

White-tailed Deer Population Status 2008

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Abstract

The statewide posthunt white-tailed deer population estimate for 2008 was approximately 1,000,000. This was 37% above the newly increased statewide goal of approximately 731,500. The 2008 posthunt population estimates were more than 20% below goal in 12 deer management units while in 65 units they were more than 20% above goal. With a harvest of over 139,000 adult bucks and more than 311,000 antlerless deer, the statewide posthunt 2008 population estimate was 18% lower than last year's estimate.

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) 5-year average percentage of yearlings among harvested adult bucks, 3) 5-year 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 2008 for most Wisconsin deer management units. 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 2008 were nearly identical to sales in 2007. The opening day of the firearm season was November 22, the second latest possible opening day under the current season structure. Only a small portion of the northern forest had snow cover for the opening weekend. Temperatures were below average for the opening weekend in much of the state, with below zero temperatures in the north. Snow fell across most of the southern 2/3's of the state on Tuesday and persisted until the second weekend of the season. Corn harvest was

below the 5-year average, with 83% of the harvest complete by mid-November. Heavy rains did not occur prior to or during the gun season; dry and frozen ground made remote access possible. The Deer Committee decided there was insufficient evidence to justify adjustments to buck recovery rates due to hunting season conditions.

Thirty-seven deer management units had earn-a-buck regulations in effect during the 2006, 2007 and/or 2008 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 2008 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 2002-2005 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 Monitoring Zones and fixed-wing transect surveys were conducted in units throughout the CWD Management Zone. Deer per mile indices from fixed-wing transect surveys were converted to estimates of density based on a regression model developed in the Disease Monitoring Zones 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. Beginning in 2006, population estimates for 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.

In 2007, population estimates in the CWD Management Zone were made for 1) the SW-Disease Eradication Zones (DEZ) that included all of deer management unit 70A and portions of 7 surrounding units; 2) the SE-DEZ that included parts of units 77A, 77B, and 77C; and 3) the portions of the remaining units that were in the Herd Reduction Zone (HRZ). Based on recommendations from the CWD stakeholder advisory group, in 2008 the DEZs were combined with the HRZ. Consequently, population estimates in 2008 were made for the entire area of deer management units. Also population goals in the CWD Management Zone were increased in 2008 in response to recommendations from the stakeholder advisory group.

Results

The statewide overwinter population goal for 2008 was increased to approximately 731,500. Estimates of posthunt deer populations during 2008 were made for 118 deer management units (Table 1). Statewide, the 2008 posthunt population estimate was approximately 1,000,000, which was 37% above the posthunt population goal. The estimated statewide population was 18% lower than the 2007 estimate. Unit-specific posthunt population densities in 2008 ranged from 7-103 deer/mi² of deer range and averaged 31 deer/mi² of deer range.

In 2008, 12 units had population estimates that were more than 20% below goal and 17 units had estimates that were 1-20% below goal. Twenty-four units had populations that were between goal and 20% above goal. Population estimates in 20 units were 21-50% above goal

and 45 units had populations that were more than 50% above goal. Population estimates declined 20% or more from 2007 in 59 units and increased 20% or more in 2 units.

The posthunt population estimate for the Northern Forest region was 31% lower in 2008 than in 2007 and was 6% below goal in 2008. The Central Forest population estimate in 2008 was 15% lower than in 2007 and was 30% above goal in 2008. Population estimates for the Eastern Farmland region were 13% lower in 2008 than in 2007 and remained 39% above goal, despite widespread use of earn-a-buck regulations in the region for three consecutive years. In the Western Farmland Region, posthunt population estimates were 16% lower in 2008 than in 2007 but were still 46% above goal. The posthunt population estimate for the Southern Farmland region was 6% lower in 2008 than in 2007 but remain more than 100% above goal .

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, 2007, and 2008 combined with reduced recruitment in 2008 following the winter of 2007-08 appears to be reducing populations in all regions. However, the exact effects of the high antlerless harvests in the farmland regions are difficult to assess due to changes in methods used to estimate population size in these regions and adjustments to inputs of the accounting models.

Discussion

Because annual buck harvest is a key input to the SAK formula, annual variation in buck harvest rates can result in biased estimates of population size. Total buck harvest in the Northern Forest declined 28% from 2007 to 2008 with the greatest decline (31%) occurring during the 9-day gun season. Similarly, total buck harvest declined 13% in the Central Forest (-15% in the gun season). Although the Deer Committee did not believe there was sufficient evidence to warrant an adjustment of buck recovery rates in the SAK calculations, if buck harvest rates were depressed due to the late opening date and/or extreme cold temperatures on the opening weekend, then the 2008 population estimates for northern and central forest deer management units may be biased low. Regional accounting models suggest less steep declines in population size from 2007 to 2008 than are shown by SAK calculations.

Table 1. White-tailed deer posthunt population estimates for Wisconsin deer management units, 2007-2008.

Region & Unit	Population goal		2007 posthunt population			2008 posthunt population			% change from 2007
	Num.	Den. ^a	Num.	Den. ^a	% over goal	Num.	Den. ^a	% over goal	
Northern Forest									
01	3,220	20	5,500	34	71	3,800	24	19	-30
01M	320	10	1,100	36	256	900	28	178	-22
02	11,286	18	21,600	35	92	14,100	23	25	-35
03	8,880	16	13,400	24	51	8,600	15	-3	-36
04	5,235	15	7,800	22	48	4,300	12	-17	-44
06	6,552	12	14,600	27	122	8,900	16	36	-39
07	2,835	15	2,400	13	-15	1,200	7	-56	-49
08	7,400	20	9,500	26	29	8,200	22	10	-14
09	8,760	20	15,100	34	72	10,100	23	15	-33
10	8,625	25	8,600	25	0	10,200	30	19	19
11	6,820	20	10,100	30	48	7,900	23	16	-21
12	4,488	17	7,200	27	59	5,800	22	29	-19
13	10,725	15	13,900	19	29	11,000	15	3	-20
14	4,592	14	7,700	23	68	6,700	20	46	-13
17	3,570	15	5,400	23	50	4,600	19	30	-14
18	7,360	20	14,600	40	99	7,700	21	4	-47
19	8,060	20	12,500	31	55	9,100	23	13	-27
20	6,804	18	10,300	27	51	7,900	21	16	-24
24	5,560	20	9,000	32	62	6,500	24	18	-28
25	8,740	20	18,400	42	111	10,500	24	20	-43
26	7,820	20	10,700	27	37	8,200	21	5	-23
28	9,840	15	13,200	20	34	9,800	15	-1	-26
29A	3,585	15	4,000	17	11	3,800	16	6	-5
29B	2,796	12	2,500	11	-11	1,600	7	-43	-36
30	4,725	15	6,300	20	34	4,600	15	-2	-27
31	8,280	20	12,100	29	46	7,100	17	-14	-41
32	10,227	21	18,100	37	77	7,400	15	-27	-59
34	4,454	17	4,400	17	-2	4,100	16	-7	-5
35	7,080	20	7,900	22	12	5,100	14	-28	-35
36	6,850	25	8,500	31	24	5,600	21	-18	-34
37	5,875	25	8,000	34	36	5,800	25	-1	-27
38	8,580	20	8,800	21	3	5,600	13	-34	-36
39	8,500	20	5,700	13	-33	3,500	8	-59	-38
40	6,560	20	6,200	19	-5	4,500	14	-32	-28
41	4,875	25	5,500	28	12	3,900	20	-19	-28
42	6,540	20	9,200	28	40	5,500	17	-15	-40
43	6,120	15	7,600	19	23	4,700	12	-23	-38
44	7,922	17	9,000	19	13	5,300	11	-33	-40
45	11,860	20	10,900	18	-8	7,200	12	-39	-34
49A	5,875	25	5,100	22	-13	3,300	14	-44	-36
49B	4,550	25	4,600	25	2	4,500	25	-2	-3
50	6,680	20	5,800	17	-13	4,600	14	-32	-22
52	6,080	20	7,500	25	24	5,600	18	-8	-26
78	330	15	680	31	105	480	22	46	-29
Regional total	285,836		390,980		37	269,780		-6	-31

Table 1. Continued.

Region & Unit	Population goal		2007 posthunt population			2008 posthunt population			% change from 2007
	Num.	Den.	Num.	Den.	% over goal	Num.	Den.	% over goal	
Central Forest									
53	11,525	25	20,400	44	77	14,500	32	26	-29
54A	12,100	25	23,000	48	90	20,600	42	70	-11
55	15,775	25	20,700	33	31	19,700	31	25	-5
56	10,050	30	12,400	37	23	8,800	26	-13	-29
58	12,650	25	18,600	37	47	17,200	34	36	-7
Regional total	62,100		95,100		53	80,800		30	-15
Eastern Farmland									
27 ^b	4,960	20	6,900	28	40	6,500	26	30	-7
33	5,520	20	8,000	29	45	4,400	16	-20	-45
46 ^b	8,025	25	9,900	31	24	8,500	26	5	-15
47 ^b	6,725	25	9,000	34	34	9,600	36	43	7
51A ^b	5,500	25	7,400	34	34	7,500	34	36	1
51B ^b	9,725	25	12,900	33	32	13,500	35	39	5
57	3,212	22	5,100	35	59	3,300	22	2	-36
57A	5,950	25	9,200	38	54	5,300	22	-10	-42
57B ^b	6,300	25	8,700	35	38	7,000	28	11	-20
57C	7,980	30	11,600	44	45	7,200	27	-10	-38
62A ^b	10,050	25	13,400	33	33	12,000	30	19	-10
62B ^b	9,075	25	20,300	56	123	20,000	55	120	-2
63A ^b	8,475	25	13,600	40	60	11,800	35	39	-13
63B ^b	6,300	25	8,900	35	41	9,400	37	50	6
64 ^b	4,860	20	11,600	48	139	10,200	42	110	-12
64M ^b	810	10	3,000	37	270	2,000	25	151	-32
65A	5,160	30	6,800	40	32	4,500	26	-13	-34
65B ^b	10,410	30	15,800	46	52	14,500	42	39	-9
66	4,300	25	10,700	62	148	9,900	57	130	-7
80A ^b	2,280	15	5,300	35	132	4,400	29	95	-16
80B ^b	3,880	20	7,700	40	99	7,400	38	91	-4
81 ^b	270	15	1,400	80	432	1,700	96	540	20
Regional total	129,767		207,200		60	180,600		39	-13
Western Farmland									
15	9,108	22	14,600	35	60	9,500	23	4	-35
16	8,375	25	13,000	39	55	9,200	27	10	-29
21	5,625	25	8,500	38	50	5,700	25	1	-33
22	6,980	20	9,900	28	41	7,800	22	11	-21
22A ^b	7,060	20	9,400	27	33	8,900	25	25	-6
23	8,060	20	14,300	35	77	11,900	30	48	-16
59A	10,400	20	14,700	28	41	11,500	22	11	-22
59B ^b	10,305	15	14,600	21	42	13,000	19	26	-11
59C ^b	15,650	25	34,900	56	123	32,200	52	106	-8
59D ^b	7,680	20	14,300	37	87	13,400	35	75	-6
59M ^b	440	10	1,700	40	295	1,700	38	282	-3
60A ^b	3,400	20	4,900	29	44	4,600	27	35	-7
60B ^b	1,660	20	3,400	41	106	3,000	38	81	-9
60M ^b	800	10	2,700	34	237	2,400	30	201	-11
61 ^b	19,160	20	38,400	40	101	32,500	34	69	-16
Regional total	114,703		199,300		74	167,300		46	-16

Table 1. Continued.

Region & Unit	Population goal		2007 posthunt population			2008 posthunt population			% change from 2007
	Num.	Den.	Num.	Den.	% over goal	Num.	Den.	% over goal	
Southern Farmland									
54B ^b	4,650	25	8,400	45	80	7,600	41	64	-9
54BCWD ^c	4060	20	6,900	34	239	6,800	34	69	-1
54C ^b	2,375	25	3,900	41	65	3,900	41	65	0
67A ^b	8,850	25	16,800	47	90	14,600	41	65	-13
67B ^b	4,700	25	7,900	42	68	7,100	38	52	-10
68A ^b	3,900	30	11,200	86	187	10,400	80	168	-7
68B ^b	5,490	30	7,100	39	28	6,300	34	15	-11
69	9,775	25	13,500	34	38	10,400	27	6	-23
70CWD ^{cd}	5,460	20	9,600	48	379	10,400	38	91	-20
SW-DEZ ^e			29,800	40	700				
70ACWD ^c	4,380	20				7,500	34	72	-14
70BCWD ^{cd}	5,090	24	6,600	34	239	8,600	40	68	19
70ECWD ^c	1,660	24	3,600	52	422	3,100	46	90	-13
70GCWD ^c	2,930	24	6,700	55	447	7,900	65	169	18
71CWD ^c	12,520	20	25,300	40	304	33,400	53	167	32
72 ^b	10,080	20	19,000	38	89	16,800	33	66	-12
73B ^b	3,700	20	8,500	46	130	7,600	41	106	-10
73BCWD ^c	860	16	3,100	57	465	3,000	55	246	-2
73D ^b	3,160	20	6,800	43	117	6,800	43	115	-1
73ECWD ^{cd}	4,990	18	8,500	50	395	10,600	38	113	-22
74A ^b	4,000	20	7,600	38	89	6,500	33	63	-13
74B ^b	8,640	20	17,900	41	107	15,600	36	81	-13
75ACWD ^{cd}	2,340	16	9,200	63	529	6,300	43	169	-32
75CCWD ^{cd}	1,980	16	2,800	115	1,054	8,800	71	346	-38
75DCWD ^{cd}	1,790	16	12,000	120	1,101	11,500	103	543	-14
76CWD ^{cd}	5,120	16	8,400	60	498	14,300	45	180	-25
76ACWD ^c	6,100	20	18,700	61	512	14,500	47	137	-23
76MCWD ^{cd}	780	10	3,200	41	525	2,000	25	152	-38
77ACWD ^{cd}	1,980	16	9,400	92	824	8,700	70	340	-24
SE-DEZ ^f			2,800	31	518				
77BCWD ^{cd}	3240	15	9,200	46	357	11,100	51	242	12
77C ^b	2,025	15	5,400	40	212	5,900	44	191	8
77CCWD ^{cd}	2,810	15	8,100	46	363	7,600	41	172	-12
77M	3,120	10	6,200	20	100	6,000	19	91	-4
Regional total	139,095		324,100		202	301,600		117	-6
Total	731,501		1,216,680		74	1,000,080		37	-18

^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 Population goals for CWD units were revised in 2008 based on recommendations from CWD stakeholder advisory group.

^d 2007 population estimate pertains to the Herd Reduction Zone portion of the unit, 2008 estimate is for entire the unit.

^e SW Disease Eradication Zone included all of Unit 70A and parts of 7 surrounding deer management units. DEZ was dissolved in 2008.

^f SE Disease Eradication Zone includes parts of units 77A, 77B, and 77C. DEZ was dissolved in 2008.

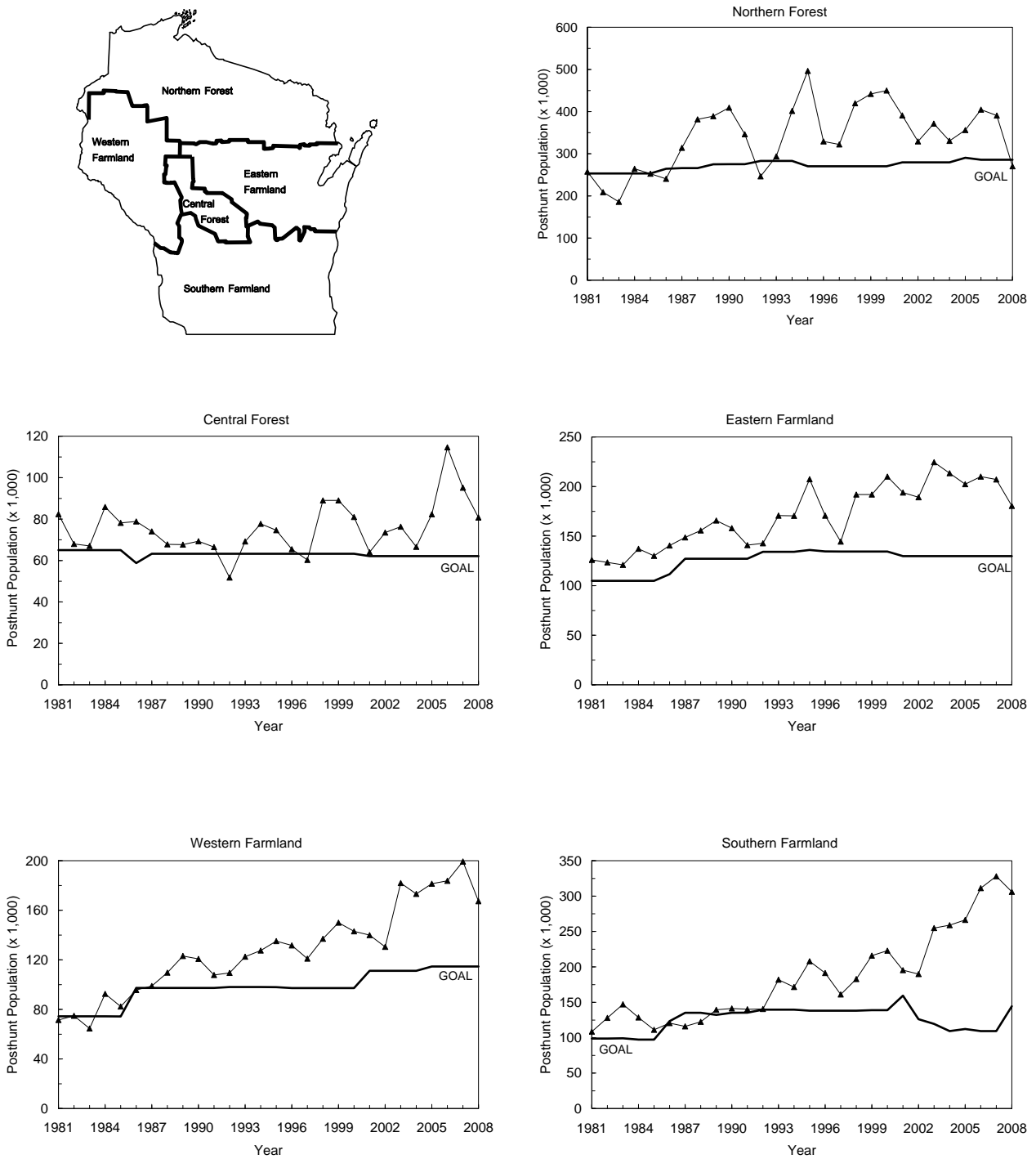


Figure 1. Regional white-tailed deer population trends in Wisconsin, 1981-2008.