STATUS OF MINNESOTA BLACK BEARS, 2011

Final Report to Bear Committee

February 13, 2012

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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

Table 1 & Fig. 1	Permit applications for bear licenses in 2011 increased to the highest level in 9 years. This may have been in response to the diminished number of permits available. The estimated number of hunters in the field (9,100) was equal to that of 1994, and not much different than 2010 (9,200). However, the total harvest (2,131) was lower because success rate (23%) was low. Success rate is generally higher with reduced numbers of hunters, but declines with abundant natural foods. Harvest sex ratios of >60% male (the case this year) tend to be indicative of abundant natural foods.
Tables 2 & Fig. 2	Normally, >25% of quota area licenses are not purchased, and this is factored into the allocation of permits. However, a new procedure was established this year to ensure that all licenses that were not purchased by permittees would be available for purchase by unsuccessful lottery applicants. Accordingly, permits were reduced in all areas by about 25% so the number of hunters would remain about the same. Prior to this reduction, permits were reduced in only one area (BMU 24).
Table 3	Only BMU 22 (BWCAW) was undersubscribed. However, all quota areas had unpurchased licenses, which went on sale Aug 4. All (1,373) were purchased within 24 hours.
Table 4	As permit allocations were significantly reduced in all BMUs over the past 5 years, the percentage of applicants drawn in the lottery diminished. In 2011, >50% of 1st-year applicants were selected in only 2 BMUs (13, 22). Three BMUs (26, 44, 45) required a drawing among 2nd-year applicants (55–77% were selected).
Table 5	Harvests were equivalent to the previous 5-year average in 3 BMUs (11, 12, 22) and lower than average in all other BMUs. Especially low harvests occurred in the southern BMUs: 44 & 45 (lowest since these were established in 1994), 51 (lowest since 1991), and 52 (lowest since 2002).
Table 6	Hunting success was much higher in the northern parts of the bear range than in the southern parts of the range. Success rates <20% occurred in BMUs 41, 44, 45 & 51, whereas success ≥30% occurred in BMUs 12, 24, 25 & 31. BMU 24 had the highest hunter success since 1992. Conversely, BMUs 44 and 51 had the lowest success since 2002. Hunting success varies geographically and year-to-year with abundance of natural foods, hunter density, and bear density.
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. These percentages tend to be lower during years with more abundant fall foods. In 2011, 65% and 78% of the harvest occurred after weeks 1 and 2, respectively.

Tables 8-9	The number of wildlife and enforcement personnel submitting bear nuisance tally forms each month was low, probably because complaints were very low. For the first time since records have been kept on both phoned-in complaints as well as on-site visits, >90% of complaints were handled by phone. Only 37 complaints prompted an on-site visit, the lowest recorded since this survey began in 1981. Likewise, a record low number of nuisance bears (n=9) were reported killed by DNR personnel or private parties (other than hunters) this year, and a record low number were killed in car collisions.
Tables 10-12 & Fig. 3	Blueberry and raspberry production were lower than normal in the northwest and north-central parts of the state. Other summer foods were variable, but tended to be near normal overall. Fall foods (particularly oak and dogwood) were highly productive in the east-central (EC) and west-central (WC) regions, explaining the low hunting success there. Surprisingly, though, hunting success was even lower than in 2008 in most of this area (BMUs 41, 44 & 51), yet the fall food index (combined ratings for oak, hazel and dogwood) in 2011 was equivalent to 2008 in the WC and lower than 2008 in the EC. However, a strong band of fall foods cut through those BMUs with especially low hunting success. Notably, hunting success in each of these BMUs was not nearly as low as in 2002, when the fall food index was especially high. Abundance of fall foods does not seem to explain this year's high hunting success in BMU 24.
Fig. 4	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 and 95% of the variation in harvest since 2000. These regression models predicted a slightly higher harvest in 2011 than actually occurred.
Fig. 5	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 BMU 45, this may be indicative of a population recovery attributable to reduced hunting pressure since 2009. BMU 12 has shown extreme year-to-year swings in harvest sex ratios. BMUs 51 & 52 show the least year-to-year variability.
Fig. 6-8	Statewide, ages of harvested females declined dramatically during the 1980s–90s, as evidenced by a declining median age and increasing proportion of the harvest composed of 1–2 year-olds. However, the trend during the past decade has been equivocal: median age of harvested females has remained at about 3.0 years old (3.1 in 2011) and the proportion of the female harvest composed of 1–2 year olds has remained near 44% (44% in 2011). Male harvest ages have been younger (~60% were 1–2 years old) and less variable. Female harvest ages have been youngest and least variable in the southern BMUs (44, 45, 51, 52). As with harvest sex ratio, extreme variation in harvest ages have occurred in BMU 12 (especially in 2011).

Fig. 9-10	Ages of harvested bears accumulated over 32 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. Therefore, it was impossible to 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. Males and females showed somewhat different trajectories, with female numbers dropping earlier (late 1990s) and more precipitously than males (early 2000s), resulting in a population that is now less female-biased than it was a decade ago. Recent data (2009) shows a possible population increase (due to reduced harvests), but this is uncertain. Reconstructed populations rely on several years of age data, so population estimates for 2010 and 2011 are not yet available.

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 1991–2011.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Permit applications	25890	26428	27365	30127	29922	30405	27353	30245	29384	29275	26824	21886	16431	16466	16153	15725	16345	17362[a]	17571[a]	18647[a]	19184[a]
Permits available	7140	7920	8630	9400	11950	12030	11370	18210	20840	20710	20710	20610	20110	16450	15950	14850	13200	11850	10000	9500	7050[b]
Licenses purchased (total)	7757	8485	9224	9826	12448	12414	11440	16737	18355	19304	16510	14639	14409	13669	13199	13164	11936	10404	9892	9689	9555
Quota area [c]	6257	6845	7528	8125	10304	10592	9655	14941	16563	17021	13632	12350	9833	10063	9340	9169	8905	7842	7342	7086	5684
Quota surplus/military [c]											235	209	2554	1356	1591	1561	526	233	77[c]	83[c]	1385
No-quota area [c]	1500	1640	1696	1701	2144	1822	1785	1796	1792	2283	2643	2080	2022	2238	2268	2434	2505	2329	2473	2520	2486
% Licenses bought																					
Of permits available [d]	87.6	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
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
Estimated no. hunters [e]	7200	7900	8600	9100	11600	11500	10300	14500	15900	16800	15500	13800	13600	12900	12500	12500	11300	9900	9400	9200	9100
Harvest	2143	3175	3003	2329	4956	1874	3212	4110	3620	3898	4936	1915	3598	3391	3340	3290	3172	2135	2801	2699	2131
Harvest sex ratio (%M) [f]	59	50	56	62	47	62	55	55	53	58	56	61	58	57	59	58	57	62	59	59	61
Success rate (%)																					
Total harvest/hunters [g]	30	40	35	26	43	16	31	28	23	23	29	14	26	26	26	26	28	21	30	29	23
Quota harvest/licenses	30	41	34	26	42	15	29	25	20	20	28	14	25	26	25	25	28	21	30	30	24

[a] Includes area 99, a designation to increase preference but not to obtain a license (2008 = 528, 2009 = 835; 2010 = 1194; 2011 = 1626).

[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]). 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 (permits issued more relevant for years when some areas were undersubscribed; see Table 3). 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, 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 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 2001–2011 were calculated as number of successful hunters/total hunters, rather than bears killed/total hunters, because hunters could take 2 bears. In 2011, 52 hunters took >1 bear (49 took 2 bears on NQ license, 2 hunters took 1 bear on NQ + 1 on quota license, 2 took 2 bears on NQ and 1 on quota license): thus, the 2131 bears were taken by 2078 different hunters, so success = 2078/9100 = 23%.

Fig. 1. Relationship between hunter numbers and hunting success (note inverted scale), 1983–2011. Red horizontal lines show mean hunting success for periods with <9000 hunters vs >12,000 hunters. Large variation in hunting success is also attributable to food conditions.

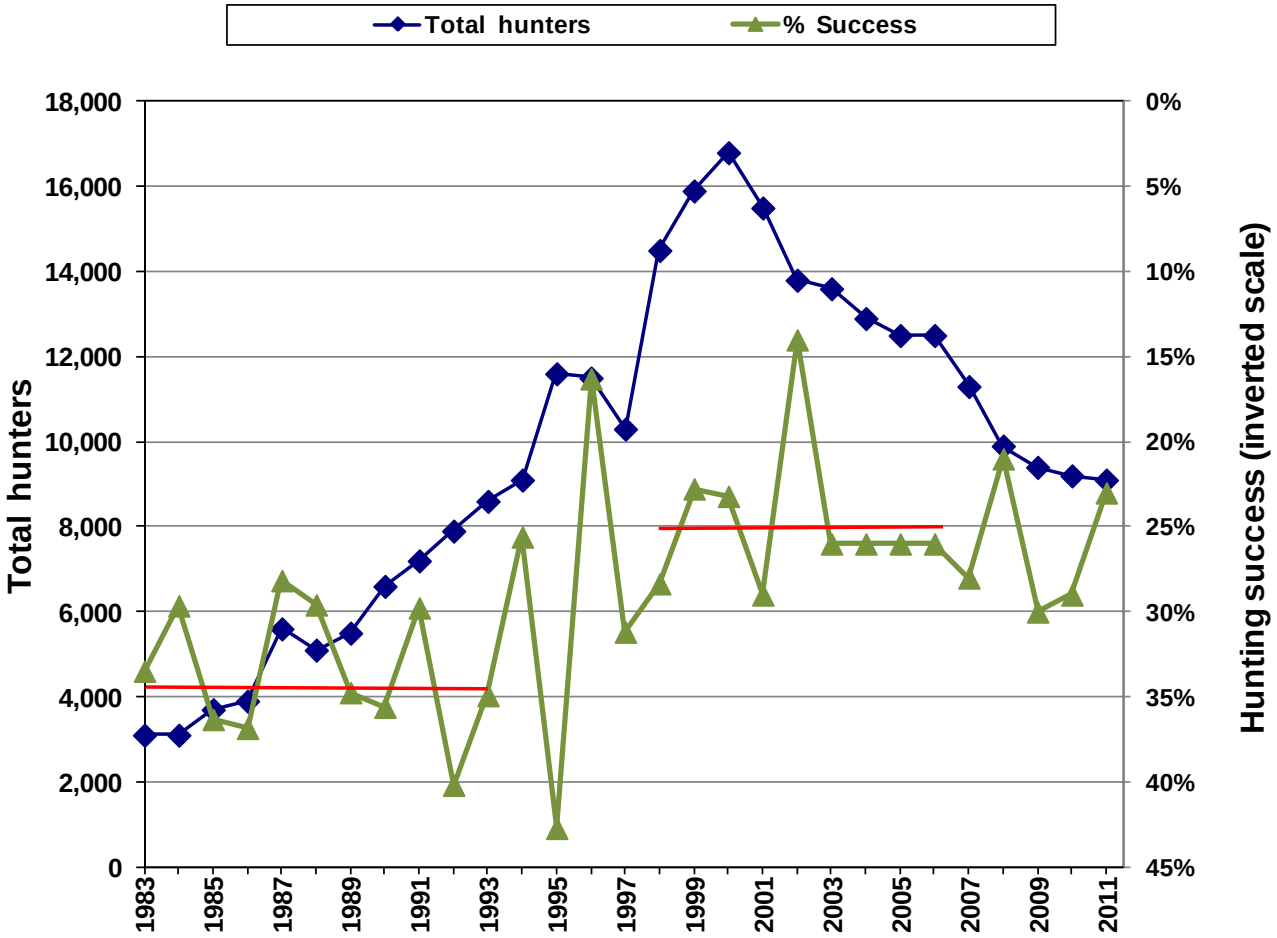

Fig. 2. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU, whereas no-quota hunters can hunt anywhere within that zone.

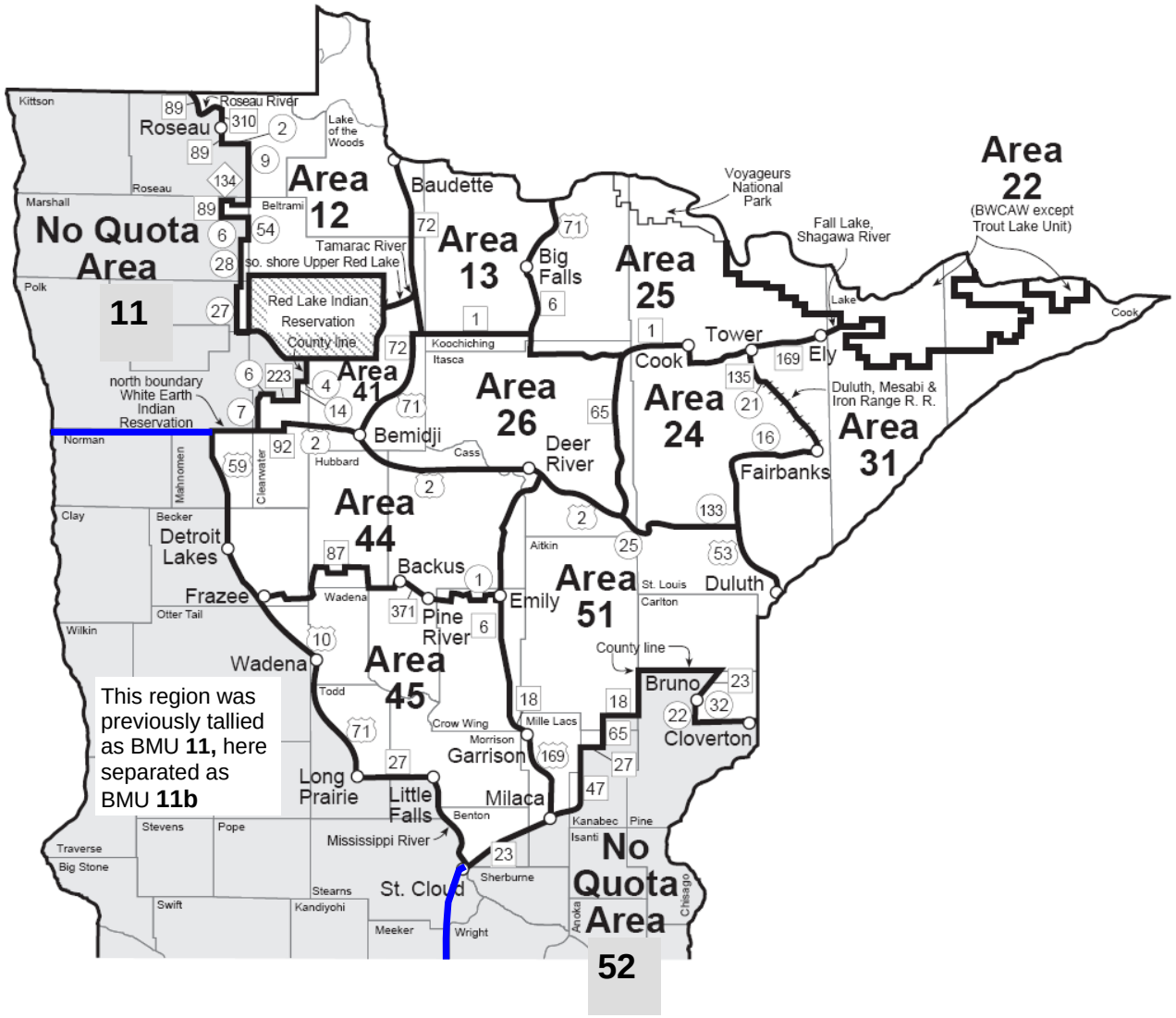

Table 2. Number of bear hunting quota area permits available, 2007–2011 (aligned with permit applications in Table 3 below; highlighted values show drop from previous year).

BMU	2011		2010	2009	2008	2007
	After reduct.[a]	Before reduct.				
12	350	450	450	450	450	500
13	450	600	600	600	650	700
22	100	125	100	150	150	150
24	350	500	550	650	750	900
25	900	1200	1200	1250	1550	1700
26	650	900	900	1000	1150	1250
31	1000	1300	1300	1300	1700	1900
41	300	400	400	400	400	400
44	850	1100	1100	1100	1350	1500
45	250	400	400	600	1000	1200
51	1850	2500	2500	2500	2700	3000
Total	7050	9475	9500	10000	11850	13200

[a] Prior to 2011, <75% of permittees purchased a license (Table 1). This was factored into the allocation of permits. 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.

Table 3. Number of bear hunting permit applicants and surplus licenses bought, 2007–2011[a]. Shaded values indicate undersubscribed areas.

BMU	2011[b]			2010		2009		2008			2007		
	Apps	Bought license	Surplus bought	Apps	Surplus	Apps	Surplus	Apps	Surplus	bought	Apps	Surplus	bought
12	834	267	84	903	5[c]	876		857			811		
13	751	366	84	753		700		709			745		
22	90	71	31	114		91	0[d]	85	50	77%	87	51	81%
24	918	294	56	971		843		825			742	159	100%
25	1763	712	190	1811	5[c]	1694		1793	4[c]		1799		
26	1894	512	139	1959		1874		1999	2[c]		2028		
31	2505	826	174	2414		2423		2388	3[c]		2383		
41	688	253	47	718		685		656			577		
44	3010	697	154	2923		2787		2821			2669		
45	1019	208	42	937		941		873	128	100%	936	266	100%
51	4086	1478	372	3950	1[c]	3822		3828			3568		
Total	17558[e]	5684	1373	17453[e]		16736[e]		16834[e]	178	92%	16345	476	98%

[a] Surplus licenses available beginning in 2001. This was discontinued in 2009 and replaced by 2nd choice lottery applicants.
[b] In 2011, all licenses not purchased by permittees were sold as "surplus". Surplus = Permits available (Table 2) minus Bought license (±2 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 applicant) that were drawn for a bear permit, 2007–2011. 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 applicants is shown parenthetically.

BMU	2011	2010	2009	2008	2007
12	2	23	29	37	46
13	51	77	84	92	94
22	100	88	100	100	100
24	14	49	75	91	100
25	35	60	72	86	94
26	0 (77)	15	32	43	53
31	11	35	43	68	79
41	6	31	37	47	59
44	0 (55)	0 (90)	3	26	38
45	0 (67)	24	61	100	100
51	25	52	58	67	84

Table 5. Minnesota bear harvest tally[a] for 2011 by Bear Management Unit (BMU) and sex compared to harvests during 2006–2010 and record high harvests.

	2011											
BMU	M	(%M)	F	U	**Total**	**2010**	**2009**	**2008**	**2007**	**2006**	**5 year mean**	**Record high harvest** (yr)
Quota												
12	84	(79)[c]	22	0	106	95	140	101	124	70	106	263 (01)
13	75	(63)	44	0	119	155	149	129	163	151	149	258 (95)
22	9	(82)	2	0	11	9	7	7	15	15	11	41 (89)
24	64	(52)	58	0	122	124	151	100	134	194	141	288 (95)
25	185	(58)	132	0	317	307	344	298	369	421	348	584 (01)
26	105	(63)	62	0	167	232	228	137	315	314	245	513 (95)
31	219	(61)	139	0	358	363	384	248	398	482	375	697 (01)
41	29	(54)	25	0	54	71	104	77	104	40	79	201 (01)
44	65	(50)	65	0	130[d]	248	255	196	333	192	245	643 (95)
45	23	(72)[c]	9	0	32[d]	58	42	72	113	118	81	178 (01)
51	171	(59)	117	0	288[e]	501	416	344	557	721	508	895 (01)
Total	1029	(60)	675	0	1704[f]	2163	2220	1709	2625	2718	2287	4288 (01)
No Quota [b]												
11	134	(61)	85	0	219	178	315	172	324	114	221	351[h] (05)
11b	1		2	0	3	11	9	3	4	6		
52	131	(64)	74	0	205[g]	347	257	251	219	400	295	400 (06)
Total	266	(63)	161	0	427	536	581	426	547	520	522	678 (95)
State	1295	(61)	836	0	**2131**	2699	2801	2135	3172	3290[h]	2819	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). Sex shown on table is the registered sex because only ~70% of tooth envelopes are submitted (2011: 1535 of 2131 = 72%). Also, some tooth envelopes had no corresponding registration data. These were added to the harvest tally:

Year	Quota area	No-quota area
2006	63	15
2007	27	9
2008	23	4
2009	19	14
2010	20	8
2011	11	2

[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* = 28 in 2006, 27 in 2007, 14 in 2008, 3 in 2009, 14 in 2010, 14 in 2011). 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 sex ratio (%M).

[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] The estimated registered harvest, including those in which registration data were lost and no tooth envelope was received. Value does not match column total because BMU data were uncorrected for lost registration data.

Table 6. Bear hunting success (%) by BMU, measured as the registered harvest (excluding second bear) divided by the number of licenses sold[a], 2006–2011.

BMU	Mean success 2006-2010	2011		2010		2009		2008		2007		2006	
		% Success	% 2 bears[b]	% Success	% 2 bears[b]	% Success	% 2 bears[b]	% Success	% 2 bears[b]	% Success	% 2 bears[b]	% Success	% 2 bears[b]
Quota	27	24		30		30		21		28		25	
12	31	30		30		39		32		36		19	
13	30	26		34[c]		32		28		31		24	
22	13	11		14		16[c]		8		14		14	
24	25	35[e]		29		31[d]		20		20		25	
25	32	35		34		36		28[f]		31		30	
26	30	26		34		31		17[f]		36		30	
31	31	36		36		38[c]		21[f]		28		33	
41	27	18		25		34		27		35		13	
44	25	15[f]		28		30		21		30		16	
45	14	13		21[d]		11[f]		11[f]		14		14	
51	25	16[f]		27		23		19		27		28	
No Quota	20	15[f]	(13)	20	(7)	22[h]	(9)	17[f]	(9)	19	(12)	22	(9)
Statewide	25	22		27		28[c]		20		26		25	

[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] Percent of successful hunters that shot 2 bears; 2nd bear is not included in the calculation of hunting success. The taking of 2 bears was legal only in the no-quota area since 2002.

[c] Highest success since 1997 (until this year).

[d] Highest success since 1995 (until this year).

[e] Highest success since 1992.

[f] Lowest success since 2002 (until this year).

[g] Of the no-quota hunters in 2011, 30 took 2 bears in BMU 11 and 20 took 2 bears in BMU 52.

[h] 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, 1990–2011.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
1990	Sat		69	82	96
1991	Sun		64	76	93
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

[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, 1990–2011.

	Apr	May	Jun	Jul	Aug	Sep	Oct
1990	75	79	80	81	78	74	70
1991	82	83	87	85	82	85	67
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

[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 1990–2011, including number of nuisance bears killed and translocated, and bears killed in vehicular collisions.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of personnel participating in survey [a]	87	85	88	86	83	84	69	71	52	60	54	50	39	34	42	46	46	37	51	40	34
Complaints examined on site	935	1562	1010	696	1568	337	661	226	189	105	122	75	81	75	61	57	63	59	65	70	37 [h]
Complaints handled by phone [b]						959	2196	743	987	618	660	550	424	507	451	426	380	452	535	514	396 [h]
Total complaints received						1296	2857	969	1176	723	782	625	505	582	512	483	443	511	600	584	433 [h]
• % Handled by phone						74%	77%	77%	84%	85%	84%	88%	84%	87%	88%	88%	86%	88%	89%	88%	91%
Bears killed by:																					
• Private party or DNR	97	187	111	67	232	27	93	31	25	25	22	12	13	25	28	11	21	22	23	22	9 [h]
• Hunter before season [c]																					
– from nuisance survey	14	38	21	28	81	6	32	23	5	7	4	0	3	3	6	2	18	3	4	3	3
– from registration file	15	52	30	25	138	18	35	31	24	43	20	11	8	4	13	6	25	5	15	10	5
• Hunter during/after season [d]	16	19	8	3	13	0	4	3	0	1	1	0	0	0	1	0	0	0	0	0	0
• Permittee [e]	20	28	6	3	57	4	7	11	7	2	6	4	6	1	5	4	5	1	3	5	0
Bears translocated	214	342	180	171	295	64	115	24	29	1	6	3	1	3	3	3	1	3	2	2	2
• % bears translocated [f]	23	22	18	25	19	19	17	11	15	1	5	4	1	4	5	5	2	5	3	3	5
Bears killed by cars [g]	50	90	54	40	68	42	52	61	60	39	43	26	25	16	22	18	20	27	18	28	15 [h]

Table 9 footnotes:

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[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.

Table 10. Bear food index values for five survey areas (see map in lower right) in northern Minnesota's bear range, 1984–2011. 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

[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.

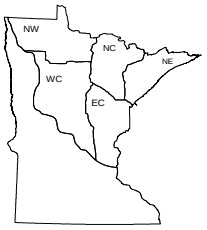


Table 11. Index values of bear food abundance[a] in 2011 compared to the previous 27-year mean (1985–2010) in 5 survey areas across Minnesota's bear range. Shaded values indicate particularly low (pink) and high (green) fruit abundance (≥1 point difference from mean for individual species, ≥5 point difference for total).

	NW		NC		NE		WC		EC		Entire Range	
FRUIT	27yr mean	2011 *n* = 11[b]	27yr mean	2011 *n* = 12	27yr mean	2011 *n* = 6	27yr mean	2011 *n* =12	27yr mean	2011 *n* = 7	27yr mean	2011 *n* =38[b]
SUMMER												
Sarsaparilla	4.4	7.0	5.9	7.2	5.4	4.8	4.6	6.7	5.7	4.3	5.1	6.0
Pincherry	3.2	3.3	4.5	3.5	4.1	3.7	4.0	2.7	3.8	4.4	3.9	3.7
Chokecherry	5.5	5.3	5.3	5.8	4.4	3.8	5.5	5.8	4.7	5.8	5.1	5.3
Juneberry	4.9	5.0	4.7	2.5	4.8	4.7	3.7	4.8	4.0	3.0	4.4	3.8
Elderberry	1.4	2.0	3.2	2.3	3.6	4.3	3.2	3.6	3.4	3.3	3.0	3.5
Blueberry	5.0	3.8	5.5	3.3	5.0	3.3	3.7	3.3	3.7	2.8	4.5	3.1
Raspberry	6.6	5.5	8.2	6.4	8.0	7.0	7.1	7.3	7.1	6.2	7.3	6.3
Blackberry	1.3	1.0	2.3	1.9	1.0	0.8	3.4	4.3	4.3	5.0	2.8	3.5
FALL												
Wild Plum	2.0	2.6	1.8	2.0	1.0	0.8	2.6	2.1	2.4	2.8	2.1	2.2
HB Cranberry	5.2	5.2	4.4	4.3	3.6	4.5	3.7	3.7	3.6	3.3	4.0	4.0
Dogwood	6.0	7.2	5.8	4.7	5.0	4.3	5.8	6.5	6.0	7.7	5.7	6.2
Oak	3.4	3.9	2.8	6.3	1.6	4.2	5.8	7.0	5.8	7.0	4.3	5.6
Mountain Ash	1.5	3.8	2.6	2.9	4.6	5.2	1.8	1.6	2.2	0.5	2.6	2.8
Hazel	6.3	5.9	7.7	6.6	7.3	6.6	8.2	7.3	7.9	6.3	7.5	6.4
TOTAL	56.7	61.4	64.7	59.6	59.1	57.9	63.1	66.7	64.5	63.5	62.2	62.5

[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 – 2011. Shaded blocks indicate particularly low (≤ 5.0, yellow) or high (≥8.0, tan) fall food productivity.

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

[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, 2011.

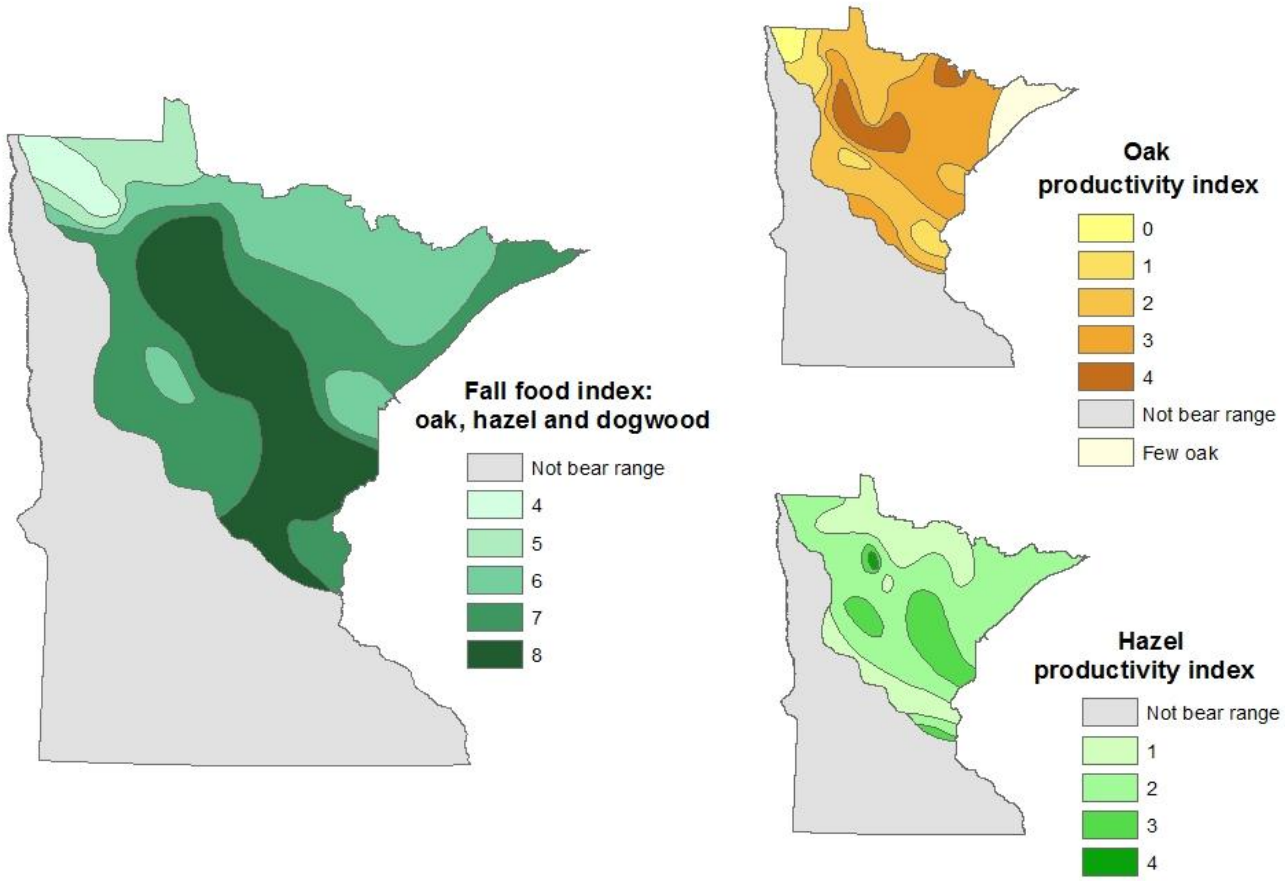
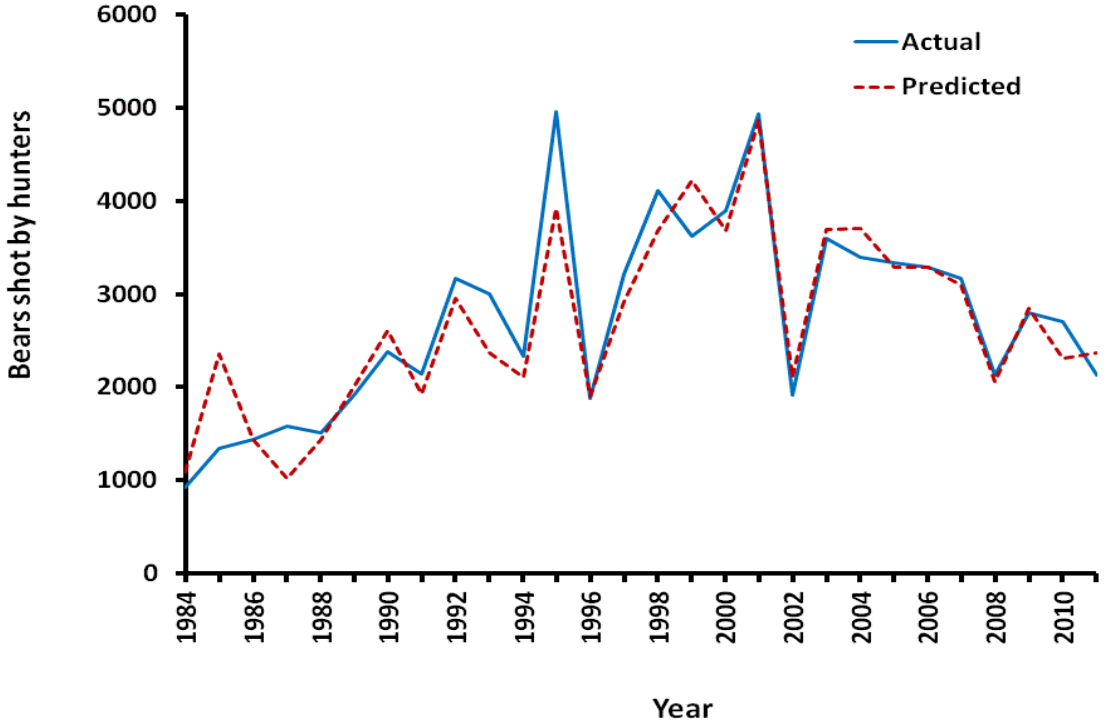


Fig 4. Number of bears harvested vs. number predicted based on fall food abundance and the number of hunters: (top graph) 1984–2011 (R^2=0.84); (bottom graph) 2000–2011 (R^2=0.95).



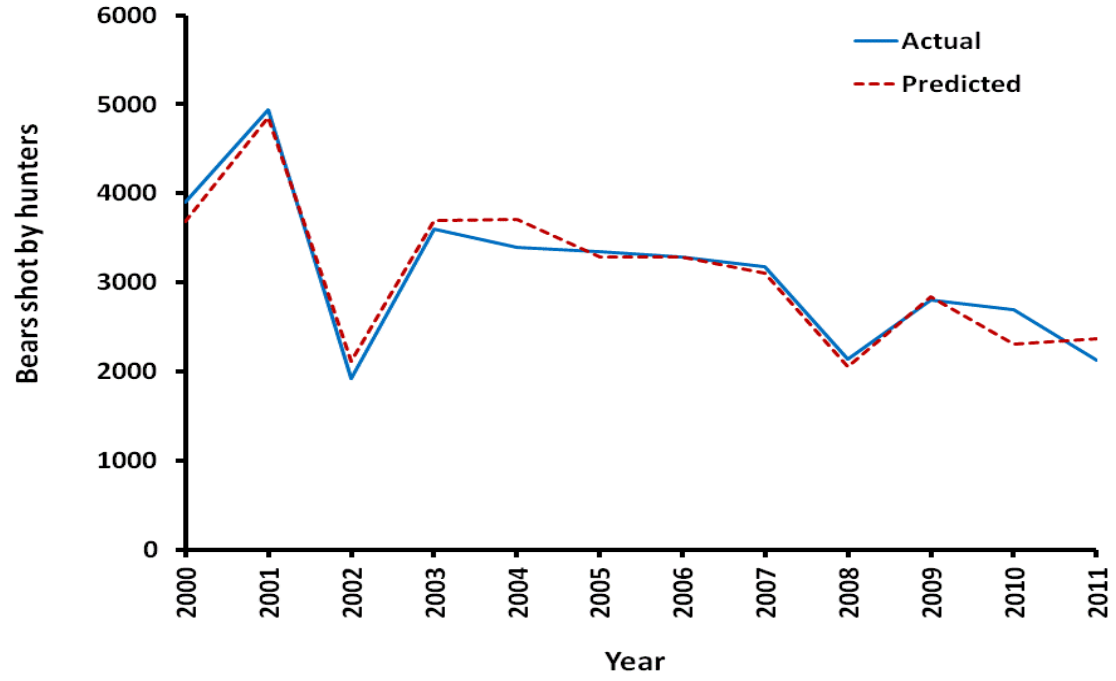


Fig 5. Sex ratios of harvested bears by BMU, 2005–2011.

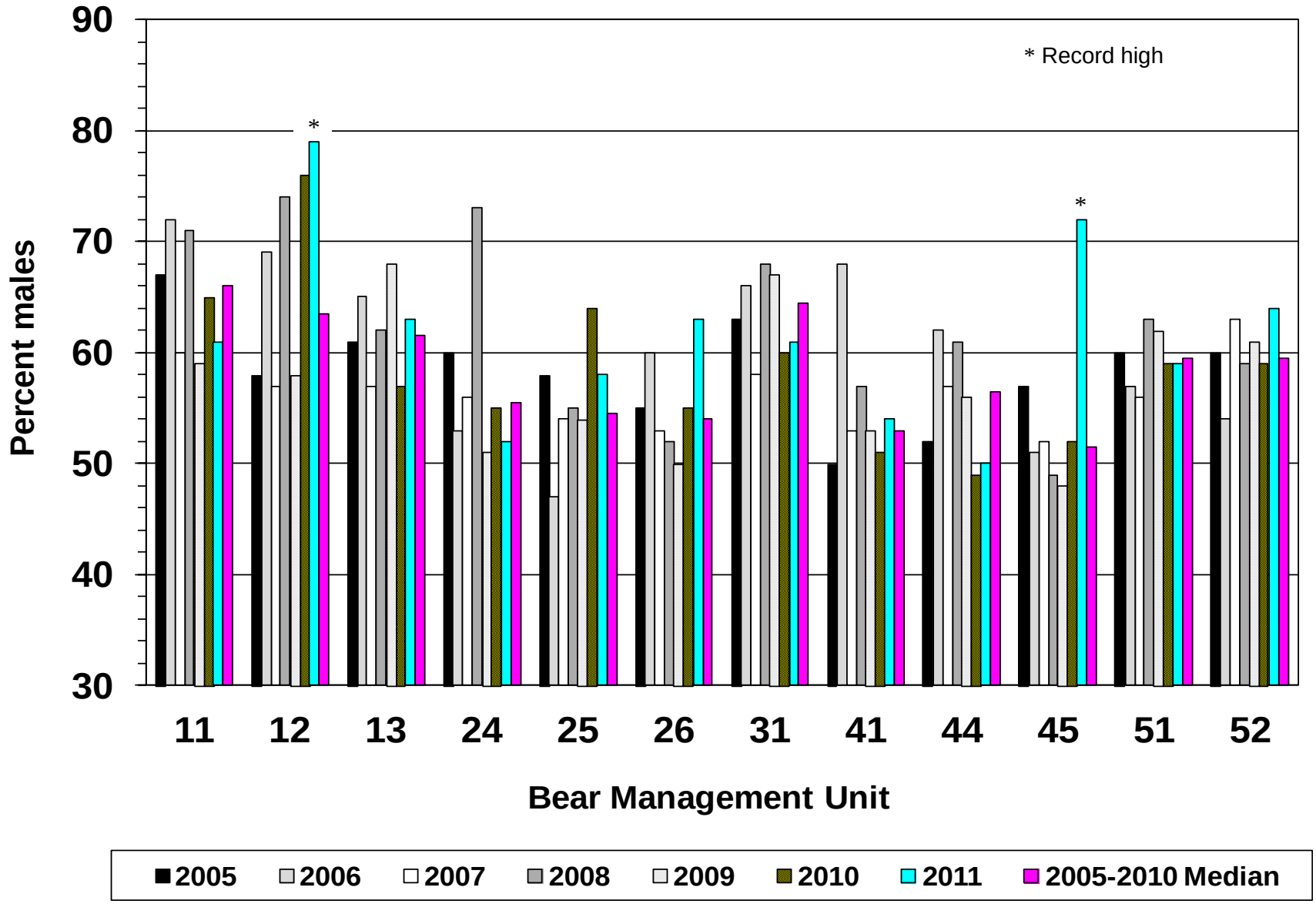


Fig 6. Median ages of harvested female bears by BMU, 2005–2011.

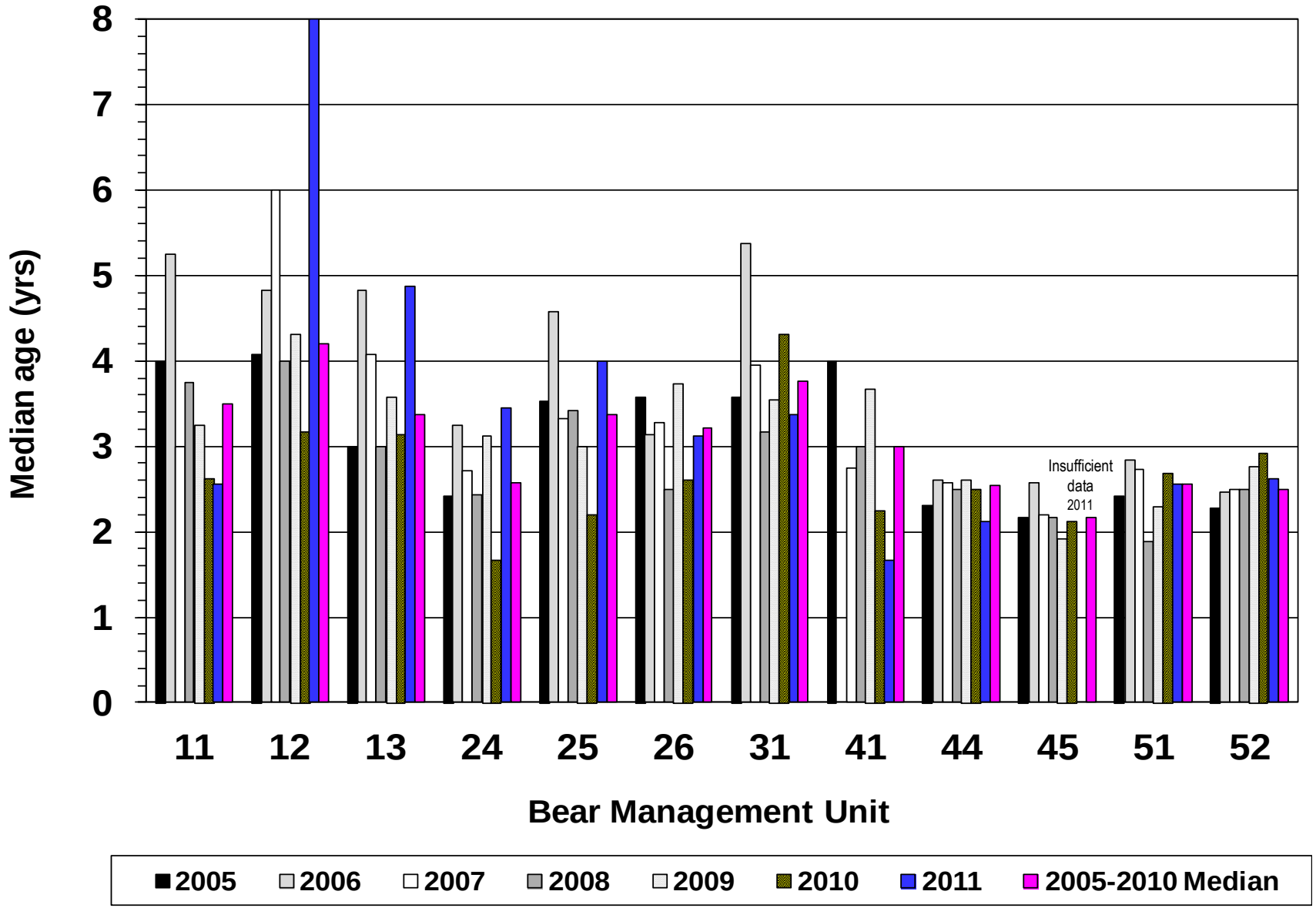


Fig. 7. Statewide harvest structure: median ages (yrs) by sex, 1982–2011.

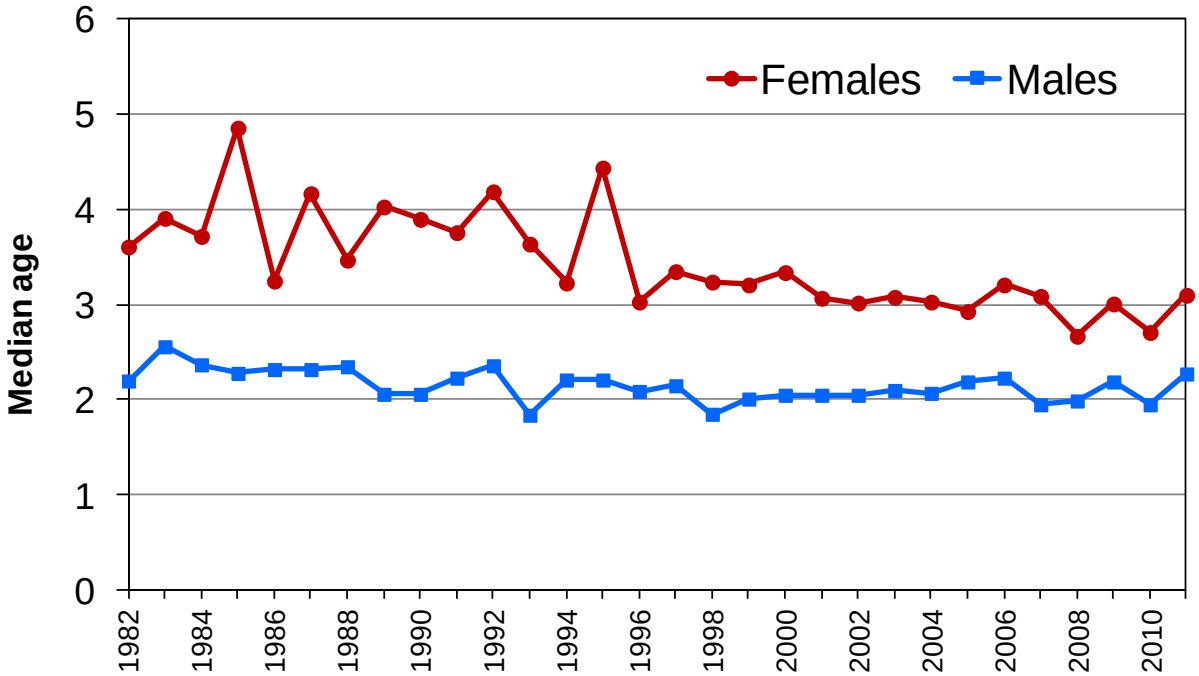


Fig. 8. Statewide harvest structure: proportion of each sex in age category, 1982–2011. Trend lines are significant.

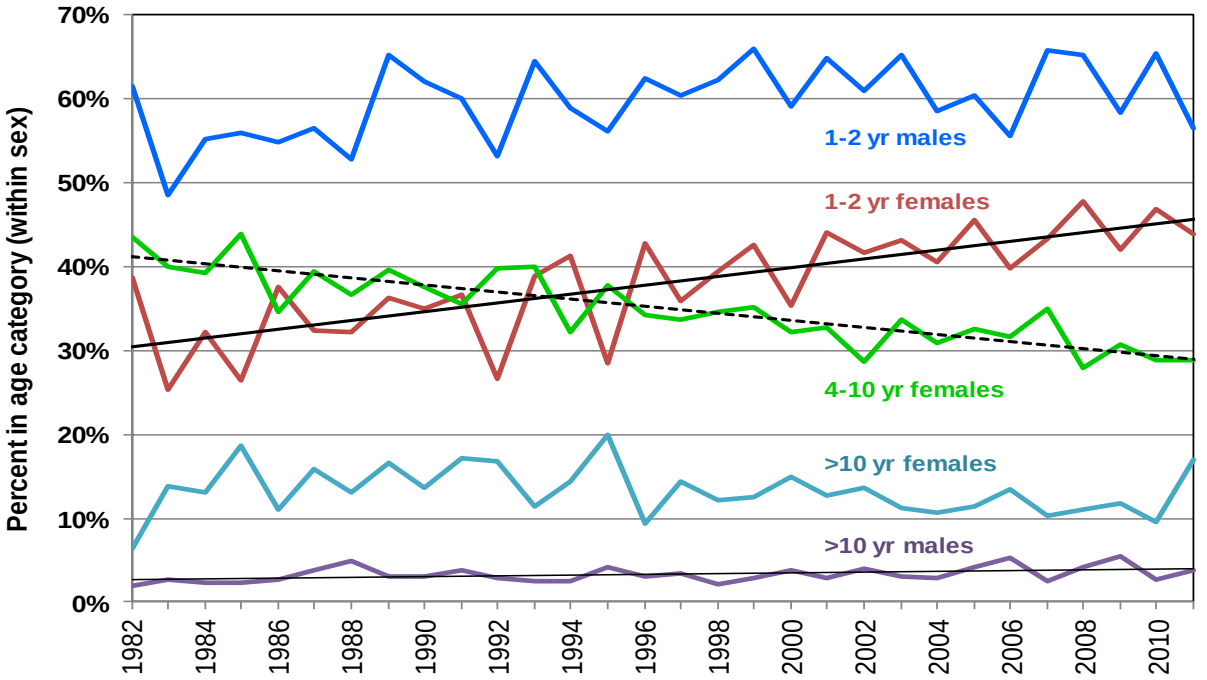


Fig. 9. Statewide population trend derived from Downing reconstruction using the harvest age structure. Curves were scaled (elevated) to various degrees to match the tetracycline-based mark–recapture estimates.

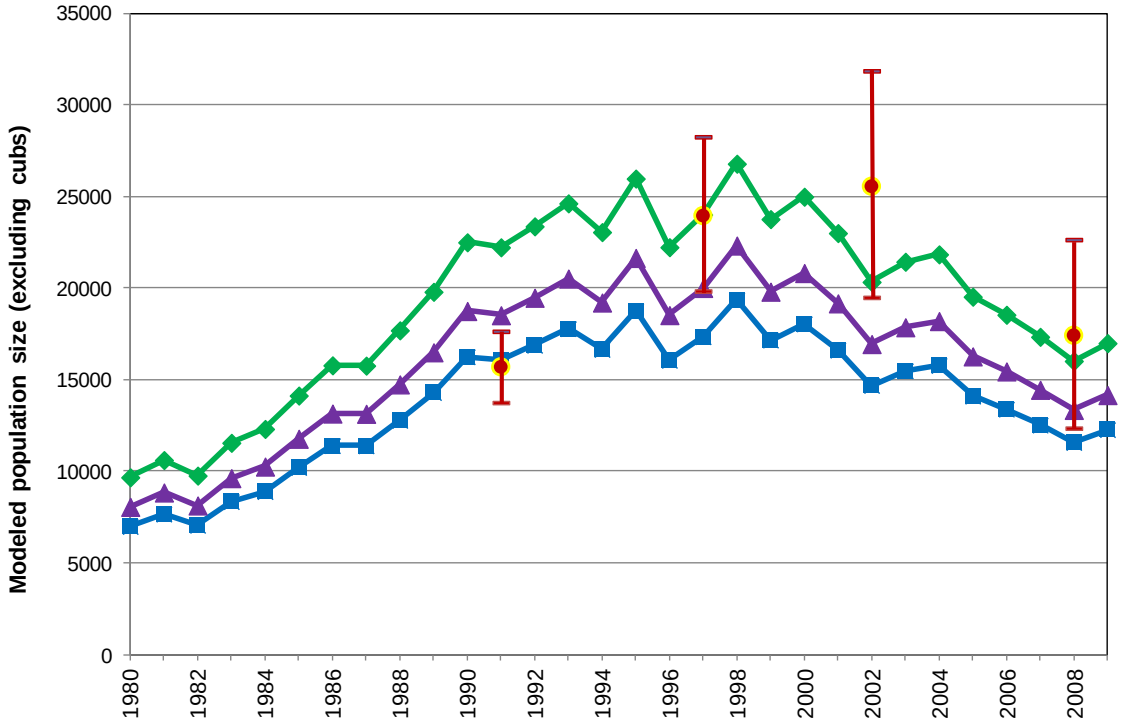


Fig. 10. Population trajectories (unscaled) of the male and female segments of the population derived from reconstructed harvest ages. Population grown rates (λ) are 5-year running averages of N_{t+1}/N_t (λ=1 is a stable population).