STATUS OF MINNESOTA BLACK BEARS

Final Report to Bear Committee

February 19, 2013

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.

Key points

Table 1 & Fig. 1	Permit applications for bear licenses seem to have stabilized at a higher level during 2010-2012 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.The estimated number of hunters in the field (8,600) was the lowest since 1993. However, the total harvest (2,604) was substantially higher than last year because success rate (30%) was up. Success rate may have increased in part due to reduced numbers of hunters (i.e., competition), and in part due to poorer fall foods.
Tables 2,3 & Fig. 2	This was the second year of a system whereby all available licenses for the quota area were sold (those not purchased by permittees selected in the lottery were purchased later as surplus). Number of available permits was reduced 15% from 2011 to 2012. All BMUs except 22 were reduced. BMU 22 was the only BMU undersubscribed.
Table 4	As permit allocations were significantly reduced in all BMUs over the past 5 years, the percentage of 1st-year applicants drawn in the lottery diminished. In 2008 and 2009, some 1st-year applicants (preference level 1) were drawn in all BMUs. By 2012, 1st – year applicants were not drawn in most BMUs. Less than 50% of 2nd-year applicants were drawn in 3 BMUs (26, 44, 45).
Table 5	Despite 5% fewer hunters statewide compared to 2011, the total harvest was 22% higher. Most of the increased harvest occurred in the southern BMUs: 45, 51, and 52. BMU 52 had a record harvest, likely due both to a high number of hunters and poor natural foods. Northern BMUs 13 and 25 had especially low harvests (lowest since 1996).
Table 6	Hunting success was the highest since 1995 in the quota area as a whole, and notably high in BMUs 24, 26, 31, 51, and 45; it was a record high in BMU 45 (33%, versus previous high of 24% in 1995). The bear population in this BMU appears to be recovering. Also, hunter density was quite low in BMU 45 due to severely reduced permits over the past few years .
Table 7	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 (2012) was normal in that respect, even though the season opened on a Saturday.

Tables 8-9	The number of wildlife and enforcement personnel submitting bear nuisance tally forms each month was higher than in the past few years, possibly because complaints were higher than normal. An unusually high number of complaints were registered shortly after bears emerged from dens in April, and remained high through the year (120-180 each month, May–Aug). The total number of complaints received in 2012 was the highest since 1999 (following a record low in 2011). However, only 16 nuisance bears were killed by private parties (excluding hunters) or DNR personnel, and for the first time, no bears were caught and moved. The number hit by cars was more than double that of 2011, but still half that of the 1990s.
Tables 10-12 & Fig. 3	Wild fruit crops were, overall, the worst documented since the catastrophic food failure of 1995; composite bear food index was well below average in 4 of 5 regions. Summer and fall berries produced poorly, due to erratic weather during May–July. An early warm spring encouraged early and prolific flowering, so early species (e.g., Juneberry and sarsaparilla) produced some fruit, but they dried up early due to heat and lack of moisture in mid-summer. Species flowering slightly later (e.g. cherries, plums) were likely damaged by cool temperatures, wind, and rain during peak flowering that froze flowers and/or prevented effective insect pollination. Blueberries were almost non-existent across the state, except in the far northeast, where snow cover during winter 2011–2012 was adequate to protect buds. Only red oak acorns were abundant across most of the bear range, resulting in near-average fall food indices. Hazel nuts and dogwood berries, also important fall foods, did not produce well.
Fig. 4	Year-to-year variability in the abundance of wild bear foods was much greater during 1984–1996 than in the ensuing 15 years. This year, 2012, was an outlier in that regard. Food abundance was not only low, but was outside the normal range of year-to-year variation since 1997. The reason for lower fruit crop variability in recent years is unknown, but may be related to generally warmer winter and summer temperatures.
Fig. 5	A combination of two key factors, 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 particularly accurate since 2000 ($R^2 = 0.95$). Since then, actual bear harvest has only once differed from predicted harvest by >10%.
Fig. 6	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). In 2011, record high harvest sex ratios (%M) occurred in BMUs 12 & 45. In 2012 BMU 12 continued to have the highest %M in the state (typical of this BMU), whereas BMU 45 had a near equal sex ratio.

Fig. 7-9	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 2.9 years old in 2012, closer to the age of harvested males (2.2 years) than in the past. This declining age structure coincided with both a period of population increase, and then a decline (Fig. 10). Variation in median age within individual BMUs is too great to discern short-term trends. The greatest variation is in the northern BMUs. The southern no-quota area (BMU 52), which likely has the highest harvest pressure, has the most consistent female age structure; ages of harvested females in this area are equivalent to BMU 44 and older than BMU 45.
Fig. 10-11	Ages of harvested bears accumulated over 33 years 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 and reconstructed populations showed an increase during the 1990s, followed by a decline during the 2000s, the shapes of the 2 trajectories differed somewhat. Therefore, it was not possible to exactly match the curve from the reconstruction to all 4 tet-based estimates, so several 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 a heavier harvest in 2009. Reconstructed populations rely on several years of age data, so population estimates for 2011 and 2012 are not yet available.

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 1992–2012.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Permit applications	26428	27365	30127	29922	30405	27353	30245	29384	29275	26824	21886	16431	16466	16153	15725	16345	17362[a]	17571[a]	18647[a]	19184[a]	18103[a]
Permits available	7920	8630	9400	11950	12030	11370	18210	20840	20710	20710	20610	20110	16450	15950	14850	13200	11850	10000	9500	7050[b]	6000
Licenses purchased (total)	8485	9224	9826	12448	12414	11440	16737	18355	19304	16510	14639	14409	13669	13199	13164	11936	10404	9892	9689	9555	8986
Quota area [c]	6845	7528	8125	10304	10592	9655	14941	16563	17021	13632	12350	9833	10063	9340	9169	8905	7842	7342	7086	5684	4951
Quota surplus/military [c]										235	209	2554	1356	1591	1561	526	233	77	83	1385	1070
No-quota area [c]	1640	1696	1701	2144	1822	1785	1796	1792	2283	2643	2080	2022	2238	2268	2434	2505	2329	2473	2520	2486	2965[h]
% Licenses bought																					
Of permits available [d]	86.4	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
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
Estimated no. hunters [e]	7900	8600	9100	11600	11500	10300	14500	15900	16800	15500	13800	13600	12900	12500	12500	11300	9900	9400	9200	9100	8600
Harvest	3175	3003	2329	4956	1874	3212	4110	3620	3898	4936	1915	3598	3391	3340	3290	3172	2135	2801	2699	2131	2604
Harvest sex ratio (%M) [f]	50	56	62	47	62	55	55	53	58	56	61	58	57	59	58	57	62	59	59	61	59
Success rate (%)																					
Total harvest/hunters [g]	40	35	26	43	16	31	28	23	23	29	14	26	26	26	26	28	21	30	29	23	30
Quota harvest/licenses	41	34	26	42	15	29	25	20	20	28	14	25	26	25	25	28	21	30	30	24	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).

[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 (2009 = 45; 2010 = 86; 2011 = 72 [including surplus youth; 2012 = 67]). Youth licenses included here with surplus and military licenses. Total licenses = quota + quota surplus + no-quota + military (no permit needed) + youth.

[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 2011-12, 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 2011-12 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 hunters could take 2 bears. In 2012, 55 hunters took >1 bear (52 took 2 bears on NQ license, 2 hunters took 1 bear on NQ + 1 on quota license, 1 took 2 bears on NQ and 1 on quota license): thus, the 2604 bears were taken by 2548 different hunters, so success = 2548/8600 = 30%.

[h] Record high number of no-quota area licenses purchased (cannot distinguish where they hunted: BMUs 11, 11b, 52).

Fig. 1. Relationship between licenses sold and hunting success (note inverted scale) in quota zone, 1987–2012 (non-quota zone first partitioned out in 1987). Number of licenses explains 31% of variation in hunting success during this period (P = 0.003). Large variation in hunting success is also attributable to food conditions.

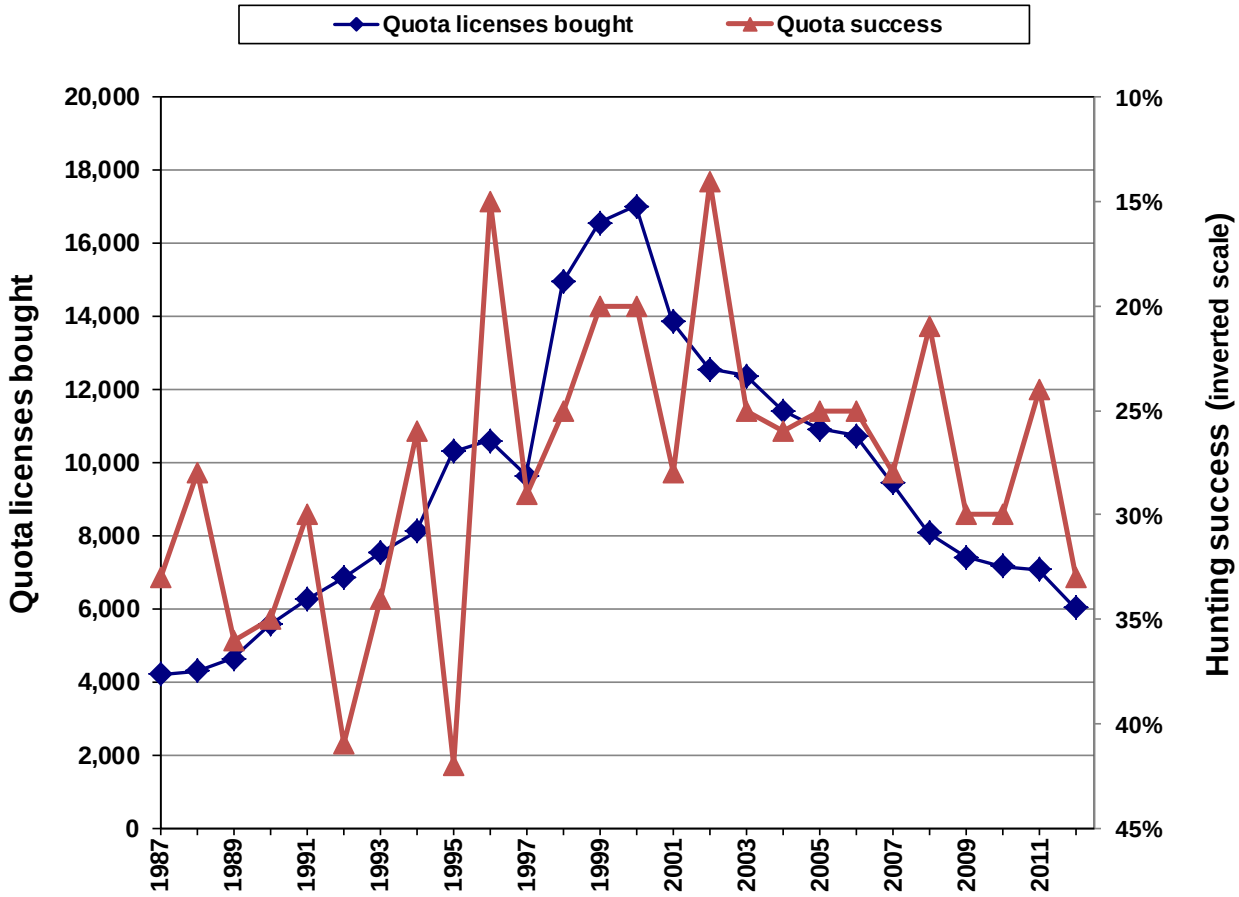

Fig. 2. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU, whereas no-quota hunters can hunt anywhere within that zone.

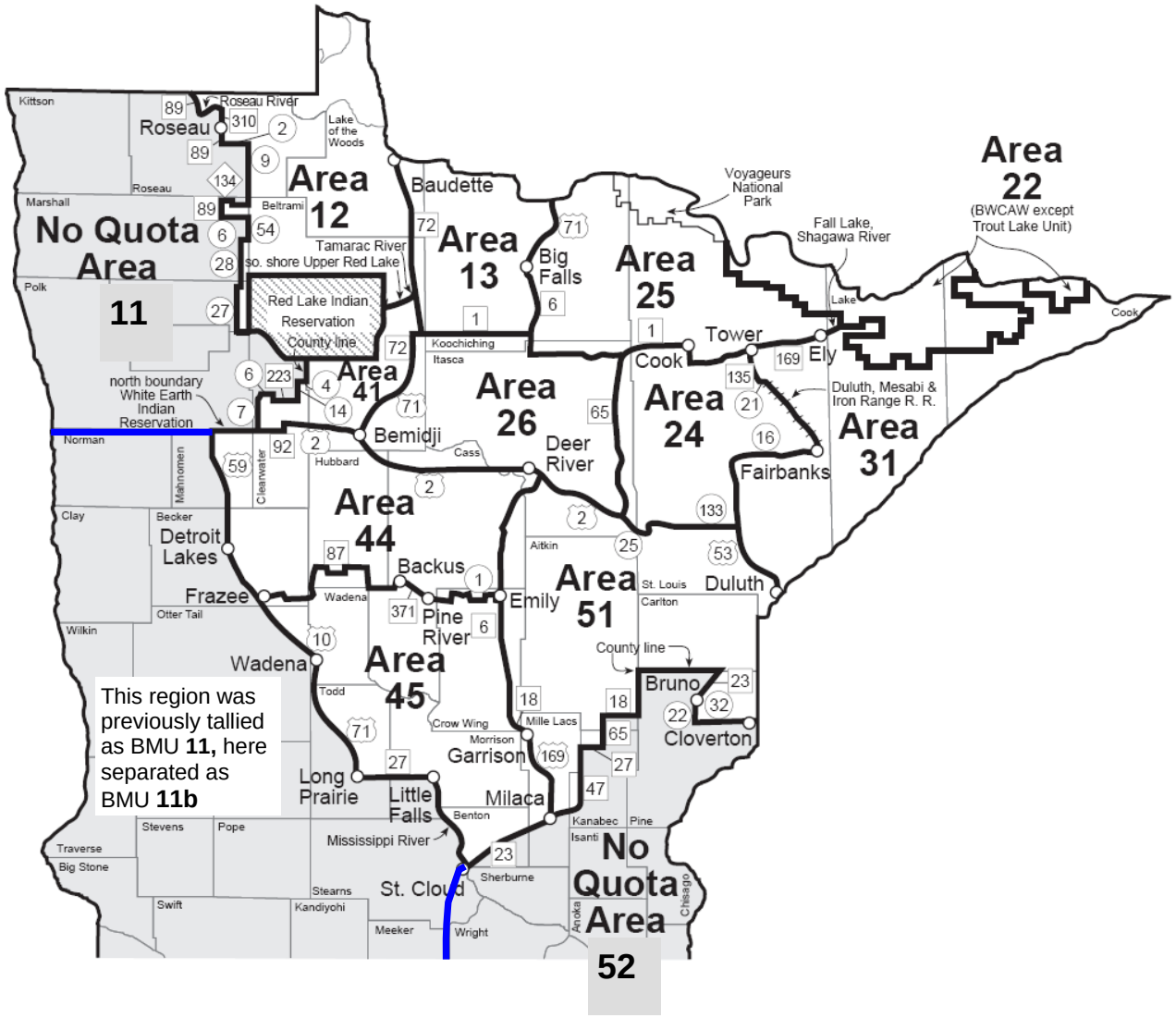

Table 2. Number of bear hunting quota area permits available, 2008–2012 (aligned with permit applications in Table 3 below; highlighted values show drop from previous year).

BMU	2012	2011		2010	2009	2008
		After reduct.[a]	Before reduct.			
12	300	350	450	450	450	450
13	400	450	600	600	600	650
22	100	100	125	100	150	150
24	300	350	500	550	650	750
25	850	900	1200	1200	1250	1550
26	550	650	900	900	1000	1150
31	900	1000	1300	1300	1300	1700
41	250	300	400	400	400	400
44	700	850	1100	1100	1100	1350
45	200	250	400	400	600	1000
51	1450	1850	2500	2500	2500	2700
Total	6000	7050	9475	9500	10000	11850

[a] In 2011, under a new procedure, 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, permits were allocated based on what had been offered in 2011.

Table 3. Number of bear hunting permit applicants and surplus licenses bought, 2008–2012[a]. Shaded values indicate undersubscribed areas (applications < permits available).

BMU	2012			2011[b]			2010		2009		2008	
	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Surplus	Apps	Surplus	Apps	Surplus
12	813	244	60	834	267	84	903	5[c]	876		857	
13	719	325	76	751	366	84	753		700		709	
22	83	56	43	90	71	31	114		91	0[d]	85	50
24	888	253	47	918	294	56	971		843		825	
25	1625	713	137	1763	712	190	1811	5[c]	1694		1793	4[c]
26	1666	458	92	1894	512	139	1959		1874		1999	2[c]
31	2406	758	146	2505	826	174	2414		2423		2388	3[c]
41	592	208	42	688	253	47	718		685		656	
44	2619	612	88	3010	697	154	2923		2787		2821	
45	1135	170	30	1019	208	42	937		941		873	128
51	3650	1154	296	4086	1478	372	3950	1[c]	3822		3828	
Total[e]	16196	4951	1057	17558	5684	1373	17453		16736		16834	178

[a] Surplus licenses available beginning in 2001. This was discontinued in 2009 and replaced by 2nd choice lottery applicants.
[b] In 2011-12, 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] No 2nd choice applicants bought a license for BMU 22, so it remained undersubscribed.
[e] 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 lottery applicants with preference level 1 (1st-year applicants) who were drawn for a bear permit, 2008–2012. 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	2012		2011		2010		2009	2008
	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1	Pref 2	Pref 1	Pref 1
12	0	80	2		23		29	37
13	33		51		77		84	92
22	100		100		88		100	100
24	0	75	14		49		75	91
25	28		35		60		72	86
26	0	49	0	77	15		32	43
31	0	84	11		35		43	68
41	0	86	6		31		37	47
44	0	28	0	55	0	90	3	26
45	0	29	0	67	24		61	100
51	1		25		52		58	67

Table 5. Minnesota bear harvest tally[a] for 2012 by Bear Management Unit (BMU) and sex compared to harvests during 2007–2011 and record high harvests.

	2012											
BMU	M	(%M)	F	U	**Total**	**2011**	**2010**	**2009**	**2008**	**2007**	**5 year mean**	**Record high harvest** (yr)
Quota												
12	58	(71)	24	0	82	106	95	140	101	124	113	263 (01)
13	68	(61)	44	0	112[f]	119	155	149	129	163	143	258 (95)
22	3	(38)	5	0	8	11	9	7	7	15	10	41 (89)
24	57	(53)	51	0	108	122	124	151	100	134	126	288 (95)
25	133	(52)	121	0	254[f]	317	307	344	298	369	327	584 (01)
26	148	(62)	90	0	238	167	232	228	137	315	216	513 (95)
31	220	(61)	143	0	363	358	363	384	248	398	350	697 (01)
41	42	(60)	28	0	70	54	71	104	77	104	82	201 (01)
44	102	(54)	86	0	188	130[d]	248	255	196	333	232	643 (95)
45	33	(49)	34	0	67	32[d]	58	42	72	113	63	178 (01)
51	284	(60)	187	0	471	288[e]	501	416	344	557	421	895 (01)
Total	1148	(59)	813	0	1961	1704[f]	2163	2220	1709	2625	2084	4288 (01)
11	155	(69)	69	0	224	219	178	315	172	324	242	351[h] (05)
11b	9	(64)	5	0	14	3	11	9	3	4	6	
52	218	(54)	187	0	405[c]	205[g]	347	257	251	219	256	400 (06)
Total	382	(59)	261	0	643	427	536	581	426	547	503	678 (95)
State	1530	(59)	1074	0	**2604**	2131	2699	2801	2135	3172	2588	4956 (95)

[a] Hunters receive tooth envelopes at registration stations, but the sex recorded on tooth envelopes sometimes differs from the registered sex (2011: 1450 [97%] unchanged; 12 $M_{(reg)} \rightarrow F_{(tooth)}$; 38 F→M; 2012: 1821 [98%] unchanged; 15 $M_{(reg)} \rightarrow F_{(tooth)}$; 28 F→M). Sex shown on table is the registered sex because only ~70% of tooth envelopes are submitted (2011: 1535 of 2131 = 72%; 2012: 1897 of 2604 = 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 and 2012.

Year	Quota area	No-quota area
2007	27	9
2008	23	4
2009	19	14
2010	20	8
2011	11	2
2012	6	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 (*n* = 27 in 2007, 14 in 2008, 3 in 2009, 14 in 2010, 14 in 2011, 8 in 2012). 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.

[c] Record high harvest.

[d] Lowest harvest since BMU was established in 1994.
[e] Lowest harvest since 1991.
[f] Lowest harvest since 1996.
[g] Lowest harvest since 2002.

[h] Estimated registered harvest, including those in which registration data were lost and no tooth envelope was received.

Table 6. Bear hunting success (%) by BMU, measured as the registered harvest (excluding second bear) divided by the number of licenses sold[a], 2007–2012.

BMU	Max success (yr) (excl 2012)		Mean success 2007-2011	2012	2011	2010	2009	2008	2007
12	49	(95)	33	27	30	30	39	32	36
13	59	(95)	30	28	26	34[c]	32	28	31
22	21	(92)	13	8	11	14	16[c]	8	14
24	45	(92)	27	36[e]	35[e]	29	31[d]	20	20
25	47	(92)	33	30	35	34	36	28[f]	31
26	59	(95)	29	43[d]	26	34	31	17[f]	36
31	55	(92)	32	40[d]	36	36	38[c]	21[f]	28
41	50	(95)	28	28	18	25	34	27	35
44	43	(95)	25	27	15[f]	28	30	21	30
45	24	(95)	14	33[b]	13	21[d]	11[f]	11[f]	14
51	37	(95)	22	32[d]	16[f]	27	23	19	27
Quota	42	(95)	27	33[d]	24	30	30	21	28
No Quota[g]	35	(95)	19	20	15[f]	20	22	17[f]	19
Statewide	40	(95)	25	28	22	27	28[c]	20	26

[a] Harvest/licenses instead of harvest/hunters because BMU-year-specific estimates for the proportion of license-holders that hunted are unreliable. 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] Success rates in different parts of the no-quota area (Fig. 1) are not distinguishable from harvest records because the number of people that hunted in each BMU is unknown. However, a hunter survey conducted following the 2009 hunting season indicated the following success rates: BMU 11 – 42%; BMU 11b – 17%; BMU 52 – 19%. These values are not directly comparable to values tabulated here due to a non-response bias in the survey (non-successful hunters are less likely to respond; respondents indicated overall success rate of 31% vs 22% calculated from harvest/licenses); nevertheless, they reflect differences in success rates among these BMUs that year (notably a year when harvest was high in BMU 11).

Table 7. Cumulative bear harvest (% of total harvest) by date, 1992–2012.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
1992	Tue		72	86	96
1993	Wed		67	80	94
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

[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, 1992–2012.

	Apr	May	Jun	Jul	Aug	Sep	Oct
1992	74	79	81	85	83	74	62
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 [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

[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 1992–2012, including number of nuisance bears killed and translocated, and bears killed in vehicular collisions.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number of personnel participating in survey [a]	85	88	88	83	84	69	71	52	60	54	50	39	34	42	46	46	37	51	40	34	56
Complaints examined on site	1562	1010	696	1568	337	661	226	189	105	122	75	81	75	61	57	63	59	65	70	37 [h]	113
Complaints handled by phone [b]					959	2196	743	987	618	660	550	424	507	451	426	380	452	535	514	396 [h]	722 [i]
Total complaints received					1296	2857	969	1176	723	782	625	505	582	512	483	443	511	600	584	433 [h]	835
• % Handled by phone					74%	77%	77%	84%	85%	84%	88%	84%	87%	88%	88%	86%	88%	89%	88%	91%	86%
Bears killed by:																					
• Private party or DNR	187	111	67	232	27	93	31	25	25	22	12	13	25	28	11	21	22	23	22	9 [h]	16
• Hunter before season [c]																					
– from nuisance survey	38	21	28	81	6	32	23	5	7	4	0	3	3	6	2	18	3	4	3	3	11
– from registration file	52	30	25	138	18	35	31	24	43	20	11	8	4	13	6	25	5	15	10	5	12
• Hunter during/after season [d]	19	8	3	13	0	4	3	0	1	1	0	0	0	1	0	0	0	0	0	0	0
• Permittee [e]	28	6	3	57	4	7	11	7	2	6	4	6	1	5	4	5	1	3	5	0	0 [j]
Bears translocated	342	180	171	295	64	115	24	29	1	6	3	1	3	3	3	1	3	2	2	2	0
• % bears translocated [f]	22	18	25	19	19	17	11	15	1	5	4	1	4	5	5	2	5	3	3	5	0
Bears killed by cars [g]	90	54	40	68	42	52	61	60	39	43	26	25	16	22	18	20	27	18	28	15 [h]	33

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 2005-2011 are either from the forms or from the confiscation records, whichever was greater (they differed very little).

[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.

[l] 120-180 calls in each month, May–Aug.

[j] 12 permits issued, but no bears killed.

Table 10. Bear food index values for five survey areas (see map in lower right) in northern Minnesota's bear range, 1984–2012. Shaded boxes denote particularly low (<45; pink) and high (≥70; green) fruit abundance.

	Survey Area					
Year	NW	NC	NE	WC	EC	Entire Range[a]
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

[a] Values represent the sums of mean statewide index values for 14 species surveyed. Means were calculated using all surveys completed in the state, not by averaging values from the 5 food survey areas.

Fig 1. Boundaries of Minnesota's 5 bear food survey areas.

Table 11. Index values of bear food abundance[a] in 2012 compared to the previous 28-year mean (1985–2011) in 5 survey areas across Minnesota's bear range. Shaded values indicate particularly low (pink) and high (green) fruit abundance (≥1 point difference for individual foods; ≥5 points difference for composite scores).

	NW		NC		NE		WC		EC		Entire Range	
FRUIT	28yr mean	2012 *n* =20[b]	28yr mean	2012 *n* = 15	28yr mean	2012 *n* = 8	28yr mean	2012 *n* = 14	28yr mean	2012 *n* = 9	28yr mean	2012 *n* =45[b]
SUMMER												
Sarsaparilla	4.5	4.8	5.9	5.6	5.4	5.4	4.7	4.5	5.7	2.4	5.1	4.2
Pincherry	3.2	2.5	4.4	2.3	4.1	3.2	3.9	3.1	3.8	2.4	3.9	2.7
Chokecherry	5.5	4.2	5.3	3.1	4.4	3.5	5.5	3.3	4.7	2.9	5.2	3.7
Juneberry	4.9	4.6	4.7	6.0	4.8	7.0	3.8	3.8	4.0	2.6	4.4	4.3
Elderberry	1.4	1.2	3.2	1.5	3.6	4.5	3.2	1.4	3.4	0.8	3.0	2.1
Blueberry	5.0	1.2	5.4	1.7	4.9	2.6	3.7	1.8	3.7	2.3	4.4	1.8
Raspberry	6.6	6.4	8.1	7.1	8.0	6.0	7.1	5.4	7.1	5.0	7.3	5.9
Blackberry	1.3	1.5	2.3	2.5	1.0	1.3	3.5	3.1	4.3	4.0	2.9	2.9
FALL												
Wild Plum	2.1	2.0	1.8	1.3	1.0	1.0	2.6	1.8	2.4	2.3	2.1	1.7
HB Cranberry	5.2	3.0	4.4	2.6	3.6	4.6	3.7	2.7	3.6	2.2	4.0	2.9
Dogwood	6.0	3.3	5.8	3.6	5.0	5.2	5.8	3.9	6.0	1.3	5.7	3.5
Oak	3.4	6.4	2.9	5.0	1.6	3.0	5.8	7.1	5.8	6.7	4.3	6.2
Mountain Ash	1.5	1.4	2.6	1.1	4.6	4.7	1.8	1.2	2.2	1.6	2.6	2.1
Hazel	6.3	6.7	7.7	6.9	7.3	7.5	8.1	7.5	7.9	5.0	7.4	6.7
TOTAL	56.9	49.1	64.7	50.3	59.1	59.4	63.1	50.5	64.5	41.5	62.2	50.7

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

[b] *n* = Number of surveys used to calculate each area-specific mean index value for 2011.

[C] Sample size for the entire bear range does not equal the sum of the sample sizes of the 5 areas because some surveys were conducted on the border of 2 or more areas and were included in tabulations for each area.

Table 12. Regional productivity indices (summed) for oak, hazel, and dogwood, 1984 – 2012. Shaded blocks indicate particularly low (≤ 5.0, yellow) or high (≥8.0, tan) fall food productivity.

Year	Survey Area					Entire Range[a]
	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

[a] This value represents the sum of mean statewide productivity index values for hazel, oak, and dogwood. Means were calculated using all surveys completed in the state, not by averaging values from the 5 food survey areas.

Fig. 3. Productivity of key fall bear foods in Minnesota's bear range, 2012.

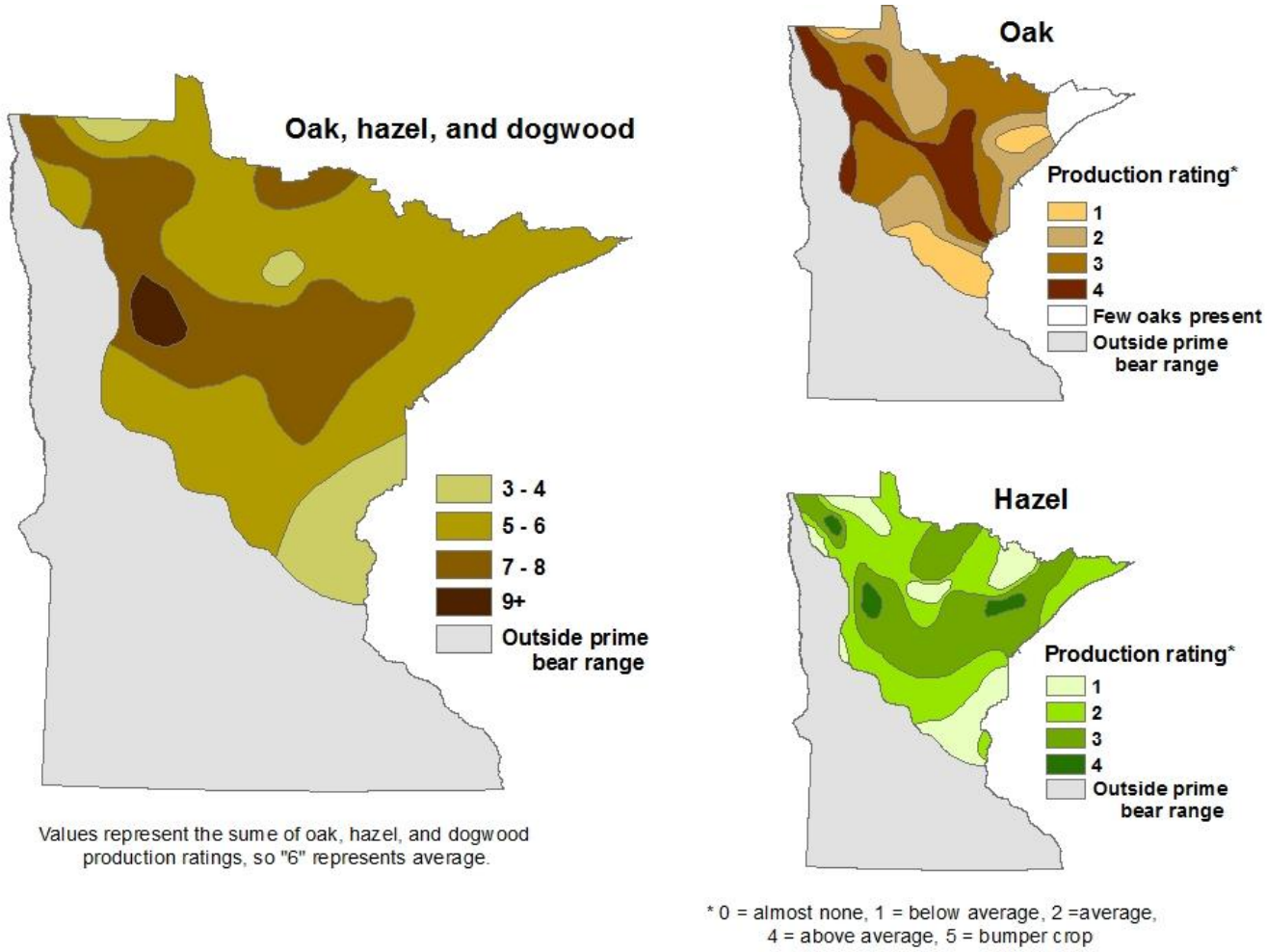

Fig 4. Summed bear food index (from Table 10) across Minnesota's bear range, comparing range of year-to-year variability during 1984–1996 versus 1997–2011, and 2012.

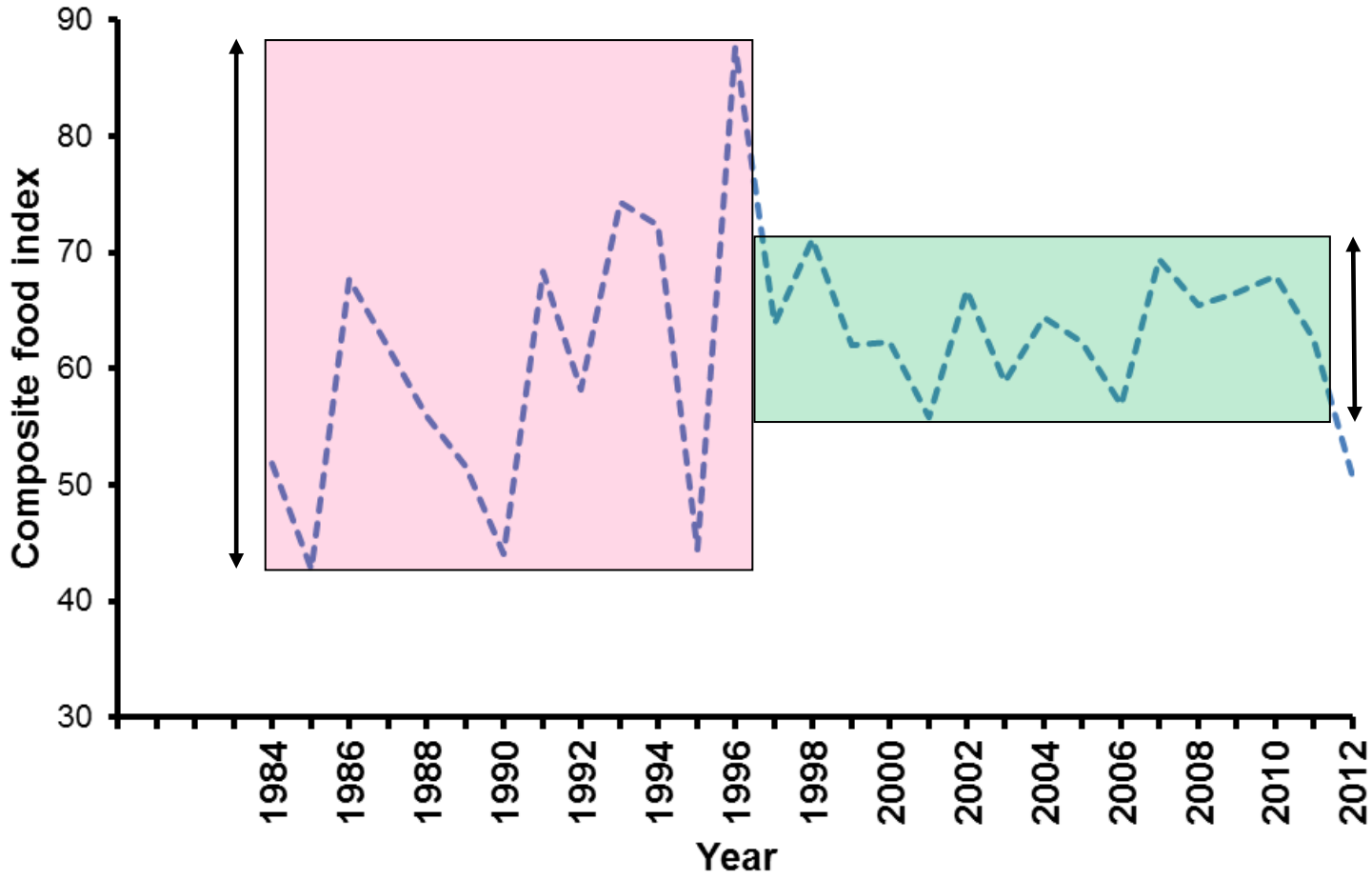

Fig 5. Number of bears harvested vs. number predicted based on fall food abundance and the number of hunters: (top graph) 1984–2012 (R^2=0.84); (bottom graph) 2000–2012 (R^2=0.95).

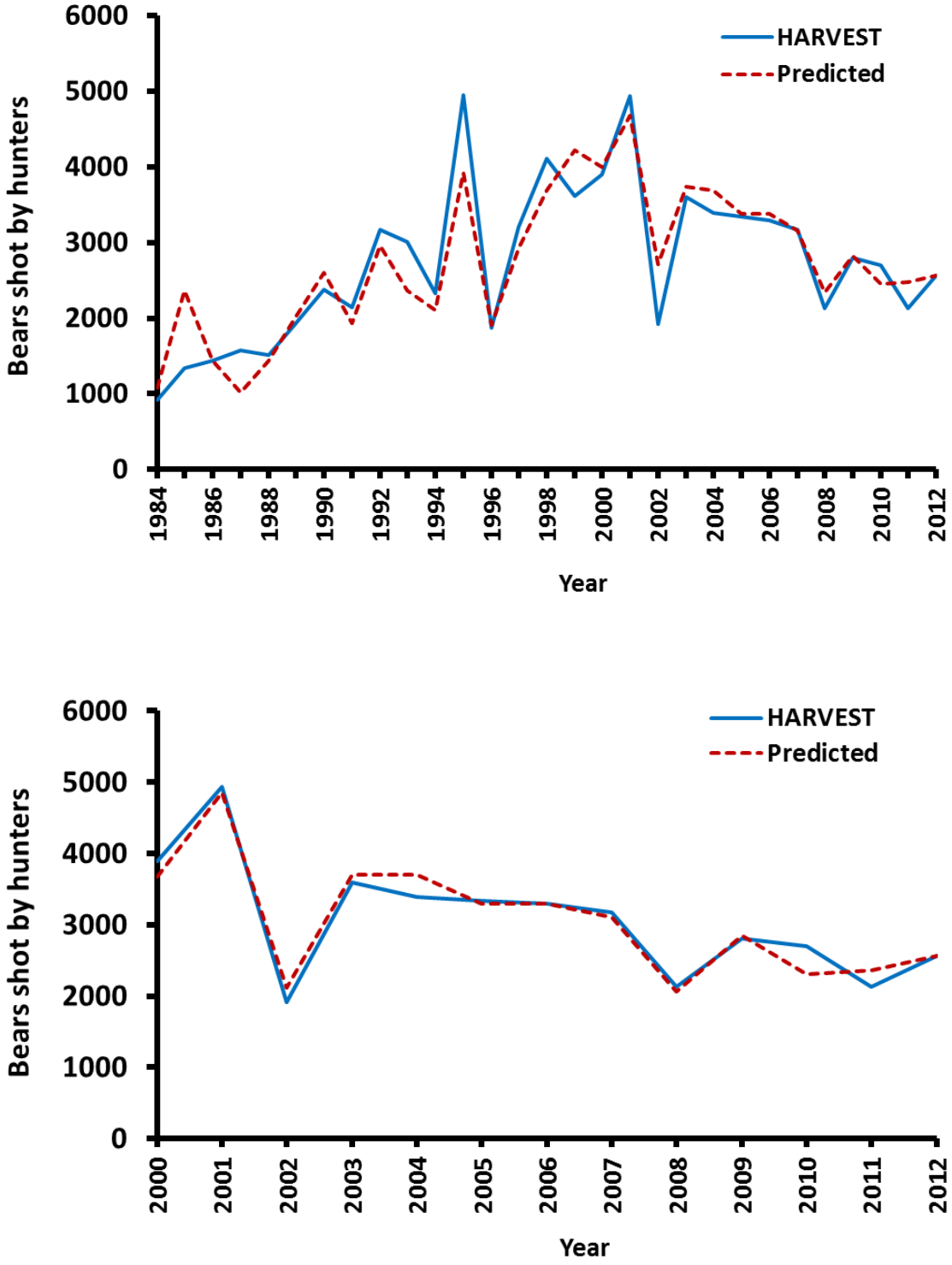

Fig 6. Sex ratios of harvested bears by BMU, 2006–2012.

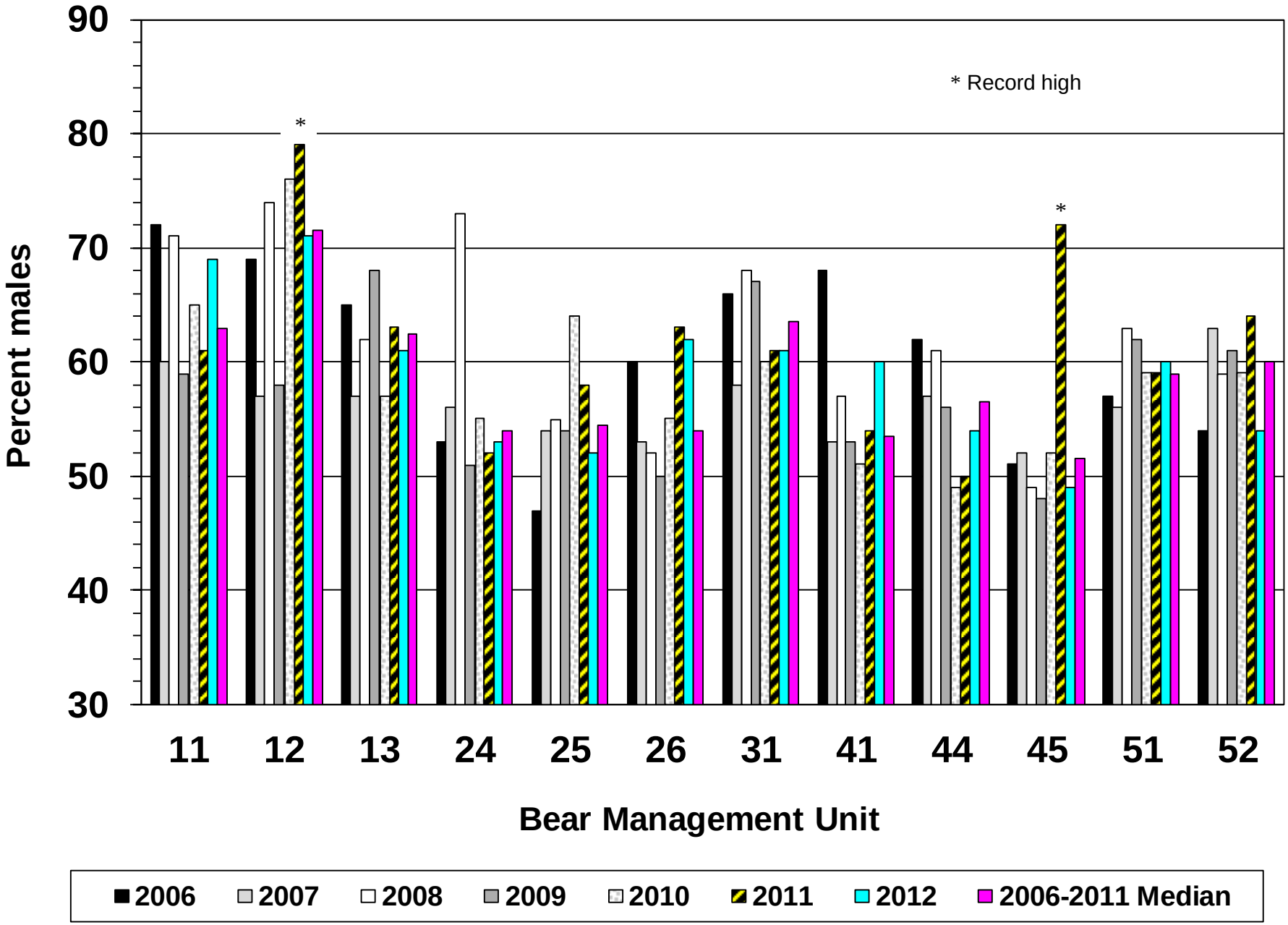

Fig 7. Median ages of harvested bears by BMU, 2006–2012.

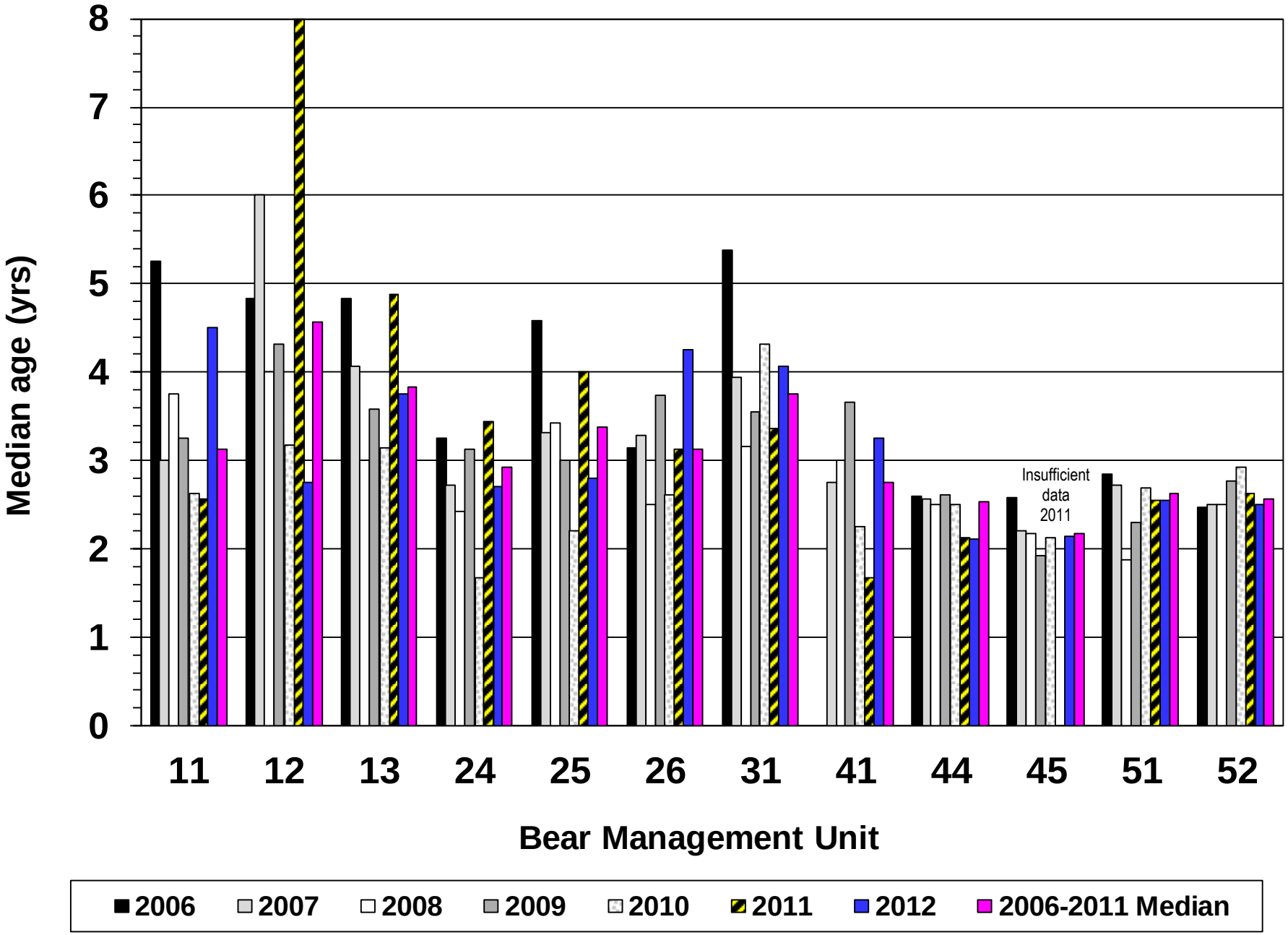

Fig. 8. Statewide harvest structure: median ages (yrs) by sex, 1982–2012.

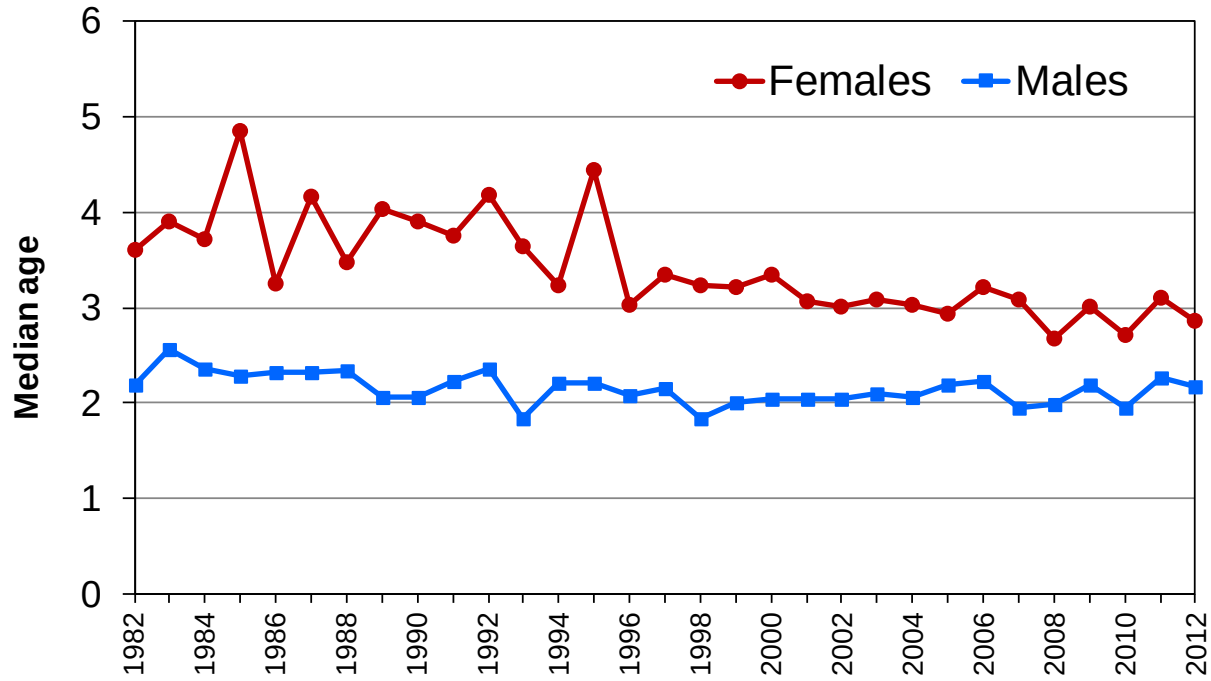

Fig. 9. Statewide harvest structure: proportion of each sex in age category, 1982–2012. Trend lines are significant.

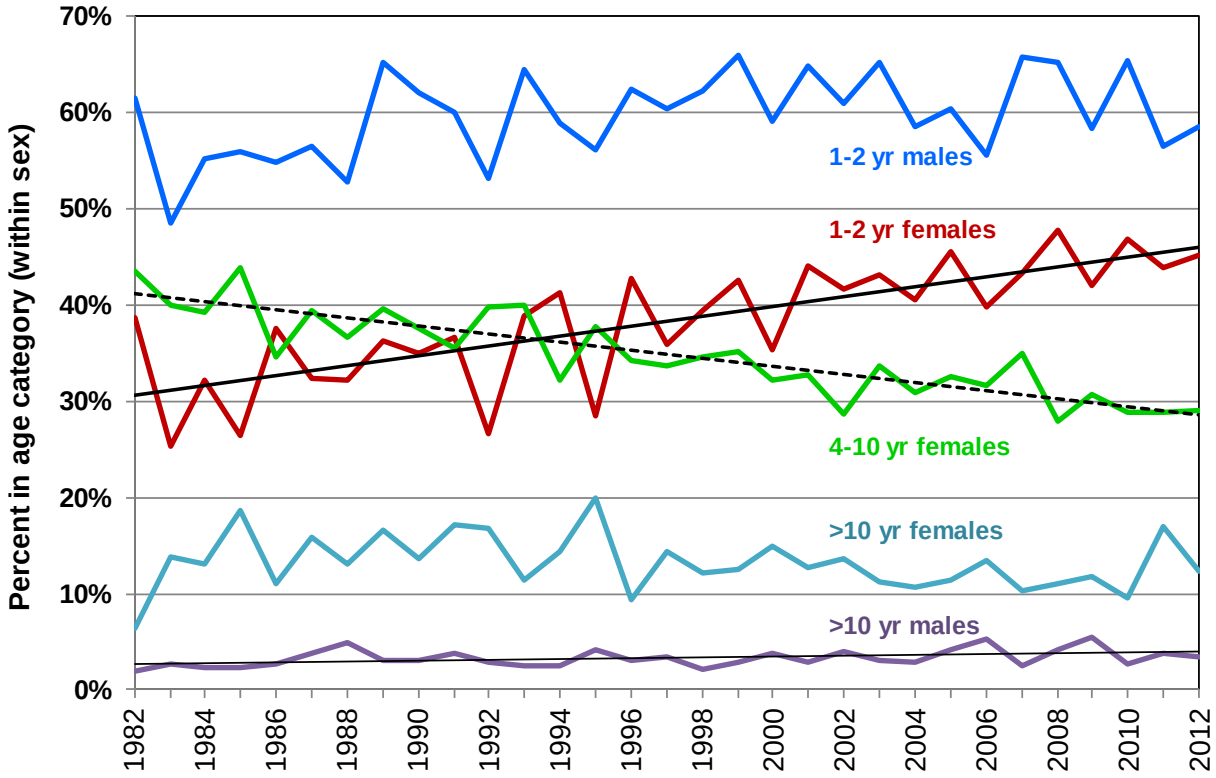

Fig. 10. Statewide population trend derived from Downing reconstruction using the harvest age structures from 1980−2012. Curves were scaled (elevated) to various degrees to match the tetracycline-based mark–recapture estimates.

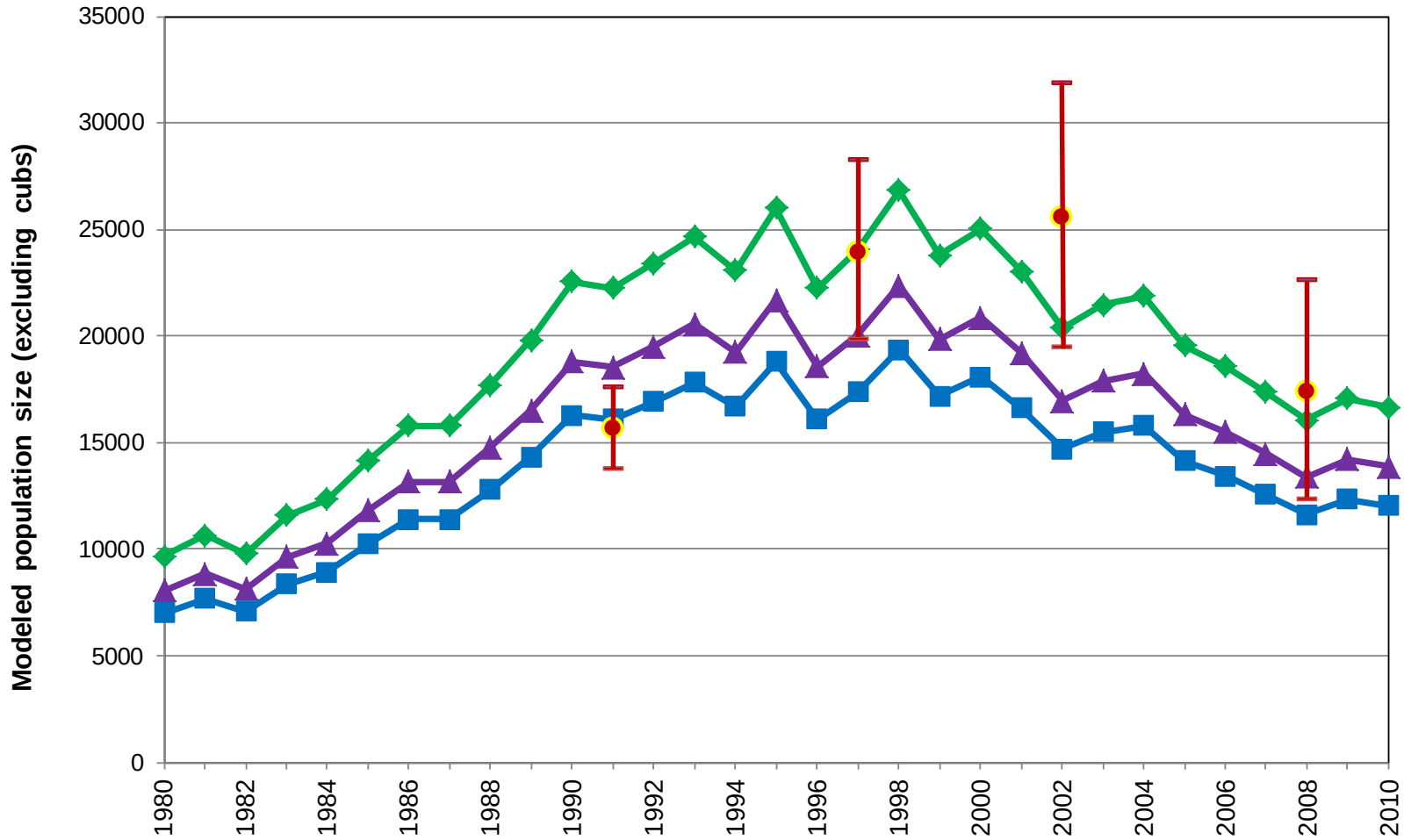

Fig. 11. Statewide population trend derived from Downing reconstruction versus total harvest and harvest as a percent of reconstructed population size. The reconstructed population consists only of bears eventually harvested, not bears that died of other causes. Thus, the actual population size is larger than the reconstructed population.