

STATUS OF MINNESOTA BLACK BEARS, 2014

Final Report to Bear Committee

February 26, 2015

Dave Garshelis & Karen Noyce



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

© 2015 Minnesota Department of Natural Resources

Key points

Table 1 & Fig. 1	<p><i>Overview: Permits, licenses, harvest, and success rates</i></p> <p>Permit applications for bear licenses has stabilized (18–19,000) at a higher level during 2010–2014 than before that, when permit availability was higher. The reduced permit availability also seems to have driven up sales of no-quota licenses, which were the highest on record in 2012 and second highest in 2014. The estimated number of hunters in the field (6,300) was the same in 2014 as last year. The total harvest (1,627) was lower than last year (and the lowest since 1988) due to a lower hunting success. Hunting success is affected by numbers of hunters (i.e., competition), food supply (affecting bears' attraction to baits), and density of bears.</p>
Tables 2,3 & Fig. 2	<p><i>Quota zone permits and licenses</i></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). No changes were made from 2013 to 2014. This was the 4th 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>
Table 4	<p><i>Quota zone lottery</i></p> <p>As permit allocations have been reduced, the percentage of 1st-year applicants drawn in the lottery diminished. In 2010, some 1st-year applicants (preference level 1) were drawn in all BMUs except one (44). In 2013 and 2014, 1st-year applicants were drawn only in BMU 22 (BWCAW). Less than 50% of 2nd-year applicants were drawn in all but 2 BMUs, and no 2nd-year applicants were drawn in 3 BMUs (26, 44, 45).</p>
Table 5 & Fig. 3	<p><i>Harvest by BMU</i></p> <p>The statewide harvest and harvest for the quota zone were the lowest since 1988. Four BMUs (12, 24, 26, 41) had record low harvests; 3 of these had record low harvests in 2013, but in each case, the harvests in 2014 were lower yet. BMU 11 had the lowest harvest since 1999, 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 increased with reduction of quota zone permits.</p>

Table 6	<p><i>Hunting success by BMU</i></p> <p>Hunting success was lower in 2014 than in 2013 for all except 1 BMU (45, which had record high success this year); one BMU (12) had the lowest success in >20 years). With these 2 BMUs as an exception, success rates tended to be about average or above average. For the first time in 2013, 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><i>Harvest by date</i></p> <p>During years of normal fall food abundance, about 70% of the harvest occurs during the 1st week of the bear season, and ~83% occurs by the end of the 2nd week. This year (and last), harvesting was delayed: only 60% in the first week and 75% after the 2nd week.</p>
Tables 8–9 & Fig. 4	<p><i>Nuisance complaints and kills</i></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 (649) fit with the low numbers observed since 2000 (when a new nuisance bear policy was adopted). Also, as typical, only 26 bears were known killed as nuisances, 2 were translocated, and 28 killed in vehicle collisions.</p>
Tables 10-12	<p><i>Food abundance</i></p> <p>The composite range-wide abundance of natural foods for bears in 2014 was high — very similar to 2013 and higher than it had been since 1998. Regionally, the high abundance of foods was most evident in the northern tier of survey areas (NW, NC, and NE) whereas food abundance in the WC and EC survey areas was closer to the previous 30-year average. Particularly notable were the abundant crops of junberry, blueberry, blackberry, plums, and dogwood, all very important to Minnesota bears. Elderberry and highbush cranberry, though abundant, tend not to be favored by bears. Some survey participants commented that the blueberry, junberry, and dogwood crops were among the best they had seen and summer weather favored a long fruiting season; many summer berries, particularly blueberries and junberries were still hanging in early September at the start of the bear hunting season. Unlike the fleshy fruits, nut crops (oak and hazel) were only average across the bear range. As a result, fall food index (oak+hazel+dogwood), which correlates strongly with hunter success, was similar to the previous 11 years. The last time statewide abundance of fall foods was unusually high was 2002.</p>

Fig. 5	<p><i>Predictions of harvest from food abundance</i></p> <p>The 2014 bear harvest closely aligned with harvests predicted, based on regression of harvest as a function of hunter numbers and the fall food productivity index. This regression is particularly high when only the past 14 years are considered (2000 – 2013).</p>
Fig. 6	<p><i>Harvest sex ratios</i></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 general, harvest sex ratios favoring males (the more vulnerable sex, and hence the minority sex in the living population) provide more resilience to the population. Whereas sex ratios vary considerably year to year over the past 2 decades, BMUs 25, 31 and 51 showed increasing trends in percent males. BMUs 13 and 41, which adjoin, showed sharply opposite trends since 2012.</p>
Figs. 7–9	<p><i>Harvest ages</i></p> <p>Long-term declining trends in median ages of harvested females were evident in BMUs 41, 24, 25, and 51. These likely contributed most to the long-term decline in the median age of harvested females statewide. Conversely, median ages of harvested males have been relatively stable for at least 20 years. Dramatic trends have occurred in the proportion of the female harvest aged 1–2 years (increasing) versus 4–10 years (declining).</p>
Figs. 10–11	<p><i>Submission of bear teeth for aging</i></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, >25% do not comply, and this missing sample, if somewhat different in age composition than the submitted teeth, may affect the resulting analyses. In 2013 and 2014 hunters could register by phone or internet, and pick up a tooth envelope later: these hunters had much poorer compliance with tooth submission than hunters who registered their bear at a registration station and obtained a tooth envelope at that time. Compliance in tooth submission also varied considerably among BMUs. Compliance was notably poor in the no-quota zone.</p>

Fig. 12	<p><i>Population trend</i></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. Population reconstruction assumes equal harvest pressure through time, which is certainly not true. Notably, as harvest pressure is diminished, and fewer bears are killed (as has been the trend since 2003; see Fig. 3), ensuing population estimates will be biased low. Population reconstruction does not provide reliable estimates for the 3 most recent years, even with stable harvest pressure. However, light harvests in 2013 and 2014 should have enabled the population to increase.</p>
Fig. 13	<p><i>Trends in harvest rates</i></p> <p>The sex ratio of harvested bears varies by age in accordance with the relative vulnerability of the sexes. With male bears being more vulnerable to harvest than females, males always predominate among harvested 1-year-olds. They also predominate, but less strongly among 2 and 3-year-old harvested bears. However, older aged bears (>6 years) are always dominated by females, because, although old females continue to be less vulnerable, there are far more of them than old males. The age at which the line fitted to these proportions crosses the 50:50 sex ratio is approximately the inverse of the harvest rate. Segregating the harvest age data into 5-year intervals showed harvest rates increasing from 1980–1999, then declining with reductions in hunter numbers (Table 1; Fig. 1). Harvest rates since 2010 have been equivalent to what they were in 1980–84, when the population was increasing (Fig. 12).</p>

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 1994–2014.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Permit applications	30127	29922	30405	27353	30245	29384	29275	26824	21886	16431	16466	16153	15725	16345	17362 ^a	17571 ^a	18647 ^a	19184 ^a	18103 ^a	18107 ^a	18885 ^a
Permits available	9400	11950	12030	11370	18210	20840	20710	20710	20610	20110	16450	15950	14850	13200	11850	10000	9500	7050 ^b	6000	3750	3750
Licenses purchased (total)	9826	12448	12414	11440	16737	18355	19304	16510	14639	14409	13669	13199	13164	11936	10404	9892	9689	9555	8986	6589	6620
Quota area ^c	8125	10304	10592	9655	14941	16563	17021	13632	12350	9833	10063	9340	9169	8905	7842	7342	7086	5684	4951	3188	3177
Quota surplus/military ^c								235	209	2554	1356	1591	1561	526	233	77	83	1385	1070	578	583
No-quota area ^c	1701	2144	1822	1785	1796	1792	2283	2643	2080	2022	2238	2268	2434	2505	2329	2473	2520	2486	2965 ^h	2823	2860
% Licenses bought																					
Of permits available ^d	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	100
Of permits issued ^d					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	84.7
Estimated no. hunters ^e	9100	11600	11500	10300	14500	15900	16800	15500	13800	13600	12900	12500	12500	11300	9900	9400	9200	9100	8600	6300	6300
Harvest	2329	4956	1874	3212	4110	3620	3898	4936	1915	3598	3391	3340	3290	3172	2135	2801	2699	2131	2604	1866	1627
Harvest sex ratio (%M) ^f	62	47	62	55	55	53	58	56	61	58	57	59	58	57	62	59	59	61	59	62	62
Success rate (%)																					
Total harvest/hunters ^g	26	43	16	31	28	23	23	29	14	26	26	26	26	28	21	30	29	23	30	30	26
Quota harvest/licenses	26	42	15	29	25	20	20	28	14	25	26	25	25	28	21	30	30	24	33	37	33

^a 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; 2014=2377).

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

^c 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.

^d 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 2011–14, all unpurchased licenses were put up for sale, and all were bought.

^e 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 2011–14 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.

^f 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.

^g 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. After 2012, hunters could take 2 bears only if they bought 2 licenses (1 quota + 1 no-quota): in 2014, only 1 hunter who bought 2 licenses killed 2 bears, and 12 hunters who bought 2 licenses killed 1 bear (7 Quota, 5 NQ).

^h Record high number of no-quota area licenses purchased.

Fig. 1. Relationship between licenses sold and hunting success (note inverted scale) in quota zone, 1987–2014 (non-quota zone first partitioned out in 1987). Number of licenses explains 36% of variation in hunting success during this period ($P = 0.0007$). Large variation in hunting success is also attributable to food conditions.

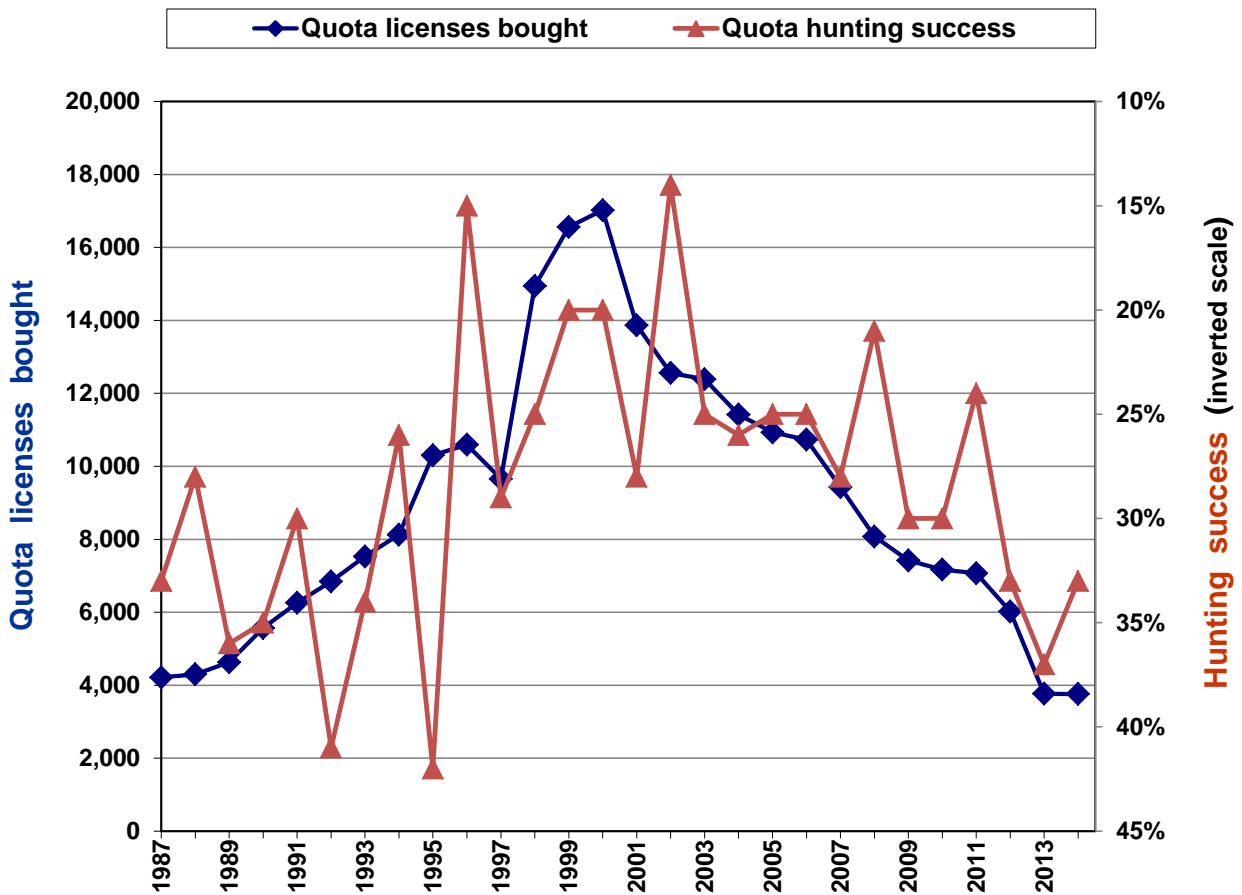


Table 2. Number of bear hunting quota area permits available, 2010–2014 (aligned with permit applications in Table 3 below; highlighted values show drop from previous year).

BMU	2014	2013	2012	2011		2010
				After reduct. ^a	Before reduct.	
12	200	200	300	350	450	450
13	250	250	400	450	600	600
22	50	50	100	100	125	100
24	200	200	300	350	500	550
25	500	500	850	900	1200	1200
26	350	350	550	650	900	900
31	550	550	900	1000	1300	1300
41	150	150	250	300	400	400
44	450	450	700	850	1100	1100
45	150	150	200	250	400	400
51	900	900	1450	1850	2500	2500
Total	3750	3750	6000	7050	9475	9500

^a 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, 2010–2014^a. Shaded values indicate undersubscribed areas (applications < permits available).

BMU	2014			2013			2012			2011 ^b			2010	
	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Surplus
12	661	164	36	707	160	44	813	244	60	834	267	84	903	5 ^c
13	703	218	32	664	213	37	719	325	76	751	366	84	753	
22	65	33	17	55	36	14	83	56	43	90	71	31	114	
24	875	174	26	763	170	30	888	253	47	918	294	56	971	
25	1533	424	76	1575	432	69	1625	713	137	1763	712	190	1811	5 ^c
26	1696	298	52	1695	303	47	1666	458	92	1894	512	139	1959	
31	2257	468	82	2261	478	72	2406	758	146	2505	826	174	2414	
41	561	129	21	575	135	15	592	208	42	688	253	47	718	
44	2751	393	57	2682	386	65	2619	612	88	3010	697	154	2923	
45	1403	127	23	1205	141	9	1135	170	30	1019	208	42	937	
51	4003	748	152	3796	734	166	3650	1154	296	4086	1478	372	3950	1 ^c
Total^d	16508	3176	574	15978	3188	568	16196	4951	1057	17558	5684	1373	17453	

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

^b In 2011–14, 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).

^c Courtesy licenses issued by Commissioner, not actual surplus.

^d 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 (unlike Table 1, where they are included).

Table 4. Percentage of quota BMU lottery applicants with preference level 1 (1st-year applicants), 2, and 3 who were drawn for a bear permit, 2010–2014. All preference level 2 applicants were drawn, except where 0 preference level 1 applicants were drawn. Likewise, all preference level 3 applicants were drawn, except where 0 preference level 2 applicants were drawn.

BMU	2014			2013			2012		2011		2010	
	Pref 1	Pref 2	Pref 3	Pref 1	Pref 2	Pref 3	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1	Pref 2
12	0	40		0	49		0	80	2		23	
13	0	72		4			33		51		77	
22	72			89			100		100		88	
24	0	13		0	41		0	75	14		49	
25	0	57		0	81		28		35		60	
26	0	0	80	0	7		0	49	0	77	15	
31	0	15		0	45		0	84	11		35	
41	0	19		0	43		0	86	6		31	
44	0	0	41	0	0	68	0	28	0	55	0	90
45	0	0	30	0	0	75	0	29	0	67	24	
51	0	22		0	53		1		25		52	

Table 5. Minnesota bear harvest tally^a for 2014 by Bear Management Unit (BMU) and sex compared to harvests during 2009–2013 and record high and low harvests (since establishment of each BMU).

BMU	2014				2013	2012	2011	2010	2009	5-year mean	Record low harvest (yr)	Record high harvest (yr)
	M	(%M)	F	Total								
Quota												
12	24	(63)	14	38 ^d	62	82	106	95	140	97	62 (13)	263 (01)
13	64	(70)	27	91 ^e	95	112	119	155	149	126	71 (88)	258 (95)
22	2	(40)	3	5	9	8	11	9	7	9	3 (03)	41 (89)
24	30	(60)	20	50 ^f	76	108	122	124	151	116	76 (13)	288 (95)
25	110	(65) ^m	58	168 ^g	197	254	317	307	344	284	149 (96)	584 (01)
26	67	(57)	50	117 ^h	121	238	167	232	228	197	121 (13)	513 (95)
31	144	(65)	77	221	197	363	358	363	384	333	157 (88)	697 (01)
41	15	(42) ⁿ	21	36 ⁱ	40	70	54	71	104	68	38 (96)	201 (01)
44	95	(56)	75	170	181	188	130	248	255	200	130 (11)	643 (95)
45	29	(54)	25	54	48	67	32	58	42	49	32 (11)	178 (01)
51	182	(63)	109	291	349	471	288	501	416	405	247 (91)	895 (01)
Total	762	(61)	479	1241 ^j	1375	1961	1704	2163	2220	1885	1192 (88)	4288 (01)
No Quota ^b												
11	52	(68)	25	77 ^k	136	224	219	178	315	214	38 (87)	351 (05)
10 ^c	7	(87)	1	8	9	14	3	11	9	9		
52	191	(63)	110	301	346	405	205	347	257	312	105 (02)	405 (12)
Total	250	(65)	136	386	491	643	427	536	581	536	198 (87)	678 (95)
State	1012	(62) ^o	615	1627 ^j	1866	2604	2131	2699	2801	2420		4956 (95)

^a Hunters receive tooth envelopes at registration stations, but the sex recorded on tooth envelopes may differ from the registered sex: Sex shown on table is the registered sex because only ~70% of tooth envelopes are submitted (2011: 72%; 2012: 73%; 2013: 75% 2014: 73%).

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 2011–2014.

Year	Quota area	No-quota area
2009	19	14
2010	20	8
2011	11	2
2012	6	1
2013	5	1
2014	2	1

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

2009: 3; 2010: 14; 2011: 14; 2012: 8; 2013: 11.; 2014: 4.

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 (presuming most were misreported kill locations).

^c Previously called BMU 11b.

^d Record low harvest since this area was established in 1987.

^e Lowest harvest since 1991.

^f Record low harvest since this area was established in 1989.

^g Lowest harvest since 1996.

^h Record low harvest since this area was established in 1991.

ⁱ Record low harvest since this area was established in 1990.

^j Lowest since 1988 (quota—no-quota split in 1987).

^k Lowest harvest since 1999.

^m Record high %males.

ⁿ Record high % females

^o Ties record high %males (equal to 2013).

Fig. 3. Trends in statewide bear harvest and proportions of harvest in the no-quota zones, 1987–2014.

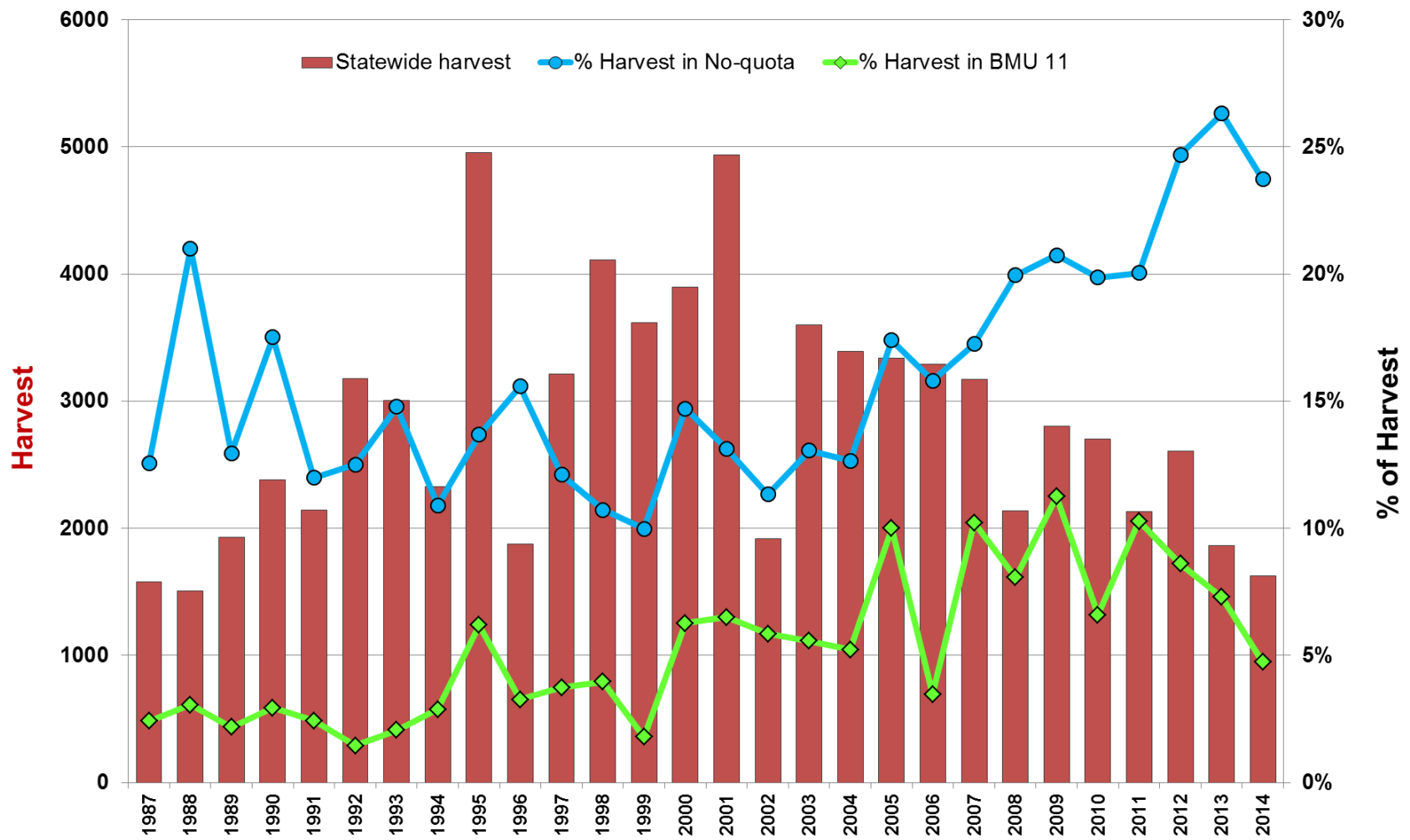


Table 6. Bear hunting success (%) by BMU, measured as the registered harvest divided by the number of licenses sold^a, 2009–2014.

BMU	Max success (yr)		Mean success 2009-2013	2014	2013	2012	2011	2010	2009
12	49	(95)	31	19 ^h	30	27	30	30	39
13	59	(95)	32	36	38 ^d	28	26	34 ^c	32
22	21	(92)	13	10	18 ^e	8	11	14	16 ^c
24	45	(92)	34	25	38 ^e	36 ^e	35 ^e	29	31 ^d
25	47	(92)	35	34	39 ^d	30	35	34	36
26	59	(95)	34	33	34	43 ^d	26	34	31
31	55	(92)	37	40	36	40 ^d	36	36	38 ^c
41	50	(95)	26	24	26	28	18	25	34
44	43	(95)	28	38	40 ^d	27	15 ^f	28	30
45	33	(12)	22	36 ⁱ	32	33 ^b	13	21 ^d	11 ^f
51	39	(13)	27	32	39 ^g	32 ^d	16 ^f	27	23
Quota	42	(95)	31	33	37 ^d	33 ^d	24	30	30
11 ^j				9	15				
10 ^j				7	12				
52 ^j				16	19				
No Quota	32	(95)	19	13	17	20	15 ^f	20	22
Statewide	40	(95)	27	25	28	28	22	27	28 ^c

^a 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. Statewide estimates of harvest/hunters are presented in Table 1.

^b Highest success since establishment of this BMU in 1994

^c Highest success since 1997 (until this year).

^d Highest success since 1995 (until this year).

^e Highest success since 1992 (until this year)

^f Lowest success since 2002 (until this year).

^g Highest success since establishment of this BMU in 1987.

^h Lowest success in >20 years (same as 2006).

ⁱ Record high success.

^j In 2013 and 2014, 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 (4%), 11 (29%), or 52 (67%) were categorized as such; those hunters who selected blocks in the quota zone (60 = 2%) were distributed in no-quota zones proportional to those who selected blocks in the no-quota zone (note: 1 of them harvested a bear in the no-quota zone, 2 harvested a bear in the quota zone, and the remainder were unsuccessful); 17 hunters chose blocks in SE Minnesota, but none harvested a bear there.

Table 7. Cumulative bear harvest (% of total harvest) by date, 1994–2014.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
1994	Thu		67	78	92
1995	Fri		72	87	97
1996	Sun		56 ^a	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 ^a	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 ^a	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
2014	Mon		60	75	92

^a 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, 1994–2014.

	Apr	May	Jun	Jul	Aug	Sep	Oct
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 ^a	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
2014	48	64	58	50	48	36	25

^a Electronic submission of monthly complaint tally beginning in 2001.

Table 9. Number of nuisance bear complaints registered by Conservation Officers and Wildlife Managers during 1994–2014, including number of nuisance bears killed and translocated, and bears killed in vehicular collisions.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of personnel participating in survey ^a	88	83	84	69	71	52	60	54	50	39	34	42	46	46	37	51	40	34	56	63	64
Complaints examined on site	696	1568	337	661	226	189	105	122	75	81	75	61	57	63	59	65	70	37 ^h	113	69	79
Complaints handled by phone ^b			959	2196	743	987	618	660	550	424	507	451	426	380	452	535	514	396 ^h	722 ⁱ	623	570
Total complaints received			1296	2857	969	1176	723	782	625	505	582	512	483	443	511	600	584	433 ^h	835	692	649
• % Handled by phone			74%	77%	77%	84%	85%	84%	88%	84%	87%	88%	88%	86%	88%	89%	88%	91%	86%	90%	88%
Bears killed by:																					
• Private party or DNR	67	232	27	93	31	25	25	22	12	13	25	28	11	21	22	23	22	9 ^h	16	24	26
• Hunter before season ^c																					
– from nuisance survey	28	81	6	32	23	5	7	4	0	3	3	6	2	18	3	4	3	3	11	0	0
– from registration file	25	138	18	35	31	24	43	20	11	8	4	13	6	25	5	15	10	5	12	0	1
• Hunter during/after season ^d	3	13	0	4	3	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0
• Permittee ^e	3	57	4	7	11	7	2	6	4	6	1	5	4	5	1	3	5	0	0	1 ^j	0
Bears translocated	171	295	64	115	24	29	1	6	3	1	3	3	3	1	3	2	2	2	0	3	2
• % bears translocated ^f	25	19	19	17	11	15	1	5	4	1	4	5	5	2	5	3	3	5	0	4	3
Bears killed by cars ^g	40	68	42	52	61	60	39	43	26	25	16	22	18	20	27	18	28	15 ^h	33	32	28

Table 9 footnotes:

- ^a Maximum number of people turning in a nuisance bear report each month (from Table 7). Monthly reports were required beginning in 1984.
- ^b Tallies of complaints handled by phone were made only during the indicated years.
- ^c 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.
- ^d Data only from nuisance survey because registration data do not indicate whether bear was a nuisance.
- ^e 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.
- ^f Percent of on-site investigations resulting in a bear being captured and translocated.
- ^g 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 2005-2014 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).
- ^h 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.
- ⁱ 120-180 calls in each month, May–Aug.
- ^j 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, 1981–2014, showing dramatic effect of change in nuisance bear policy.

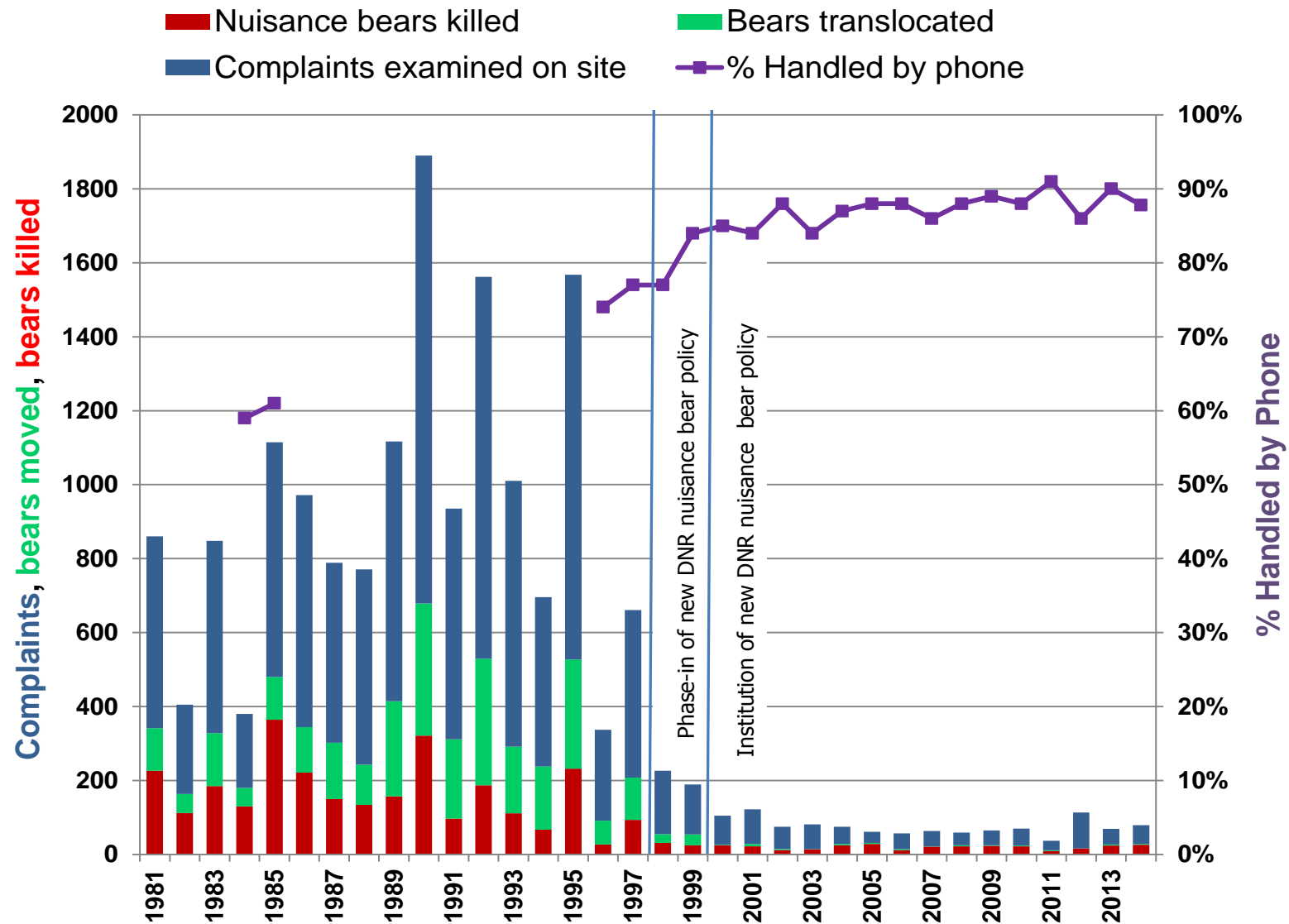
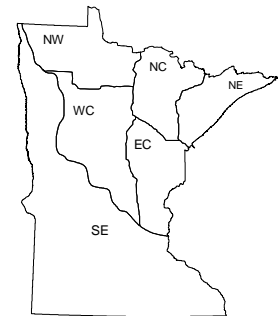


Table 10. Regional bear food indices^a in Minnesota's bear range, 1984–2014. Shaded blocks indicate particularly low (<45; pink) or high (≥70; green) values.

Year	Survey Area					Entire
	NW	NC	NE	WC	EC	
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	71.8
2014	71.4	70.7	71.4	61.0	66.5	70.2



^a Each bear food index value represents the sum of the mean index values for 14 species, based on surveys conducted in that area. Range-wide mean is derived directly from all surveys conducted in the state (i.e., not by averaging survey area means).

Table 11. Regional mean index values^a for bear food species in 2014 compared to the previous 30-year mean (1984-2013) 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 totals).

	NW		NC		NE		WC		EC		Entire Range	
FRUIT	30yr mean	2014 <i>n</i> = 7 ^b	30yr mean	2014 <i>n</i> = 7	30yr mean	2014 <i>n</i> = 5	30yr mean	2014 <i>n</i> = 5	30yr mean	2014 <i>n</i> = 7	29yr mean	2013 <i>n</i> = 27
SUMMER												
Sarsaparilla	4.6	5.1	5.9	5.2	5.3	4.5	4.6	2.0	5.5	4.7	5.1	4.7
Pincherry	3.2	4.0	4.4	5.0	4.1	4.8	3.8	2.5	3.7	4.2	3.8	4.2
Chokecherry	5.6	5.4	5.4	5.7	4.4	4.8	5.4	5.0	4.6	5.4	5.2	5.4
Juneberry	5.0	6.8	4.9	6.5	4.9	6.0	3.7	3.0	3.9	5.6	4.4	5.6
Elderberry	1.4	7.0	3.1	2.8	3.6	3.0	3.1	5.0	3.3	4.2	3.0	4.2
Blueberry	5.0	7.2	5.4	5.8	4.9	4.8	3.6	5.3	3.6	6.1	4.4	6.1
Raspberry	6.6	5.1	8.1	8.2	8.0	9.2	7.0	9.0	7.0	7.4	7.3	7.4
Blackberry	1.3	2.0	2.3	6.7	1.0	6.7	3.4	4.7	4.4	4.9	2.9	4.9
FALL												
Wild Plum	2.1	3.9	1.8	1.8	1.0	2.0	2.6	1.7	2.4	3.2	2.1	3.2
HB Cranberry	5.2	6.3	4.3	7.3	3.7	7.5	3.7	4.0	3.6	5.3	4.0	5.3
Dogwood	6.0	7.1	5.7	6.8	5.0	5.5	5.8	7.5	5.9	6.8	5.7	6.8
Oak	3.5	3.9	3.0	3.4	1.7	6.3	5.9	6.3	5.8	5.2	4.4	5.2
Mountain Ash	1.6	1.2	2.6	1.5	4.7	3.0	1.7	0.0	2.2	1.7	2.6	1.7
Hazel	6.3	6.3	7.6	4.0	7.3	3.3	8.1	5.0	7.8	5.6	7.4	5.6
TOTAL	57.4	71.4	64.5	70.7	59.6	71.3	61.8	61.0	63.7	66.5	62.3	70.2

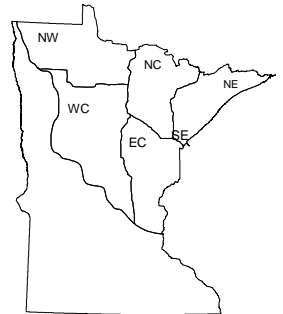
^a Food abundance indices were calculated by multiplying species abundance ratings x fruit production ratings.

^b *n* = Number of surveys used to calculate area-specific means

^c 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.

Table 12. Regional productivity index^a for important fall foods (oak + hazel + dogwood) in Minnesota's bear range, 1984 – 2014. Shading indicates particularly low (≤ 5.0 ; yellow) or high (≥ 8.0 ; tan) values.

Year	Survey Area					Entire Range
	NW	NC	NE	WC	EC	
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	6.3
2014	7.0	5.6	5.4	7.7	6.1	6.7



^a Values represent the sum of mean production scores for hazel, oak, and dogwood, derived from surveys conducted in each survey area. Range-wide mean is for all surveys conducted in the state (i.e. not an average of survey area means).

Fig. 5. Number of bears harvested vs. number predicted, based on fall food production and the number of hunters: 2000–2014 ($R^2=0.95$; top); 1984–2014 ($R^2=0.84$; bottom).

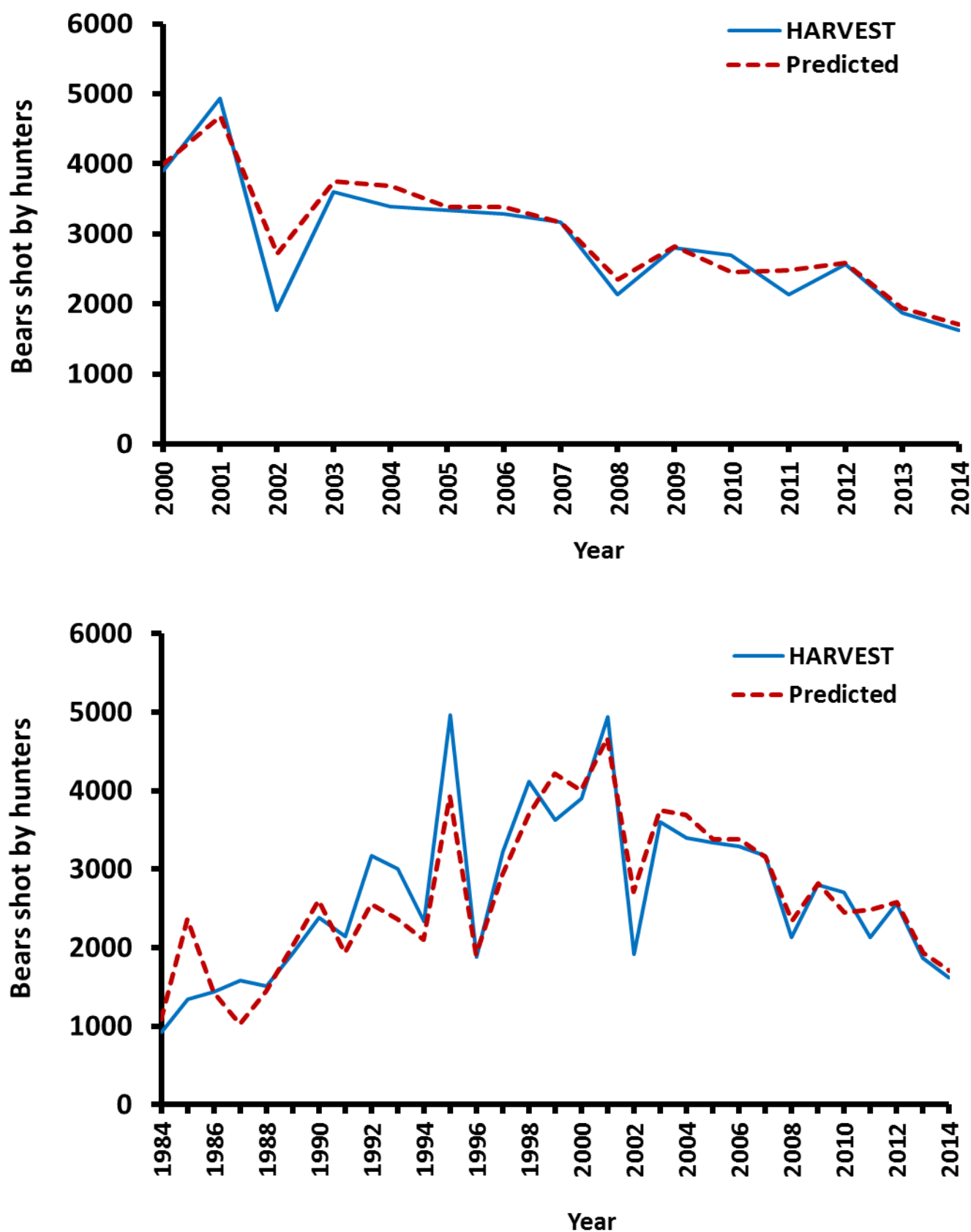
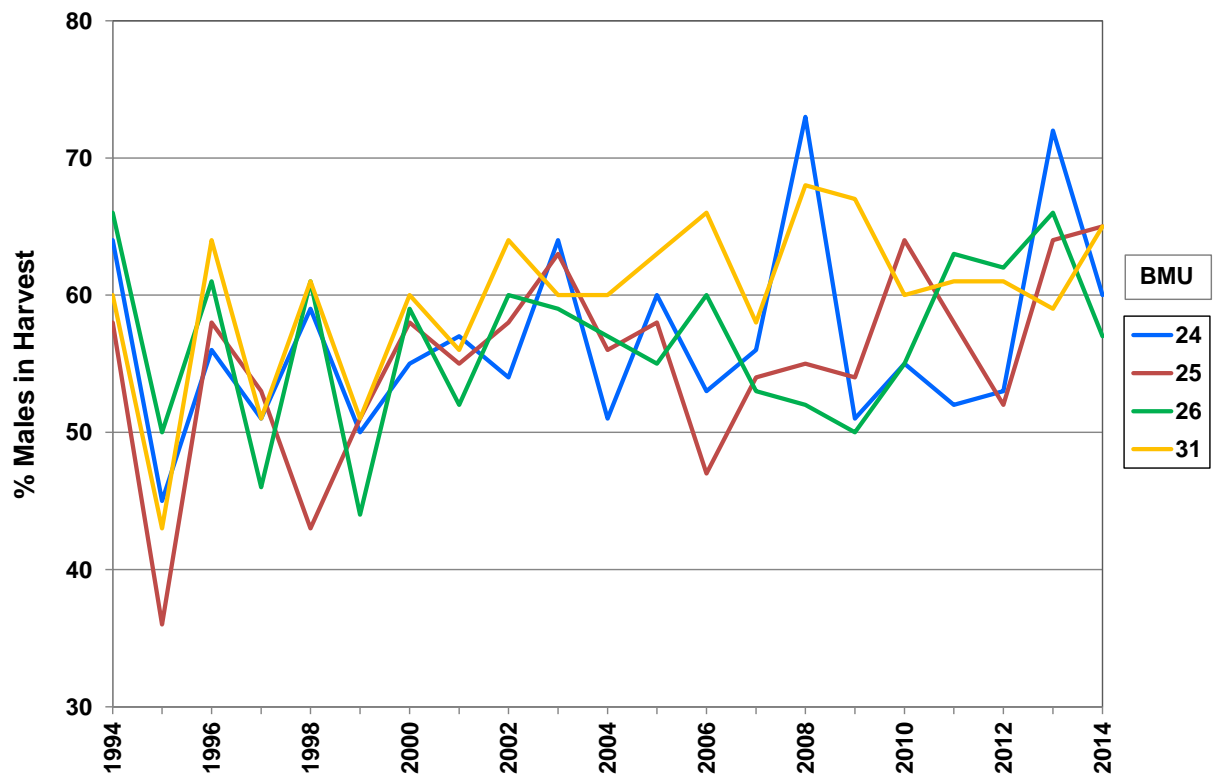
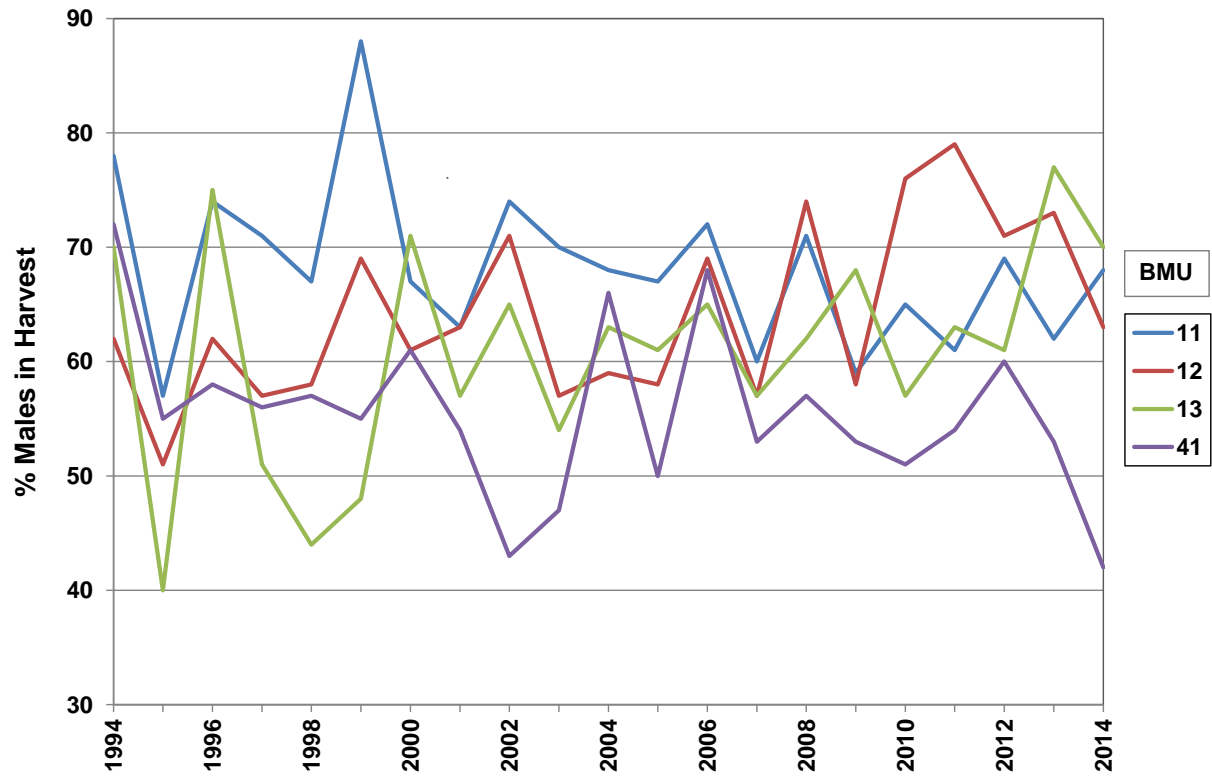


Fig 6. Sex ratios of harvested bears by BMU, 1994–2014.



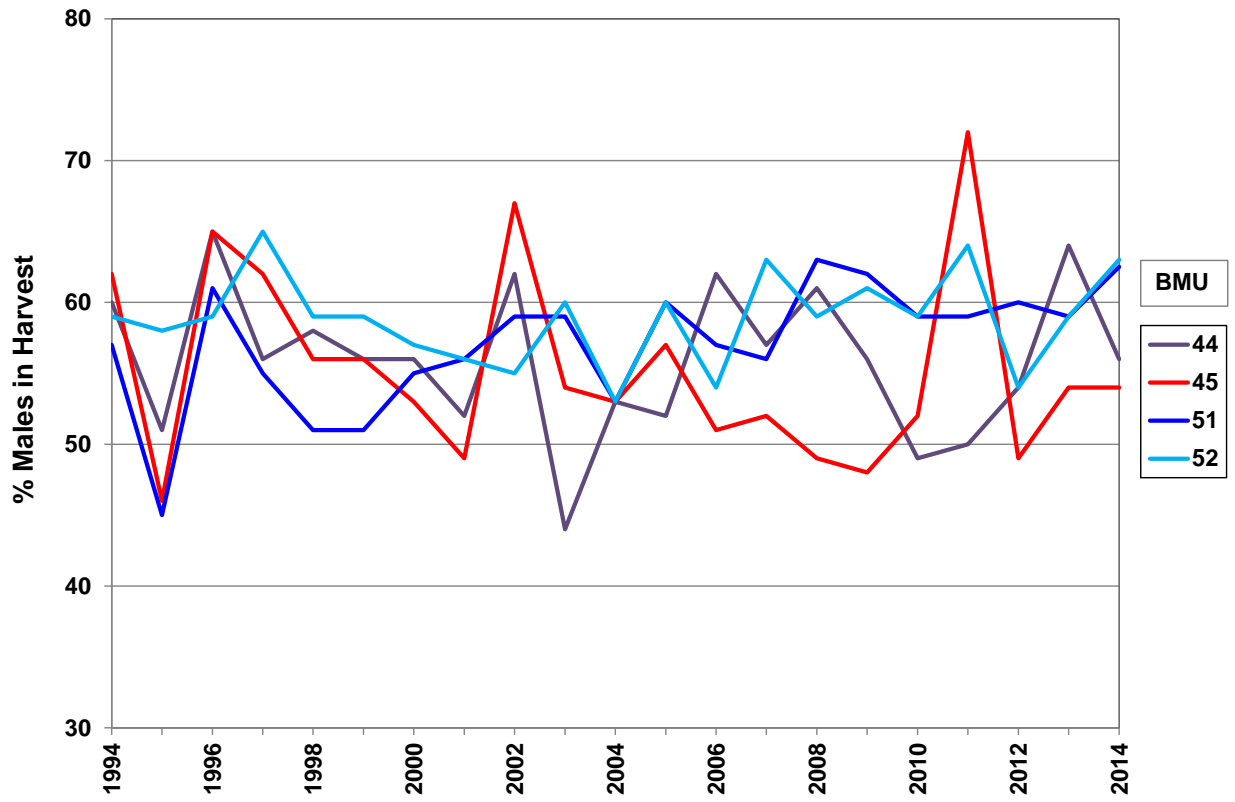
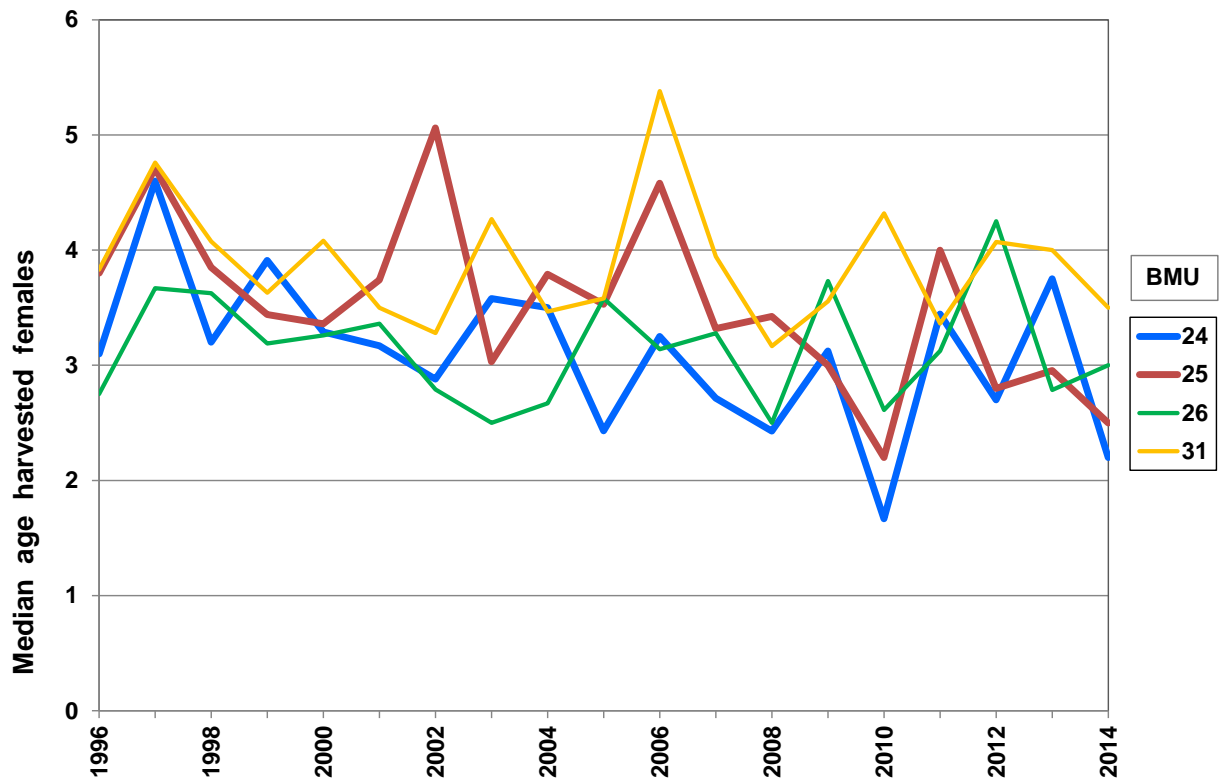
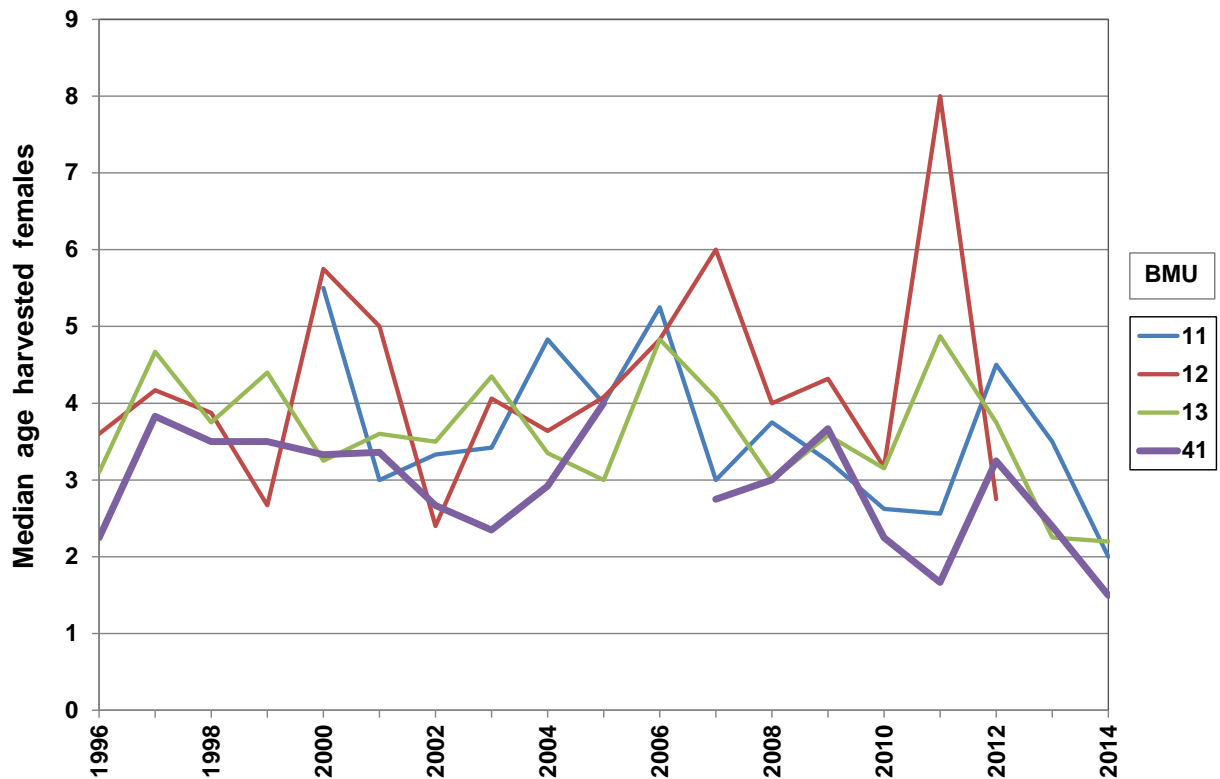


Fig 7. Median ages of harvested female bears by BMU, 1996*–2014.
Curves with thicker lines show significant declines through time.
(*note: most median ages were very high in 1995, so to view trends more accurately, graphs begin in 1996)



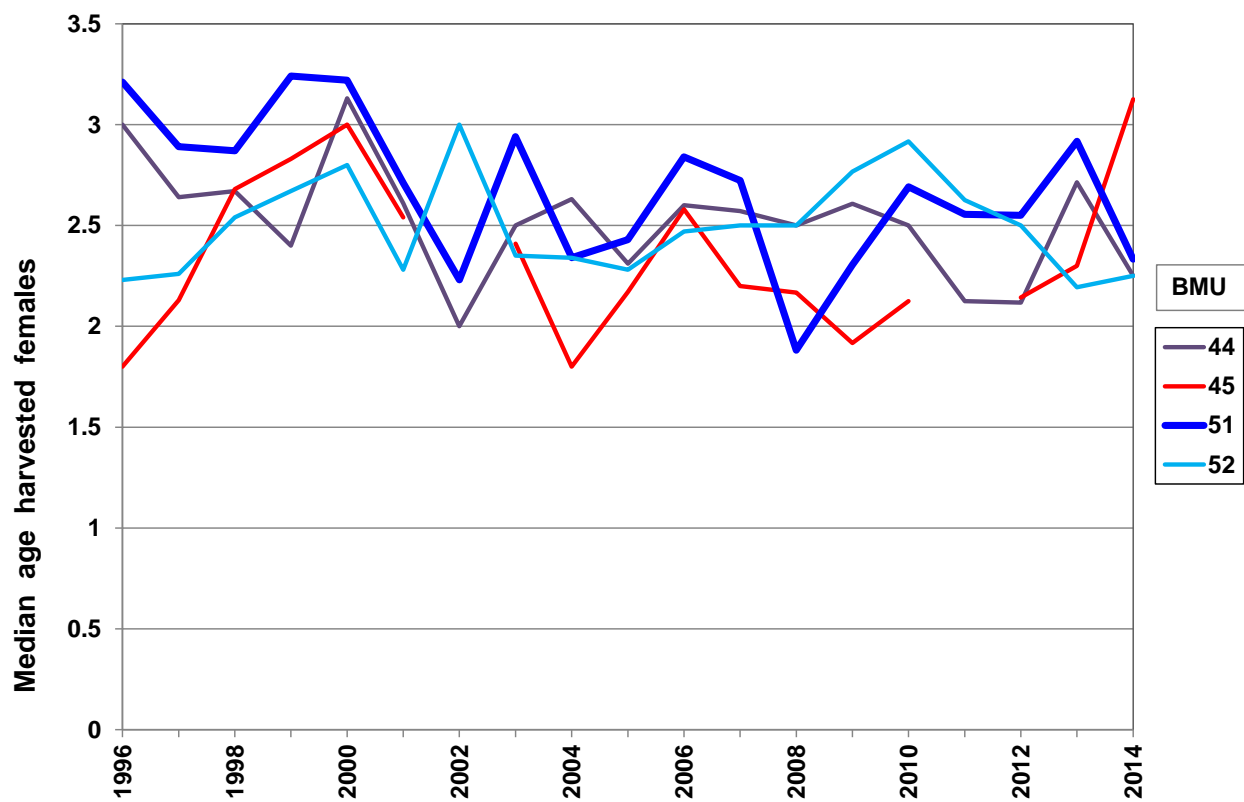


Fig. 8. Statewide median ages (yrs) of harvested bears by sex, 1982–2014.

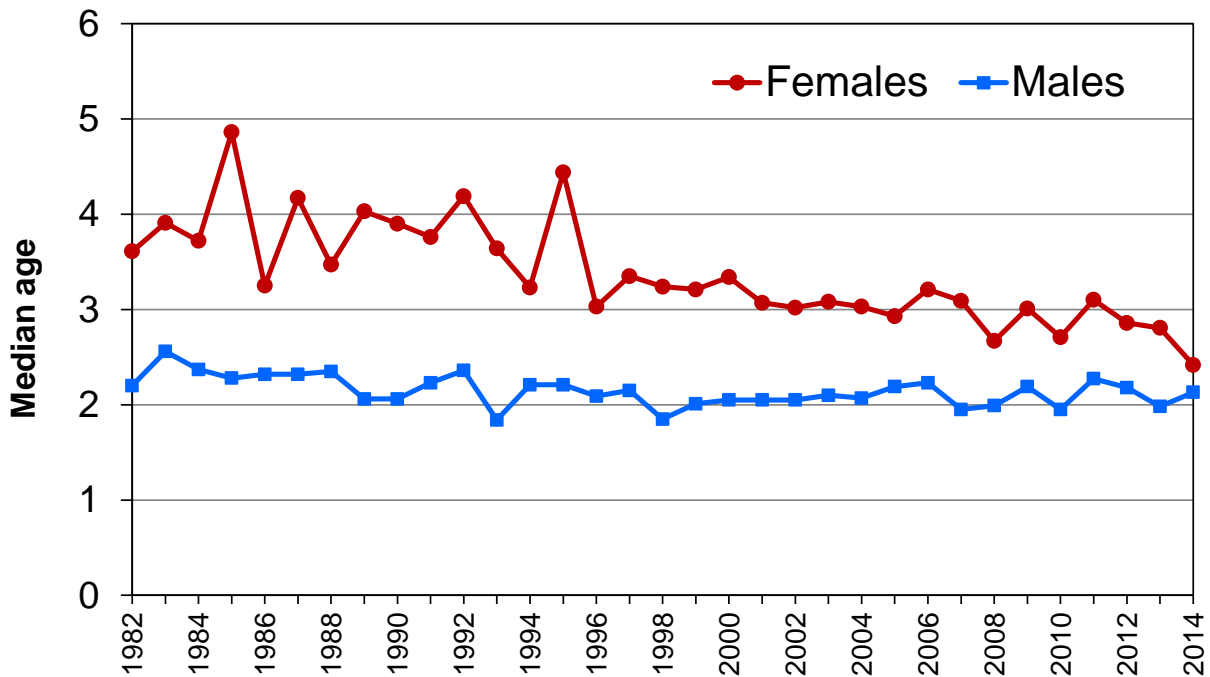


Fig. 9. Statewide harvest structure: proportion of each sex in age category, 1982–2014. Trend lines are significant.

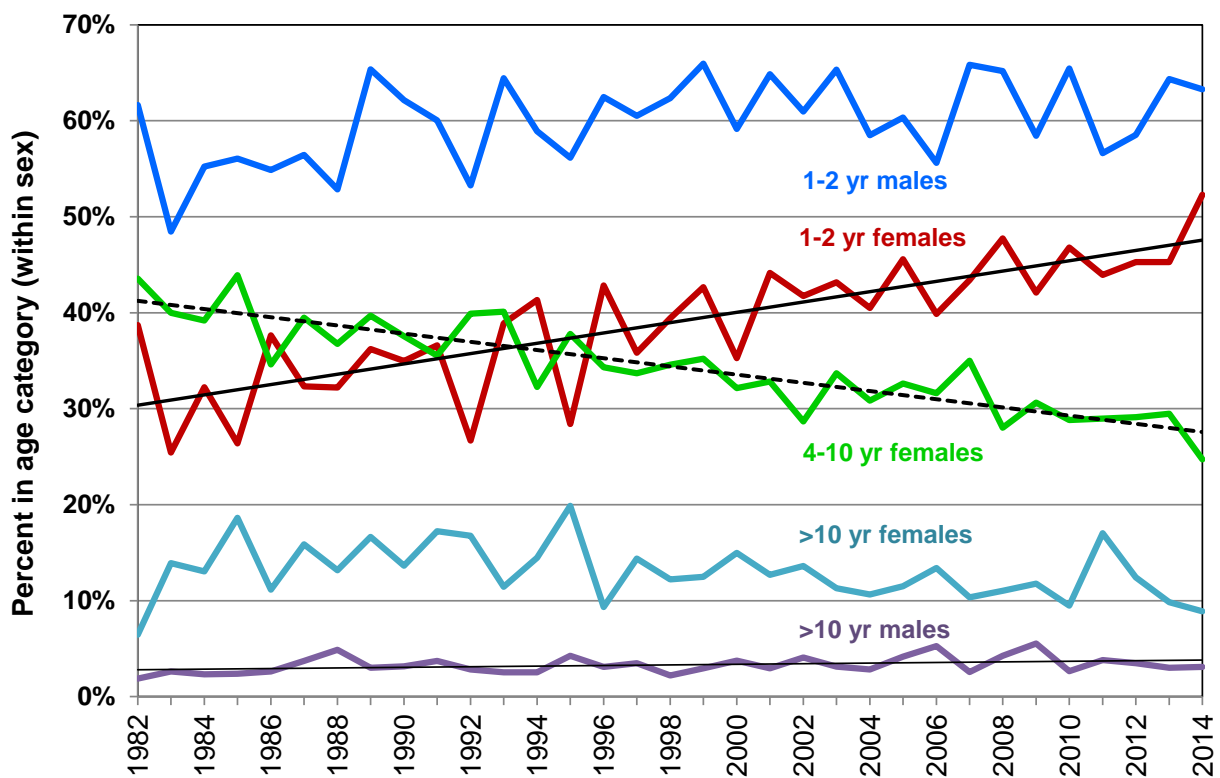


Fig. 10. Percent of hunters submitting bear teeth for aging (now vital for population reconstruction, see Fig. 12). Cooperation levels exceeded 80% when registration stations were paid to extract teeth (this practice ended in 1993) and when non-compliant hunters were sent a reminder and second tooth envelope (2009).

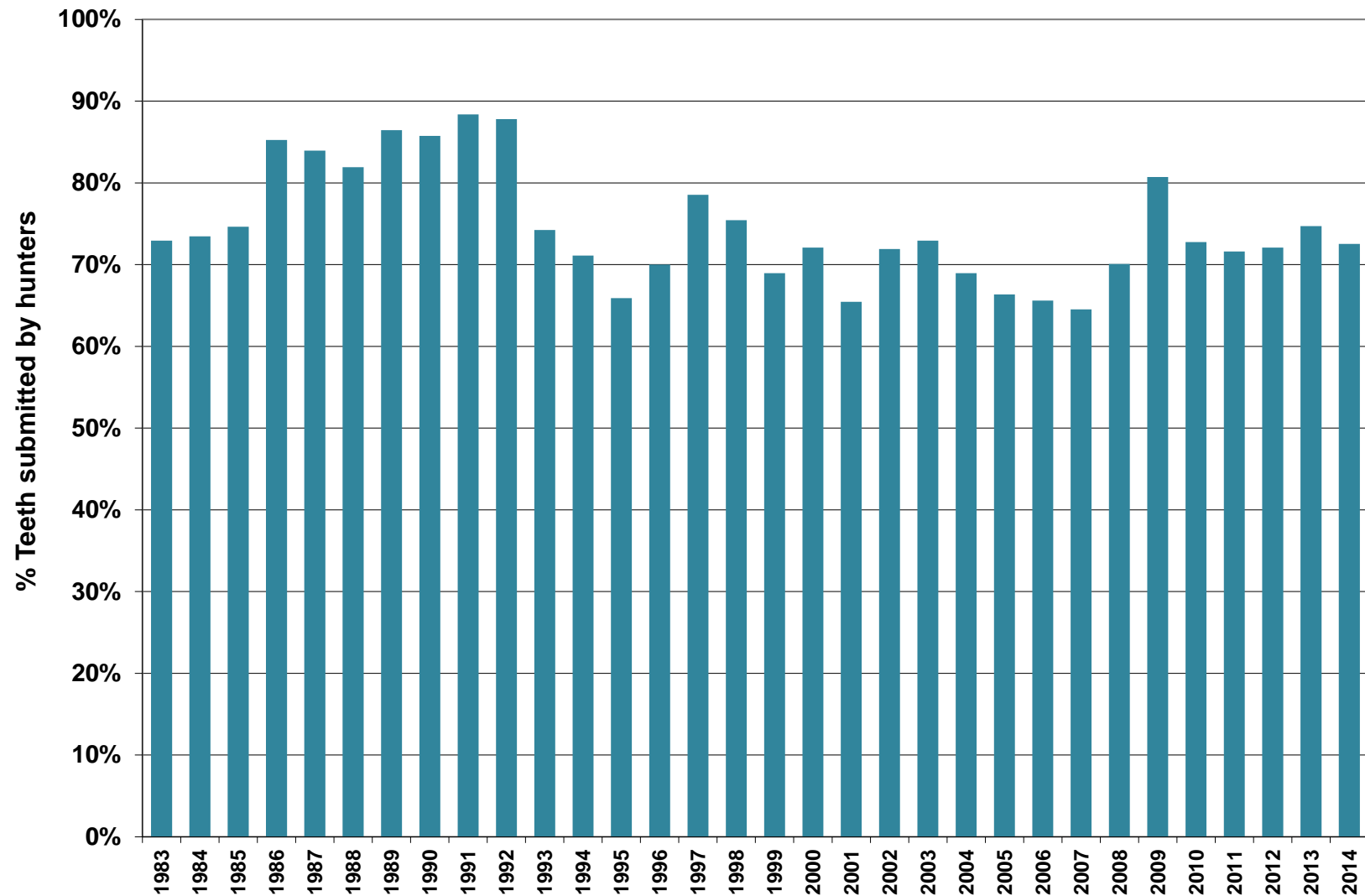


Fig. 11. Percent of hunters who submitted a bear tooth in 2014, by method of registration (top panel) and by BMU (bottom panel). Beginning in 2013, hunters could register their bear by phone or internet.

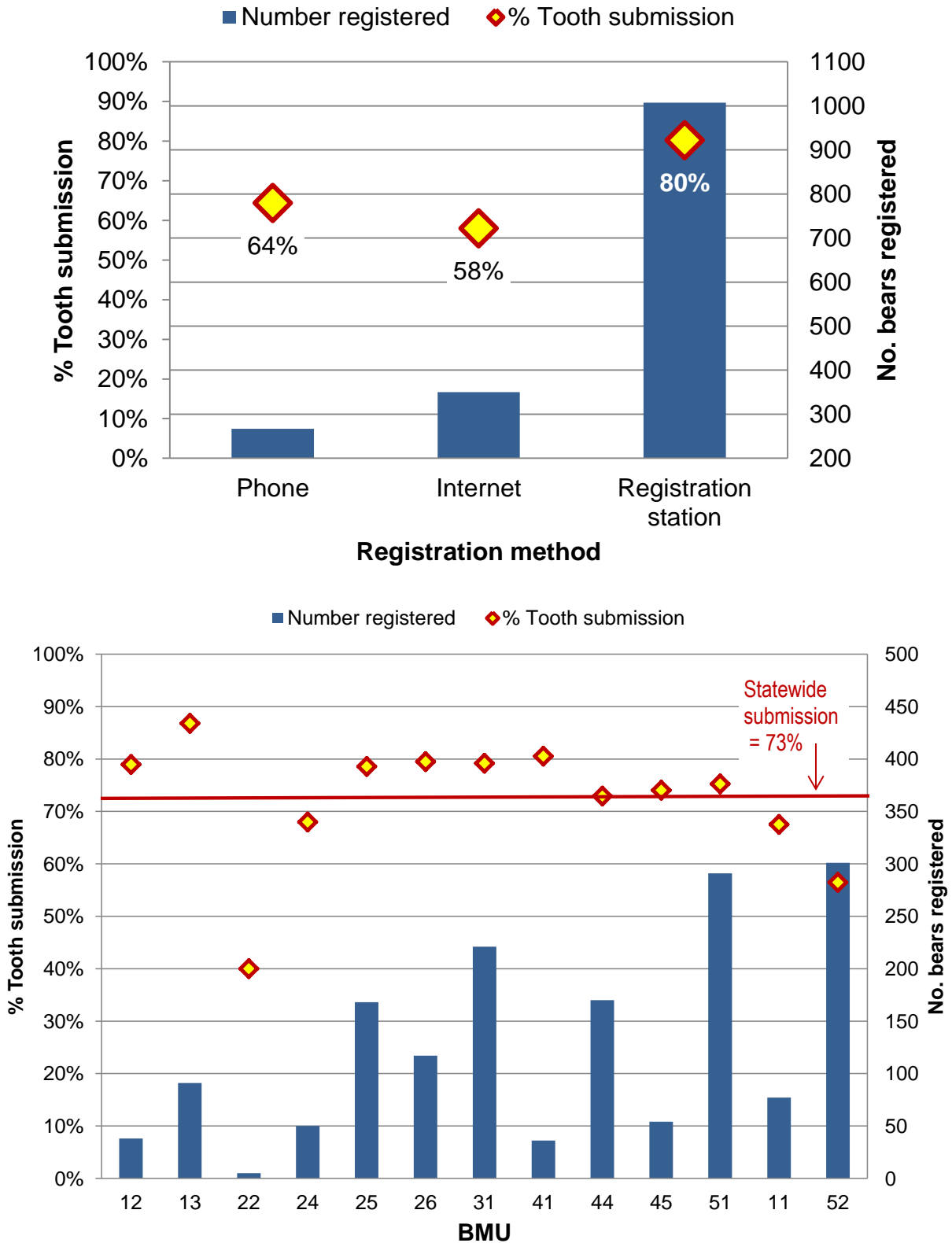


Fig. 12. Statewide bear population trend derived from Downing reconstruction using the harvest age structures from 1980–2014. Curves were scaled (elevated) to various degrees to attempt to match the tetracycline-based mark–recapture estimates. Estimates beyond 2012 are unreliable using 2013 and 2014 data.

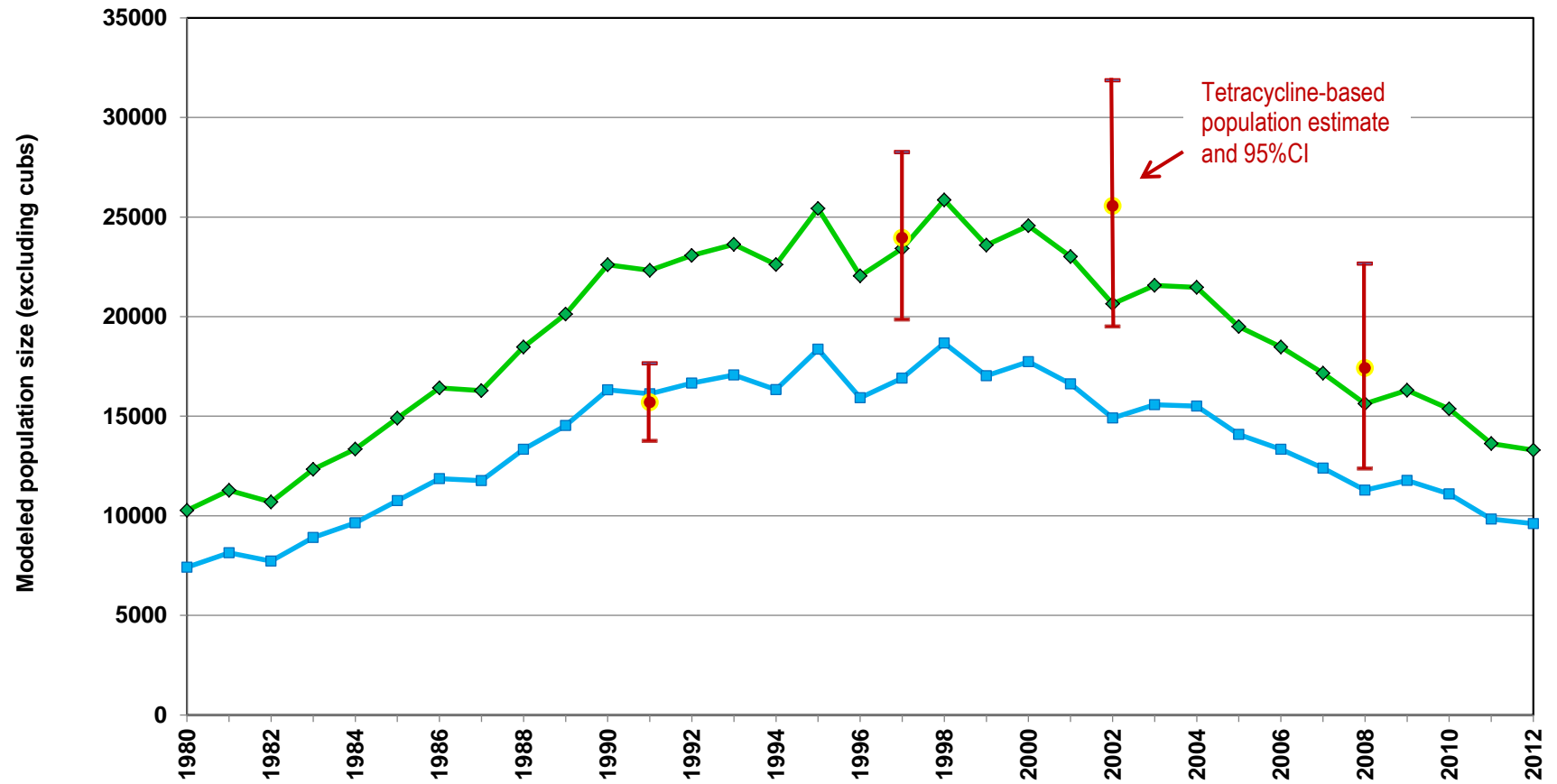


Fig. 13. Trends in proportion of male bears in statewide harvest at each age, 1–10 years, grouped in 5-year time blocks, 1981–2014. Higher harvest rates result in steeper curves. Fitting a line to the data for each time block and predicting the age at which 50% of the harvest is male yields approximately the inverse of the harvest rate (derived rates shown in inset).

