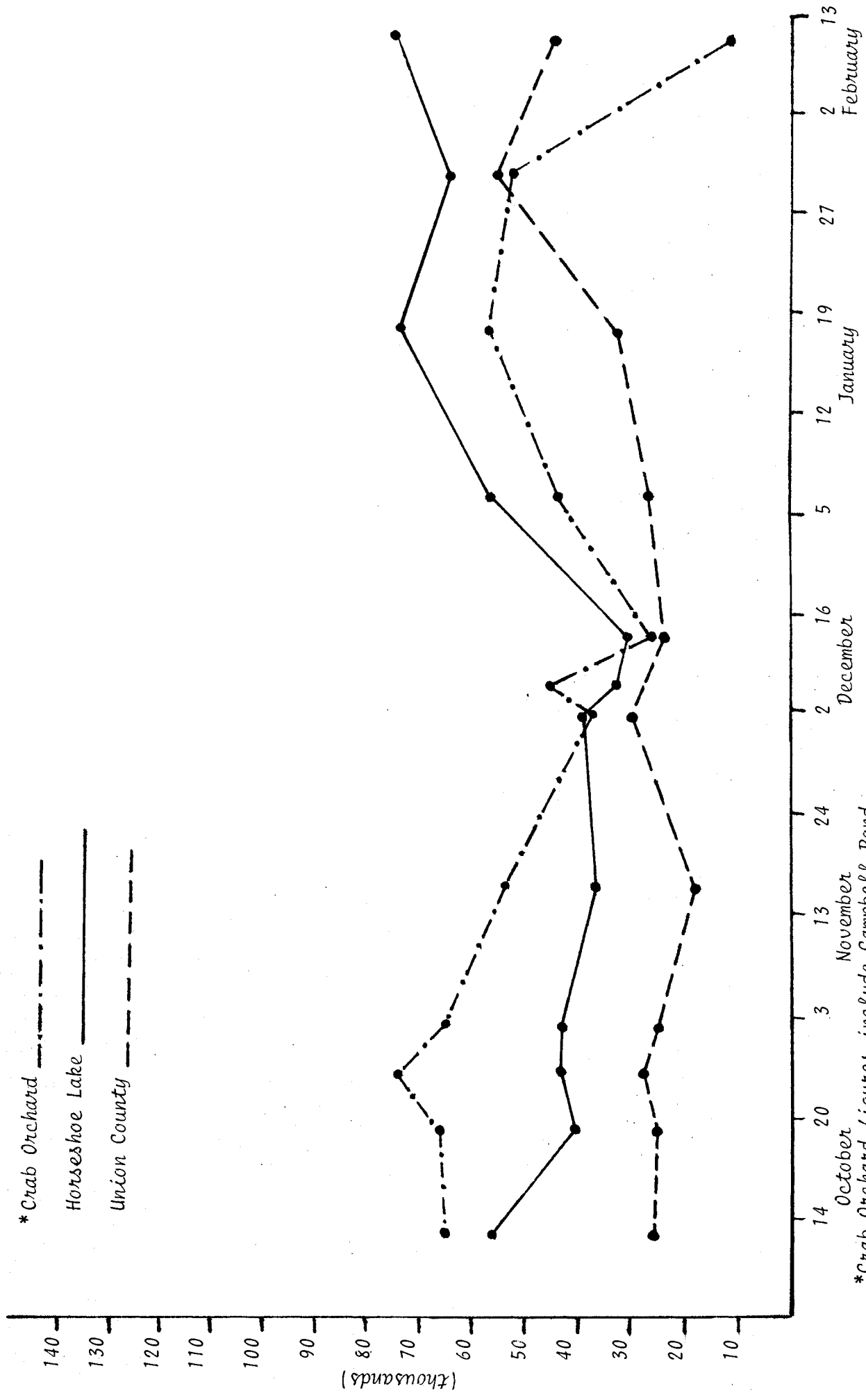


Figure 3. Numbers of Canada geese on the three refuges in southern Illinois quota zone during fall and winter, 1981-82.