

White-tailed Deer Population Status 2007

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Abstract

The statewide posthunt white-tailed deer population estimate for 2007 was 1,217,000. This was 74% above the statewide goal of approximately 700,000. The 2007 posthunt population estimates were more than 20% above goal in 104 deer management units. With a harvest of over 171,000 adult bucks and more than 345,000 antlerless deer, the posthunt 2007 population estimate was unchanged from last year's estimate; however, changes in estimates between years are in part confounded with changes in methodology and assumed model inputs.

Methods

Population estimates for most Wisconsin deer management units were calculated using the Sex-Age-Kill (SAK) formula. This formula combines information on the age composition of the buck harvest with an estimate of the percentage of adult buck mortality that is due to legal hunting (buck recovery rate) to estimate the percentage of the adult buck population that is harvested (buck harvest rate). The prehunt adult buck population size in each management unit is estimated by dividing the unit's registered buck harvest by estimates of buck harvest rates. Prehunt adult buck population estimates are then expanded to estimate the entire prehunt deer population by 1) multiplying buck population estimates by adult sex-ratios to estimate the adult doe population size, and 2) multiplying doe population estimates by fall fawn:doe ratios to estimate fall fawn populations. Posthunt deer populations are estimated by subtracting total harvest from prehunt estimates.

Primary inputs to the SAK formula are 1) year- and unit-specific harvests of antlered and antlerless deer, 2) average percentage of yearlings among harvested adult bucks, 3) average percentage of yearlings among harvested adult does, 4) buck recovery rate, and 5) fall fawn:doe ratios. The percentage of yearlings among harvested bucks is used as an estimate of the annual mortality rate of adult bucks. Multi-year averages are used for yearling buck and doe percents because annual variation in reproduction or fawn survival can affect annual estimates of percentage of yearlings, thereby biasing estimates of adult buck mortality. In addition, year- and unit-specific samples of aged deer often are inadequate for reliable estimation of yearling percents.

Fawn:doe ratios were updated in the Northern and Central forest regions based on results of the Summer Deer Observation survey. Average yearling buck and doe percents and buck recovery rates were updated in 2007 for most Wisconsin deer management units.

Consistent with recommendations from the SAK independent review panel, the Deer Committee decided that 5-year averages of yearling buck and doe percents would be used in calculating SAK estimates in all units this year, as was done in 2006. Estimates of buck recovery rate used for a number of Northern and Central Forest units were adjusted upward from those predicted by the standard mortality-harvest rate model due to concerns by local managers that the standard model overestimated non-harvest mortality.

Sales of gun deer licenses in 2007 were 0.3% lower than in 2006. The opening day of the firearm season was November 17, the earliest possible under the current season structure. Only a small portion of the northern forest had snow cover for the opening weekend. Temperatures were above average for the opener in much of the state. Snow fell across most of the state by the middle of the 9-day season and persisted until the second weekend of the season. Corn harvest was slightly above the 5-year average, with 92% of the harvest complete by mid-November. The Deer Committee decided there was no reason to adjust buck recovery rates due to hunting season conditions.

Thirty-four deer management units had earn-a-buck regulations in effect during the 2004, 2006 and/or 2007 deer seasons (Table 1). Hunters were required to harvest an antlerless deer before they were allowed to harvest a buck. Buck harvest rates were reduced in these units in years with earn-a-buck regulations and apparently for several years thereafter. Therefore, the SAK formula was not used to estimate population size in these units. Population size in these units was estimated using accounting-style population models. Model inputs were calibrated to produce the best fit between simulated trends and historic SAK estimates. Model estimated harvest rates in 2007 for antlered and antlerless deer were considered when calibrating the models and in some cases minor adjustments were made to the starting population size in accounting models.

Population estimates for units in CWD management zones also were not based on the SAK method because buck harvest rates were likely inconsistent with past harvest rates. In recent years population estimates in CWD units were derived from a mixture of information from accounting population models and aerial surveys. Helicopter quadrat surveys were conducted in the Southwest and Southeast Disease Eradication Zones (DEZs) and fixed-wing transect surveys were conducted in units in the Herd Reduction Zone. Deer per mile indices from fixed-wing transect surveys were converted to estimates of density based on a regression model developed in the SW DEZ that related fixed-wing counts to helicopter survey estimates. As data from aerial surveys has increased over time, greater weight has been giving to these data in final estimates of population size. As in 2006, population estimates for 2007 in all CWD units were derived from the aerial survey data, except for DMU 76M where an accounting model was used because of flight restrictions in the City of Madison.

Results

The statewide overwinter population goal for 2007 was approximately 700,000. Estimates of size of posthunt deer populations during 2007 were made for 119 deer management units (Table 1). Statewide, the 2007 posthunt population estimate was 1,217,000, which was 74% above the posthunt population goal. The estimated statewide population was nearly identical to the 2006 estimate. The statewide 2006 and 2007 posthunt populations were the first and second highest on record. Unit-specific posthunt population densities ranged from 11-120 deer/mi² of deer range and averaged 37 deer/mi² of deer range.

In 2007, 8 units had population estimates that were 1-20% below goal. Seven units had populations that were between goal and 20% above goal. Population estimates in 36 units were 21-50% above goal and 66 units had populations that were more than 50% above goal. Population estimates declined 20% or more from 2006 in 7 units and increased 20% or more in 13 units; however, as discussed below, changes in estimates between years may be confounded with changes in methodology and assumed model inputs.

The posthunt population estimate for the Northern Forest region was 3% lower in 2007 than in 2006 but remained 37% above goal in 2007. The Central Forest population estimate in 2007 was 17% lower than in 2006 and was 53% above goal in 2007. Population estimates for the Eastern Farmland region were 2% lower in 2007 than in 2006 and remained 60% above goal, despite widespread use of earn-a-buck regulations in the region in 2007. In the Western Farmland Region, posthunt population estimates were 8% higher in 2007 than in 2006. Lack of apparent population reductions in the Eastern and Western Farmland regions as a result of high antlerless harvests associated with extensive use of herd control and earn-a-buck regulations is partly due to adjustments made to starting population sizes in accounting models. These adjustments are believed to have resulted in more accurate estimates of the 2007 population but suggest that 2006 estimates may have been biased low and confound interpretation of the effects of harvest regulations. The posthunt population estimate for the Southern Farmland region was 5% higher in 2007 than in 2006. This increase may in part reflect greater observability of deer on the aerial surveys conducted in the CWD zone units associated with prolonged deep snow this winter.

Deer populations in the Northern Forest, Eastern Farmland, and Western Farmland regions increased substantially during the 1980's (Figure 1). Aggressive harvests during the late 1980's and early 1990's, combined with very poor recruitment in the Northern and Central Forest regions in 1992, reduced or stabilized populations in these regions. Deer populations in all regions grew rapidly following conservative harvests in 1993. Liberal harvests in the farmland regions together with over-winter losses associated with severe winters during 1995-96 and 1996-97 reduced populations from the 1995 peak in all regions. The near-record mild winter of 1997-98 and relatively conservative antlerless harvests in 1998 allowed population growth in all regions. Substantial antlerless harvests across much of the state in 2000, together with the moderately severe winter of 2000-01 in the Northern Forest, set the stage for population declines in all regions in 2001. Lower harvests during 2002 led to population increases in all regions in 2003. Aggressive antlerless harvests in 2004, 2006 and 2007 may be stabilizing or reducing populations in the Northern Forest and Eastern and Western Farmland regions but the exact effects of these high antlerless harvests are confounded by adjustments to inputs of the SAK and accounting models.

Table 1. White-tailed deer population status in Wisconsin deer management units, 2006-2007.

Region & Unit	Population goal		2006 posthunt population			2007 posthunt population			% change from 2006
	Num.	Den. ^a	Num.	Den. ^a	% over goal	Num.	Den. ^a	% over goal	
Northern Forest									
01	3,220	20	5,500	34	71	5,500	34	71	0
01M	320	10	990	31	209	1,100	36	256	15
02	11,286	18	21,500	34	91	21,600	35	92	1
03	8,880	16	14,900	27	68	13,400	24	51	-10
04	5,235	15	6,900	20	32	7,800	22	48	13
06	6,552	12	12,400	23	89	14,600	27	122	18
07	2,835	15	2,400	13	-15	2,400	13	-15	0
08	7,400	20	10,500	28	42	9,500	26	29	-9
09	8,760	20	16,000	37	83	15,100	34	72	-6
10	8,625	25	12,200	35	41	8,600	25	0	-30
11	6,820	20	9,900	29	45	10,100	30	48	1
12	4,488	17	7,700	29	72	7,200	27	59	-8
13	10,725	15	17,100	24	59	13,900	19	29	-19
14	4,592	14	8,100	25	76	7,700	23	68	-4
17	3,570	15	6,600	28	85	5,400	23	50	-19
18	7,360	20	13,900	38	89	14,600	40	99	5
19	8,060	20	12,400	31	54	12,500	31	55	0
20	6,804	18	11,000	29	62	10,300	27	51	-6
24 ^b	5,560	20	10,700	39	92	9,000	32	62	-16
25	8,740	20	17,800	41	104	18,400	42	111	4
26	7,820	20	11,200	29	43	10,700	27	37	-4
28	9,840	15	10,000	15	2	13,200	20	34	32
29A	3,585	15	4,500	19	26	4,000	17	11	-11
29B	2,796	12	3,200	14	14	2,500	11	-11	-22
30	4,725	15	6,400	20	35	6,300	20	34	-1
31	8,280	20	9,600	23	16	12,100	29	46	26
32	10,227	21	17,000	35	66	18,100	37	77	7
34	4,454	17	4,800	18	8	4,400	17	-2	-9
35	7,080	20	8,300	23	17	7,900	22	12	-4
36	6,850	25	11,400	42	66	8,500	31	24	-26
37	5,875	25	8,100	35	38	8,000	34	36	-2
38	8,580	20	10,600	25	24	8,800	21	3	-17
39	8,500	20	6,300	15	-26	5,700	13	-33	-10
40	6,560	20	7,500	23	14	6,200	19	-5	-17
41	4,875	25	5,500	28	13	5,500	28	12	-2
42	6,540	20	8,800	27	35	9,200	28	40	4
43	6,120	15	8,000	20	31	7,600	19	23	-6
44	7,922	17	9,300	20	17	9,000	19	13	-4
45	11,860	20	10,000	17	-16	10,900	18	-8	8
49A	5,875	25	4,600	20	-22	5,100	22	-13	12
49B	4,550	25	5,700	32	25	4,600	25	2	-19
50	6,680	20	6,900	21	3	5,800	17	-13	-15
52	6,080	20	7,700	25	27	7,500	25	24	-3
78	330	15	680	31	106	680	31	105	-1
Regional total	285,836		404,570		42	390,980		37	-3

Table 1. Continued.

Region & Unit	Population goal		2006 posthunt population			2007 posthunt population			% change from 2006
	Num.	Den. ^a	Num.	Den. ^a	% over goal	Num.	Den. ^a	% over goal	
Central Forest									
53	11,525	25	25,500	55	121	20,400	44	77	-20
54A	12,100	25	26,200	54	117	23,000	48	90	-12
55	15,775	25	22,300	35	41	20,700	33	31	-7
56	10,050	30	15,500	46	54	12,400	37	23	-20
58	12,650	25	25,100	50	99	18,600	37	47	-26
Regional total	62,100		114,600		85	95,100		53	-17
Eastern Farmland									
27 ^b	4,960	20	7,300	29	47	6,900	28	40	-5
33	5,520	20	6,500	23	17	8,000	29	45	24
46 ^b	8,025	25	10,800	34	34	9,900	31	24	-8
47 ^b	6,725	25	9,200	34	36	9,000	34	34	-1
51A ^b	5,500	25	7,800	35	41	7,400	34	34	-5
51B ^b	9,725	25	12,900	33	33	12,900	33	32	0
57	3,212	22	4,800	33	49	5,100	35	59	7
57A	5,950	25	7,800	33	30	9,200	38	54	18
57B ^b	6,300	25	8,300	33	31	8,700	35	38	5
57C	7,980	30	12,400	46	55	11,600	44	45	-6
62A ^b	10,050	25	16,500	41	64	13,400	33	33	-19
62B ^b	9,075	25	19,500	54	115	20,300	56	123	4
63A ^b	8,475	25	13,400	39	58	13,600	40	60	2
63B ^b	6,300	25	9,300	37	48	8,900	35	41	-5
64 ^b	4,860	20	12,800	53	164	11,600	48	139	-9
64M ^b	810	10	3,500	43	327	3,000	37	270	-13
65A	5,160	30	7,400	43	44	6,800	40	32	-8
65B ^b	10,410	30	16,600	48	60	15,800	46	52	-5
66 ^b	4,300	25	10,100	59	135	10,700	62	148	6
80A ^b	2,280	15	4,900	32	113	5,300	35	132	9
80B ^b	3,880	20	7,400	38	91	7,700	40	99	4
81 ^b	270	15	1,190	66	340	1,400	80	432	21
Regional total	129,767		210,390		62	207,200		60	-2
Western Farmland									
15	9,108	22	13,400	32	47	14,600	35	60	9
16	8,375	25	12,900	39	55	13,000	39	55	1
21	5,625	25	7,100	32	26	8,500	38	50	19
22	6,980	20	10,100	29	45	9,900	28	41	-3
22A ^b	7,060	20	10,700	30	52	9,400	27	33	-12
23 ^b	8,060	20	15,900	39	97	14,300	35	77	-10
59A	10,400	20	15,300	29	47	14,700	28	41	-4
59B ^b	10,305	15	15,000	22	46	14,600	21	42	-3
59C ^b	15,650	25	25,300	40	61	34,900	56	123	38
59D ^b	7,680	20	15,900	41	107	14,300	37	87	-10
59M ^b	440	10	2,100	48	381	1,700	40	295	-18
60A	3,400	20	4,900	29	44	4,900	29	44	0
60B	1,660	20	3,000	36	78	3,400	41	106	16
60M ^b	800	10	1,300	17	65	2,700	34	237	104
61 ^b	19,160	20	30,800	32	61	38,400	40	101	25
Regional total	114,703		183,700		60	199,300		74	8

Table 1. Continued.

Region & Unit	Population goal		2006 posthunt population			2007 posthunt population			% change from 2006
	Num.	Den. ^a	Num.	Den. ^a	% over goal	Num.	Den. ^a	% over goal	
Southern Farmland									
54B ^b	4,650	25	9,500	51	104	8,400	45	80	-12
54BCWD	2,030	10	9,900	47	386	6,900	34	239	-28
54C ^b	2,375	25	4,700	49	98	3,900	41	65	-17
67A ^b	8,850	25	19,200	54	117	16,800	47	90	-13
67B ^b	4,700	25	8,900	47	89	7,900	42	68	-11
68A ^b	3,900	30	9,400	72	140	11,200	86	187	19
68B ^b	5,490	30	7,700	42	41	7,100	39	28	-9
69	9,775	25	12,900	33	32	13,500	34	38	5
70CWD	2,000	10	10,500	53	424	9,600	48	379	-10
SW-DEZ ^c	3,720	5	29,300	39	688	29,800	40	700	3
70BCWD	1,940	10	6,500	34	236	6,600	34	239	0
70ECWD	690	10	2,600	38	283	3,600	52	422	37
70GCWD	1,220	10	6,400	53	426	6,700	55	447	3
71CWD	6,260	10	21,000	34	235	25,300	40	304	19
72 ^b	10,080	20	20,900	42	108	19,000	38	89	-9
73B	3,700	20	6,100	33	64	8,500	46	130	40
73BCWD	540	10	2,200	40	300	3,100	57	465	41
73D	3,160	20	5,000	31	57	6,800	43	117	38
73ECWD	1,720	10	3,500	21	105	8,500	50	395	136
74A ^b	4,000	20	7,800	39	95	7,600	38	89	-3
74B	8,640	20	15,000	35	73	17,900	41	107	19
75ACWD	1,460	10	10,200	70	597	9,200	63	529	-10
75CCWD	240	10	2,400	100	896	2,800	115	1,054	15
75DCWD	1,000	10	10,300	103	931	12,000	120	1,101	17
76CWD	1,400	10	8,800	63	527	8,400	60	498	-5
76ACWD	3050	10	15,200	50	398	18,700	61	512	22
76MCWD	510	10	1,800	36	261	3,200	41	525	13
77ACWD	1,020	10	8,400	83	725	9,400	92	824	11
SE-DEZ ^d	460	5	3,100	34	570	2,800	31	518	-9
77BCWD	2,010	10	9,800	49	388	9,200	46	357	-7
77C ^b	2,025	15	4,800	35	136	5,400	40	212	14
77CCWD	1,740	10	7,100	41	306	8,100	46	363	13
77M	3,120	10	6,600	21	112	6,200	20	100	-6
Regional total	107,475		307,500		186	324,100		202	5
Total	699,881		1,220,760		74	1,216,680		74	0

^a Deer/mi² of deer range.

^b Unit had earn-a-buck regulations in 2004, 2006, and/or 2007. Population estimate based on accounting model.

^c SW Disease Eradication Zone includes all of Unit 70A and parts of 7 surrounding deer management units.

^d SE Disease Eradication Zone includes parts of units 77A, 77B, and 77C.

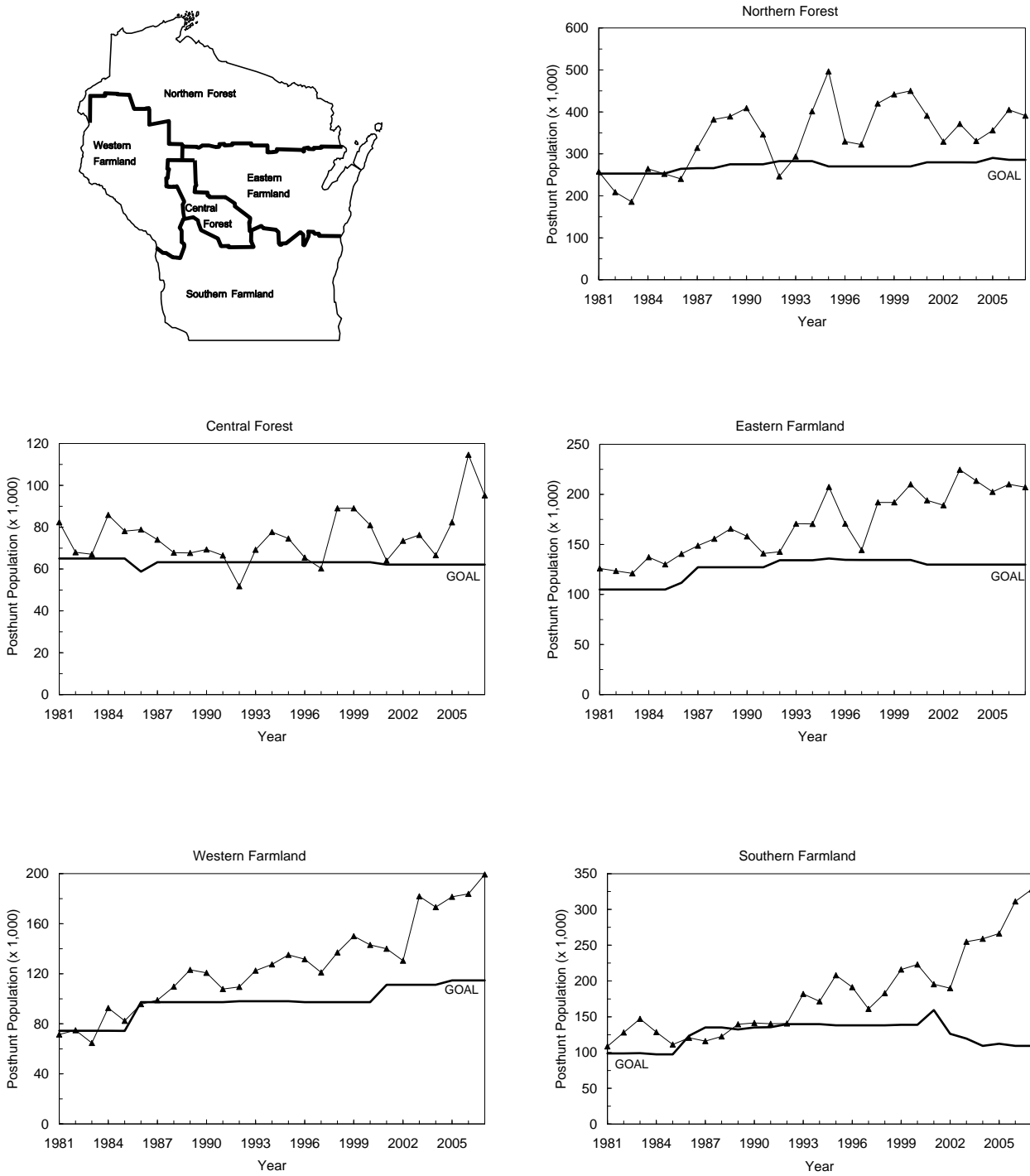


Figure 1. Regional white-tailed deer population trends in Wisconsin, 1981-2007.