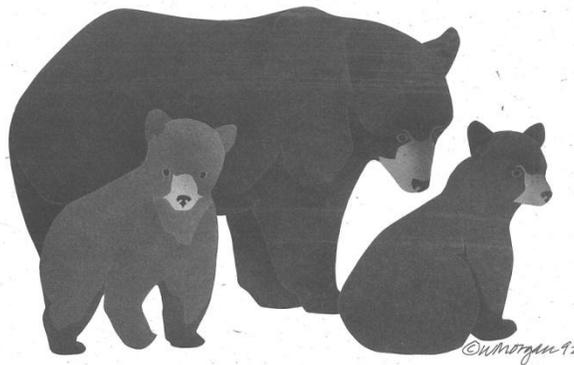


# **STATUS OF MINNESOTA BLACK BEARS, 2013**

## **Final Report to Bear Committee**

March 13, 2014

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*All data contained herein are subject to revision,  
due to updated information, improved analysis  
techniques, and/or regrouping of data for analysis.*

## Key points

<p>Table 1 &amp; Fig. 1</p>	<p><b>Overview: Permits, licenses, harvest, and success rates</b></p> <p>Permit applications for bear licenses seem to have stabilized at a higher level during 2010-2013 than before that, when permit availability was higher. The reduced permit availability seems to have driven up sales of no-quota licenses, which were the highest on record in 2012 and second highest in 2013. The estimated number of hunters in the field (6,300) was the lowest since 1989, and the total harvest (1,866) was the lowest since 1988. Statewide success rate was the same as last year (30%), but quota area success rate (37%) was the highest since the very poor food year of 1995. High success rate in the quota zone is related in part to reduced numbers of hunters (i.e., competition).</p>
<p>Tables 2,3 &amp; Fig. 2</p>	<p><b>Quota zone permits and licenses</b></p> <p>The number of available quota zone permits was reduced 38% from 2012 to 2013; this reduction was distributed fairly uniformly across Bear Management Units (BMUs). This followed a reduction of 15% from 2011 to 2012. These reductions were aimed at increasing the bear population in the quota zone. This was the third year of a system whereby all available licenses for the quota zone were sold (those not purchased by permittees selected in the lottery were purchased later as surplus).</p>
<p>Table 4</p>	<p><b>Quota zone lottery</b></p> <p>As permit allocations have been reduced, the percentage of 1<sup>st</sup>-year applicants drawn in the lottery diminished. In 2009, some 1<sup>st</sup>-year applicants (preference level 1) were drawn in all BMUs. In 2013, 1<sup>st</sup>-year applicants were drawn only in BMU 22 (BWCAW). Less than 50% of 2<sup>nd</sup>-year applicants were drawn in all but 2 BMUs, and no 2<sup>nd</sup>-year applicants were drawn in 2 BMUs (44 and 45).</p>
<p>Table 5 &amp; Fig. 3</p>	<p><b>Harvest by BMU</b></p> <p>The statewide harvest and harvest for the quota zone were the lowest since 1988. Three BMUs (12, 24, 26) had record low harvests. BMU 11 had the lowest harvest since 2006, but the no-quota zone as a whole had a fairly normal harvest. The percent of the total statewide harvest contained within the no-quota zone has sharply increased with reduction of quota zone permits, reaching a record this year (26%).</p>

Table 6	<p><b><i>Hunting success by BMU</i></b></p> <p>Hunting success was the highest since the early-mid 1990s in the quota zone as a whole, and in 4 quota zone BMUs; one additional BMU (51) had the highest success since it was established by splitting the quota and no-quota zones in 1987. These high success rates are likely a reflection of low hunter density (and possibly more hunter effort, given the decreased opportunity to be drawn for a permit). For the first time hunter numbers could be estimated for the individual BMUs in the no-quota zone, based on where hunters indicated they planned to hunt when they purchased their license. This enabled a derivation of hunting success for BMUs 10, 11, and 52. This system, though, needs improvement as many no-quota hunters selected portions of the quota zone.</p>
Table 7	<p><b><i>Harvest by date</i></b></p> <p>During years of normal fall food abundance, about 70% of the harvest occurs during the 1<sup>st</sup> week of the bear season, and ~83% occurs by the end of the 2<sup>nd</sup> week. This year (2013), harvesting was delayed: only 61% in the first week and 76% after the 2<sup>nd</sup> week.</p>
Tables 8–9 & Fig. 4	<p><b><i>Nuisance complaints and kills</i></b></p> <p>The number of wildlife and enforcement personnel submitting bear nuisance tally forms each month was higher than normal, but the total number of registered complaints (623) was about average (mean = 586) since the institution of the nuisance bear policy took effect in 2000. Also, as typical, only 25 bears were known killed as nuisances, 3 were translocated, and 32 killed in vehicle collisions.</p>
Tables 10-12 & Fig. 5	<p><b><i>Food abundance</i></b></p> <p>The abundance of wild bear foods in 2013 was the highest in 15 years (since the summer of 1998). This was in sharp contrast to 2012, when bear foods were the scarcest they had been since the catastrophic food failure of 1995. Statewide food survey results show that it is typical for fruiting to be better than average the year after food failures, as witnessed in 1985/1986, 1990/1991, 1995/1996, and now 2012/2013. High bear food indices this year were primarily due to abundant summer berries particularly across the northern tier of survey areas. In contrast to summer foods, productivity of key fall foods (hazel, oak, and dogwood — those that affect hunting success) were average or a bit above average across most of the bear range in 2013.</p>

Fig. 6	<p><b><i>Predictions of harvest from food abundance</i></b></p> <p>A combination of fall food abundance and number of hunters accounts for 84% of the yearly variation in the bear harvest since 1984. Predictions of the number of bears killed by hunters, based solely on these 2 factors, have been more accurate since 2000 (<math>R^2 = 0.95</math>). Since then, actual bear harvest has only once differed from predicted harvest by &gt;10%.</p>
Fig. 7	<p><b><i>Yearly variability in food abundance</i></b></p> <p>Following a 15-year period of relative abundance and stability, bear food production exhibited a wider swing in 2012 and 2013 than observed since 1996. Back-to-back years of poor foods followed by abundant foods often result in a partial synchronization of reproduction among female bears, resulting in alternating years of small and large cohorts being born for the next several years: 2014 reproduction is likely to reflect the excellent 2013 summer food crop.</p>
Fig. 8	<p><b><i>Harvest sex ratios</i></b></p> <p>Sex ratios of harvested bears reflect both the sex ratio of the living population (which varies with harvest pressure) as well as the relative vulnerability of the sexes to hunters (which varies with natural food conditions and hunter density). In 2013, 3 BMUs had record high (or tied with record high) sex ratios (%M)(BMUs 13, 25, 26), as did the state as a whole (62%). However, no BMU showed a consistent trend in sex ratios (BMU 26 shows a generally increasing trend from 2007 to 2013, but not so going back before that).</p>
Fig. 9–11	<p><b><i>Harvest ages</i></b></p> <p>Statewide, ages of harvested females declined dramatically during the past 3 decades, as evidenced by a declining median age and increasing proportion of the harvest composed of 1–2 year-olds. Median age of harvested females was 2.8 years old in 2013, with signs that this downward trend is leveling off. Median ages of harvested males has remained at about 2 years old for the past 20 years. Variation in female median ages within individual BMUs is too great to discern short-term trends. The low, male-skewed harvest this year resulted in smaller sample sizes of female ages per BMU, and hence more erratic median ages. Notably, though, BMU 11 (no quota) has less erratic female median ages through time than adjacent BMU 12, and BMU 52 (no quota) has similar female median ages as adjacent BMU 51.</p>

<p>Fig. 12 &amp; 13</p>	<p><b><i>Submission of bear teeth for aging</i></b></p> <p>Ages of harvested bears are now used as the principal means of monitoring population trends. Although hunters are required to submit a tooth from their harvested bear, &gt;25% do not comply, and this missing sample, if somewhat different in age composition than the submitted teeth, may affect the resulting analyses. This year, for the first time, hunters could register their bear either by phone or internet, but if they did so, they were required to complete their registration by obtaining a tooth envelope at a registration station. These hunters, though, had poorer compliance with tooth submission than hunters who registered their bear and received a tooth envelope at the registration station in one step. Compliance in tooth submission also varied considerably among BMUs. Compliance was notably poor in the no-quota zone.</p>
<p>Fig. 14</p>	<p><b><i>Population trend</i></b></p> <p>Ages of harvested bears accumulated since 1980 were used to reconstruct minimum statewide population sizes through time (i.e., the size of the population that eventually died due to hunting). This was scaled upwards (to include bears that died of other causes), using tetracycline mark–recapture estimates as a guide. Whereas both the tetracycline-based and reconstructed populations showed an increase during the 1990s, followed by a decline during the 2000s, the shapes of the 2 trajectories differed somewhat (the reconstructed population curves were less steep). Therefore, it was not possible to exactly match the curve from the reconstruction to all 4 tet-based estimates, so a group of curves were scaled to differing degrees to intersect different sets of tet-estimates. Both the tetracycline and age-reconstructed estimates showed a population decline of ~30% from 2001 to 2008. A light harvest in 2008 enabled the population to grow slightly, but it declined again after heavier harvests in 2009, 2010, and 2012. It appears that the light harvest of 2013 enabled the population to increase slightly. This conclusion remains tentative, however, as population estimates for the most recent 3 years are not directly obtained from population reconstruction, but may be derived from relationships between harvest and prior reconstructed population estimates.</p>

**Table 1.** Bear permits, licenses, hunters, harvests, and success rates, 1993–2013.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Permit applications	27365	30127	29922	30405	27353	30245	29384	29275	26824	21886	16431	16466	16153	15725	16345	17362 <sup>a</sup>	17571 <sup>a</sup>	18647 <sup>a</sup>	19184 <sup>a</sup>	18103 <sup>a</sup>	18107 <sup>a</sup>
Permits available	8630	9400	11950	12030	11370	18210	20840	20710	20710	20610	20110	16450	15950	14850	13200	11850	10000	9500	7050 <sup>b</sup>	6000	3750
Licenses purchased (total)	9224	9826	12448	12414	11440	16737	18355	19304	16510	14639	14409	13669	13199	13164	11936	10404	9892	9689	9555	8986	6589
Quota area <sup>c</sup>	7528	8125	10304	10592	9655	14941	16563	17021	13632	12350	9833	10063	9340	9169	8905	7842	7342	7086	5684	4951	3188
Quota surplus/military <sup>c</sup>									235	209	2554	1356	1591	1561	526	233	77	83	1385	1070	578
No-quota area <sup>c</sup>	1696	1701	2144	1822	1785	1796	1792	2283	2643	2080	2022	2238	2268	2434	2505	2329	2473	2520	2486	2965 <sup>h</sup>	2823
% Licenses bought																					
Of permits available <sup>d</sup>	87.2	86.4	86.2	88.0	84.9	82.0	79.5	82.2	67.0	60.9	61.6	69.4	68.5	72.3	71.4	67.7	73.4	74.6	100	100	100
Of permits issued <sup>d</sup>						84.4	87.2	83.9	69.8	66.3	65.7	68.3	67.1	68.9	70.0	67.2	73.8	74.5	80.7	82.7	85.0
Estimated no. hunters <sup>e</sup>	8600	9100	11600	11500	10300	14500	15900	16800	15500	13800	13600	12900	12500	12500	11300	9900	9400	9200	9100	8600	6300
Harvest	3003	2329	4956	1874	3212	4110	3620	3898	4936	1915	3598	3391	3340	3290	3172	2135	2801	2699	2131	2604	1866
Harvest sex ratio (%M) <sup>f</sup>	56	62	47	62	55	55	53	58	56	61	58	57	59	58	57	62	59	59	61	59	62
Success rate (%)																					
Total harvest/hunters <sup>g</sup>	35	26	43	16	31	28	23	23	29	14	26	26	26	26	28	21	30	29	23	30	30
Quota harvest/licenses	34	26	42	15	29	25	20	20	28	14	25	26	25	25	28	21	30	30	24	33	37

<sup>a</sup> Includes area 99, a designation to increase preference but not to obtain a license (2008 = 528, 2009 = 835; 2010 = 1194; 2011 = 1626; 2012 = 1907; 2013 = 2129).

<sup>b</sup> Permits reduced because of a new procedure in 2011 that ensures that all available licenses are purchased (see Table 2).

<sup>c</sup> Quota area established in 1982. No-quota area established in 1987. Surplus licenses from undersubscribed quota areas sold beginning in 2000; originally open only to unsuccessful permit applicants, but beginning in 2003, open to all. In 2011, surplus licenses offered for all lottery licenses not purchased by July 31. Free licenses for 10 and 11 year-olds were available beginning 2009 (2009 = 45; 2010 = 86; 2011 = 72; 2012 = 67; 2013 = 85 [including surplus youth]).

<sup>d</sup> Quota licenses bought (including surplus)/permits available, or licenses bought (prior to surplus)/permits issued. Beginning in 2008, some permits were issued for area 99; these are no-hunt permits, just to increase preference, and are not included in this calculation. In 2011-13, all unpurchased licenses were put up for sale, and all were bought.

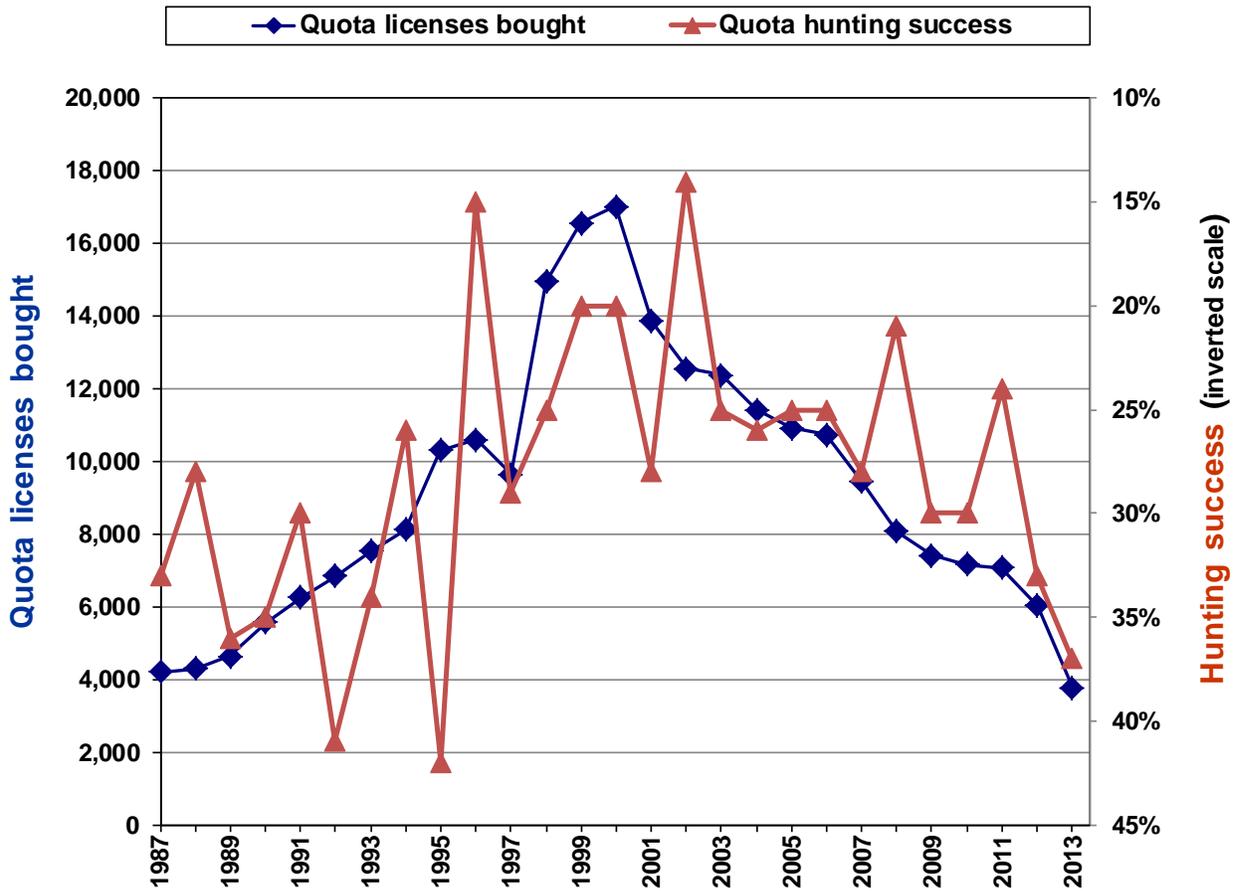
<sup>e</sup> Number of licensed hunters x percent of license-holders hunting. Percent hunting is based on data from bear hunter surveys conducted during 1981–91, 1998 (86.8%), 2001(93.9%) and 2009 (95.3%). The estimated no. of hunters in 2011-13 may be under-estimated because a large no. of people bought surplus licenses 1 month before the season, so they were more apt to hunt.

<sup>f</sup> Sex ratio as reported by hunters; hunters classify about 10% of female bears as males, so the actual harvest has a lower %M than shown here. In good food years, the harvest is more male-biased.

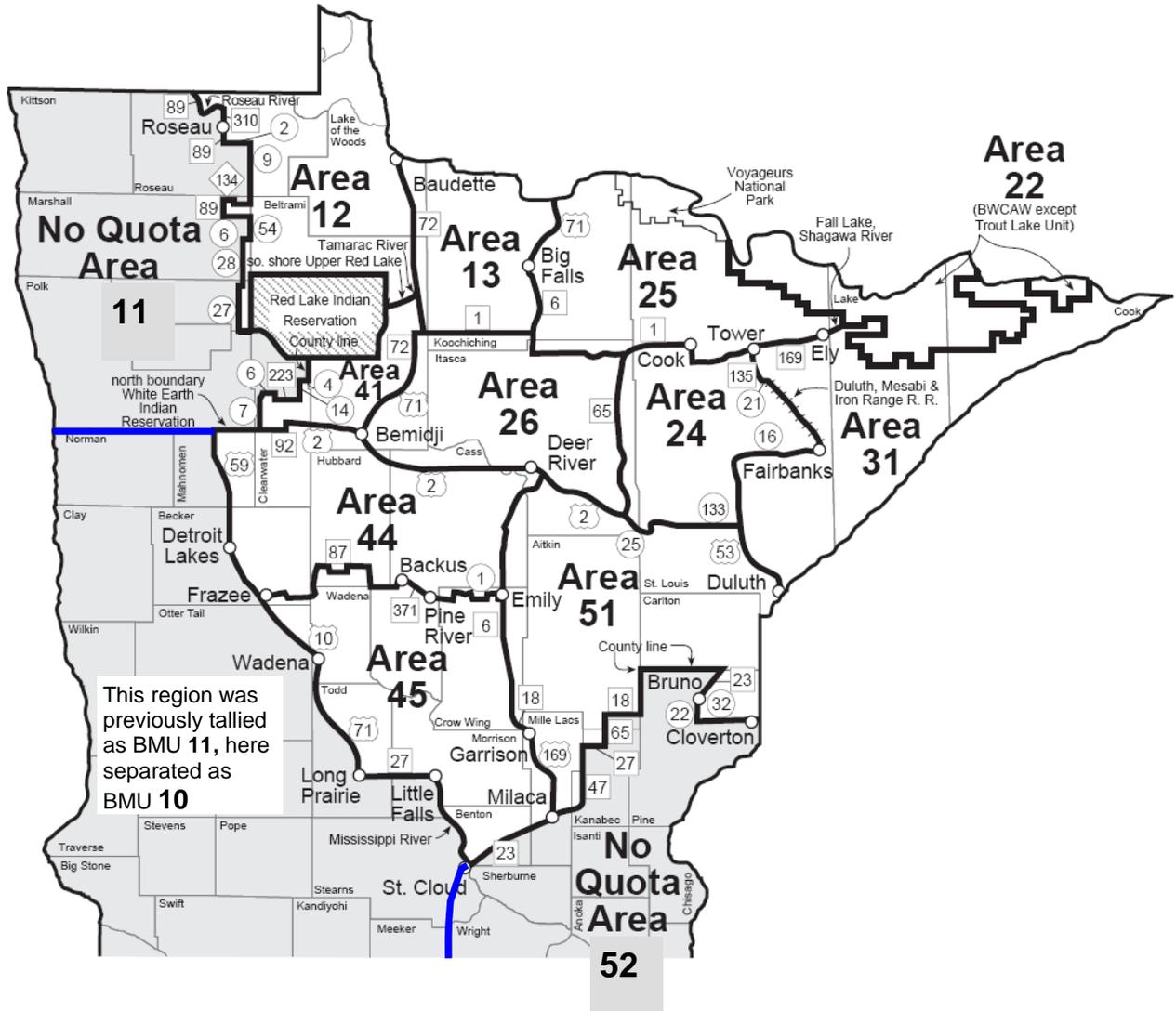
<sup>g</sup> Success rates in 2001–2012 were calculated as number of successful hunters/total hunters, rather than bears killed/total hunters, because no-quota hunters could take 2 bears. In 2013, hunters could take 2 bears only if they bought 2 licenses (1 quota + 1 no-quota): of 30 people who bought 2 licenses, only 2 killed 2 bears.

<sup>h</sup> Record high number of no-quota area licenses purchased.

**Fig. 1.** Relationship between licenses sold and hunting success (note inverted scale) in quota zone, 1987–2013 (non-quota zone first partitioned out in 1987). Number of licenses explains 35% of variation in hunting success during this period ( $P = 0.0001$ ). Large variation in hunting success is also attributable to food conditions.



**Fig. 2.** Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU, whereas no-quota hunters can hunt anywhere within that zone. BMU 10 is renamed this year (previously grouped with BMU 11, then separated as BMU 11b), in preparation for possibly making BMU 11 a quota area.



**Table 2.** Number of bear hunting quota area permits available, 2009–2013 (aligned with permit applications in Table 3 below; highlighted values show drop from previous year).

BMU	2013	2012	2011		2010	2009
			After reduct. <sup>a</sup>	Before reduct.		
12	200	300	350	450	450	450
13	250	400	450	600	600	600
22	50	100	100	125	100	150
24	200	300	350	500	550	650
25	500	850	900	1200	1200	1250
26	350	550	650	900	900	1000
31	550	900	1000	1300	1300	1300
41	150	250	300	400	400	400
44	450	700	850	1100	1100	1100
45	150	200	250	400	400	600
51	900	1450	1850	2500	2500	2500
<b>Total</b>	3750	6000	7050	9475	9500	10000

<sup>a</sup> Beginning in 2011, all licenses not purchased by permittees were sold (Table 3). In order not to increase the number of hunters, 2011 permit allocations were reduced by the mean percentage of licenses that were purchased in each BMU in 2009–2010. The table shows the permit allocation before and after this reduction. In 2012 and 2013, permits were allocated based on this new procedure.

**Table 3.** Number of quota BMU permit applicants and surplus licenses bought, 2009–2013<sup>a</sup>. Shaded values indicate undersubscribed areas (applications < permits available).

BMU	2013			2012			2011 <sup>b</sup>			2010		2009	
	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Surplus	Apps	Surplus
12	707	160	44	813	244	60	834	267	84	903	5 <sup>c</sup>	876	
13	664	213	37	719	325	76	751	366	84	753		700	
22	55	36	14	83	56	43	90	71	31	114		91	0 <sup>d</sup>
24	763	170	30	888	253	47	918	294	56	971		843	
25	1575	432	69	1625	713	137	1763	712	190	1811	5 <sup>c</sup>	1694	
26	1695	303	47	1666	458	92	1894	512	139	1959		1874	
31	2261	478	72	2406	758	146	2505	826	174	2414		2423	
41	575	135	15	592	208	42	688	253	47	718		685	
44	2682	386	65	2619	612	88	3010	697	154	2923		2787	
45	1205	141	9	1135	170	30	1019	208	42	937		941	
51	3796	734	166	3650	1154	296	4086	1478	372	3950	1 <sup>c</sup>	3822	
<b>Total<sup>e</sup></b>	15978	3188	568	16196	4951	1057	17558	5684	1373	17453		16736	

<sup>a</sup> Surplus licenses available beginning in 2001. This was discontinued in 2009 and replaced by 2<sup>nd</sup> choice lottery applicants.

<sup>b</sup> In 2011-13, all licenses not purchased by permittees were sold as “surplus”. Surplus = Permits available (Table 2) minus Bought license (±4 to account for groups applying together).

<sup>c</sup> Courtesy licenses issued by Commissioner, not actual surplus.

<sup>d</sup> No 2<sup>nd</sup> choice applicants bought a license for BMU 22, so it remained undersubscribed.

<sup>e</sup> Beginning in 2008, applicants could apply for area 99 in order to increase future preference, but not buy a license; these are not included in this total.

**Table 4.** Percentage of quota BMU lottery applicants with preference level 1 (1<sup>st</sup>-year applicants) who were drawn for a bear permit, 2009–2013. All preference level 2 applicants were drawn, except where 0 preference level 1 applicants were drawn, in which case the success of preference level 2 lottery applicants is also shown.

BMU	2013		2012		2011		2010		2009
	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1
12	0	49	0	80	2		23		29
13	4		33		51		77		84
22	89		100		100		88		100
24	0	41	0	75	14		49		75
25	0	81	28		35		60		72
26	0	7	0	49	0	77	15		32
31	0	45	0	84	11		35		43
41	0	43	0	86	6		31		37
44	0	0 <sup>a</sup>	0	28	0	55	0	90	3
45	0	0 <sup>a</sup>	0	29	0	67	24		61
51	0	53	1		25		52		58

<sup>a</sup> No preference level 2 applicants were drawn, and only a portion of level 3 applicants were drawn (BMU 44 = 68%; BMU 45 = 75%).

**Table 5.** Minnesota bear harvest tally<sup>a</sup> for 2013 by Bear Management Unit (BMU) and sex compared to harvests during 2008–2012 and record high and low harvests (since establishment of each BMU).

BMU	2013			2012	2011	2010	2009	2008	5-year mean	Record low harvest (yr)	Record high harvest (yr)	
	M (%M)	F	Total									
<b>Quota</b>												
12	45 (73)	17	62 <sup>d</sup>	82	106	95	140	101	105	63 (87)	263 (01)	
13	73 (77) <sup>m</sup>	22	95 <sup>e</sup>	112	119	155	149	129	133	71 (88)	258 (95)	
22	3 (33)	6	9	8	11	9	7	7	8	3 (03)	41 (89)	
24	55 (72)	21	76 <sup>f</sup>	108	122	124	151	100	121	93 (96)	288 (95)	
25	126 (64) <sup>n</sup>	71	197 <sup>g</sup>	254	317	307	344	298	304	149 (96)	584 (01)	
26	80 (66) <sup>n</sup>	41	121 <sup>h</sup>	238	167	232	228	137	200	131 (96)	513 (95)	
31	117 (59)	80	197 <sup>g</sup>	363	358	363	384	248	343	157 (88)	697 (01)	
41	21 (53)	19	40 <sup>g</sup>	70	54	71	104	77	75	38 (96)	201 (01)	
44	115 (64)	66	181	188	130	248	255	196	203	130 (11)	643 (95)	
45	26 (54)	22	48	67	32	58	42	72	54	32 (11)	178 (01)	
51	206 (59)	143	349	471	288	501	416	344	404	247 (91)	895 (01)	
Total	867 (63)	508	1375 <sup>i</sup>	1961	1704	2163	2220	1709	1951	1192 (88)	4288 (01)	
<b>No Quota<sup>b</sup></b>												
11	84 (62)	52	136 <sup>j</sup>	224	219	178	315	172	222	38 (87)	351 (05)	
10 <sup>c</sup>	7 (78)	2	9	14	3	11	9	3	8			
52	204 (59)	142	346	405 <sup>k</sup>	205	347	257	251	293	105 (02)	405 (12)	
Total	295 (60)	196	491	643	427	536	581	426	523	198 (87)	678 (95)	
<b>State</b>	1162 (62) <sup>n</sup>	704	1866 <sup>i</sup>	2604	2131	2699	2801	2135	2474		4956 (95)	

<sup>a</sup> Hunters receive tooth envelopes at registration stations, but the sex recorded on tooth envelopes may differ from the registered sex:

2011: 1450 [97%] unchanged, 12 M<sub>(reg)</sub>→F<sub>(tooth)</sub>, 38 F→M

2012: 1821 [98%] unchanged, 15 M<sub>(reg)</sub>→F<sub>(tooth)</sub>, 28 F→M

2013: 1338 [97%] unchanged, 13 M<sub>(reg)</sub>→F<sub>(tooth)</sub>, 23 F→M.

Sex shown on table is the registered sex because only ~70% of tooth envelopes are submitted (2011: 72%; 2012: 73%; 2013: 75%).

Also, some tooth envelopes had no corresponding registration data. These were added to the harvest tally. The number of missing registrations was greatly reduced in 2011–2013.

Year	Quota area	No-quota area
2008	23	4
2009	19	14
2010	20	8
2011	11	2
2012	6	1
2013	5	1

<sup>b</sup> Some hunters with no-quota licenses hunted in the quota area, and their kills were assigned to the BMU where they apparently hunted:

2008: 14; 2009: 3; 2010: 14; 2011: 14; 2012: 8; 2013: 11.

Some quota area hunters also apparently hunted in the wrong BMU, based on the block where they said they killed a bear, but these were recorded in the BMU where they were assigned, not the BMU of the indicated harvest block, presuming most were misreported kill locations.

<sup>c</sup> Previously called BMU 11b.

<sup>d</sup> Record low harvest since this area was established in 1987.

<sup>e</sup> Lowest harvest since 1991.

<sup>f</sup> Record low harvest since this area was established in 1989.

<sup>g</sup> Lowest harvest since 1996.

<sup>h</sup> Record low harvest since this area was established in 1991.

<sup>i</sup> Lowest since 1988 (quota—no-quota split in 1987).

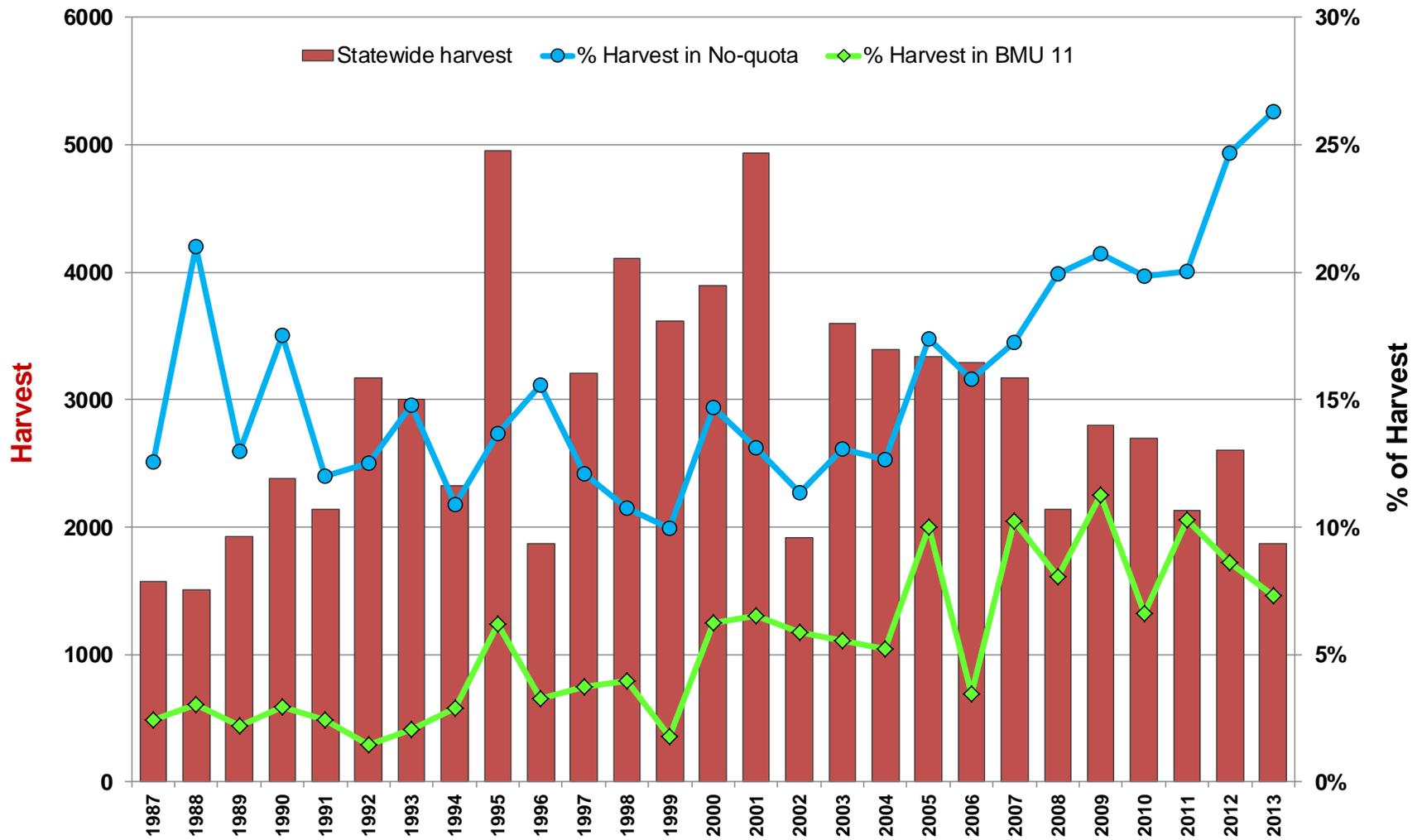
<sup>j</sup> Lowest harvest since 2006.

<sup>k</sup> Record high harvest.

<sup>m</sup> Record high %males.

<sup>n</sup> Ties record high %males (since quota—no-quota split).

**Fig. 3.** Trends in statewide bear harvest and proportions of harvest in the no-quota zones, 1987–2013.



**Table 6.** Bear hunting success (%) by BMU, measured as the registered harvest (excluding second bear) divided by the number of licenses sold<sup>a</sup>, 2008–2013.

BMU	Max success (yr) (excl 2013)	Mean success 2008-2012	2013	2012	2011	2010	2009	2008
12	49 (95)	32	30	27	30	30	39	32
13	59 (95)	30	38 <sup>d</sup>	28	26	34 <sup>c</sup>	32	28
22	21 (92)	11	18 <sup>e</sup>	8	11	14	16 <sup>c</sup>	8
24	45 (92)	30	38 <sup>e</sup>	36 <sup>e</sup>	35 <sup>e</sup>	29	31 <sup>d</sup>	20
25	47 (92)	33	39 <sup>d</sup>	30	35	34	36	28 <sup>f</sup>
26	59 (95)	30	34	43 <sup>d</sup>	26	34	31	17 <sup>f</sup>
31	55 (92)	34	36	40 <sup>d</sup>	36	36	38 <sup>c</sup>	21 <sup>f</sup>
41	50 (95)	27	26	28	18	25	34	27
44	43 (95)	24	40 <sup>d</sup>	27	15 <sup>f</sup>	28	30	21
45	24 (95)	18	32	33 <sup>b</sup>	13	21 <sup>d</sup>	11 <sup>f</sup>	11 <sup>f</sup>
51	37 (95)	23	39 <sup>g</sup>	32 <sup>d</sup>	16 <sup>f</sup>	27	23	19
<b>Quota</b>	42 (95)	28	37 <sup>d</sup>	33 <sup>d</sup>	24	30	30	21
11 <sup>h</sup>			15					
10 <sup>h</sup>			12					
52 <sup>h</sup>			19					
<b>No Quota</b>	32 (95)	19	17	20	15 <sup>f</sup>	20	22	17 <sup>f</sup>
<b>Statewide</b>	40 (95)	25	28	28	22	27	28 <sup>c</sup>	20

<sup>a</sup> Harvest/licenses instead of harvest/hunters because BMU-year-specific estimates for the proportion of license-holders that hunted are unreliable. No-quota hunters could take 2 bears during 2008-2012, so their success was calculated by whether or not they shot at least 1 bear. No-quota hunters could take only 1 bear in 2013. Statewide estimates of harvest/hunters are presented in Table 1.

<sup>b</sup> Highest success since establishment of this BMU in 1994

<sup>c</sup> Highest success since 1997 (until this year).

<sup>d</sup> Highest success since 1995 (until this year).

<sup>e</sup> Highest success since 1992 (until this year)

<sup>f</sup> Lowest success since 2002 (until this year).

<sup>g</sup> Highest success since establishment of this BMU in 1987.

<sup>h</sup> For the first time, in 2013, an attempt was made to differentiate the number of no-quota hunters by BMU. When no-quota hunters bought licenses, they recorded the deer block where they anticipated hunting. Those who selected blocks in or adjacent to BMUs 10 (3%), 11 (30%), or 52 (63%) were categorized as such; those hunters who selected blocks in the quota zone (127= 4%) were distributed in no-quota zones proportional to those who selected blocks in the no-quota zone (note: 5 of them harvested a bear in the no-quota zone, 4 harvested a bear in the quota zone, 1 harvested a bear in the quota zone with a quota zone license, and the remainder were unsuccessful); 10 hunters chose blocks in SE Minnesota, 9 of whom lived in the area, but none harvested a bear.

**Table 7.** Cumulative bear harvest (% of total harvest) by date, 1992–2013.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
1993	Wed		67	80	94
1994	Thu		67	78	92
1995	Fri		72	87	97
1996	Sun		56 <sup>a</sup>	70	87
1997	Mon		76	88	97
1998	Tue		76	87	96
1999	Wed		69	81	95
2000	Wed	57	72	82	96
2001	Wed	67	82	88	98
2002	Sun		57 <sup>a</sup>	69	90
2003	Mon		72	84	96
2004	Wed		68	82	95
2005	Thu		72	81	94
2006	Fri		69	83	96
2007	Sat		69	82	96
2008	Mon		58 <sup>a</sup>	71	92
2009	Tue		74	86	96
2010	Wed		69	84	96
2011	Thu		65	78	93
2012	Sat		68	83	96
2013	Sun		61	76	94

<sup>a</sup> The low proportion of total harvest taken during the opening week (<60%) reflects a high abundance of natural foods.

**Table 8.** Number of people participating in nuisance bear survey, 1993–2013.

	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>
1993	83	84	82	88	82	81	68
1994	77	88	82	86	83	68	61
1995	74	77	79	83	80	72	61
1996	71	83	84	77	75	67	54
1997	61	69	69	64	62	60	43
1998	34	67	71	63	55	41	33
1999	52	52	40	47	44	39	16
2000	60	58	50	54	42	37	33
2001 <sup>a</sup>	52	54	50	49	42	32	21
2002	50	44	43	46	35	29	19
2003	36	39	34	29	27	25	14
2004	28	33	34	32	32	24	13
2005	35	36	42	36	35	26	20
2006	28	39	46	43	30	29	24
2007	46	41	39	35	40	31	21
2008	31	35	37	33	23	20	17
2009	44	51	41	40	39	35	28
2010	36	40	33	27	28	23	16
2011	30	34	29	31	29	27	21
2012	56	52	47	40	38	32	23
2013	63	56	62	49	42	42	32

<sup>a</sup> Electronic submission of monthly complaint tally beginning in 2001.

**Table 9.** Number of nuisance bear complaints registered by Conservation Officers and Wildlife Managers during 1993–2013, including number of nuisance bears killed and translocated, and bears killed in vehicular collisions.

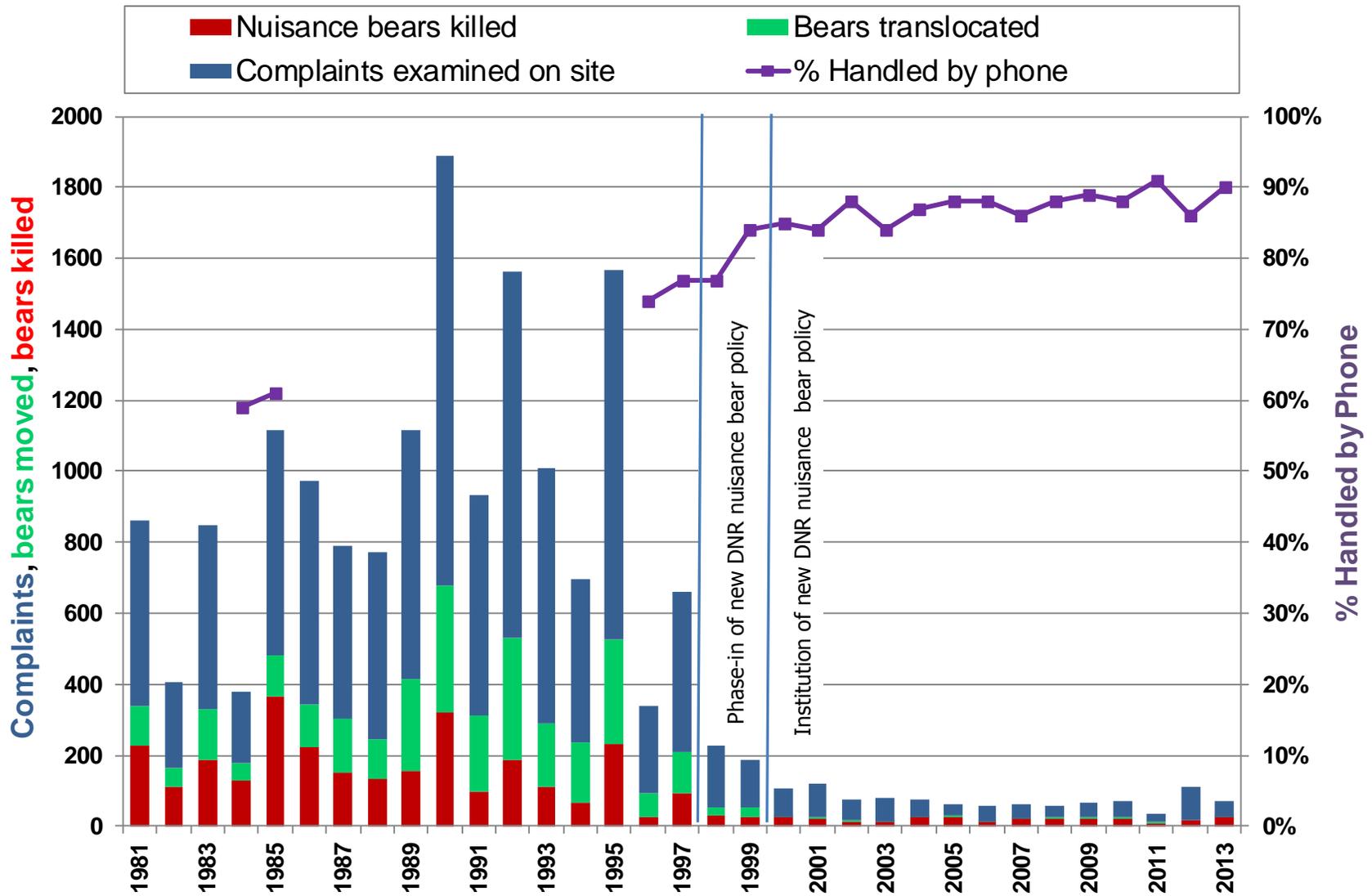
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number of personnel participating in survey <sup>a</sup>	88	88	83	84	69	71	52	60	54	50	39	34	42	46	46	37	51	40	34	56	63
Complaints examined on site	1010	696	1568	337	661	226	189	105	122	75	81	75	61	57	63	59	65	70	37 <sup>h</sup>	113	69
Complaints handled by phone <sup>b</sup>				959	2196	743	987	618	660	550	424	507	451	426	380	452	535	514	396 <sup>h</sup>	722 <sup>i</sup>	623
Total complaints received				1296	2857	969	1176	723	782	625	505	582	512	483	443	511	600	584	433 <sup>h</sup>	835	692
• % Handled by phone				74%	77%	77%	84%	85%	84%	88%	84%	87%	88%	88%	86%	88%	89%	88%	91%	86%	90%
Bears killed by:																					
• Private party or DNR	111	67	232	27	93	31	25	25	22	12	13	25	28	11	21	22	23	22	9 <sup>h</sup>	16	24
• Hunter before season <sup>c</sup>																					
– from nuisance survey	21	28	81	6	32	23	5	7	4	0	3	3	6	2	18	3	4	3	3	11	0
– from registration file	30	25	138	18	35	31	24	43	20	11	8	4	13	6	25	5	15	10	5	12	0
• Hunter during/after season <sup>d</sup>	8	3	13	0	4	3	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1
• Permittee <sup>e</sup>	6	3	57	4	7	11	7	2	6	4	6	1	5	4	5	1	3	5	0	0	1 <sup>j</sup>
Bears translocated	180	171	295	64	115	24	29	1	6	3	1	3	3	3	1	3	2	2	2	0	3
• % bears translocated <sup>f</sup>	18	25	19	19	17	11	15	1	5	4	1	4	5	5	2	5	3	3	5	0	4
Bears killed by cars <sup>g</sup>	54	40	68	42	52	61	60	39	43	26	25	16	22	18	20	27	18	28	15 <sup>h</sup>	33	32

Table 9 footnotes:

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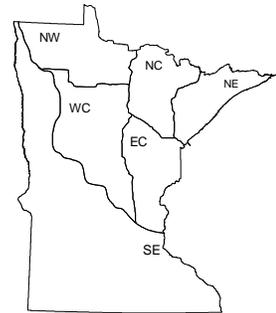
- <sup>a</sup> Maximum number of people turning in a nuisance bear report each month (from Table 7). Monthly reports were required beginning in 1984.
- <sup>b</sup> Tallies of complaints handled by phone were made only during the indicated years.
- <sup>c</sup> The discrepancy between the number recorded on the nuisance survey and the number registered before the opening of the season indicates incomplete data. Similarity between the two values does not necessarily mean the same bears were reported.
- <sup>d</sup> Data only from nuisance survey because registration data do not indicate whether bear was a nuisance.
- <sup>e</sup> A permit for non-landowners to take a nuisance bear before the bear season was officially implemented in 1992, but some COs individually implemented this program in 1991. Data are based on records from the nuisance survey, not directly from permit receipts.
- <sup>f</sup> Percent of on-site investigations resulting in a bear being captured and translocated.
- <sup>g</sup> Car kill data were reported on the monthly nuisance form for the first time in 2005. In all previous years, car kill data were from confiscation records. Values shown for 2005-2013 are either from the forms or from the confiscation records, whichever was greater (they differed very little)(2013: 32 confiscations, 28 reported in nuisance survey).
- <sup>h</sup> Lowest since record-keeping began (1981 for on-site complaints, nuisance bears killed and car-kills). However, participation in this survey may have affected the results. In 2011, 2 known nuisance kills of radio-collared bears, which were handled by COs, were not tallied here because these 2 COs did not participate in this survey.
- <sup>i</sup> 120-180 calls in each month, May–Aug.
- <sup>j</sup> 4 permits issued, 1 bear killed.

**Fig. 4.** Trends in nuisance bear complaints, nuisance bears killed and moved, and percentage of complaints handled by phone, 1981–2013, showing dramatic effect of change in nuisance bear policy.



**Table 10.** Regional bear food indices<sup>a</sup> in Minnesota’s bear range, 1984 – 2013. Shaded blocks indicate particularly low (<45; pink) or high (≥70; green) values.

Year	Survey Area						Entire Range
	NW	NC	NE	WC	EC	SE <sup>b</sup>	
1984	32.3	66.8	48.9	51.4	45.4		51.8
1985	43.0	37.5	35.3	43.5	55.5		42.7
1986	83.9	66.0	54.7	74.7	61.1		67.7
1987	62.7	57.3	46.8	67.4	69.0		61.8
1988	51.2	61.1	62.7	54.4	47.3		56.0
1989	55.4	58.8	48.1	47.8	52.9		51.6
1990	29.1	39.4	55.4	44.0	47.9		44.1
1991	59.7	71.2	64.8	72.1	78.9		68.4
1992	52.3	59.9	48.6	48.1	63.3		58.2
1993	59.8	87.8	75.0	73.9	76.8		74.3
1994	68.6	82.3	61.3	81.5	68.2		72.3
1995	33.8	46.5	43.9	42.0	50.9		44.4
1996	89.5	93.2	88.4	92.2	82.1		87.6
1997	58.2	55.5	58.8	62.0	70.1		63.9
1998	56.9	72.8	66.4	72.3	84.5		71.1
1999	63.7	59.9	61.1	63.2	60.6		62.0
2000	57.7	68.0	54.7	69.2	67.4		62.3
2001	40.6	48.7	55.6	62.2	66.0		55.8
2002	53.1	63.4	60.4	68.6	68.3		66.8
2003	59.1	57.5	55.2	58.6	49.7		58.8
2004	57.0	60.5	61.1	70.3	67.9		64.4
2005	53.4	65.9	61.4	59.9	72.6		62.3
2006	51.0	64.9	53.4	51.0	52.1		56.9
2007	68.4	79.0	67.3	67.6	70.0		69.4
2008	58.6	74.1	64.7	66.6	71.4		65.4
2009	59.9	67.8	63.2	69.2	69.5		66.5
2010	70.0	71.3	79.0	60.8	57.3		68.0
2011	61.4	59.6	57.9	66.7	63.5		62.5
2012	49.1	50.3	59.4	50.5	41.5		50.7
2013	71.9	77.1	76.0	59.1	63.2	57.3	71.8



<sup>a</sup> Each composite “bear food index” value listed here represents the sum of the average indices for 14 species, calculated based on all surveys conducted in that survey area that year. Likewise, the range-wide mean is based on all surveys completed in the state that year and is not an average of the survey area means.

<sup>b</sup> Surveys were first compiled for the SE area in 2013. Bear range shows increasing expansion into this area.

**Table 11.** Regional mean index values<sup>a</sup> for bear food species in 2013 compared to the previous 29-year mean (1984–2012) in Minnesota’s bear range. Shading indicates particularly high (green) or low (pink) fruit abundance relative to average (≥1 point difference for individual foods; ≥5 points difference for composite scores).

FRUIT	NW		NC		NE		WC		EC		SE <sup>d</sup>	Entire Range	
	29yr mean	2013 <i>n</i> = 12 <sup>b</sup>	29yr mean	2013 <i>n</i> = 14	29yr mean	2013 <i>n</i> = 6	29yr mean	2013 <i>n</i> = 11	29yr mean	2013 <i>n</i> = 6	2013 <i>n</i> = 6	29yr mean	2013 <i>n</i> = 41 <sup>c</sup>
SUMMER													
Sarsaparilla	4.5	6.9	5.9	5.0	5.4	4.5	4.6	3.9	5.5	3.2	2.0	5.1	4.7
Pincherry	3.2	2.6	4.3	6.2	4.0	6.0	3.9	2.4	3.7	2.3	2.0	3.8	4.3
Chokecherry	5.5	8.6	5.3	9.2	4.3	7.4	5.4	5.1	4.6	4.6	3.7	5.1	7.0
Juneberry	4.9	8.4	4.7	10.2	4.9	6.8	3.8	3.7	3.9	4.3	3.0	4.4	6.9
Elderberry	1.4	1.4	3.1	1.9	3.6	3.7	3.1	3.0	3.3	3.0	4.0	3.0	2.6
Blueberry	4.9	7.9	5.3	9.3	4.8	5.8	3.7	3.4	3.6	2.5	2.0	4.3	5.7
Raspberry	6.6	6.7	8.1	8.8	7.9	9.4	7.1	6.6	7.0	7.2	6.2	7.3	7.5
Blackberry	1.3	0.3	2.3	1.0	1.0	1.5	3.4	2.5	4.4	5.8	5.5	2.9	2.6
FALL													
Wild Plum	2.0	2.5	1.8	2.3	1.0	2.5	2.6	2.5	2.4	3.3	5.0	2.1	2.9
HB Cranberry	5.1	6.2	4.3	4.8	3.6	5.2	3.7	3.3	3.5	4.8	2.0	4.0	4.9
Dogwood	6.0	8.2	5.7	6.1	5.0	5.0	5.7	7.1	5.9	6.6	5.6	5.6	6.7
Oak	3.5	4.0	3.0	4.1	1.7	3.0	5.9	5.9	5.9	4.2	8.6	4.4	5.0
Mountain Ash	1.6	1.6	2.6	2.9	4.6	8.2	1.8	2.0	2.2	3.0	2.7	2.6	4.3
Hazel	6.3	6.6	7.7	5.3	7.3	7.0	8.1	7.7	7.8	8.4	5.0	7.4	6.7
<b>TOTAL</b>	<b>56.8</b>	<b>71.9</b>	<b>64.1</b>	<b>77.1</b>	<b>59.1</b>	<b>76.0</b>	<b>62.8</b>	<b>59.1</b>	<b>63.7</b>	<b>63.2</b>	<b>57.3</b>	<b>62.0</b>	<b>71.8</b>

<sup>a</sup> Food abundance indices were calculated by multiplying species abundance ratings x fruit production ratings.

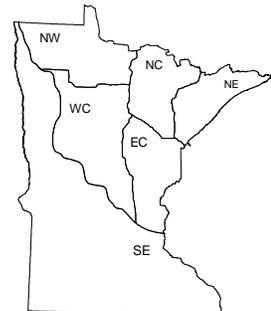
<sup>b</sup> *n* = Number of surveys used to calculate area-specific means

<sup>c</sup> Sample size for the entire range does not equal the sum of the sample sizes of 5 survey areas because some surveys were conducted on the border of 2 or more areas and were included in calculations for both.

<sup>d</sup> Surveys were first compiled for the SE area in 2013.

**Table 12.** Regional productivity indices<sup>a</sup> for 3 important fall foods (oak, hazel, and dogwood) in Minnesota’s bear range, 1984–2013. Shading indicates particularly low ( $\leq 5.0$ ; yellow) or high ( $\geq 8.0$ ; tan) values.

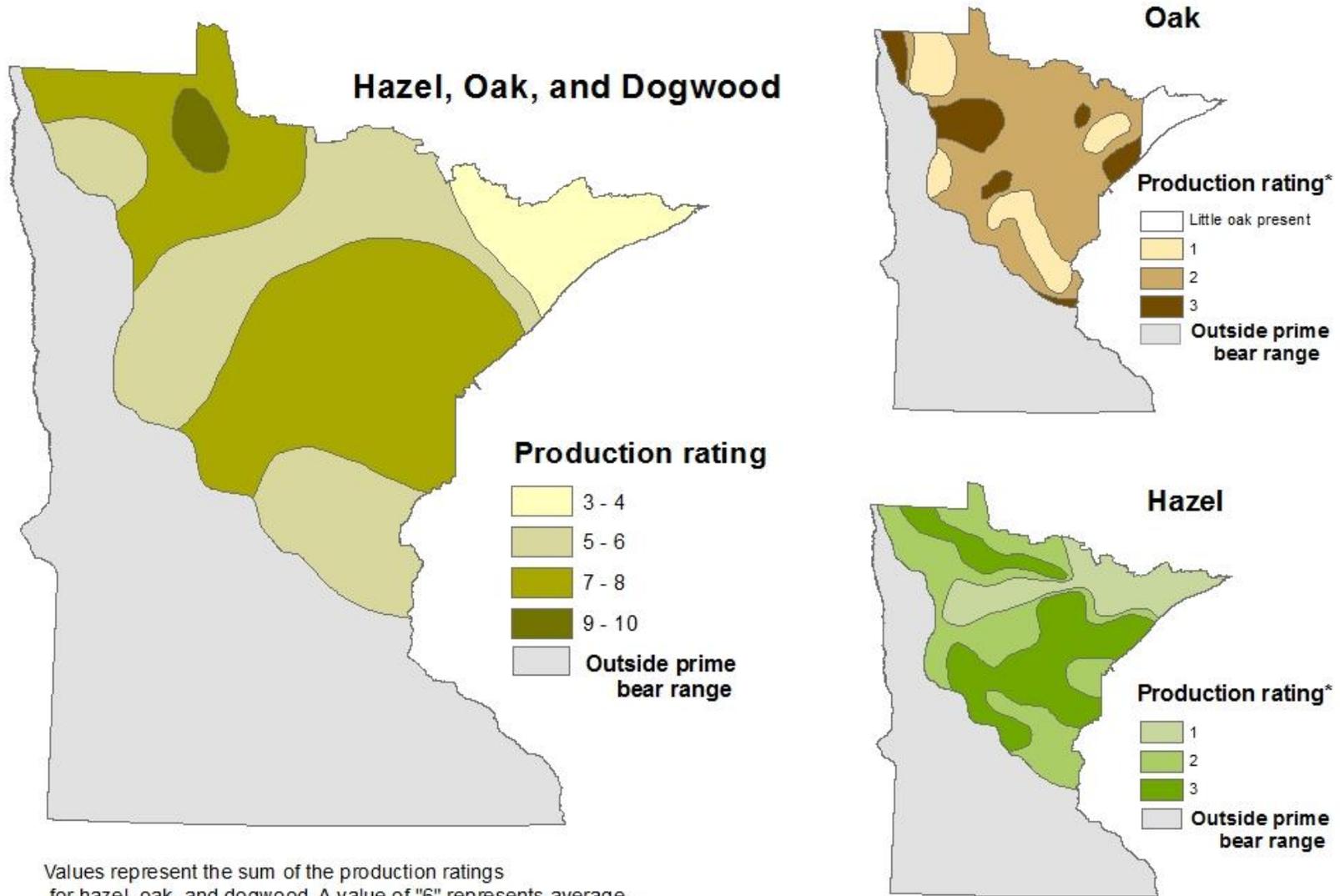
Year	Survey Area						Entire Range
	NW	NC	NE	WC	EC	SE <sup>b</sup>	
1984	4.2	7.6	7.0	6.2	7.0		6.5
1985	4.9	2.8	4.2	4.7	5.3		4.4
1986	7.2	5.0	4.0	7.0	6.2		6.2
1987	8.0	7.8	7.3	7.6	8.0		7.7
1988	5.5	7.2	7.3	6.8	6.1		6.7
1989	6.0	5.3	4.1	5.7	6.4		5.8
1990	3.3	4.2	6.4	5.7	6.4		5.2
1991	6.2	6.2	5.4	7.2	7.7		6.7
1992	4.7	5.0	4.4	4.4	6.8		5.1
1993	5.3	7.1	6.7	6.2	7.7		6.5
1994	7.1	7.8	5.8	7.8	7.1		7.2
1995	4.8	4.8	5.1	4.6	5.3		4.9
1996	8.7	8.6	8.1	9.2	8.5		8.6
1997	5.8	5.4	5.1	6.8	6.5		6.2
1998	5.8	6.0	6.3	7.1	7.8		6.7
1999	6.4	5.1	5.9	6.6	6.0		6.2
2000	5.8	7.7	7.2	7.5	8.5		7.0
2001	3.4	4.1	5.7	6.0	6.5		5.2
2002	8.7	7.1	6.6	8.8	8.2		8.1
2003	6.3	6.0	5.5	6.2	6.0		6.1
2004	6.1	5.4	5.4	6.4	6.1		5.9
2005	5.8	5.8	6.1	6.4	7.0		6.2
2006	6.7	6.1	6.0	6.7	5.8		6.3
2007	6.0	5.8	5.7	6.6	6.4		6.2
2008	6.6	7.3	6.2	7.0	8.9		7.1
2009	5.1	6.2	5.3	6.3	6.5		6.0
2010	7.7	6.4	6.5	6.2	5.4		6.6
2011	5.8	6.5	6.2	7.0	7.4		6.5
2012	6.2	6.3	6.3	6.5	4.8		6.1
2013	6.8	6.0	5.7	6.7	6.9	6.2	6.3



<sup>a</sup> Each value represents the sum of the average production scores for hazel, oak, and dogwood, calculated based on all surveys conducted in that survey area that year. Means were calculated using all surveys completed in the state, not by averaging values from the 5 food survey areas.

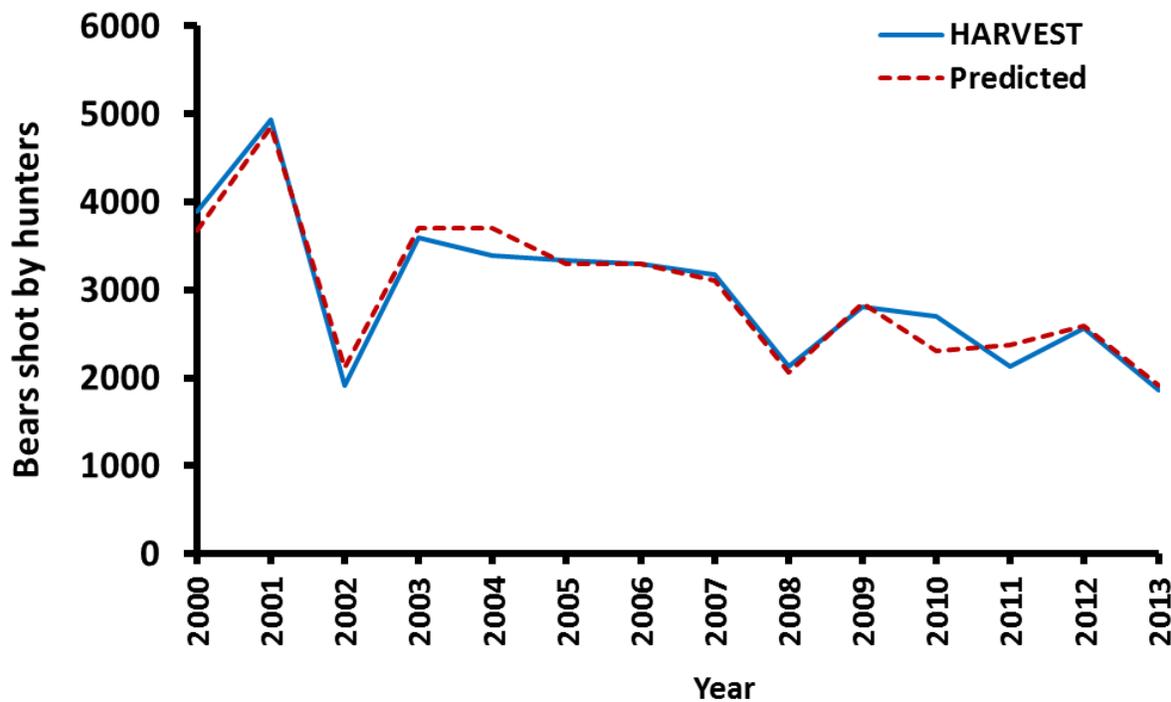
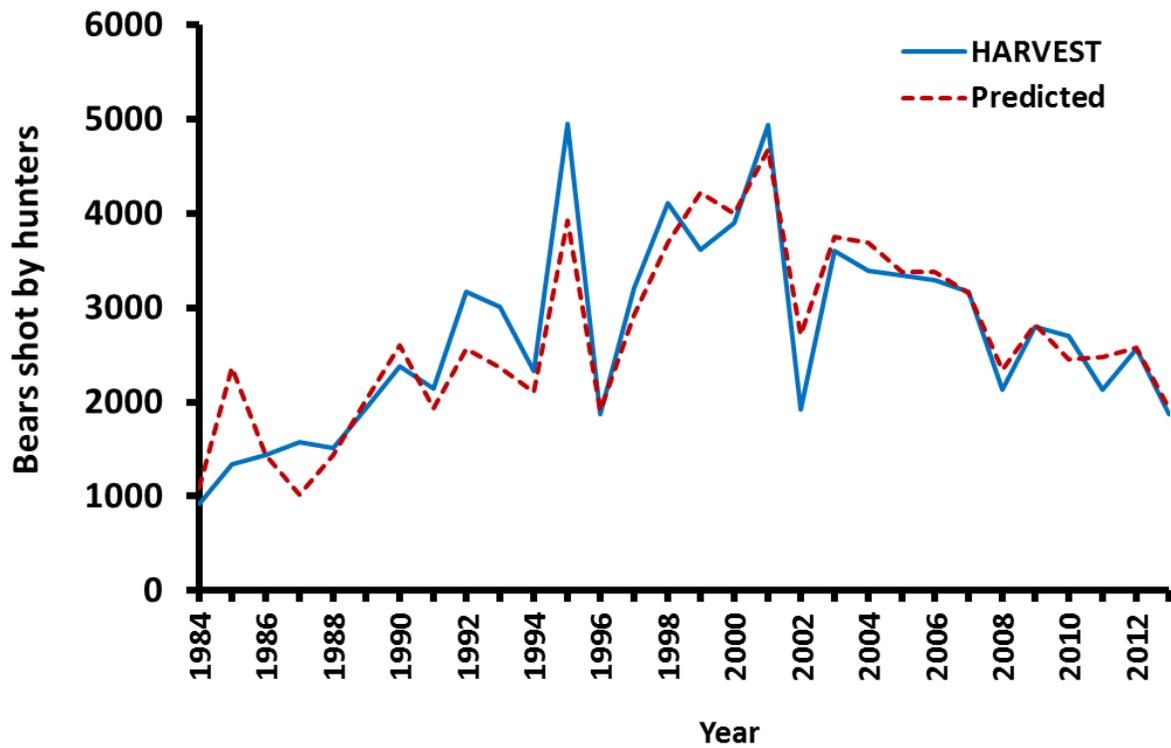
<sup>b</sup> Surveys were first compiled for the SE area in 2013.

**Fig. 5.** Productivity of key fall bear foods in Minnesota's primary bear range, 2013.

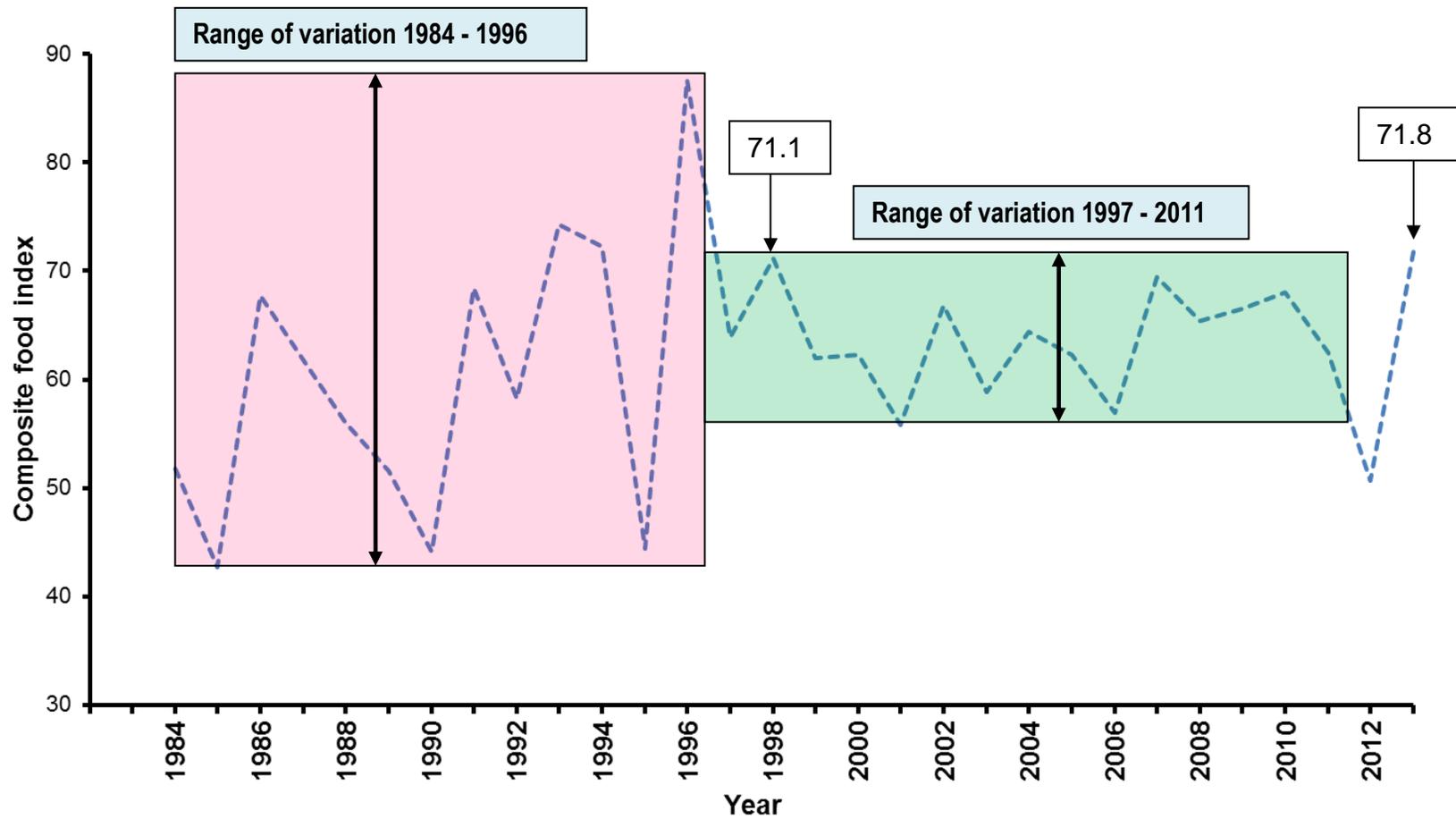


\* 0 = almost none, 1 = below average, 2 = average, 3 = above average, 4 = bumper crop

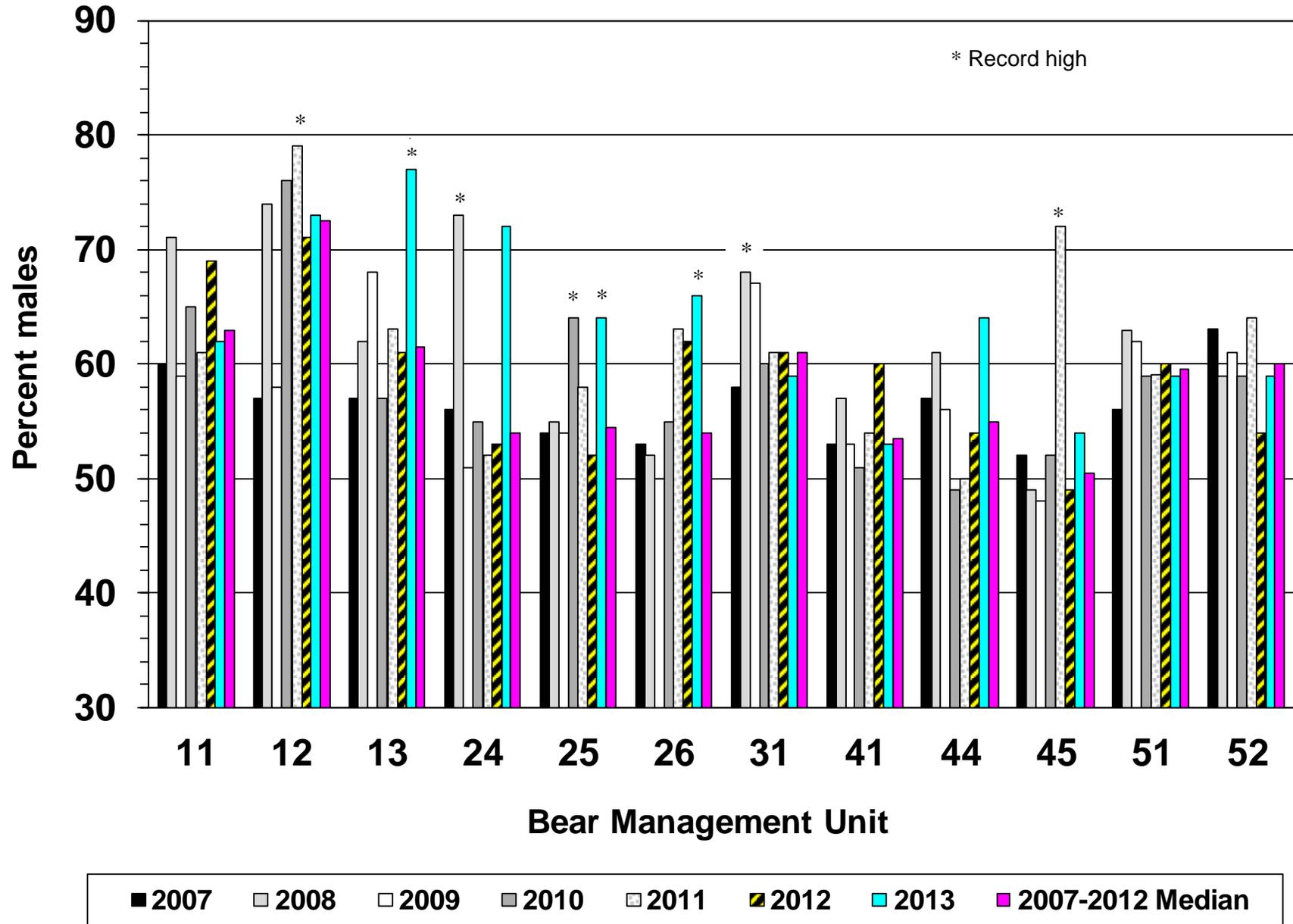
**Fig. 6.** Number of bears harvested vs. number predicted based on fall food abundance and the number of hunters: 1984–2013 (top;  $R^2=0.84$ ); 2000–2013 (bottom;  $R^2=0.95$ ).



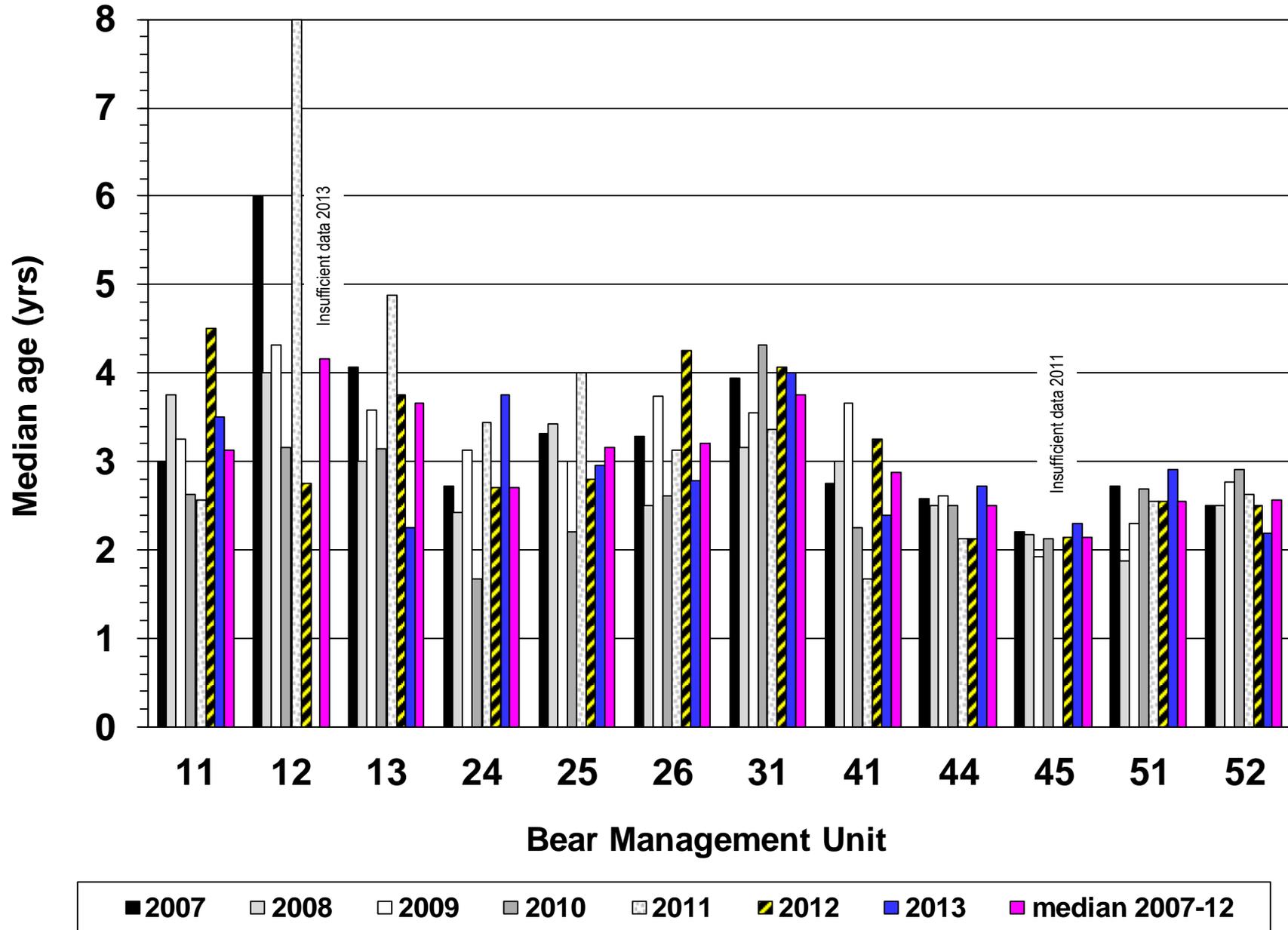
**Fig. 7.** Trends in year-to-year variability of bear food index across Minnesota’s bear range, 1984–2013. Bear food abundance was somewhat higher in 2013 and lower in 2012 than in any of the previous 15 years, but less extreme than the variation observed during 1984–1996.



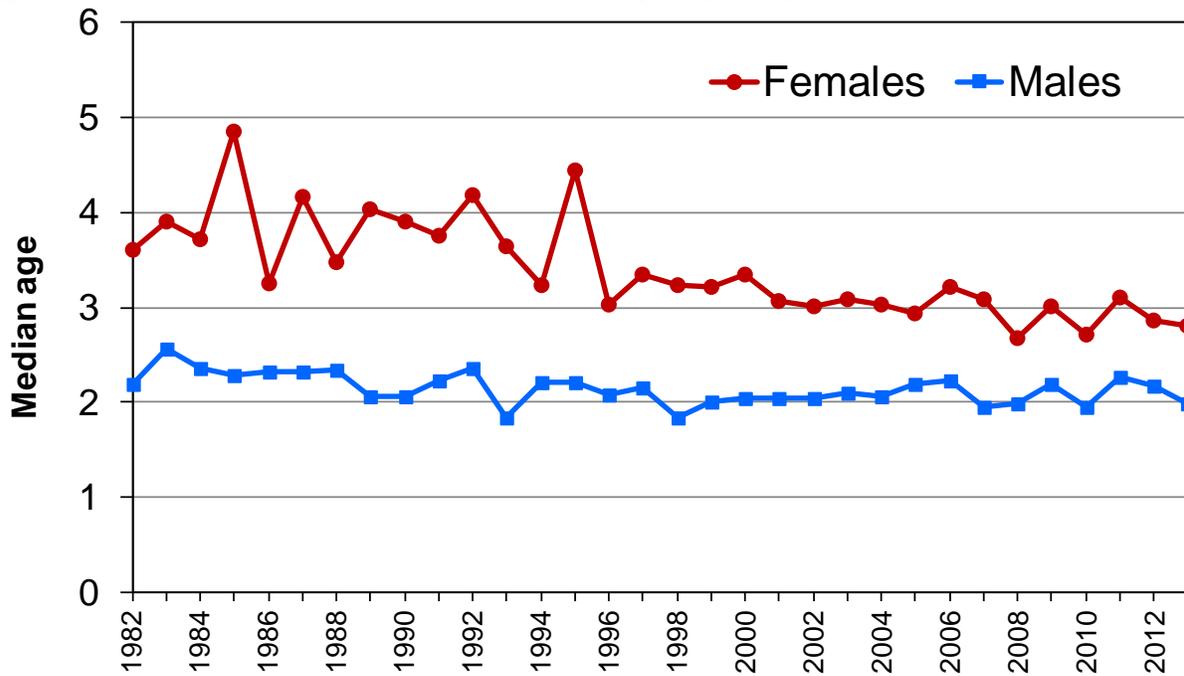
**Fig 8.** Sex ratios of harvested bears by BMU, 2007–2013.



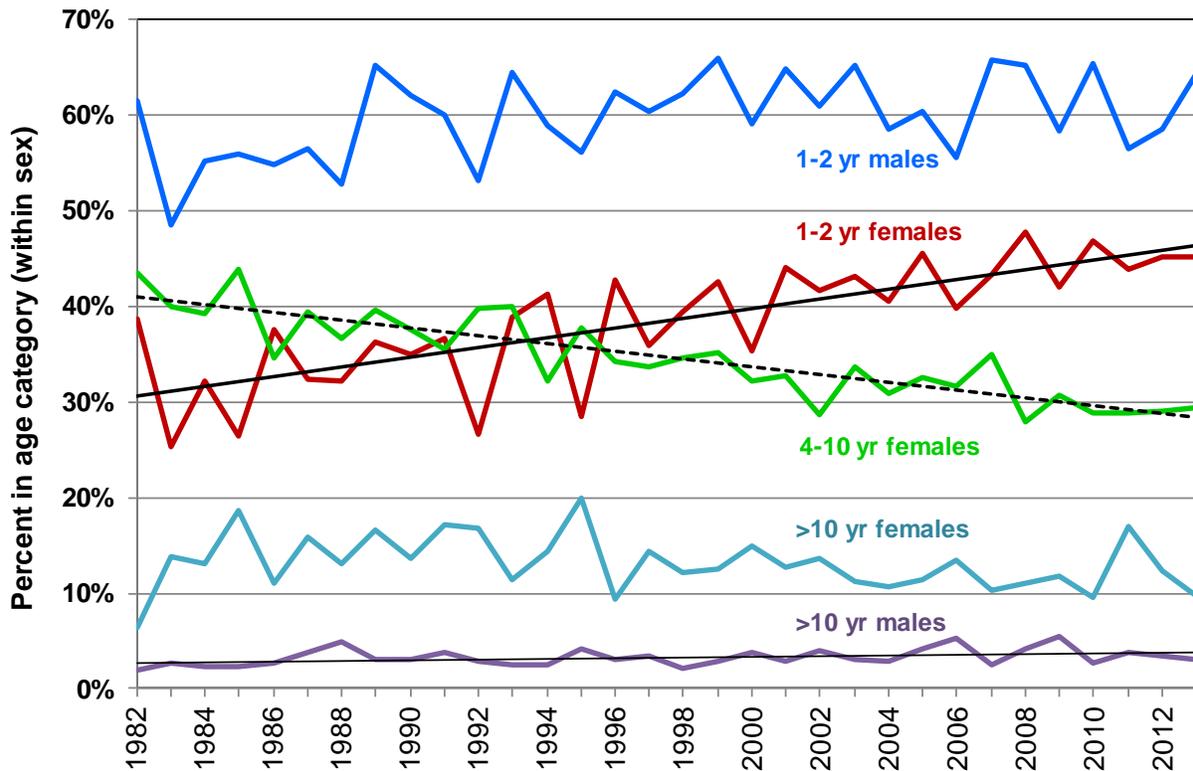
**Fig 9.** Median ages of harvested female bears by BMU, 2007–2013.



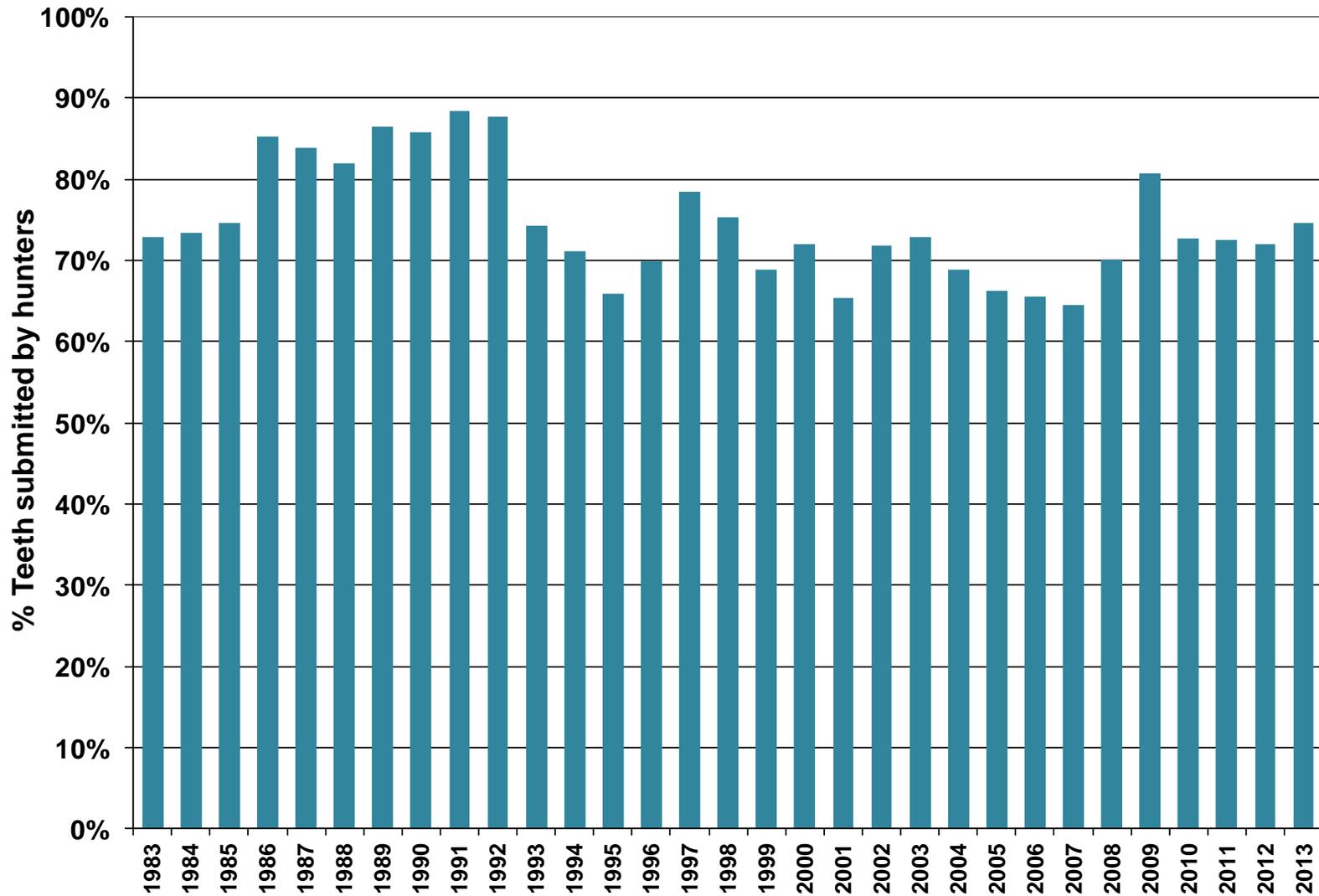
**Fig. 10.** Statewide harvest structure: median ages (yrs) by sex, 1982–2013.



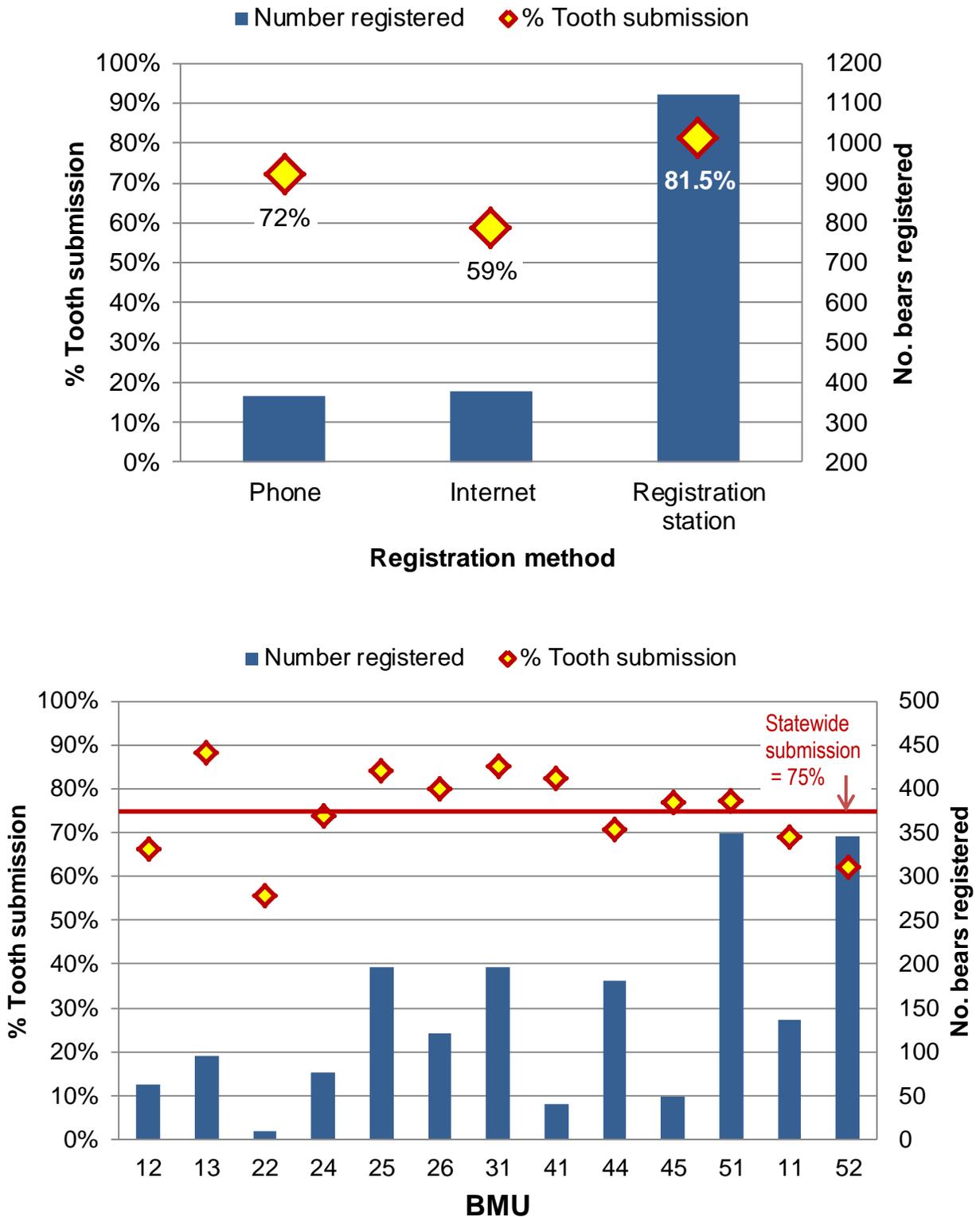
**Fig. 11.** Statewide harvest structure: proportion of each sex in age category, 1982–2013. Trend lines are significant.



**Fig. 12.** Percent of hunters submitting bear teeth for aging (now vital for population reconstruction, see Fig. 14). Cooperation levels exceeded 80% when registration stations were paid to extract teeth (this practice ended in 1993) and when non-compliant hunters were sent a reminder and second tooth envelope (2009).



**Fig. 13.** Percent of hunters who submitted a bear tooth in 2013, by method of registration (top panel) and by BMU (bottom panel). For the first time, in 2013, hunters could register their bear by phone or internet, but to complete the registration process they were supposed to go to a registration station and obtain a tooth envelope.



**Fig. 14.** Statewide population trend derived from Downing reconstruction using the harvest age structures from 1980–2013. Curves were scaled (elevated) to various degrees to attempt to match the tetracycline-based mark–recapture estimates. Estimates for 2012–2014 were derived from population growth rates extrapolated from the reconstruction analyses (hence the break in the curves).

