DEPARTMENT OF NATURAL RESOURCES

STATUS OF MINNESOTA BLACK BEARS, 2023

Harvests, Complaints, Foods, and Pre-hunt Population Trends

February 8, 2024

Final Report to Bear Committee

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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	***Overview: Permits, licenses, harvest, and success rates*** Permit applications for bear licenses exceeded 20,000 for the seventh straight year. Applications have not been this high since 2001. Of these, nearly 5,000 (19%), a record high number, applied for area 99, meaning that they only sought to raise their preference level for the permit system, but not hunt this year. Permit availability was 11% higher than 2022. Hunting success is inversely related to the number of hunters but also strongly affected by fall foods. The total number of hunters declined from 2020 and 2021, but there are still nearly 20% more hunters each year than pre-pandemic.
Fig. 2	***Bear Management Units*** There are currently 14 Bear Management Units (BMUs) where license sales are limited by a quota, 1 BMU where the number of permits is unlimited, and 4 BMUs with no quota at all. The BMU divisions in the no-quota zone are for internal data analysis purposes only: hunters do not have to choose a BMU in which to hunt within this zone. In the quota zone, hunters must apply for a certain BMU and are drawn through a preference lottery based on their number of previously unsuccessful applications (Table 4). The first digit in each BMU (1–5) refers to 5 larger BMUs in which each was previously a part (when numbering began in 1985). Since then, several BMUs have been split, to better adjust hunting pressure. In 2016, BMU 26 was divided into 27 and 28, and BMU 44 was split into 46 and 47 (BMUs 28 and 47 comprise the Leech Lake Reservation). This split, along former BMU lines, allows current data to be regrouped into these former BMUs and thereby compared to older data (which is done in this report). In 2022, BMU 14 was split from BMU 12. BMU 451 was split from BMU 45 in 2020 as an experimental unit to understand if we could reduce crop damage through hunting. The results for this BMU are reported under the quota zone but were not remerged with BMU 45. This is because of the unlimited number of tags in BMU 451, so BMU-level results would not be comparable with previous years.
Tables 2 & 3	***Quota zone permits and licenses*** The number of quota zone permits available in 2023 increased by 11% from 2022. DNR has kept permits at conservative levels for over a decade (<4,035). This was the 13th year (since 2011) of a system whereby unsold licenses for the quota zone (>500) could be purchased later as surplus. BMU 451 (new in 2020) had an unlimited number of permits but was still part of the quota zone (548 sold, all listed as surplus license sales). This experimental zone was created to test the hypothesis that hunters can effectively reduce nuisance complaints and crop damage.
Fig. 3	***Quota zone applicants*** Statewide, quota zone applications have been slowly increasing, and all BMUs (except 31) had similar or increased numbers of applicants compared to last year. As in year's past, BMU 45 showed a significant, two-fold increase over the past 10 years.

Table 4	***Resident vs. Non-resident hunters*** The proportion of resident hunters has remained stable for the past 5 years. The Northwest no-quota zone (BMU 11) consistently had the highest proportions of non-resident hunters (17%–29%).
Table 5	***Quota zone lottery*** We do not have (nor have we ever had) a bear population that can sustain levels of harvest where everyone who applies for a tag is successfully drawn. The low quota zone permit availability over the past 11 years has made it increasingly difficult to succeed in the lottery, and thus wait times remained high in some areas in 2023. The trade-off is that the quality of the hunt and the success rates are exceedingly high in the quota zone (Table 1, Fig. 1). First-time and second-time applicants were successful only in BMU 22 (wilderness area hunt). Four BMUs required a preference level of 4 for guaranteed success, and BMUs 24, 27, 28, 45, 46, and 47 required a preference level of 5 or above for any chance of drawing a tag. This high threshold for these BMUs is due to the increasing number of applicants this year (Fig. 3), not a reduced number of available permits (Table 2).
Table 6	***Harvest by BMU*** The statewide harvest in 2023 was 20% lower than 2022, and 39% lower than 2021. This was likely due to the range-wide boom in production of natural bear foods for the second year in a row, coupled with a very warm opening weekend. The sex ratio of the harvest was ≥60% males in all BMUs, except 22 (BWCA). The statewide harvest sex ratio has exceeded 60% male in all years except 2021 and 2020 since 2013 (Table 1) when permits were reduced. However, these same highly male-biased sex ratios have also occurred in the no-quota area, suggesting that it is not just due to low hunter density. When natural foods are poor, reproductive females are far more likely to be shot than in average or good food years.
Fig. 4	***Harvest by quota vs no-quota zones*** Permit availability continuously declined during the decade 2003–2013 (Table 1), and commensurately, total harvests declined and the percent of the harvest in the no-quota zone increased. The percent harvest in the no-quota zone was down this year slightly, split evenly between BMUs 11 and 52 (Table 5), as was the proportion of hunters in the no-quota. Participation of no-quota hunters has declined the last two years from the record high in 2021 (Table 1).
Table 7	***Hunting success by BMU*** In 2023, success was at or below the 5-year average in quota zones in all BMUs. Many were below the 5-year average due to abundant natural foods and high temperatures during opening weekend. The success rate in the quota zone was nearly 3 times higher than in the no-quota zone (33% vs. 12%, respectively). Success rates in the no-quota were below long-term averages (notably low harvest in BMU 52).
Table 8	***Harvest by date***

	During years of normal fall food abundance, about 70% of the harvest occurs during the 1st week of the bear season, and about 83% occurs by the end of the 2nd week. This year lagged behind this pattern somewhat, due to the abundant crops of natural foods across Minnesota this fall and high temperatures during opening weekend.
Table 9 & Fig. 5	***Human bear conflicts*** The total number of recorded bear complaints has been stable for a decade but has fluctuated with natural food abundance. A new recording system was instituted in 2017 whereby Wildlife Managers recorded all bear complaints online as they were received, instead of submitting reports at the end of each month (thus, unlike previous years, Managers who had no complaints were not counted in the number of personnel participating). Conservation Officers implemented a similar system beginning July 2019. This dramatically increased the reporting rate of Conservation Officers. This year, we received the fewest number of bear complaints since we started recording these data in 1980.
Tables 10–12 & Fig. 6	***Food abundance*** The composite range-wide, all-season abundance of natural bear foods (fruits and nuts) in 2023 was the 4th best on record. Abundance of many summer foods was above the long-term (38-year) average for all regions. In general, summer food conditions were exceptionally good across the state. The statewide fall food index (productivity of dogwood + oak + hazel), which helps predict annual harvest after accounting for hunter effort (Fig. 11), was the 3rd best year on record. Hazelnuts, acorns, and dogwood berries were above average in many areas of the state. The oak production this year was exceptional in almost all areas where oaks exist.
Fig. 7	***Predictions of harvest from food abundance*** The 2023 statewide harvest was roughly what was expected, based on regression of harvest as a function of hunter numbers and the fall food productivity index. For the quota zone, the actual harvest in 2023 was nearly the same as predicted by this regression.
Figs. 8–9	***Submission of bear teeth for aging*** Ages of harvested bears are used as the principal means of monitoring population trends. Although hunters are required to submit a tooth from their harvested bear, historically >25% did not comply. Reminder notices were sent to non-compliant hunters each year during 2014–2017, which spurred a higher initial compliance the following years (>80%). Since 2018, with no reminder mailing, compliance has been 82–87%. Since 2013, hunters could register by phone or internet, and pick up a tooth submission envelope later: tooth submission compliance by these hunters has equalized across all registration types. A decreasing proportion of hunters are registering their bear at a registration station over the past years. Compliance with tooth submission was higher in the quota zones than in the no-quota area but was especially low (<80%) in a number of units (BMUs 10, 12, 22, 41, and 52).

Fig. 10	***Population trend: Statewide and quota vs no-quota zones*** A new Bayesian model developed by Allen et al. (2018) for bear monitoring in Wisconsin includes not only the sex-age composition of harvested bears (like the Downing), but also reproductive and survival parameters (obtained from data collected from long-term monitoring of radio-collared bears in different study sites across Minnesota). The trajectory of this model is robust to assumption violations but seems to be an underestimate compared to our tetracycline estimates. The models for this year indicated that the statewide population has stabilized and is slowly recovering. It is also not dissimilar to the Downing model overall trajectory. Notably, the quota area as a whole has stabilized since 2012 and has been increasing steadily the past couple years. The no-quota area has been increasing steadily for the last 20 years.
Fig. 11	***Trends in harvest rates*** The sex ratio of harvested bears varies by age. Male bears are more vulnerable to harvest than females, so males always predominate among harvested 1-year-olds (67–75%). Males also predominate, but less strongly, among 2 and 3-year-old harvested bears. However, older-aged harvested bears (≥8 years) are nearly always dominated by females, because, although old females continue to be less vulnerable as individuals, there are far more of them than old males in the living population. 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 data into time blocks showed harvest rates increasing from 1980–1999, then declining with reductions in hunter numbers (Fig. 1). Based on this method, harvest rates in recent years have been similar to the early 1980s when the population was similarly small (~15% of the total bear population was harvested). One problem in using this very simple method is that it assumes that the relative difference for males versus females in their vulnerability to harvest does not change systematically through time. This may not be true, given the steadily increasing male-skewed harvests since the late 1990s, and especially in recent years (Fig. 14).

Fig. 12	***Population trend: BMU-level estimates*** Using the Allen et al. (2018) population model, we were able to estimate population trend for each BMU. This has been something out of reach until this year due to limitations from small annual harvests over time and the insensitivity of the Downing model with small populations. The population estimates tended to follow what we know about bear reproduction in Minnesota. The poor soils in NE Minnesota BMUs produce less bear food and subsequently, have much lower bear reproduction (BMUs 24, 25, 31) than areas farther south. In the western and southern BMUs (the periphery of bear range in Minnesota), oak forest and agriculture provide bears with abundant food. Bears in these BMUs (11, 46 and 47 [former 44], 45, 51, and 52) reproduce at younger ages and will be the quickest to recover from the population reduction in the 2000s. The remaining BMUs have reproduction levels between the north and south. They are the areas we would expect to stabilize and recover after the periphery of bear range. Caution in interpreting the estimates is needed. Modeled population trends are far more robust than population estimates for a given year. The scale (estimated population size) is not as accurate as the overall trend (increasing, decreasing, or stable). There is little to no population closure in any given BMU due to their small size and the frequency of bear migration in MN. Furthermore, a way to evaluate our current management goals is to compare the most recent estimates with those in 2012–2013, when permits were cut dramatically. Harvest quotas have been essentially level since that point and comparing with that cut point will allow for a better understanding of recent trends. After permit cuts in BMUs 12, 24, 25, and 31 last year and the abundant natural foods, there seems to be some flattening of the decline in BMUs 25 and 31. This is welcome news and is a good indicator that the cuts are helping. We'll need a few more years of low permit numbers in these BMUs to ensure the population has stabilized and the decline has reversed. The good news is that populations in BMUs 26 (current BMUs 27 and 28), 41, 44 (current BMUs 46 and 47), 45, and 51 seem to have stabilized since the permit cuts in 2012. All of the aforementioned BMUs have been stable and started to increase since the permit cut, although BMUs 41 and 51 have had a very negligible decline over the past few years. The no-quota BMUs have been increasing rather quickly since 2012. Estimates of growth are 6.0% (BMU 11) and 2.0% (BMU 52) annually from 2012–2024. We do not have an explanation for why these areas with unlimited hunting are growing so quickly but hypothesize that it is the high-quality habitat and relatively low/uneven hunting pressure across BMU 11 and 52. There are big tracts of public land in the no-quota areas (especially in BMU 11), but generally these WMAs are large wetland complexes and hard to access by hunters. The remainder of the areas are dominated by private land with limited access to hunters. The modeled population trend seems to match the perception among the public and area wildlife staff that bear populations are increasing quickly. Specifically, in BMU 11, bears were non-existent in the early 1990s, but bear range and population size have expanded since then. Commensurately in BMU 52, there are regular bear sightings in the northern suburbs of the Twin Cities in Anoka, Chisago, and Washington counties.

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 2003–2023.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Permit applications[a]	16431	16466	16153	15725	16345	17362	17571	18647	19184	18103	18107	18885	18422	19958	21034	21184	20632	22279	24598	25817	26138
Permits available[b]	20110	16450	15950	14850	13200	11850	10000	9500	7050	6000	3750	3750	3700	3850	3350	3350	3400	3575	3575	3605	4035
Licenses purchased (total)	14409	13669	13199	13164	11936	10404	9892	9689	9555	8986	6589	6620	6962	7177	6655	6550	6801	8882	8990	8153	8194
Quota zone [c]	9833	10063	9340	9169	8905	7842	7342	7086	5684	4951	3188	3177	3257	3420	2954	2921	2988	3178	3187	3146	3532
Quota surplus/military [c]	2554	1356	1591	1561	526	233	77	83	1385	1070	578	583	446	441	401	428	417	398	392	505	586
Quota-no limit area-451																		1038	768	595	548
No-quota zone [c]	2022	2238	2268	2434	2505	2329	2473	2520	2486	2965	2823	2860	3259	3316	3300	3200	3396	4262	4643 [h]	3907	3528
% Licenses bought																					
Of permits available [d]	61.6	69.4	68.5	72.3	71.4	67.7	73.4	74.6	100	100	100	100	100	100	100	100	100	100	100	100	100
Of permits issued [d]	65.7	68.3	67.1	68.9	70.0	67.2	73.8	74.5	80.7	82.7	85.0	84.7	87.9	88.7	88.2	87.2	87.8	80.8	89.1	86.1	85.4
Residents in Quota [d]													86.3	88.1	76.6	88.9	87.6	86.6	87.5	88.1	88.6
Estimated no. hunters [e]	13600	12900	12500	12500	11300	9900	9400	9200	9200	8600	6300	6300	6700	6900	6400	6300	6700	8400	8500	8100	8200
Harvest	3598	3391	3340	3290	3172	2135	2801	2699	2131	2604	1866	1627	1971	2641	2040	1766	2340	3203	2971	2251	1802
Harvest sex ratio (%M) [f]	58	57	59	58	57	62	59	59	61	59	62	62	66	61	63	66	61	56	59	60	69 [i]
Success rate (%)																					
Total harvest/hunters [g]	26	26	26	26	28	21	30	29	23	30	30	26	30	38	32	28	35	38	35	35	22
Quota harvest/licenses [k]	25	26	25	25	28	21	30	30	24	33	37	33	39 [j]	50 [j]	46	38	49 [j]	57 [j,k]	51 [k]	42 [k]	33 [k]

[a] From 2008 to 2023, 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; 2015 = 2455; 2016 = 2641; 2017 = 2803; 2018 = 3254; 2019 = 3450; 2020 = 3691; 2021 = 4189; 2022 = 4470; 2023 = 4928 (record high in the last two decades).

[b] Beginning in 2011, a procedure was implemented that ensures that all available licenses are purchased (see Table 2).

[c] Quota zone established in 1982. No-quota zone 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 August 1. Free licenses for 10- and 11-year-olds were available beginning in 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 2011–2022, all unpurchased licenses were put up for sale and were bought. The percent of resident hunters in the quota area each year includes all license types (regular quota, youth, and surplus licenses). This statistic was added to the report in 2021 and was able to easily back-calculate to 2015.

[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%), 2009 (95.3%), 2018 (92.7%) and 2022 (97.8%). Beginning in 2011 all unpurchased quota licenses were sold as "surplus" in August, and this process is quick and competitive; thus, for 2011–23 all Surplus and Military license-holders were considered to have hunted.

[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 2023, 1 hunter shot 2 bears.

[h] Record high number of no-quota zone licenses purchased in 2021; record high % of licenses in no-quota zone in 2021 (>50%; see Fig. 4).

[i] Record high % males in statewide harvest.

[j] 2020: record highest success rate in quota zone; 2021: second highest success rate; 2016: third-highest success rate.

[k] In 2020, BMU 451 was broken out of BMU 45 and was an area in the quota zone with an unlimited number of licenses. The quota success rate is calculated without BMU 451 in it to make hunting success estimates comparable across years. The 2023 success rate for BMU 451 is listed in Table 6 and the success rate for the quota area with Area 451 included is 30%.

Fig. 1. Relationship between licenses sold and hunting success (*note inverted scale*) in quota zone, 1987–2023 (quota and no-quota zones first partitioned in 1987). Number of licenses bought explains 60% of variation in hunting success during this period. Large variation in hunting success is also attributable to food conditions (e.g., during 2013–2023, when licenses were held relatively constant). Statistics from BMU 451 are not included in this graph to allow for quota zone comparisons with the past.

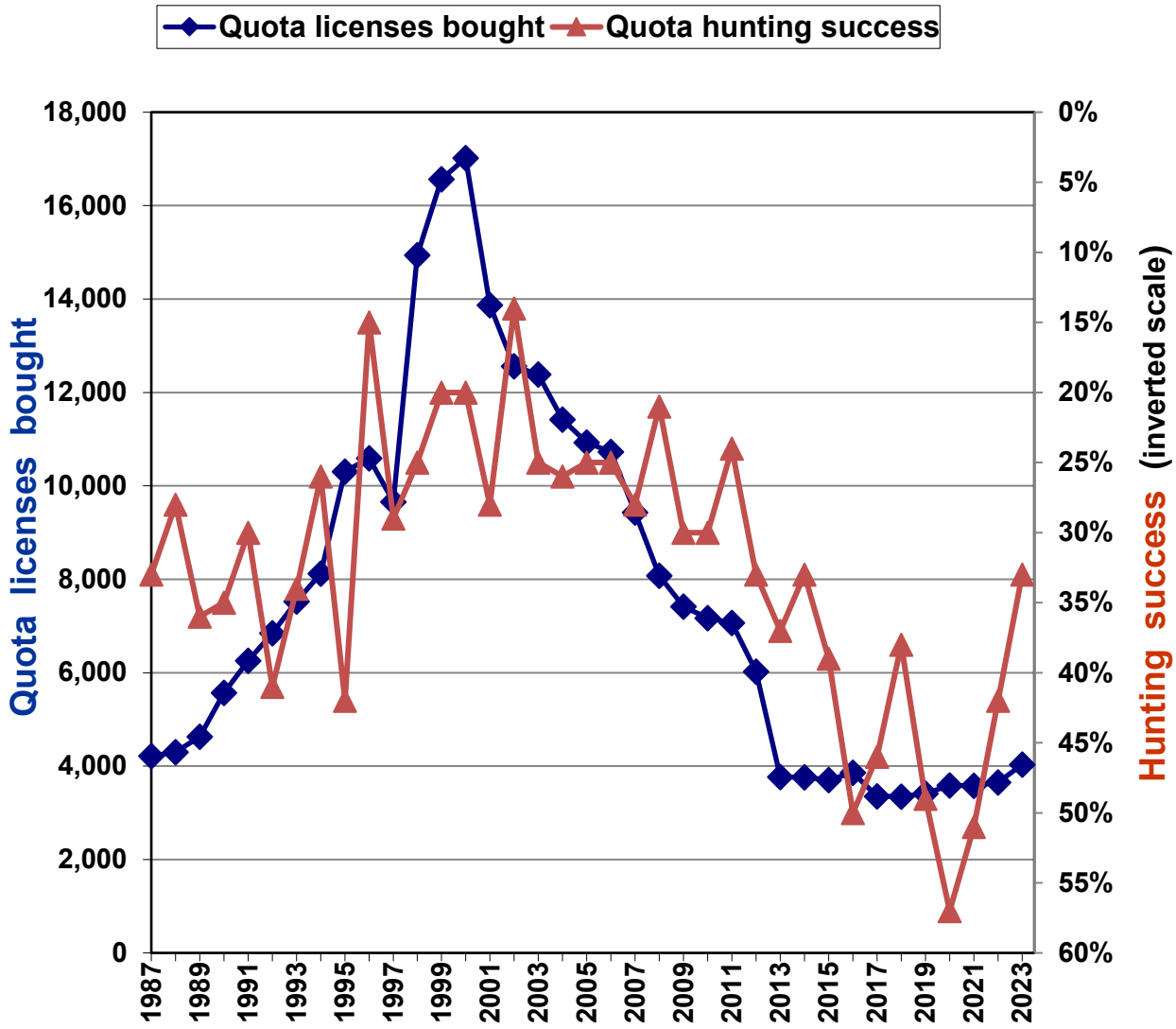


Fig. 2. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU. In 2016, BMU 26 was divided into 27 and 28, and BMU 44 was split into 46 and 47 (BMUs 28 and 47 comprise the Leech Lake Reservation). BMU 14 was split from BMU 12 in 2022. No-quota hunters can hunt anywhere within the gray-colored zone, including the southeast corner of Minnesota (not shown; designated area 60). In 2020, zone 451 was split from 3 deer permit areas of 45 to relieve crop damage in the area. This area is in the quota-zone, but with an unlimited number of participants.

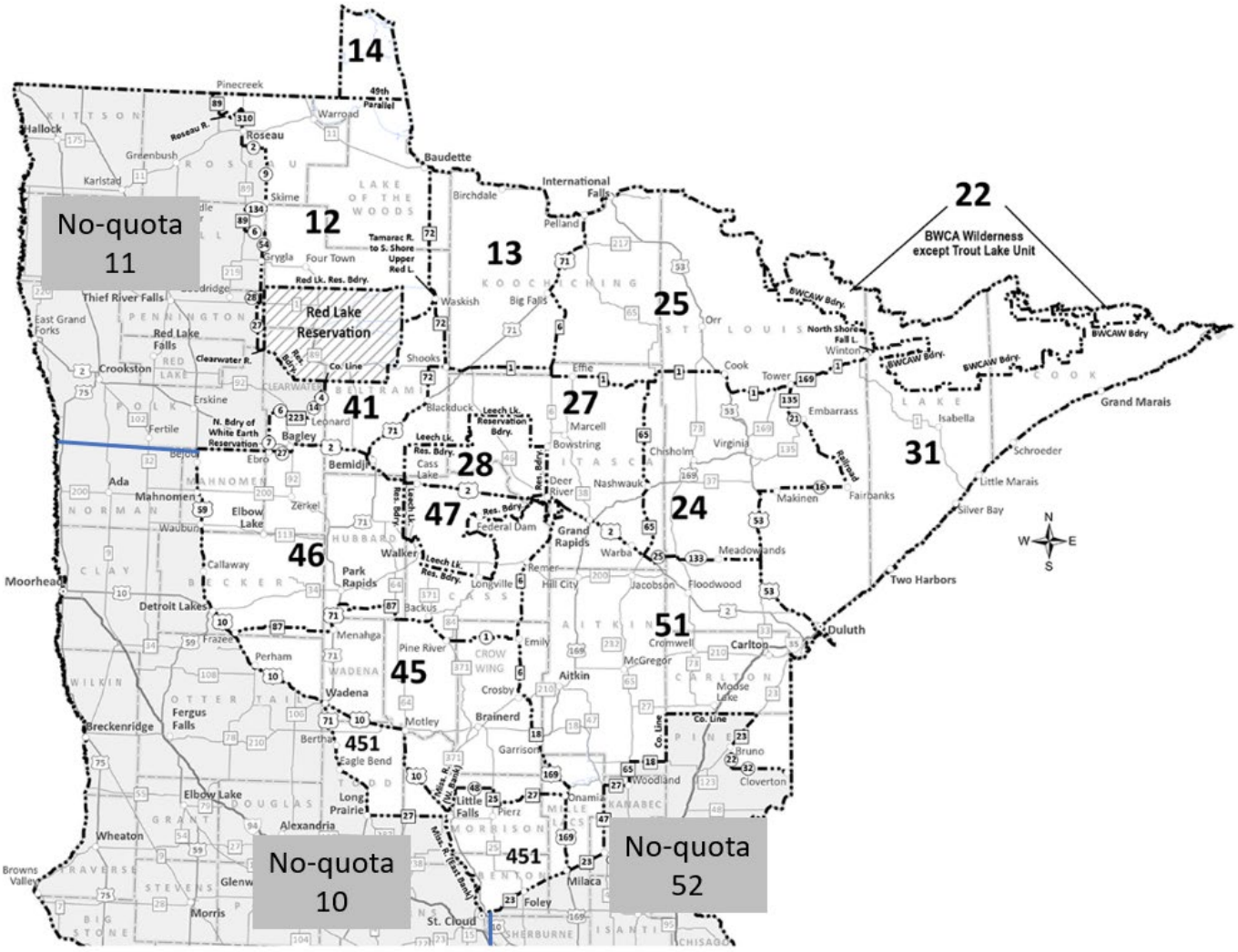


Table 2. Number of bear hunting quota area permits available, 2019–2023. Highlighted values show a change from the previous year.

BMU	2019	2020	2021	2022	2023
12	150	125	125	100	125
13	250	225	225	225	250
14				10	10
22	50	50	50	50	50
24	200	175	175	135	100
25	500	400	400	360	325
27	225	225	225	225	275
28	60	60	60	60	60
31	550	500	500	425	400
41	150	175	175	200	200
45	150	200	200	250	350
46	350	400	400	450	600
47	40	40	40	40	40
51	900	1000	1000	1075	1250
Total	**3400**	**3575**	**3575**	**3605**	**4035**

[a] In 2016, the Leech Lake Reservation was split from BMUs 26 and 44 to form BMUs 28 (north) and 47 (south), with the remaining area of BMU 26 renamed BMU 27 and remaining area of BMU 44 renamed BMU 46.

Table 3. Number of quota BMU permit applicants (Apps), licenses bought (after permits drawn) and surplus licenses bought, 2018–2023[a].

BMU	2018			2019			2020			2021			2022			2023		
	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought	Apps	Bought license	Surplus bought
12	703	109	16	711	104	21	751	107	18	891	110	15	931	82	18	923	112	13
13	682	177	47	712	199	26	734	195	30	944	198	27	939	192	33	996	208	42
14													51	7	3	20	8	2
22	76	36	14	61	35	14	69	32	18	73	40	10	51	38	12	99	36	14
24	928	155	20	840	153	22	909	155	20	1072	157	18	1144	122	13	1158	86	14
25	1561	355	44	1520	348	52	1627	367	33	1806	356	44	1836	313	47	1904	291	34
27	1265	204	21	1280	200	25	1338	207	18	1532	200	25	1675	203	22	1634	240	35
28	309	52	8	318	51	9	312	49	11	358	59	1	351	55	5	326	52	8
31	2074	428	71	1907	432	67	2022	444	57	2297	428	72	2222	351	74	2125	342	58
41	648	114	11	661	143	7	663	154	21	841	155	20	848	167	33	831	169	31
45	2383	160	15	2351	178	22	1978	186	14	2241	190	10	2308	222	28	2436	306	44
451[c]									1038			768			595			548
46	2769	317	33	2662	313	37	2853	364	36	3340	364	36	3596	391	59	3527	515	85
47	182	35	5	198	34	6	216	33	7	244	33	7	263	34	6	240	34	6
51	4344	779	123	3956	798	102	4058	885	115	4766	897	105	5106	926	149	4991	1046	204
Total[b]	17924	2921	428	17177	2988	410	18577	3178	1454	20405	3187	1158	21343	3146	1097	21343	3532	1134

[a] Beginning in 2011, all licenses not purchased by permittees were sold as "surplus". In all cases (see footnote b), all the surplus licenses were purchased. Surplus = Permits available (Table 2) minus Bought licenses.

[b] 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 the total number of applications (unlike Table 1, where they are included). This number also includes the permits sold in area 451.

[c] Beginning in 2020, applicants could buy a license over the counter for area 451. This was an area in the quota zone with no limit on the quota and all licenses are considered surplus licenses. This is not an area for lottery or applications; only surplus licenses could be purchased.

Fig 3. Trends in number of applicants for quota zone permits by BMU over past 10 years, 2014–2023. For 2016–2023, BMUs 27 and 28 were grouped into old BMU 26 and BMUs 46 and 47 were grouped into old BMU 44.

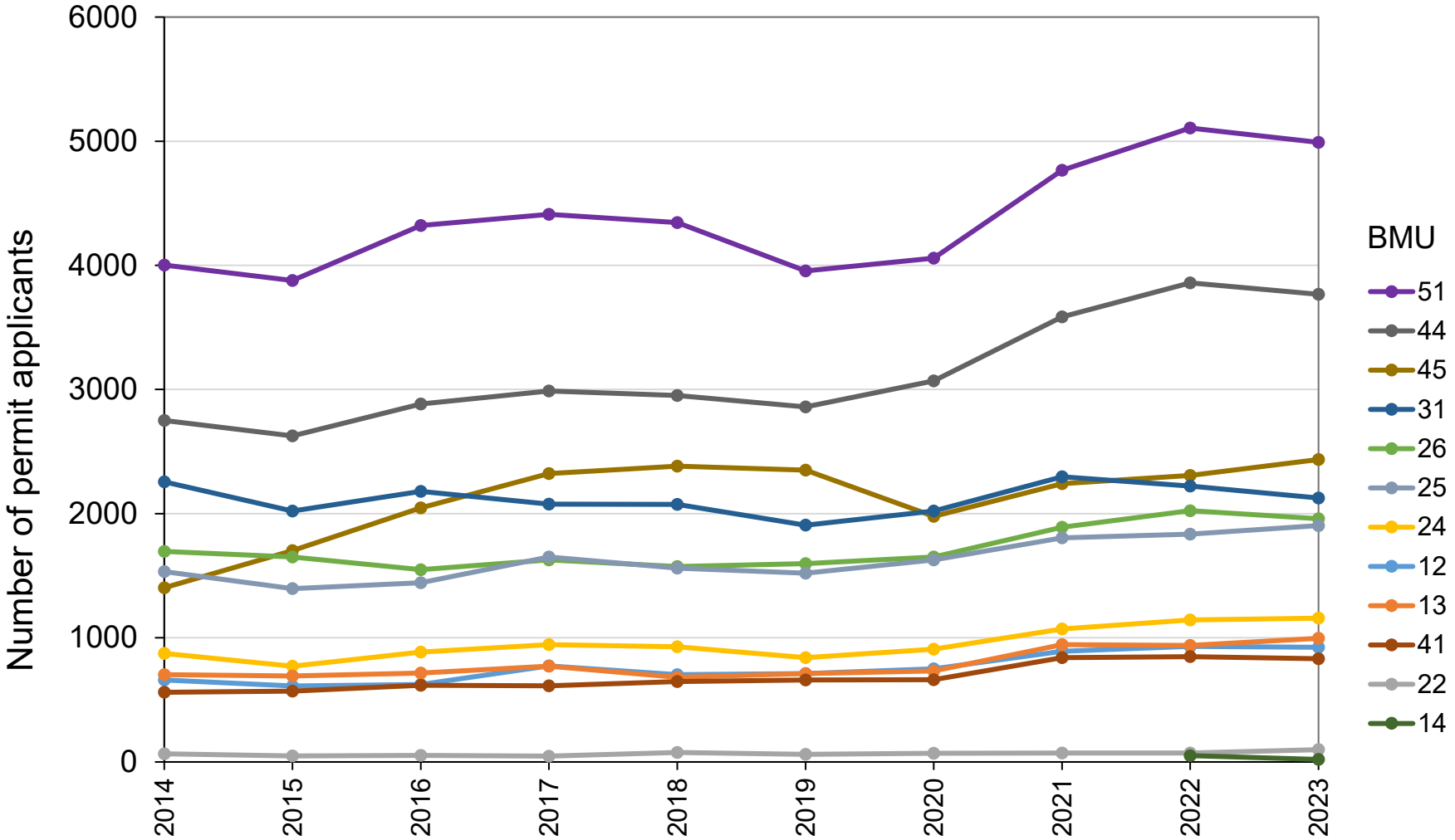


Table 4. Percentage (%) of resident bear hunters (2018–2023) for each bear management unit (BMU) in Minnesota.

BMU	2018	2019	2020	2021	2022	2023
10[a]	94	93	98	96	92	83
11[a]	79	75	79	75	70	71
12	83	89	86	86	90	80
13	88	79	78	78	80	82
14					100	90
22	94	92	92	94	92	82
24	94	95	98	96	88	82
25	81	81	82	79	84	80
27	91	89	88	88	90	87
28	60	83	73	68	69	71
31	80	82	74	77	79	80
41	90	87	91	87	91	90
45	99	98	98	97	99	97
46	95	93	92	93	93	91
47	63	90	93	83	83	83
51	95	93	93	93	93	93
52[a]	90	92	93	91	92	91
451			97	97	96	94

[a] No-quota hunters must indicate where they plan to hunt when purchasing their license, but sometimes change their mind or indicate permit areas that are not in bear range. We used the reallocated hunter numbers to account for this discrepancy (see Table 7, bottom).

Table 5. Percent of quota BMU lottery applicants with preference levels 1 (1st-year applicants), 2, 3, 4, and 5 who were drawn for a bear permit during 2018–2023. Blank spaces indicate 100% of applicants were drawn. 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[a].

BMU	2020					2021					2022						2023				
	Pref 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 6	Pref 1	Pref 2	Pref 3	Pref 4	Pref 5
12	0	0	0	72		0	0	58			0	0	0	25			0	0	0	10	
13	0	0	93			0	0	66			0	0	43				0	0	26		
14											0	0	0	80			0	0	40		
22	65					56					60						42				
24	0	0	0	93		0	0	0	78		0	0	0	35			0	0	0	0	69
25	0	0	45			0	0	32			0	0	97				0	0	0	70	
27[b]	0	0	0	49		0	0	0	20		0	0	0	0	93		0	0	0	0	92
28[b]	0	0	0	2		0	0	0	0	77	0	0	0	0	61		0	0	0	0	49
31	0	0	33			0	0	9			0	0	0	91			0	0	0	59	
41	0	0	26			0	0	26			0	0	15				0	0	13		
46[b]	0	0	0	0	83	0	0	0	0	58	0	0	0	0	41		0	0	0	0	64
47[b]	0	0	0	18		0	0	0	0	72	0	0	0	0	31		0	0	0	0	31
45	0	0	0	0	23	0	0	0	0	5	0	0	0	0	0	91	0	0	0	0	18
51	0	0	24			0	0	18			0	0	20				0	0	26		

[a] As an example, in 2020: BMU 12: 0% of preference level 1, 2, and 3 applicants were drawn, 72% of preference level 4, and 100% of preference level 5 and above were drawn for a permit; BMU 22: 65% preference level 1 applicants were selected, 100% all higher preference levels; BMU 45: no preference level 1–4 applicants were drawn, 23% of hunters with preference level 5 were drawn, and 100% of hunters with preference level 6 and above were drawn.

[b] BMU 26 was split into 27/28 and BMU 44 was split into 46/47 in 2016.

Table 6. Minnesota bear harvest tally for 2023 by Bear Management Unit (BMU)[a] and sex[b] compared to harvests during 2018–2022 and record high and low harvests (since establishment of each BMU, not counting current year).

	2023											
BMU	**M**	**(%M)**	**F**	**Total**	**2022**	**2021**	**2020**	**2019**	**2018**	**5-year mean**	**Record low harvest** (yr)	**Record high harvest** (yr)
Quota												
12	29	71	12	41	48	71	84	62	66	66	38 (14)	263 (01)
13	77	69	34	111	110	110	126	105	119	113	71 (88)	258 (95)
14	1	100	0	1	0							
22	1	50	1	2	1	3	7	3[d]	4	4	3 (03)	41 (89)
24	27	68	13	40	58	81	97	86	60	76	50 (14)	288 (95)
25	126	68	59	185	176	215	251	224	223	218	149 (96)	584 (01)
26					[133]	[174]	[186]	[169]	[141]	[157]	117 (14)	513 (95)
27	84	63	49	133	101	140	148	128	105	124	105 (18)	148 (20)
28	24	83	5	29	32	34	38	41	36	36	36 (18)	42 (20)
31	107	75	36	143	197	296	325	212	211	248	157 (88)	697 (01)
41	36	62	22	58	85	75	74	76	58	73	35 (15)	201 (01)
44					[228]	[228]	[256]	[203]	[154]	[203]	130 (11)	643 (95)
46	126	68	58	182	211	201	231	181	139	192	139 (18)	231 (20)
47	14	64	8	22	16	27	25	22	15	21	15 (18)	25(16,20)
45	61	68	29	90	121	108	85	108	51	94	32 (11)	178 (01)
451	31	63	18	49	74	110	168					
51	220	70	93	313	350	477	511	411	185[d]	387	185 (18)	895 (01)
Total	964	69	437	1401	1578	1948	2210	1659	1272	1790	1192 (88)	4288 (01)
No-Quota												
11	130	69	58	188	268	386	487[f]	269	287	339	38 (87)	487 (20)
10	54	74	19	73	44	50	29[f]	26	21	34	15 (16)	50 (21)
52	89	64	49	138	351	587	476[f]	386	186	397	105 (02)	587 (21)
60[c]	0	0	0	0	0	0	1	0	0	0		
888[g]	1	50	1	2	9							
Total	274	68	127	401	672	1023	993[e]	681	494	709	198 (87)	1023 (21)
State	1247	69	571	**1818**	2251	2971	3203	2340	1766	2330	1509 (88)	4956 (95)

[a] Some tooth envelopes were received from hunters who did not register their bear. These were added to the harvest tally: 2013:6; 2014:3; 2015:6; 2016:7; 2017:4; 2018:2; 2019:18; 2020:8; 2021:4; 2022:10; 2023:16.Some hunters with no-quota licenses hunted in the quota zone, and their kills were assigned to the BMU where they apparently hunted: 2013:11; 2014:4; 2015:12; 2016:9; 2017:2; 2018:4*; 2019:4; 2020:6; 2021:11; 2022:10, 2023:2 *None were authorized NQ license-holders hunting in quota zone. 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).

[b] Sex recorded on tooth envelopes may differ from the registered sex. Sex shown on table is the registered sex.

[c] BMU 60 designates SE Minnesota, which is within No-quota zone. Only two bears have been harvested in this zone in our records dating back to 1980.

[g] BMU 888 designates NQ hunters authorized to remove a conflict bear (typically prior to the hunting season).

Notable harvests:

[d] Tie for record low harvest.

[e] Highest harvest since 2007.

[f] Record high harvest for these no-quota zones.

Fig. 4. Trends in statewide bear harvest and proportions of harvest and licenses in the no-quota zones, 1987–2023.

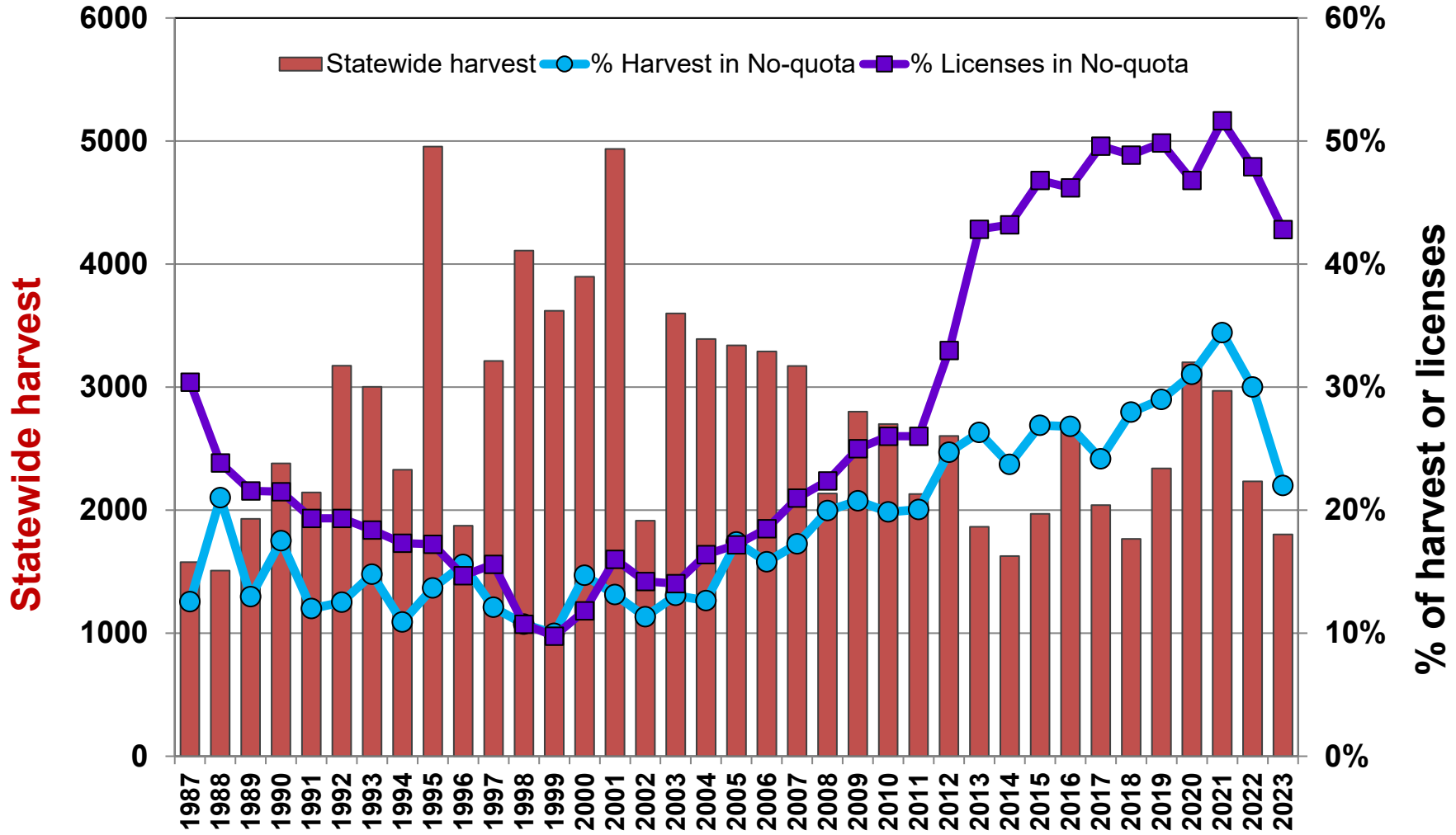


Table 7. Bear hunting success (%) by BMU, measured as the registered harvest divided by the number of licenses sold[a], 2018–2023[a].

BMU	Max success (yr) before 2023		Mean success 2018–2023	2023	2022	2021	2020	2019	2018
12	67	(20)	54	32	55[c]	67[b]	53	43	52
13	59	(95,16)	50	44	49	56[c]	53	45	59[b]
14				10	0				
22	18	(92)	10	4	6	14	8	16	10
24	55	(21)	46	40	46	55[b]	34	46	48[c]
25	63	(21)	56	55	54	63[b]	56	53	57[c]
26	65	(21)	58	48	61[c]	65[b]	49	57	52
27	66	(21)	56	48	62[c]	66[b]	47	53	52
28	70	(18)	61	46	57	63[c]	60	70[d]	53
31	65	(21)	52	35	59[c]	65[b]	42	52	56
41	50	(95)	46	29	43	42	46	49[c]	46
44	58	(21)	48	31	52[c]	58[b]	39	41	48
46	58	(21)	47	30	50[c]	58[b]	39	40	47
47	68	(22)	53	54	68[b]	63[c]	38	43	50
45	54	(22)	45	25	54[b]	43	29	44	40
451			15	9	14	16			
51	51	(21)	41	24	47[c]	51[b]	21	41	46
Quota[e]	57	(21)	45	33	51[c]	57[b]	38	46	50
11[f]			23	18	24	23	25	17	28
10[f]			10	14	12	12	9	8	9
52[f]			17	7	23	19	10	14	19
No Quota	32	(95)	20	12	22	24	15	15	21
Statewide	40	(95)	33	21	33	38[c]	27	31	37

[a] Registered 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] Record high (or tied record high) success.

[c] Second highest (or tied second highest) success.

[d] Highest success ever for any BMU.

[e] In 2020, BMU 451 was broken out of BMU 45 and was an area in the quota zone with an unlimited number of licenses. The quota success rate is calculated without BMU 451 in it to make hunting success estimates comparable across years. The success rate for BMU 451 is listed on its own line in the table.

[f] Since 2013, an attempt was made to differentiate the number of no-quota (NQ) hunters by BMU in order to estimate success rates. When no-quota hunters bought licenses, they recorded the deer block where they anticipated hunting. A significant number chose blocks in the quota zone; those who did not harvest a bear in the quota zone were divided up into NQ-BMUs in proportion to those who chose blocks in or adjacent to NQ-BMUs. A few chose BMU 60 (SE Minnesota); the first bear was harvested there in 2017, 1 more was killed there in 2020. Of these BMU 60 hunters, most seem to have indicated this in error and registered a bear elsewhere in the no-quota. Table shows % indicating where they planned to hunt (number of hunters in parentheses for BMU 60 and Quota zone):

BMU	2023	2022	2021	2020		2019	
11	30.1	32.4	34.7	34.3		30.9	
10	14.9	9.1	9.3	8.6		14.3	
52	54.5	58.3	56.0	56.8		52.0	
60 (n)	0.5 (18)	0.3 (10)	0	0.3	(13)	0.3	(11)
Quota zone (n)	0	0	0	0.6	(27)	2.5	(94)

Table 8. Cumulative bear harvest (% of total harvest) by date, 1998–2023.

Year	Day of week for opener	Aug 22/23 – Aug 31	Sep 1 – Sep 7	Sep 1 – Sep 14	Sep 1 – Sep 30
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[a]	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[a]	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
2015	Tue		58[b]	75	91
2016	Thu		68	83	95
2017	Fri		69	83	93
2018	Sat		59[a]	75	91
2019	Sun		71	83	95
2020	Tues		70	83	94
2021	Wed		66	80	95
2022	Thu		51[a]	72[a]	89
2023	Fri		50[a,b]	66[a,b]	87

[a] The low proportion of total harvest taken during the opening week (<60%) reflects a high abundance of natural foods.
[b] The slow start the first week was likely due to especially warm weather.

Table 9. Number of human-bear conflict complaints registered by Wildlife Managers and Conservation Officers during April–October during 2005–2023, including number of conflict bears killed and translocated, and bears killed in vehicular collisions.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017[j]	2018 [j]	2019 [j]	2020 [j]	2021 [j]	2022 [j]	2023 [j]
Number of personnel participating in survey [a]	42	46	46	37	51	40	34	56	63	64	61	55	86 (51,35)	79 (56,23)	126 (60,66)	112 (70,42)	94 (36,58)	95 (39, 56)	92 (38, 54)
Complaints examined on site	61	57	63	59	65	70	37	113	69	79	97	118	71 (22,49)	40 (21,19)	82 (37,45)	87 (3,84)	72 (6,66)	68 (2,66)	30 (1, 29)
Complaints handled by phone [b]	451	426	380	452	535	514	396	722	623	570	840	780	644 (450,194)	438 (369,69)	736 (599,137)	784 (591,193)	572 (450,122)	461 (339,122)	298 (196,102)
Total complaints received	512	483	443	511	600	584	433	835	692	649	937	898	715	478	818	871	644	529	328
• % Handled by phone	88	88	86	88	89	88	91	86	90	88	90	87	90	92	90	90	79	87	91
• Calls handled by the information center[m]																281	364	281	186
Bears killed by:	28	11	21	22	23	22	9 [k]	16	24	26	45	53	22 (4,18)	9 [k] (4,5)	45 (5,40)	42 (3,39)	36 (3,33)	30 (2,28)	15 (2,13)
• Private party or DNR																			
• Hunter before season [c]																			
– from nuisance survey	6	2	18	3	4	3	3	11	0	0	1	13	1	2	0	20	4	4	2
– from registration file	13	6	25	5	15	10	5	12	0	1	4	6	3	11	5	34	24	8	2
• Hunter during/after season [d]	1	0	0	0	0	0	0	0	1	0	1	1	1	0	0	3	23	1	1
• Hunter by Area 888 license [e]													1		3	40	45	9	2
• Permittee [f]	5	4	5	1	3	5	0	0	1	0	3	0	0	1	2	5	2	2	3
Bears translocated [g]	3	3	1	3	2	2	2	0	3	2	0	0	0	0	0	3	2	2	4
Bears killed by cars [h]	22	18	20	27	18	28	15	33	32	28	47 [h]	27	9 (0,9) [h]	25 (15,10) [h]	16 (11,5) [h]	25 (23, 2)[h]	15 (10,5)	12 (6,6)	7 (6,1)

[a] Maximum number of people turning in a human-bear conflict report each month. Monthly reports were required beginning in 1984 and included cases of zero complaints. In 2017, the recording system was changed, where Wildlife Managers only recorded actual complaints (not zero complaints), generally at the time the complaint was received. Since then, the number reflects the total number of people receiving and recording at least 1 complaint during that year. For consistency, the records from Conservation Officers were handled the same way. Beginning July 2019, COs recorded complaints electronically and individually (as they occurred), similar to Wildlife Managers (but using a different recording system).

[b] If a complaint was handled by phone, it means a site visit was not made.

[c] The discrepancy between the number recorded on the human-bear conflict 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 human-bear conflict survey because registration data do not indicate whether bear was involved in a human-bear conflict. In 2021 and 2022, data included all validation letter information in this total.

[e] In 2017, hunters could choose Area 88 (hereafter, 888 in the table) in the quota lottery, and if drawn, could hunt for a conflict bear, if authorized. Starting in 2021, Area 888 was only a designation for hunters willing to take a conflict bear in the quota area on a no-quota license, if so authorized; 17 of these hunters were authorized to do so. Other hunters were authorized to take a conflict bear on a validated license (12 in total).

[f] A permit for non-landowners to take a conflict 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 human-bear conflict survey, not directly from permit receipts. Only 12 bears have been killed by permittees since 2011. In 2020, 13 permits were issued but only 5 bears killed.

[g] According to DNR human-bear conflict policy, trapped conflict bears should not be translocated. Generally, these are cubs that were sent to the rehabilitation facility in Garrison.

[h] Car kill data were reported on the monthly human-bear conflict form beginning in 2005. In all previous years, car kill data were from Enforcement's confiscation records. In 2015, confiscation records had more car-kills than the human-bear conflict survey (47 vs 33), so the higher number is shown here. In 2017, only 1 car-kill was in the confiscation records, and in 2018 there were just 2. In 2017, the electronic system used by managers did not allow for recording of car kills. In 2018, an effort was made to increase car-kill reporting by managers, which was further increased in 2019 by adding a distinct coding for non-confiscated car kills that were either observed or reported by the public.

[j] Beginning in 2017, Wildlife Managers recorded human-bear conflicts on an all-species wildlife damage app, whereas Conservation Officers continued to submit monthly human-bear conflict survey forms (April–Oct). Beginning in 2019, COs also used an electronic app to record bear complaints (but a different app than wildlife). Because the 2 survey tools are not exactly the same, data are presented separately for each in parenthesis (Wildlife Managers, COs). For consistency, only April–October data are included (in 2017, managers recorded 10 calls in other months; in 2018, 14 calls were in other months; in 2019, 16 calls were in other months; in 2020, 21 calls were in other months; in 2021, 17 calls were in other months; in 2022, 14 calls were in other months; in 2023, 2 calls were in other months). For the wildlife manager data, anytime a WCIL row was entered, it is considered an independent complaint, so there are some duplicates when there were repeat issues at the same location.

[k] Lowest number of conflict bears were killed in 2011 and 2018, since recording began in 1982.

[m] Although it is unknown when this started, the information center at Central Office has been fielding human-bear conflict calls. We started to record these data in 2020. To date, some calls (~40%) are forwarded on to wildlife managers or conservation officers, but the rest are handled by the information center.

Fig. 5. Trends in human-bear conflict complaints, and conflict bears killed and moved, 1981–2023, showing dramatic effect of change in human-bear conflict policy, and a stable trend over the past decade.

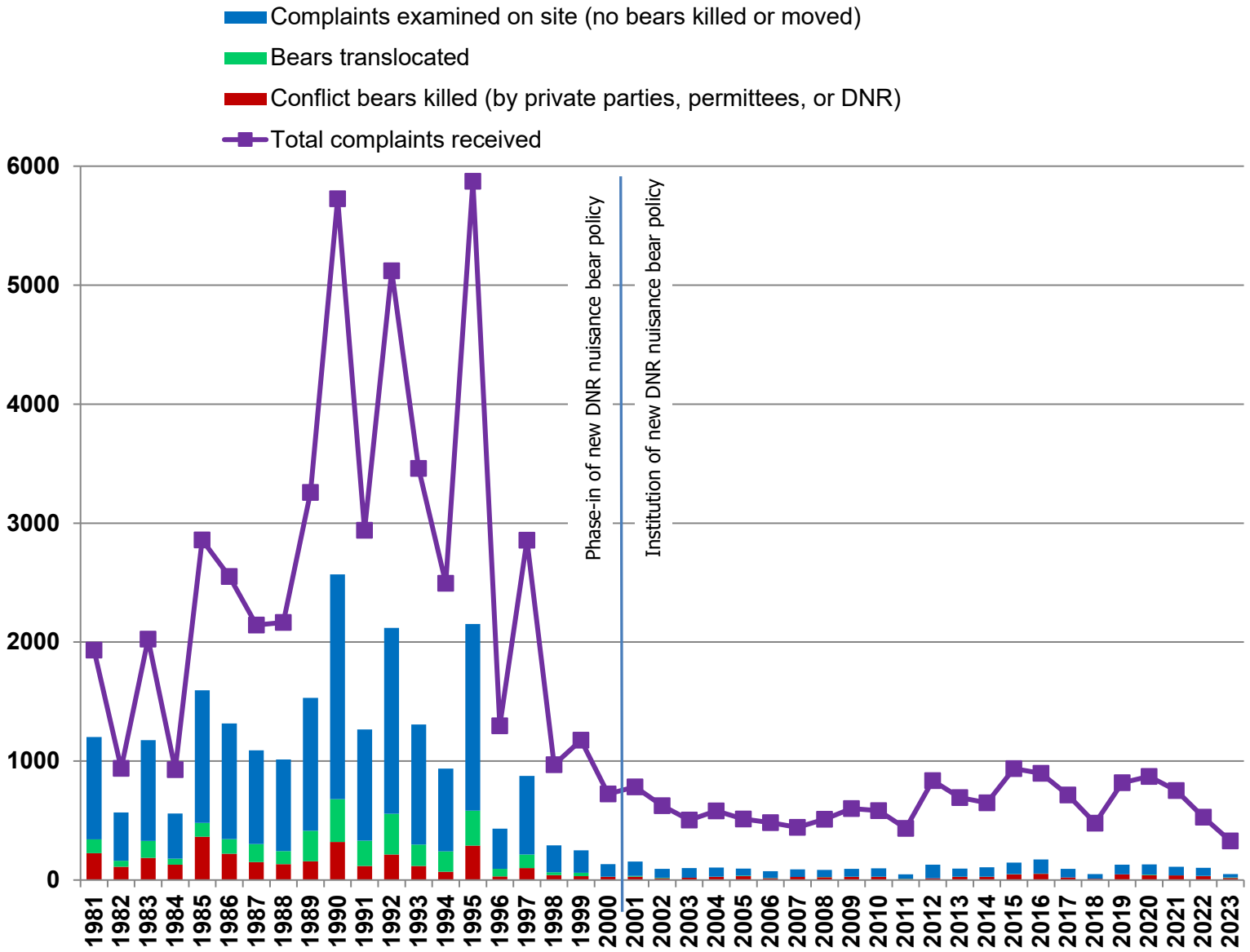


Table 10. Regional bear food indices[a] in Minnesota's bear range, 1984–2023. Shaded blocks indicate particularly low (<50; pink) or high (≥70; green) values.

	Survey Area					
Year	NW	NC	NE	WC	EC	Rangewide
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[b]	93.2	88.4	92.2	82.1	87.6[b]
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
2015	47.2	56.3	44.8	57.2	46.5	50.7
2016	79.5	64.3	75.8	64.4	60.6	70.3
2017	67.1	57.5	56.2	70.6	73.9	61.3
2018	72.6	82.4	101.8[b]	71.5	88.3[b]	83.9
2019	68.8	60.9	64.4	59.8	65.1	63.9
2020	65.3	42.1	47.5	51.7	51.9	53.0
2021	28.8	38.0	34.7	32.0	42.1	35.2
2022	80.2	91.4[b]	89.4	78.9	78.5	84.7
2023	70.6	81.7	84.4	69.4	73.0	78.6

[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).
[b] Record high food rating.

Table 11. Regional mean index values[a] for bear food species in 2023 compared to the previous 38-year mean (1984-2022) 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).

FRUIT	NW		NC		NE		WC		EC		Rangewide	
	38yr mean	2023 (*n* = 8[b])	38yr mean	2023 (*n* = 10)	38yr mean	2023 (*n* = 9)	38yr mean	2023 (*n* = 5)	38yr mean	2023 (*n* = 11)	38yr mean	2023 (*n* = 31[c])
SUMMER												
Sarsaparilla	4.7	4.6	5.8	6.0	5.2	5.3	4.4	3.0	5.2	4.4	5.0	5.0
Pincherry	3.4	6.7	4.4	7.0	4.3	6.3	3.7	2.0	3.7	4.4	3.9	7.8
Chokecherry	5.9	9.3	5.4	8.7	4.7	9.4	5.4	5.6	4.6	6.2	5.3	7.9
Juneberry	5.1	6.5	4.7	8.6	4.9	10.8	3.6	4.2	3.9	5.0	4.4	7.4
Elderberry	1.7	2.7	2.9	3.3	3.7	5.5	3.1	4.7	3.2	4.4	3.0	4.5
Blueberry	5.0	4.2	5.3	4.9	5.0	5.0	3.6	8.0	3.9	4.5	4.4	5.2
Raspberry	6.4	4.9	7.8	11.3	7.8	8.4	7.0	5.8	6.9	8.4	7.1	7.8
Blackberry	1.4	1.3	2.5	2.5	1.4	1.7	3.6	3.4	4.5	3.6	3.0	2.8
FALL												
Wild Plum	2.4	5.1	1.9	4.0	1.5	5.1	2.8	3.0	2.5	3.7	2.3	4.5
HB Cranberry	5.2	3.5	4.3	3.3	4.0	3.4	3.7	3.6	3.8	2.3	4.1	3.1
Dogwood	6.2	5.9	5.6	4.4	4.9	7.1	5.9	7.3	5.9	8.7	5.7	6.7
Oak	3.6	8.0	3.2	7.6	2.1	5.2	5.9	10.6	5.7	9.9	4.5	8.2
Mountain Ash	1.6	2.3	2.6	3.0	4.7	5.4	1.8	3.0	2.4	3.8	2.7	3.8
Hazel	6.4	5.7	7.3	7.8	6.8	5.8	7.6	5.3	7.4	3.8	7.1	5.9
TOTAL[d]	58.9	70.6	64.0	81.7	60.9	84.4	62.1	69.4	63.6	73.0	62.6	78.6

[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.

[d] Because of rounding error, these totals may be slightly different than the sum of adding down the columns.

Table 12. Regional productivity index[a] for important fall bear foods (oak + hazel + dogwood), 1984–2023. Particularly low (≤ 5.0; yellow) or high (≥8.0; tan) values are shaded.

	Survey Area					
Year	NW	NC	NE	WC	EC	Entire Range
1984	4.2	7.6	7.0	6.2	7.0	6.5
1985	4.9	2.8[b]	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[b]	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
2015	5.8	5.9	3.5	8.2	3.7[b]	5.6
2016	5.7	5.2	6.0	5.4	5.2	5.3
2017	6.8	5.6	5.1	7.4	7.1	6.5
2018	5.8	6.1	7.7	8.3	8.4	7.2
2019	6.2	7.1	6.6	6.5	7.1	6.7
2020	5.8	5.4	5.1	5.4	5.4	5.5
2021	3.8	4.3	3.3[b]	4.2[b]	4.4	4.2[b]
2022	7.2	7.9	6.7	7.8	7.9	7.4
2023	7.6	7.5	7.6	7.7	7.7	7.7

[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).
[b] Record low fall food score in survey area.

Fig. 6. Production of fall bear foods (dogwood, oak, hazel) across Minnesota, 2023.

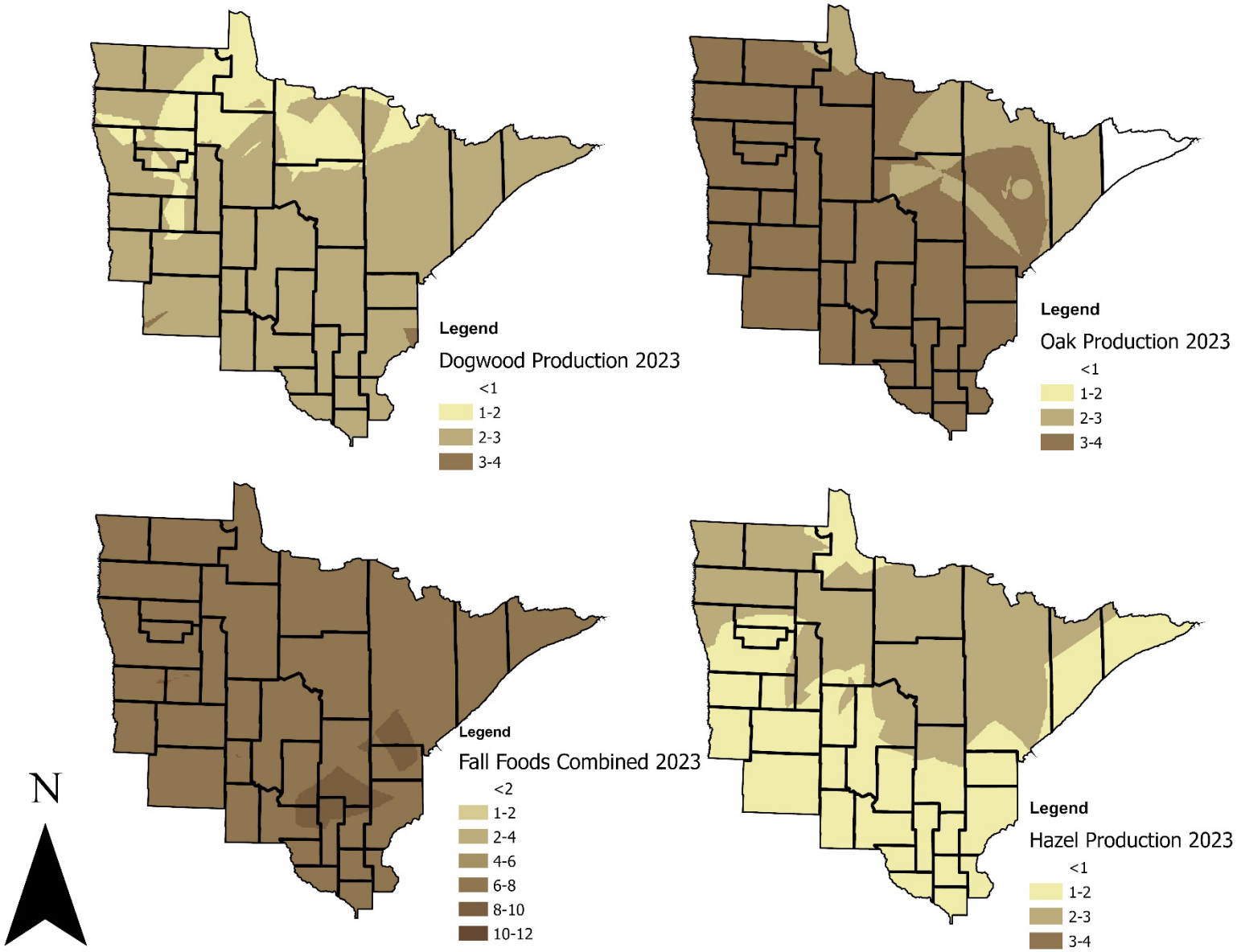


Fig. 7. Number of bears harvested vs. number predicted to be harvested based on number of hunters and fall food production statewide 1984–2023. Regression for the dataset included an interaction term between food and hunters to better predict changes in harvest when foods were extremely high or low.

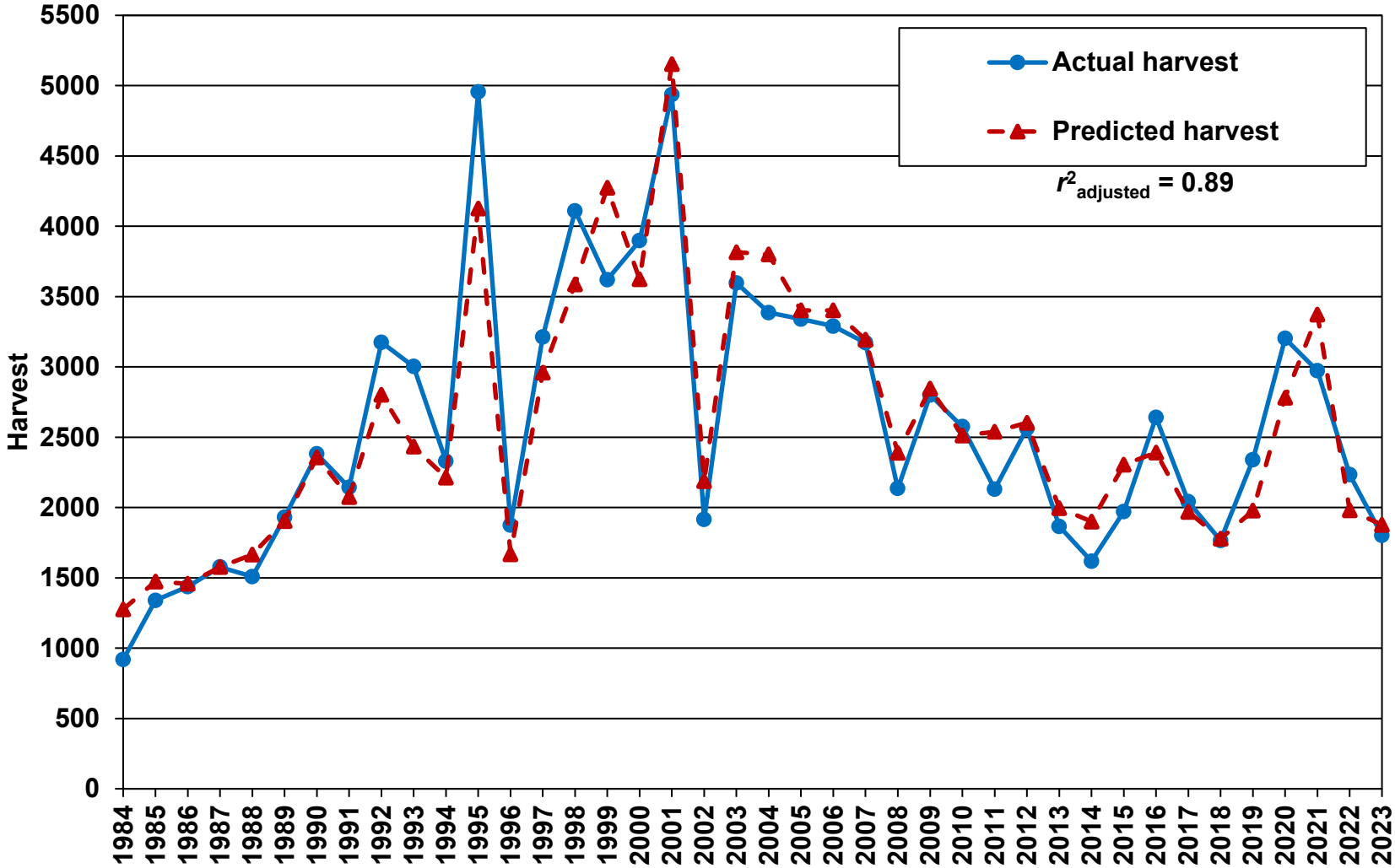


Fig 8. Percent of hunters submitting useable bear teeth for aging (vital for population monitoring, see Figs. 10–12). Cooperation levels exceeded 80% when registration stations were paid to extract teeth (this practice ended in 1993), and in recent years after a series of reminder letters (however, no letter was sent after 2017).

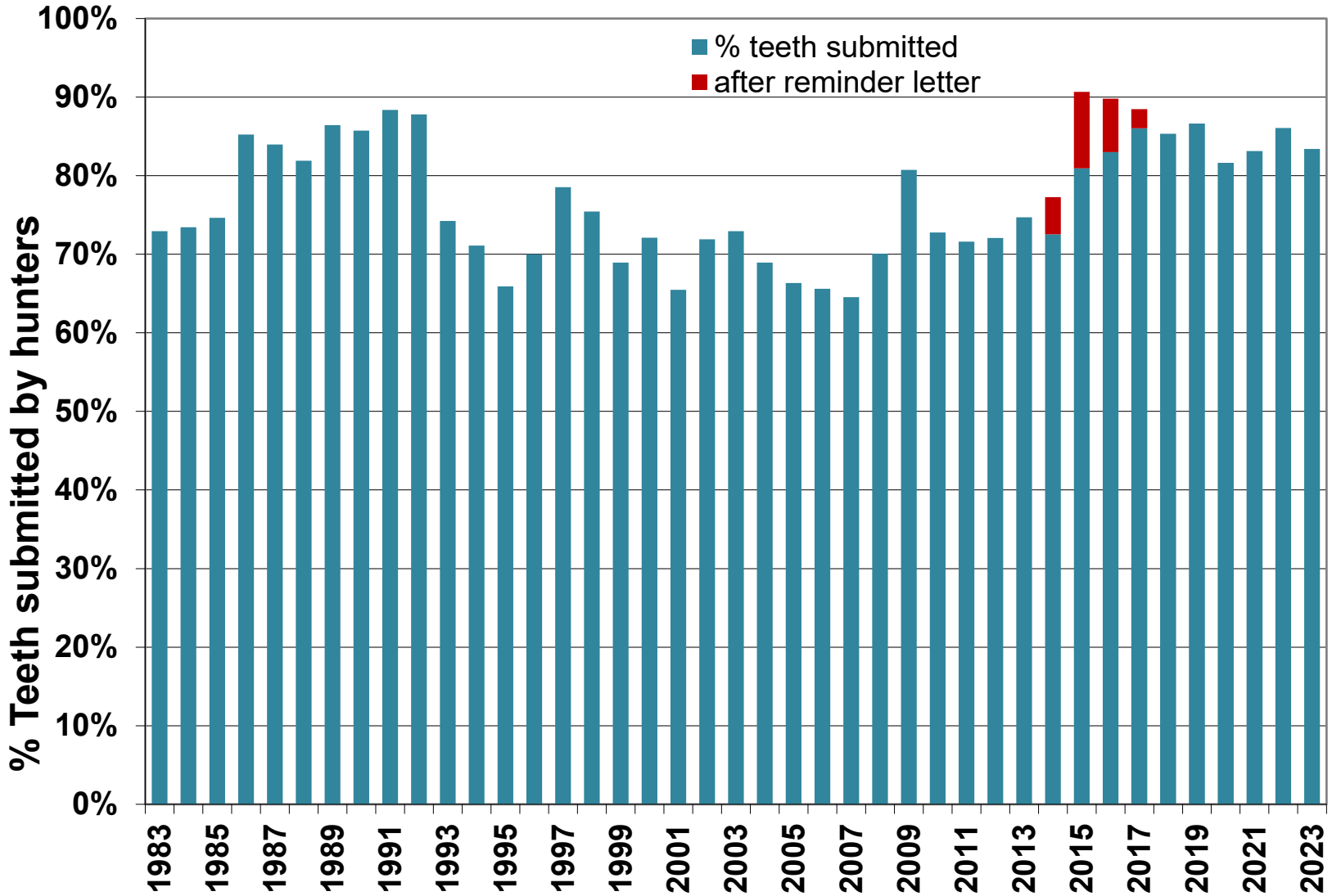
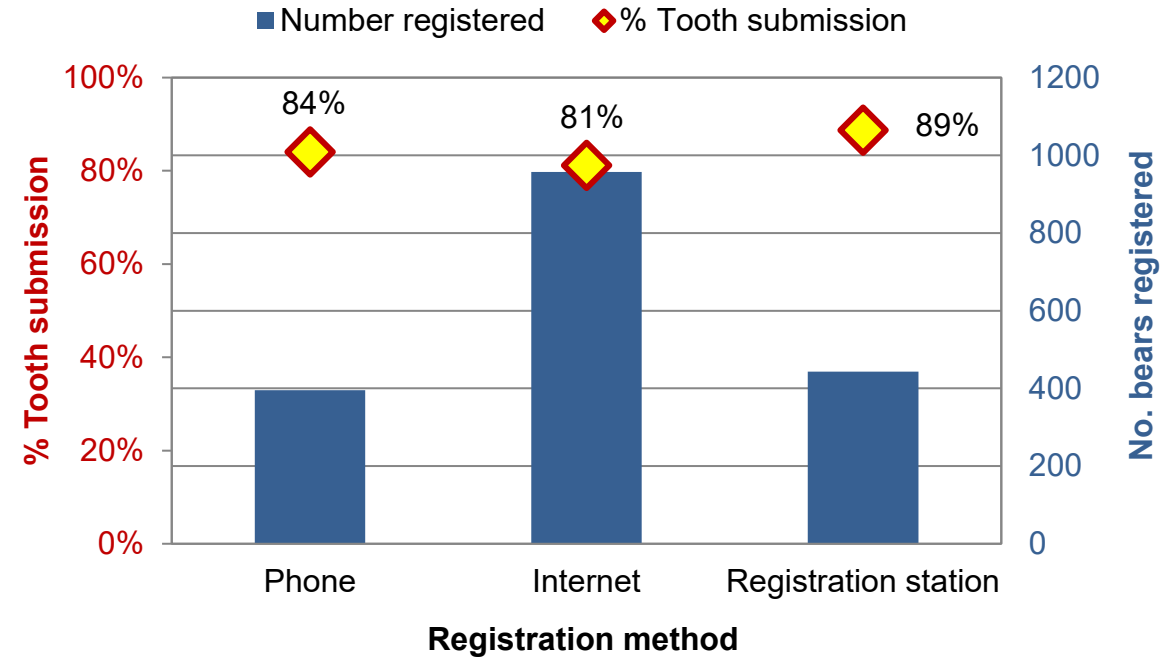


Fig. 9. Percent of hunters who submitted a bear tooth in 2023 by method of registration (top panel) and by BMU (bottom panel). Beginning in 2013, hunters could register their bear by phone, internet, and in person at a station. The 2023 statewide submission average (84%; red line, bottom panel) was above the long-term average (77%).



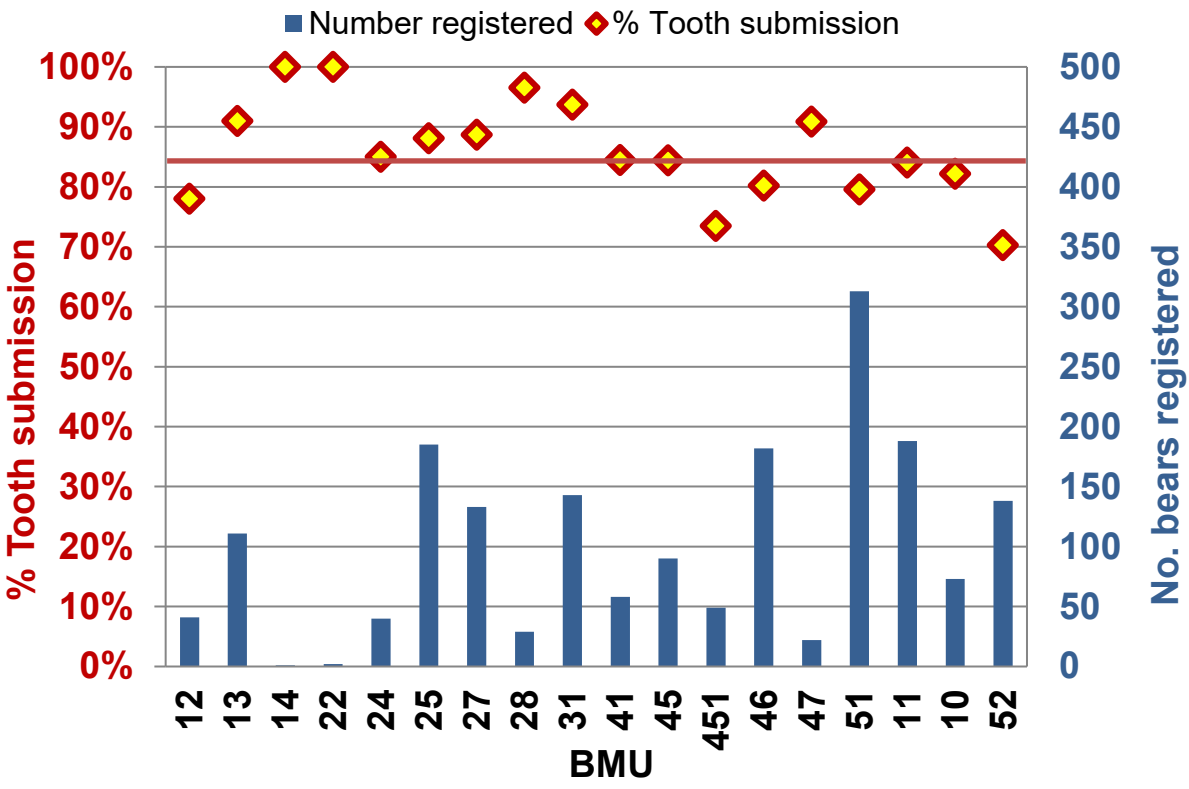


Fig. 10. Population trends during 1996–2024 derived from Allen et al. (2018) model statewide estimates (± 95% credible intervals), and population estimates for quota and no-quota zones.

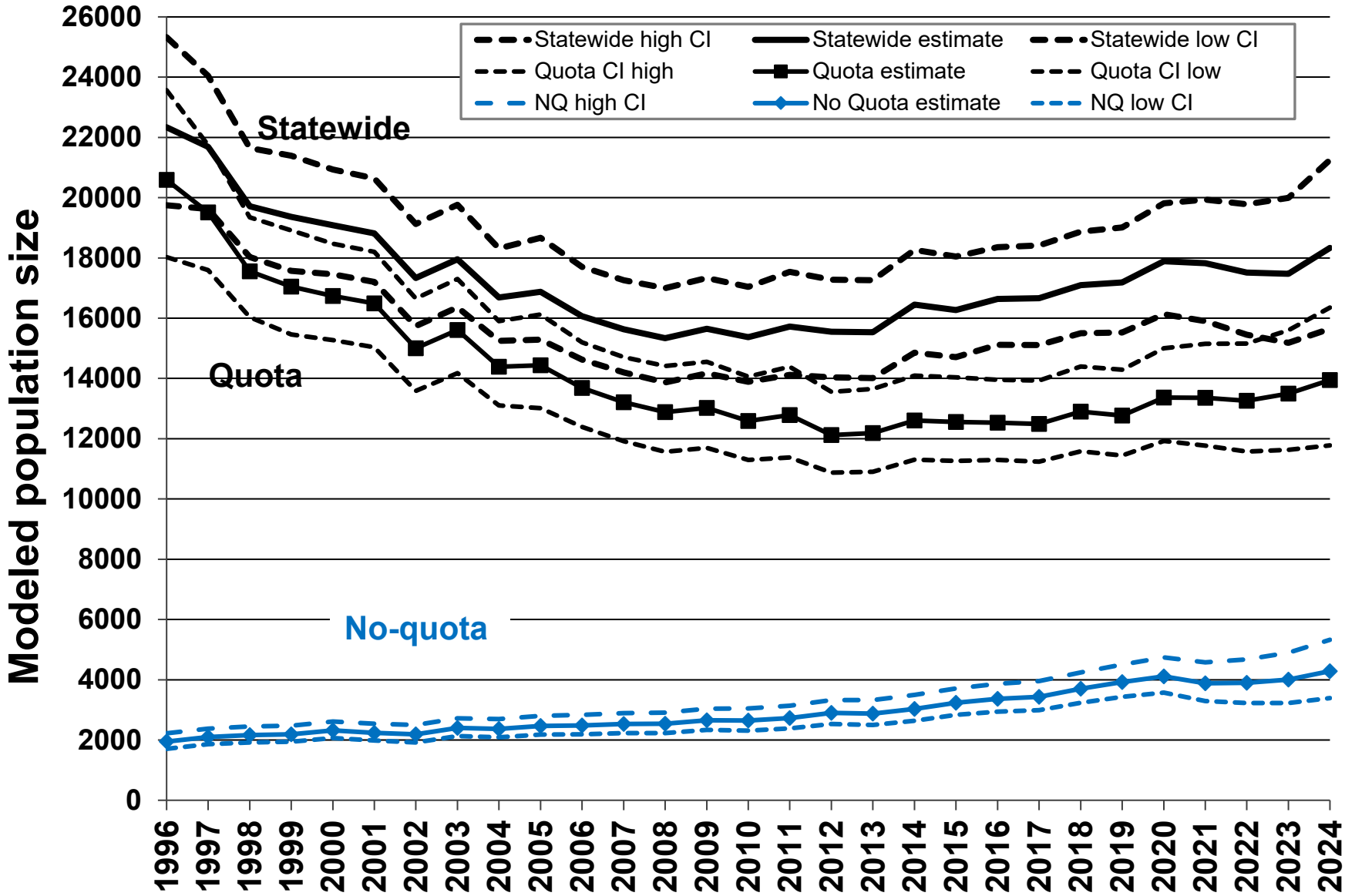


Fig. 11. Trends in proportion of male bears in statewide harvest at each age, 1–10 years, grouped in 5-year time blocks, 1980–2023. Higher harvest rates result in steeper curves because males in the living population are reduced faster than females. Fitting a line to the data for each time block and predicting the age at which 50% of the harvest is male (dashed orange horizontal line) yields approximately the inverse of the harvest rate (derived rates are shown in inset). Flatter curves in recent years indicate lower harvest rates (e.g., 2015–19 lower than 1980–84), but a slight increase in recent years.

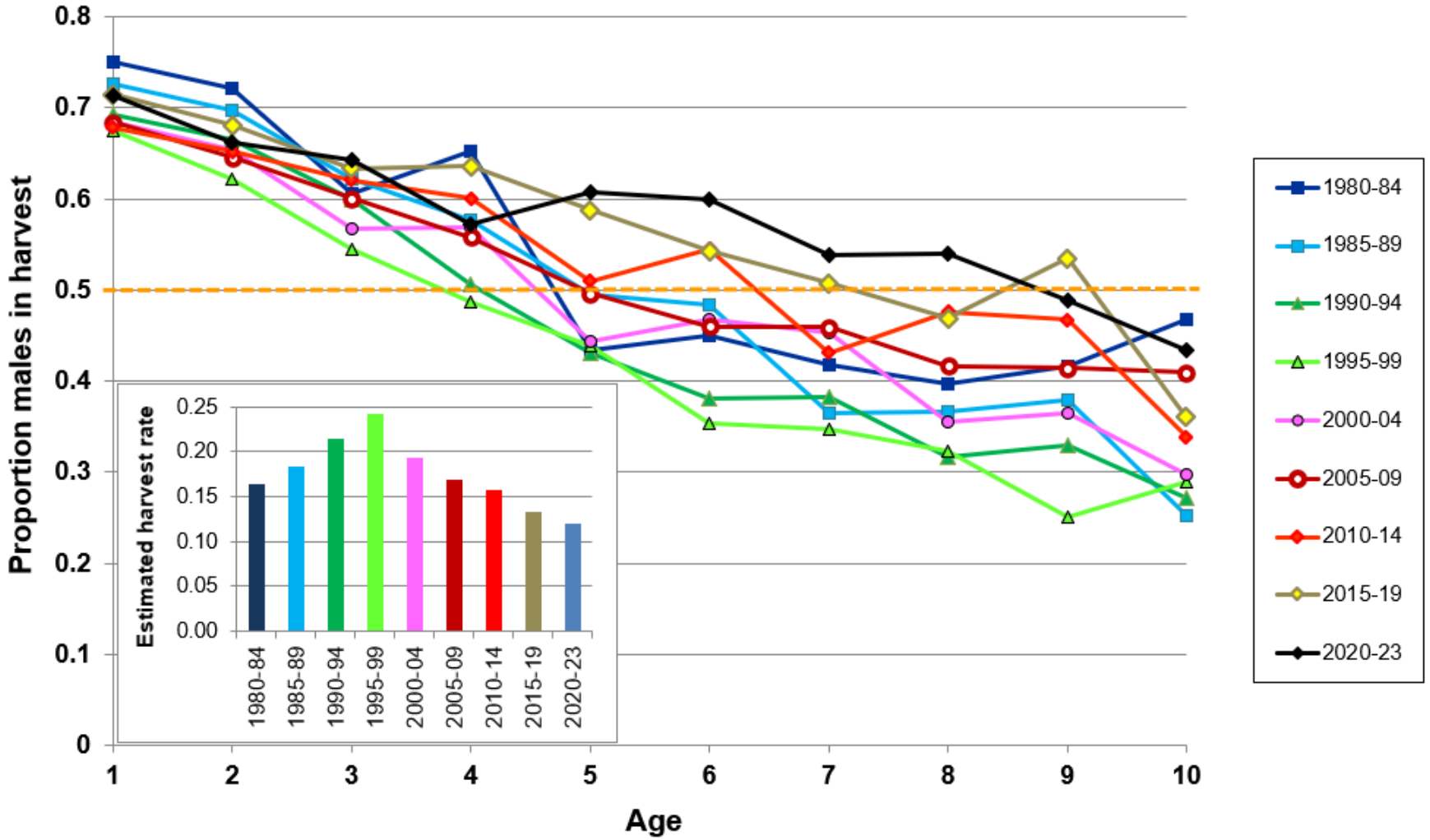


Fig 12. Allen et al. (2018) BMU-level, pre-hunt estimates 2000–2024. The vertical black line in 2012-2013 represents when quota permits were cut by >50% and have remained stable at low levels since then. The dashed lines represent the 95% pointwise credible intervals of the population estimate. With the small population size at BMU level, estimates of population trend are more reliable than actual population size. BMU harvest in area 22 is too small to reliably model. BMU population estimates are compiled into pre-2017 BMUs (e.g., BMU 27 and 28 are aggregated into BMU 26; BMU 46 and 47 are aggregated into BMU 44).

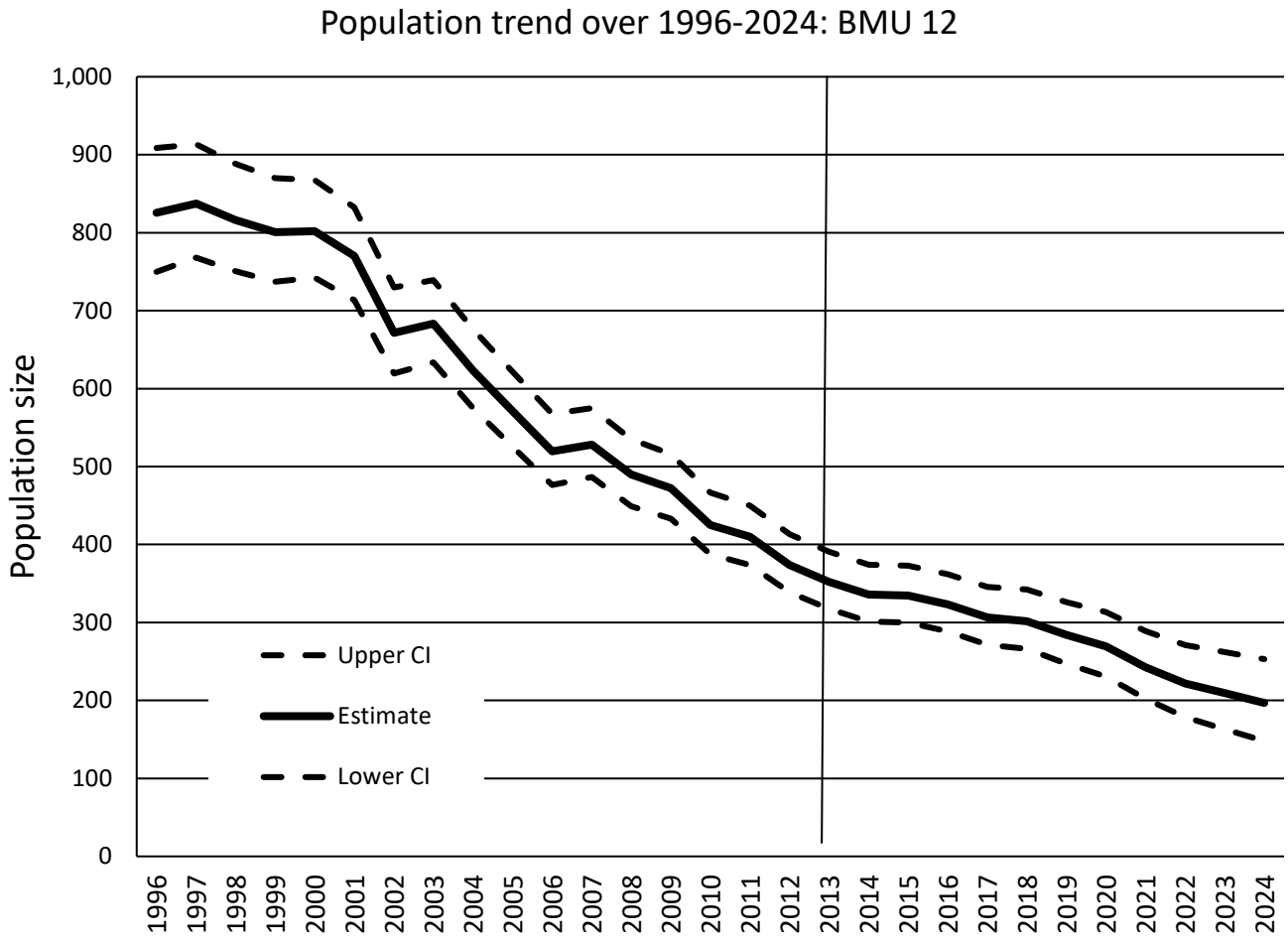


Fig. 12 cont'd.

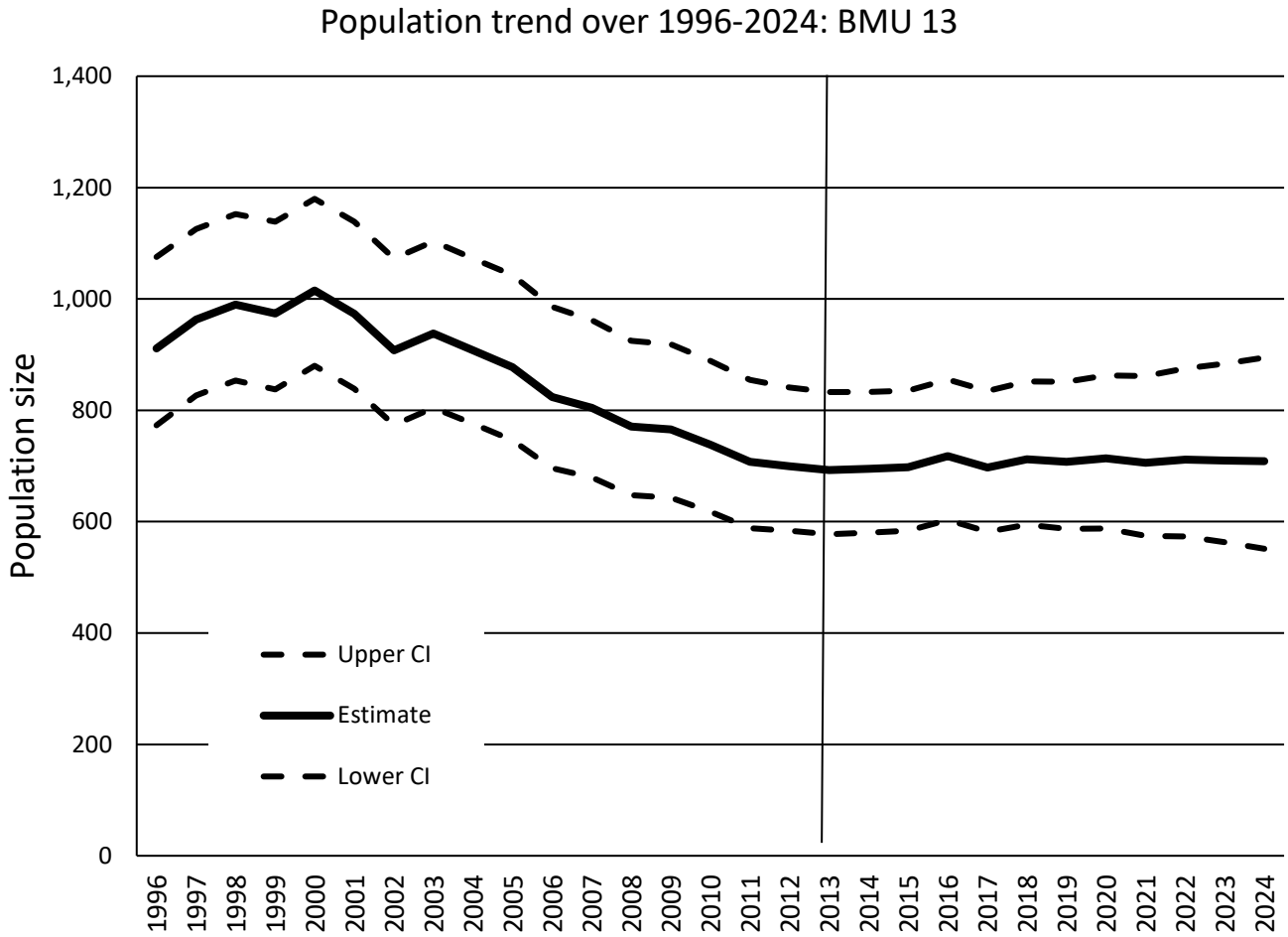

Population trend over 1996-2024: BMU 13
Population size
1,400
1,200
1,000
800
600
400
200
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd.

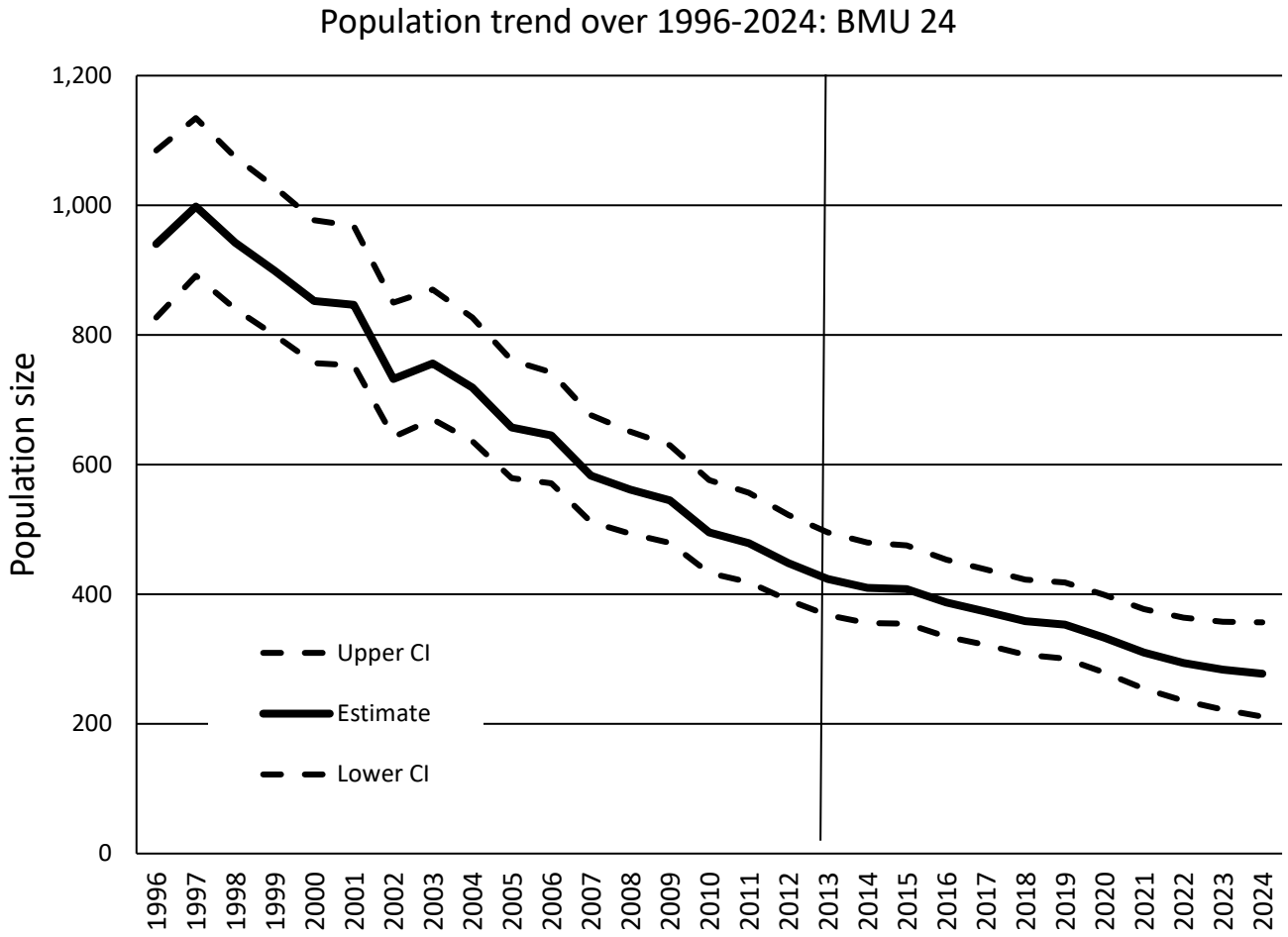
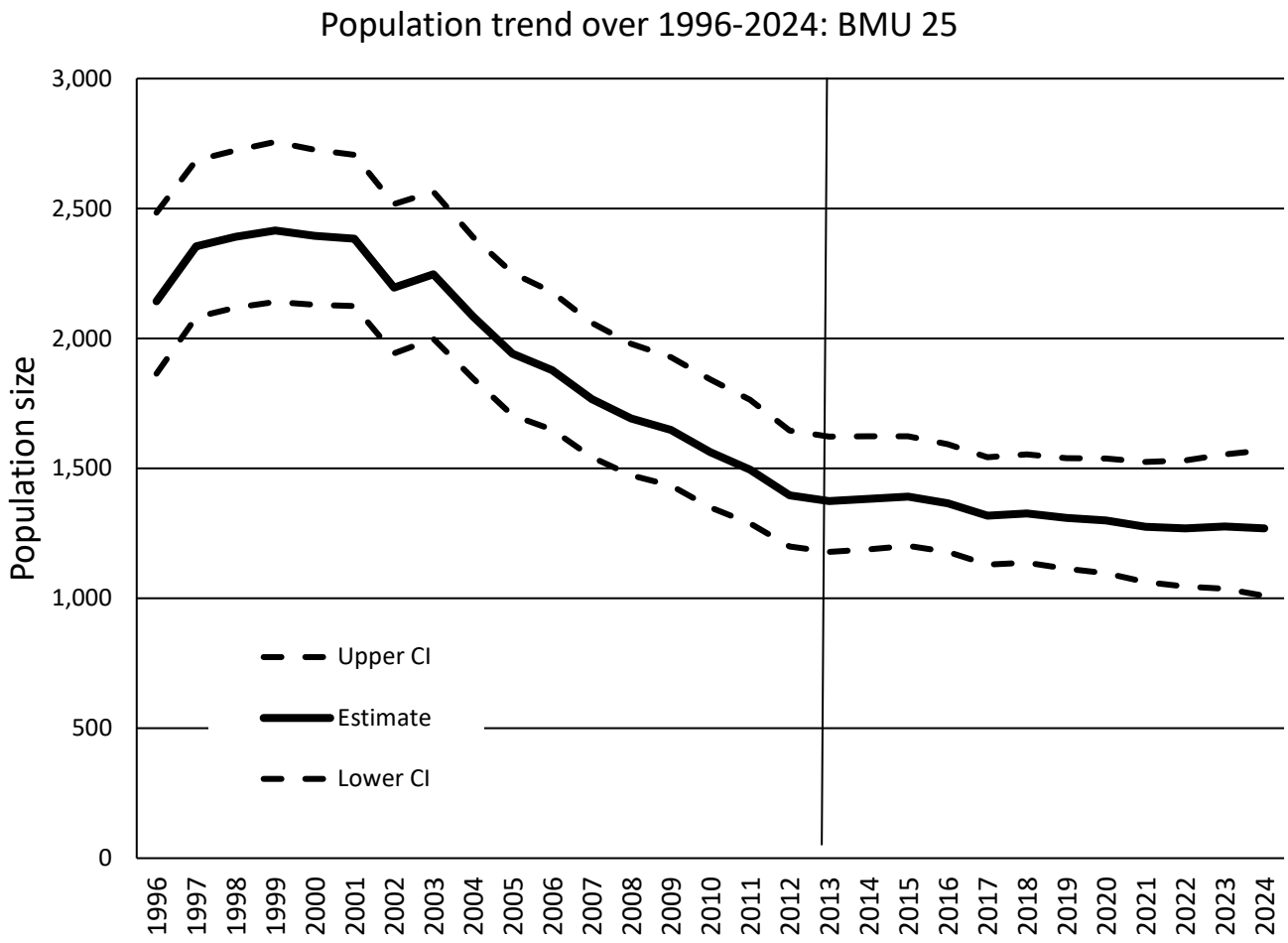

Population trend over 1996-2024: BMU 24
Population size
1,200
1,000
800
600
400
200
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd.


Population trend over 1996-2024: BMU 25
Population size
3,000
2,500
2,000
1,500
1,000
500
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
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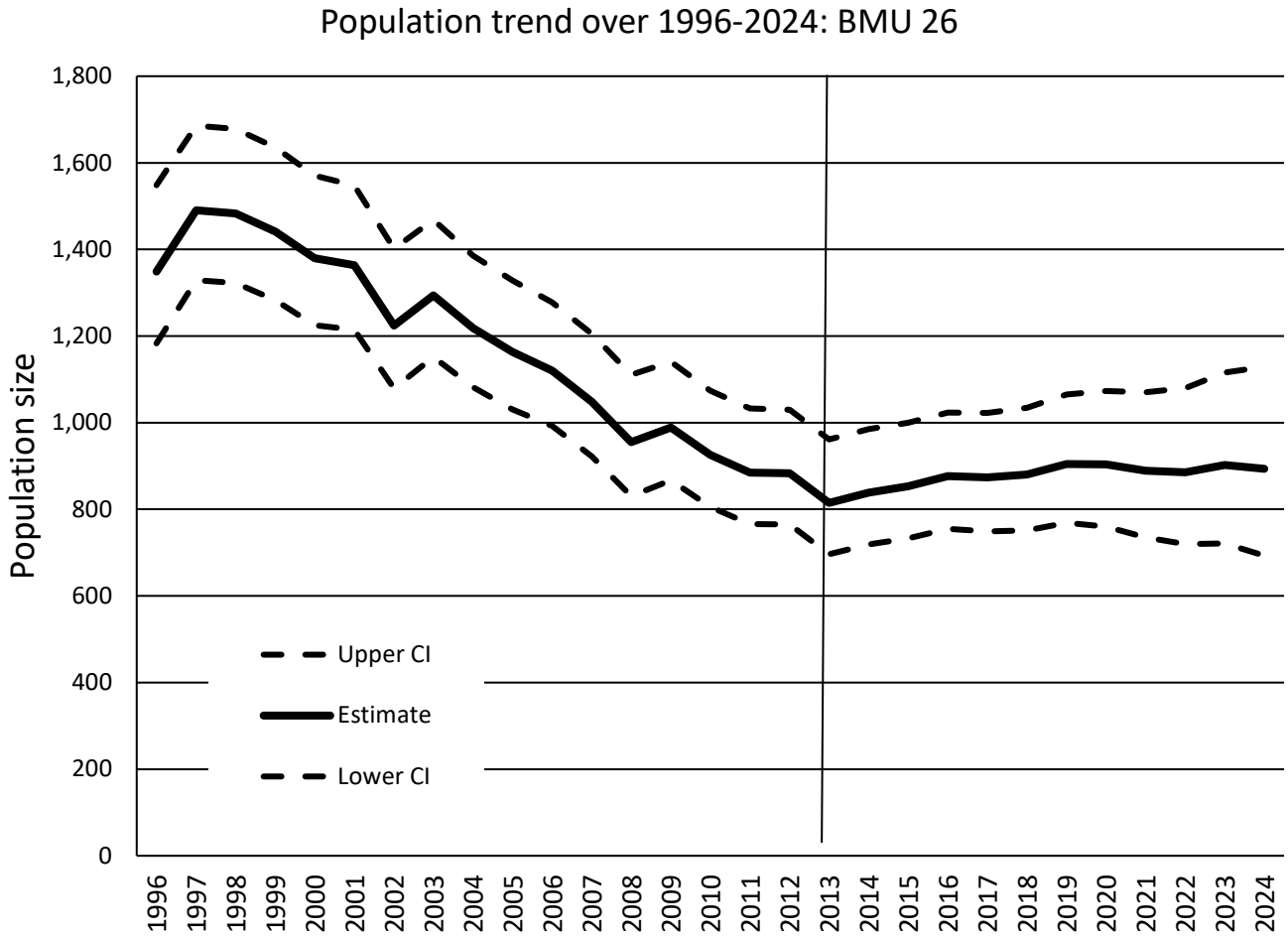
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd.


Population trend over 1996-2024: BMU 26
Population size
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
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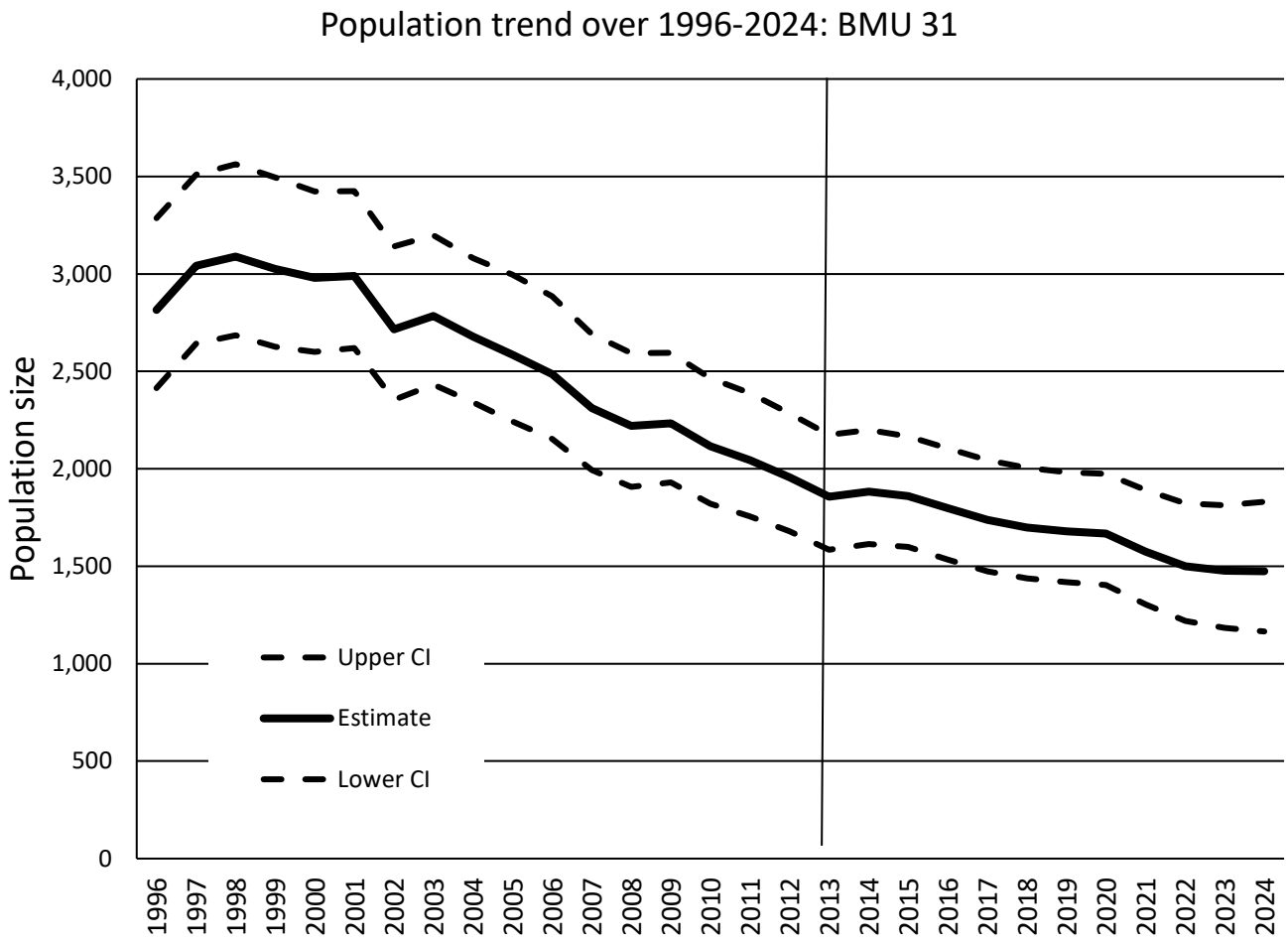
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd.


Population trend over 1996-2024: BMU 31
Population size
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
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2011
2012
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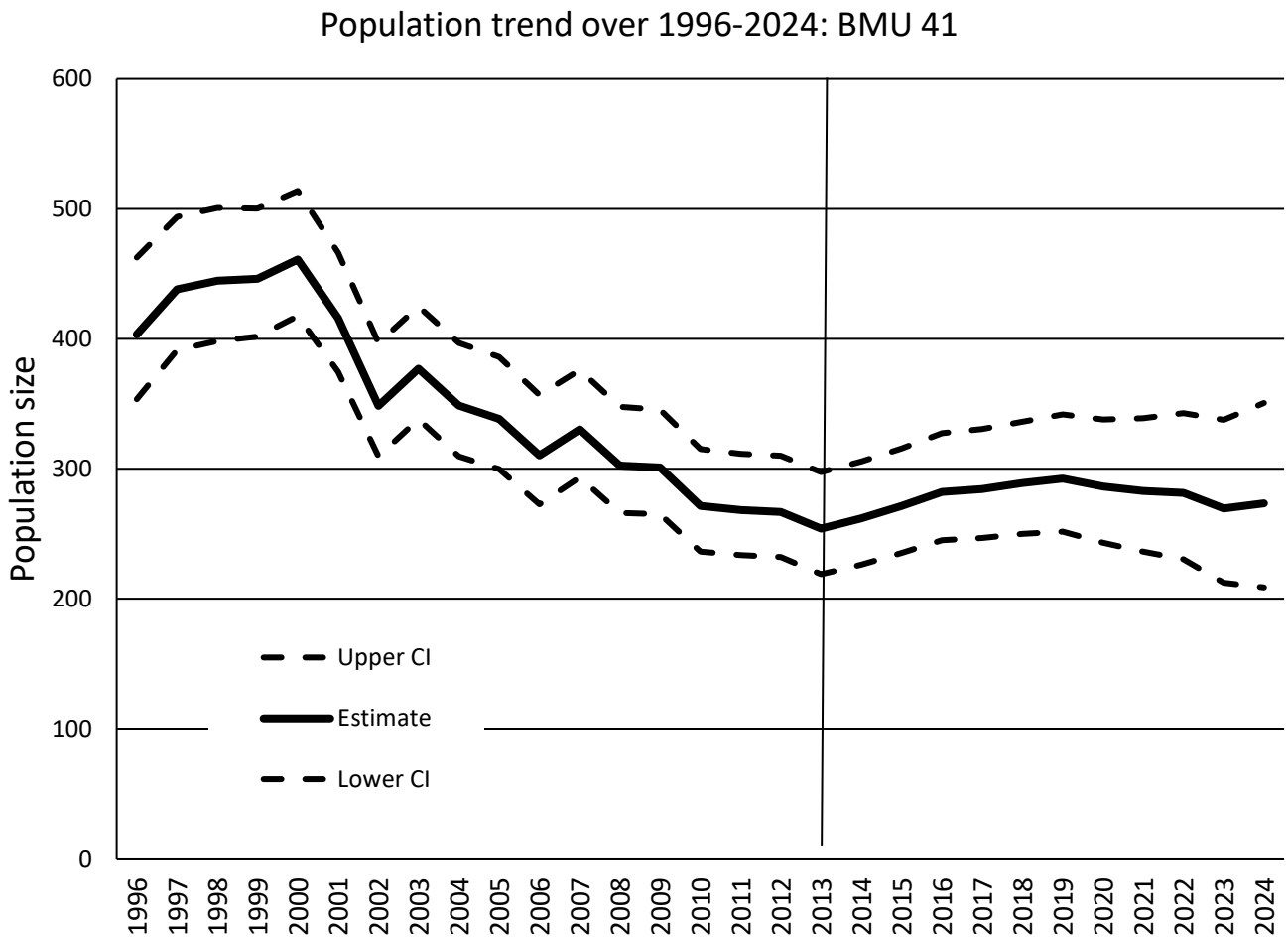
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd.


Population trend over 1996-2024: BMU 41
Population size
600
500
400
300
200
100
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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2012
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2020
2021
2022
2023
2024

Fig. 12 cont'd.

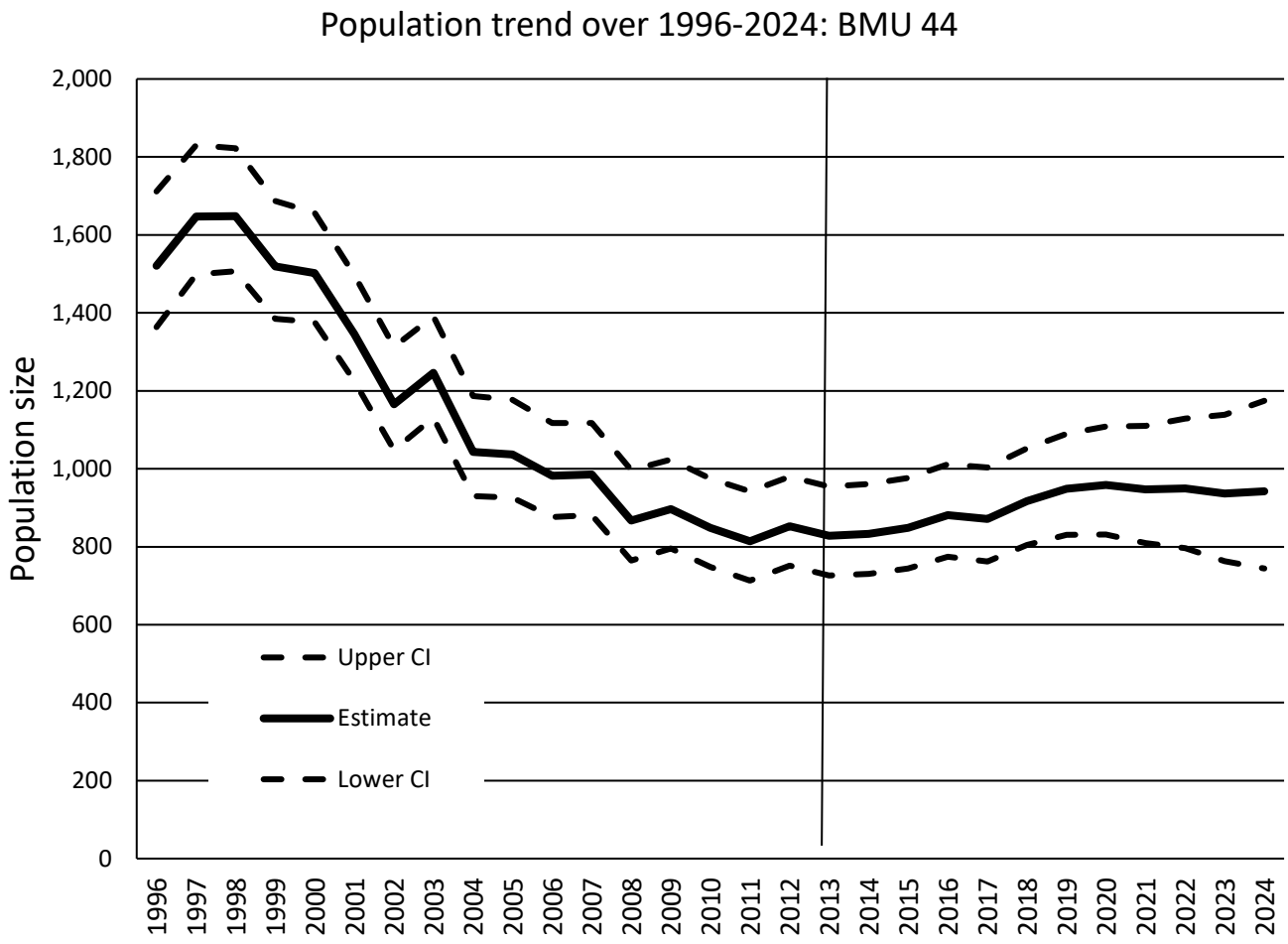
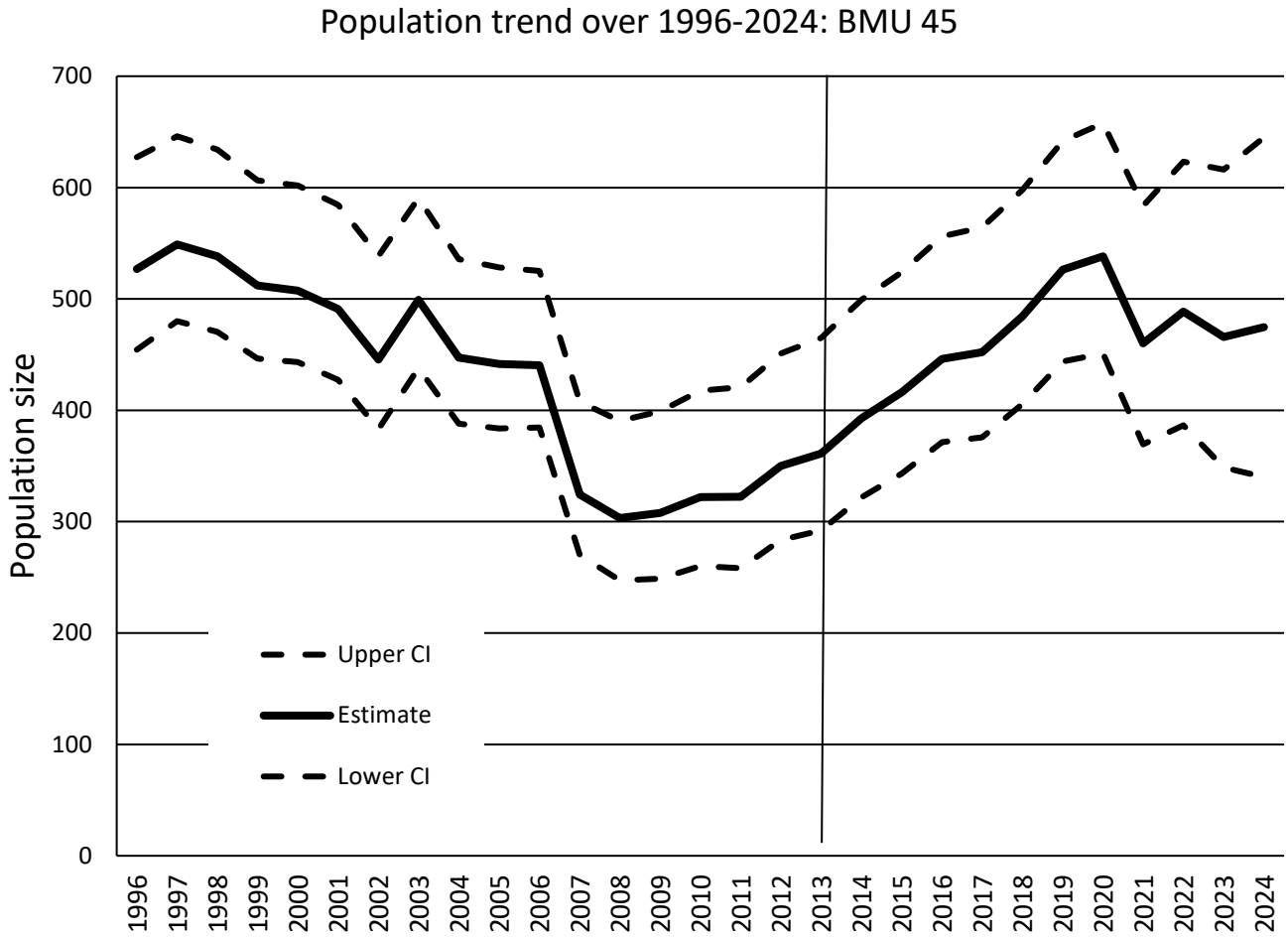

Population trend over 1996-2024: BMU 44
Population size
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd


Population trend over 1996-2024: BMU 45
Population size
700
600
500
400
300
200
100
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
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2020
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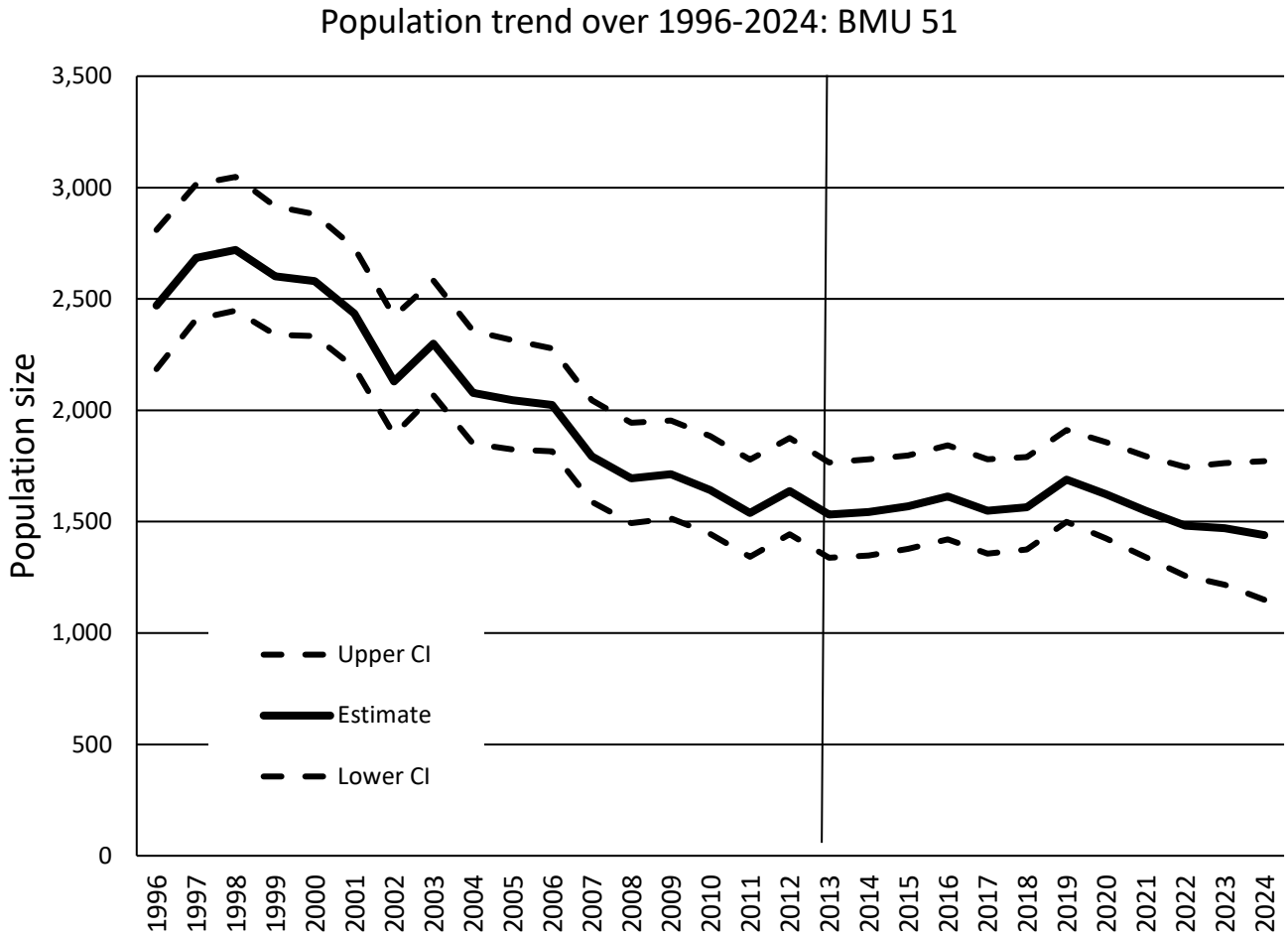
2022
2023
2024

Fig. 12 cont'd


Population trend over 1996-2024: BMU 51
Population size
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Upper CI
Estimate
Lower CI
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
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2011
2012
2013
2014
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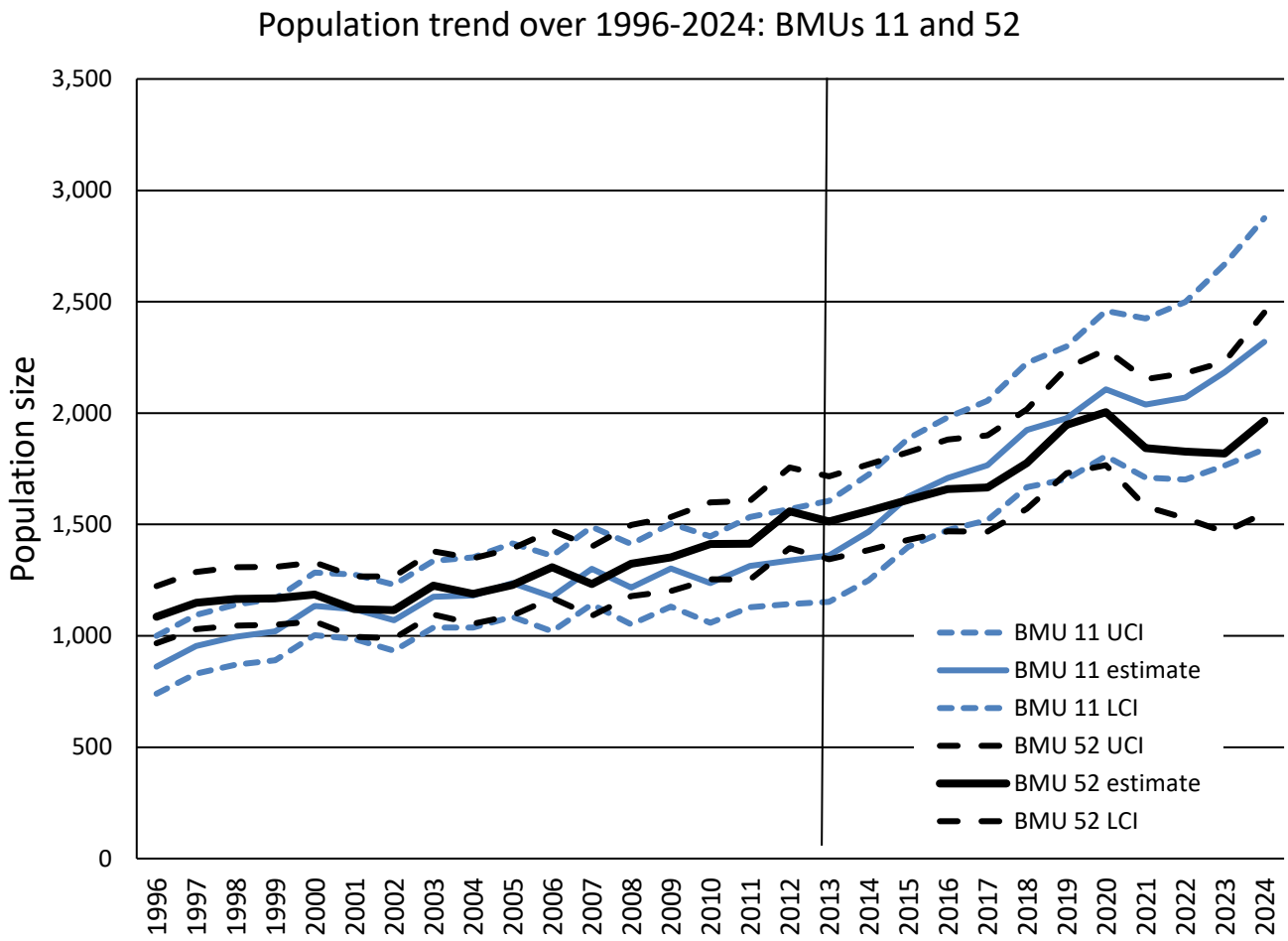
2016
2017
2018
2019
2020
2021
2022
2023
2024

Fig. 12 cont'd


Population trend over 1996-2024: BMUs 11 and 52
Population size
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
BMU 11 UCI
BMU 11 estimate
BMU 11 LCI
BMU 52 UCI
BMU 52 estimate
BMU 52 LCI