

STATUS OF MINNESOTA BLACK BEARS, 2022

**Harvests, Complaints, Foods, Population Trends, and
Hunter survey**

February 9, 2023

Final Report to Bear Committee

Andrew N. Tri



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

Key points

<p>Table 1 & Fig. 1</p>	<p><i>Overview: Permits, licenses, harvest, and success rates</i></p> <p>Permit applications for bear licenses exceeded 20,000 for the fifth straight year. Applications have not been this high since 2001. Of these, >4,400 (17%), 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 slightly higher than 2021. Hunting success is inversely related to the number of hunters but also strongly affected by fall foods. The total number of hunters were nearly a 30% increase over the 5-year average and is similar to the increase we saw in 2020.</p>
<p>Fig. 2</p>	<p><i>Bear Management Units</i></p> <p>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 this year 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.</p>
<p>Tables 2 & 3</p>	<p><i>Quota zone permits and licenses</i></p> <p>The number of quota zone permits available in 2022 was very similar to 2022. This is the 10th year (since 2013) that permits have been kept relatively low (<3,900). This was the 12th year (since 2011) of a system whereby licenses for the quota zone that were not purchased by permittees selected in the lottery (>400) 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 (595 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. This area will exist for at least 3 years to understand if there are any reductions in crop damage.</p>

Fig. 3	<p><i>Quota zone applicants</i></p> <p>Statewide, quota zone applications have been slowly increasing, and all BMUs (except 31) had similar or increased numbers of applicants over last year. As in year's past, BMU 45 showed a significant, two-fold increase over the past 10 years.</p>
Table 4	<p><i>Residents vs. Non-resident hunters</i></p> <p>The proportion of resident hunters has remained stable for the past 5 years. The Northwest no-quota zone (11) consistently had the highest proportions of non-resident hunters (21%–30%). Most BMUs had ~10–15% non-resident hunters, except for 11, 13, 25, 28, 31, and 47 which varied between 20%–37% with wide fluctuations annually.</p>
Table 5	<p><i>Quota zone lottery</i></p> <p>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 10 years has made it increasingly difficult to succeed in the lottery and wait times increased again in 2022. 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). This year, although quotas were about the same as last year, a higher level of preference was needed to secure a permit because a large number of hunters who had accumulated preference points by previously applying to area 99 entered the lottery for a BMU. First-time and second-time applicants were successful only in BMU 22 (wilderness area hunt). Six BMUs required a preference level of 4 for guaranteed success, and BMUs 27, 28, 46, 47, and 45 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).</p>
Table 6	<p><i>Harvest by BMU</i></p> <p>The statewide harvest in 2022 was 25% lower than 2021, and 30% lower than 2020. This was likely due to the range-wide boom in production of natural bear foods for the second year in a row. The sex ratio of the harvest was $\geq 60\%$ males in BMUs 12, 13, 25, 27, 28, 31, 41, 45, and 51. All others had sex ratios closer to $>50\%$ male, except for BMU 45 (47% male). 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 likelier to be shot than in average or good food years.</p>
Fig. 4	<p><i>Harvest by quota vs no-quota zones</i></p> <p>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 has continued to increase, split evenly between BMUs 11 and 52 (Table 5). Nearly half of the bear hunters were hunting with a no-quota license this year.</p>
Table 7	<p><i>Hunting success by BMU</i></p>

	<p>In 2022, success was at or below the 5-year average in quota zone, with the exception of 45 where success was the second highest ever recorded. Success rate in quota zone nearly 2.5 times higher than in the no-quota zone (42% vs. 17%, respectively). Success rates in the no quota were similar to long-term averages, but still good overall (17% average over the last 5 years).</p>
Table 8	<p><i>Harvest by date</i></p> <p>During years of normal fall food abundance, about 70% of the harvest occurs during the 1st week of the bear season, and ~83% occurs by the end of the 2nd week. This year lagged behind this pattern somewhat, likely due to the abundant crops of natural foods across Minnesota this fall.</p>
Table 9 & Fig. 5	<p><i>Human bear conflicts</i></p> <p>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 number of officers reporting bear complaints. Complaints were similar to 2018, and this year had the second lowest level of bear complaints in a decade.</p>
Tables 10–12 & Fig. 6	<p><i>Food abundance</i></p> <p>The composite range-wide, all-season abundance of natural bear foods (fruits and nuts) in 2022 was the second-best on record. Abundance of many summer foods was above the long-term (37-year) average for all regions. In general, summer food conditions were exceptionally good across the state, and in most regions rivaled peak food year in 1996. Fall foods were also above average. The statewide fall food index (productivity of dogwood + oak + hazel), which helps predict annual harvest after accounting for hunter effort (Fig. 11), was the 4th best year on record. Hazelnuts, acorns, and dogwood berries were above average in many areas of the state.</p>
Fig. 7	<p><i>Predictions of harvest from food abundance</i></p> <p>The 2022 statewide harvest was 10% higher than expected, based on regression of harvest as a function of hunter numbers and the fall food productivity index. This regression is nearly as strong (and has accurately predicted previous harvests) when only the past 15 years are considered. For the quota zone, the actual harvest in 2022 was also 15% higher than predicted by this regression.</p>

<p>Figs. 8–9</p>	<p><i>Submission of bear teeth for aging</i></p> <p>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, 22, 41, and 52).</p>
<p>Fig. 10</p>	<p><i>Population trend: Statewide and quota vs no-quota zones</i></p> <p>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). This model does not have a lag time like the Downing (so projections are available to post-hunt 2022, but the estimation method provides a “dampening” effect on the year-to-year variation in population estimates that results in a flatter curve than expected. The trajectory of this model is robust to assumption violations but is certainly an underestimate when considering 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 only had a minor decline after the past 2 years of increased harvest, but the no-quota area has been increasing steadily for the last 20 years. The credible intervals for these 2 estimates are not included for ease of reading.</p>

<p>Fig. 11</p>	<p><i>Trends in harvest rates</i></p> <p>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%).</p> <p>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).</p>
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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 worse bear reproduction (BMUs 12, 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 our 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.

Acknowledging that these results are post-hunt 2022, 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). 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 a few BMUs. 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, 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 BMU 41 has had a very minor decline over the past few years.

The no-quota BMUs have been increasing rather quickly since 2012. Estimates of growth are 7.0% (BMU 11) and 3.9% (BMU 52) annually from 2012–2022. 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.

Fig. 12

<p>Table 13 & Fig. 17</p>	<p><i>Hunter experience, methods, and effort</i></p> <p>A bear hunter survey was employed to assess changes in hunter effort and hunting methods over time, comparing periodic hunter surveys conducted over a 30-year period, 1988–2022. A random sample of 74% of all hunters were surveyed this year (6,000 total surveys), of which responses were received from 60% in the quota zone and 29% in the no-quota zone (the remaining 11% of respondents did not indicate which area they hunted). In total, 165 surveys were address returns, and 1614 hunters responded, indicating a 28% response rate. Hunters have gained bear hunting experience over time and a preponderance of hunters now use trail cameras (88% in quota zone, 78% in no-quota). However, type of weapon, use of bait, and use of guides has remained relatively stable, at least during the 2000s. There was a slight increase in the number of days hunting this survey over the long-term mean (7.2 days this year vs. long-term average of 6.3 days). Fewer hunters indicated passing up a shot at a bear in 2018 and 2022 than in the past. Those that did pass up a shot did so mainly seeking a larger bear or to avoid shooting a female with cubs. The percentage of hunters who passed-up shooting a bear was virtually the same in quota and no-quota zones.</p>
<p>Fig. 18</p>	<p><i>Hunter reactions to hunter density & low quotas</i></p> <p>Few hunters indicated that low hunter density (less competition, due to low quotas) made them more selective in the bear they shot. However, quota hunters enjoyed their hunt more than no-quota hunters because the no-quota areas have become more crowded (at least in spots).</p>
<p>Fig. 19 & 20</p>	<p><i>Hunter opinions of status of bear population</i></p> <p>Nearly 80% of hunters expressed an opinion of the status of the bear population in the general area where they hunted. Among these, 37% thought the local population was stable, nearly 31% thought it was increasing, and 11% thought it was declining. Opinions of population status differed by BMU. Roughly half the hunters in quota BMUs 28 and 45 thought local populations of bears were increasing. When comparing with 2018, about half as many hunters indicated the population was increasing in their zones (with 28 and 45 being the exception) in 2022. However, in all BMUs (except 22), $\geq 50\%$ of all hunters surveyed thought that their local bear population was increasing or stable.</p>

Table 1. Bear permits, licenses, hunters, harvests, and success rates, 2002–2022.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Permit applications ^a	21886	16431	16466	16153	15725	16345	17362	17571	18647	19184	18103	18107	18885	18422	19958	21034	21184	20632	22279	24598	25817
Permits available ^b	20610	20110	16450	15950	14850	13200	11850	10000	9500	7050	6000	3750	3750	3700	3850	3350	3350	3400	3575	3575	3605
Licenses purchased (total)	14639	14409	13669	13199	13164	11936	10404	9892	9689	9555	8986	6589	6620	6962	7177	6655	6550	6801	8882	8990	8153
Quota zone ^c	12350	9833	10063	9340	9169	8905	7842	7342	7086	5684	4951	3188	3177	3257	3420	2954	2922	2988	3178	3187	3146
Quota surplus/military ^c	209	2554	1356	1591	1561	526	233	77	83	1385	1070	578	583	446	441	401	428	417	398	392	505
Quota-no limit area-451																			1038	768	595
No-quota zone ^c	2080	2022	2238	2268	2434	2505	2329	2473	2520	2486	2965	2823	2860	3259	3316	3300	3200	3396	4262 ^h	4643	3907
% Licenses bought																					
Of permits available ^d	60.9	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
Of permits issued ^d	66.3	65.7	68.3	67.1	68.9	70.0	67.2	73.8	74.5	80.7	82.7	85.0	84.7	87.9	88.7	88.2	87.2	87.8	80.8	89.1	86.1
Residents in Quota ^d														86.3	88.1	76.6	88.9	87.6	86.6	87.5	88.1
Estimated no. hunters ^e	13800	13600	12900	12500	12500	11300	9900	9400	9200	9200	8600	6300	6300	6700	6900	6400	6300	6700	8400	8500	8100
Harvest	1915	3598	3391	3340	3290	3172	2135	2801	2699	2131	2604	1866	1627	1971	2641	2040	1766	2340	3203	2971	2251
Harvest sex ratio (%M) ^f	61	58	57	59	58	57	62	59	59	61	59	62	62	66 ⁱ	61	63	66 ⁱ	61	56	59	60
Success rate (%)																					
Total harvest/hunters ^g	14	26	26	26	26	28	21	30	29	23	30	30	26	30	38	32	28	35	38	35	35
Quota harvest/licenses ^k	14	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

^a From 2008 to 2019, 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 (record high in the last two decades); additionally, area 88 nuisance-only bear license applications counted in this total in 2017=3, 2018=6, 2019=5, 2020=11, 2021=4 (people who selected area 88 as 1st preference).

^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 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 2011–20, 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%), and 2018 (92.7%). Beginning in 2011 all unpurchased quota licenses were sold as “surplus” in August, and this process is quick and competitive; thus, for 2011–19 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 2019, 2 hunters shot 2 bears. In 2020, 5 hunters shot 2 bears. In 2021, 3 hunters shot 2 bears. In 2022, 3 hunters shot 2 bears.

^h Record high number of no-quota zone licenses purchased in 2020; record high % of licenses in no-quota zone in 2017 (nearly 50%; see Fig. 4).

ⁱ Record high % males in statewide harvest.

^j 2020: highest success rate in quota zone ever; 2016: second highest success rate; 2019: 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 2021 success rate for BMU 451 is listed in Table 6 and the success rate for the quota area with Area 451 included is 45%.

Fig. 1. Relationship between licenses sold and hunting success (*note inverted scale*) in quota zone, 1987–2022 (quota and no-quota zones first partitioned in 1987). Number of licenses explains 60% of variation in hunting success during this period. Large variation in hunting success is also attributable to food conditions (e.g., during 2013–2022, 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.

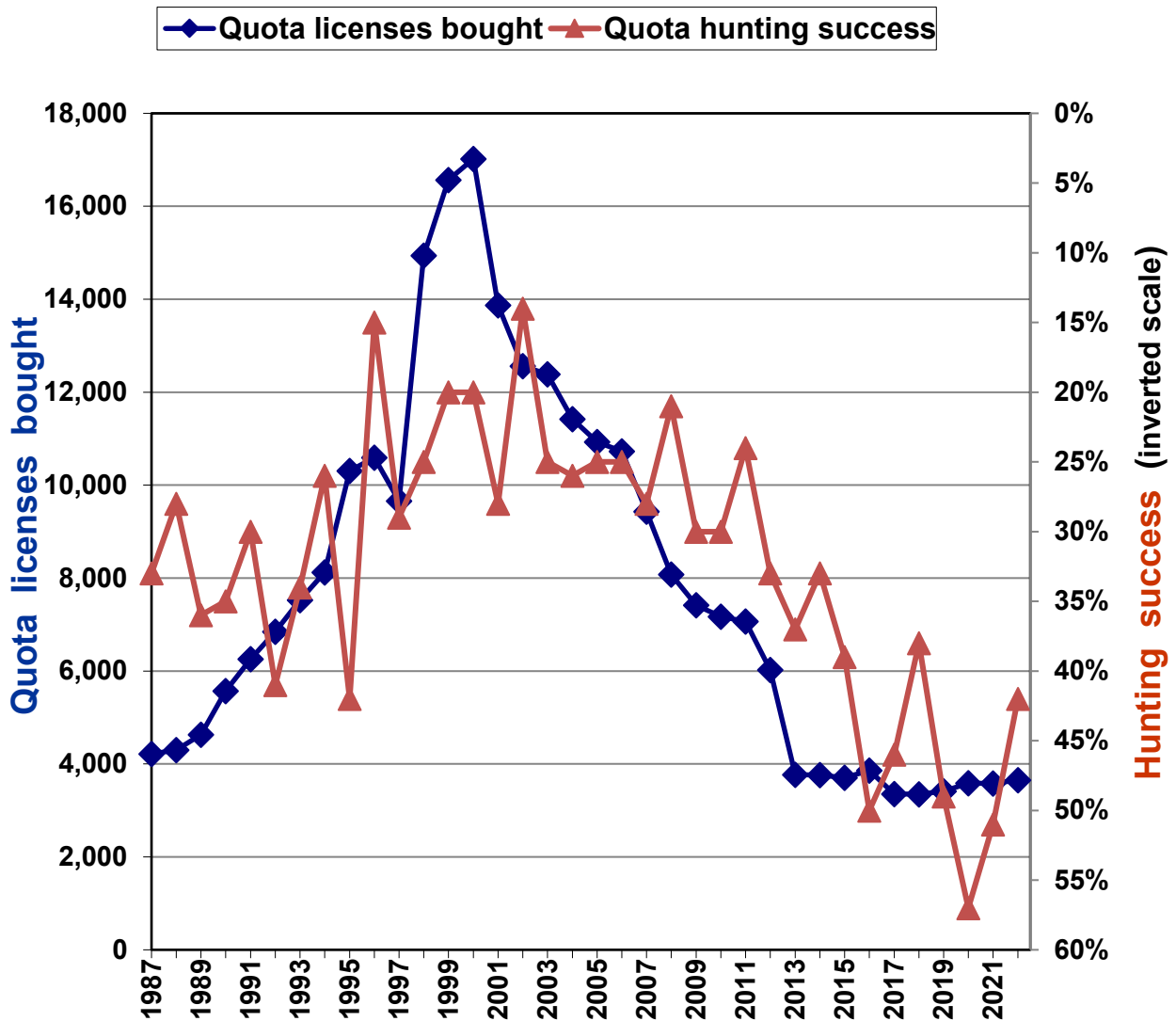


Fig. 2. Bear management units (BMUs) within quota (white) and no-quota (gray) zones. Hunters in the quota zone are restricted to a single BMU. In 2016, BMU 26 was divided into 27 and 28, and BMU 44 was split into 46 and 47 (BMUs 28 and 47 comprise the Leech Lake Reservation). BMU 14 was split from BMU 12 in 2922. 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.

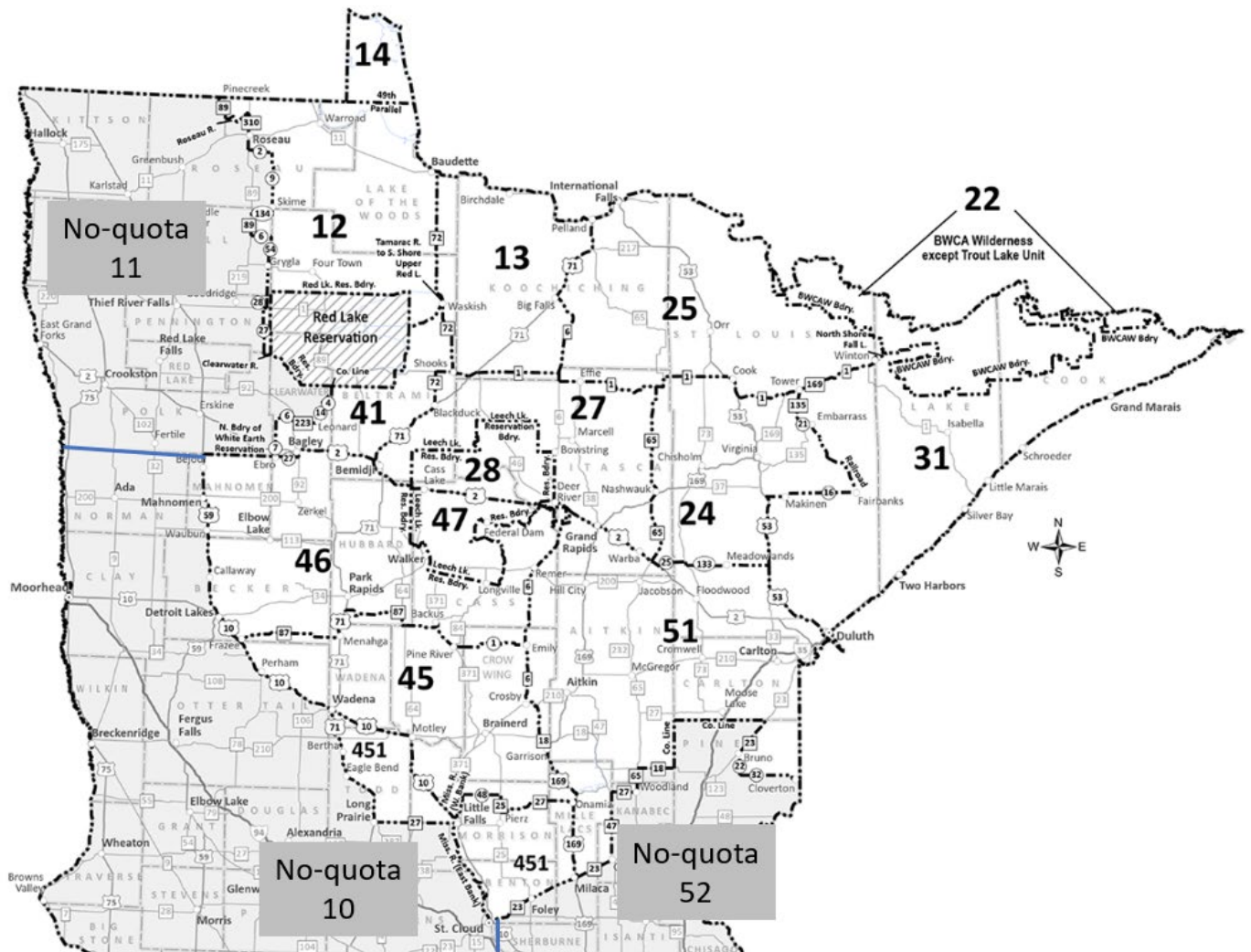


Table 2. Number of bear hunting quota area permits available, 2018–2022. Highlighted values show a change from the previous year.

BMU	2018	2019	2020	2021	2022
12	125	150	125	125	100
13	225	250	225	225	225
14					10
22	50	50	50	50	50
24	175	200	175	175	135
25	400	500	400	400	360
27	225	225	225	225	225
28	60	60	60	60	60
31	500	550	500	500	425
41	125	150	175	175	200
45	175	150	200	200	250
46	350	350	400	400	450
47	40	40	40	40	40
51	900	900	1000	1000	1075
Total	3350	3700	3575	3575	3605

^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 28 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, 2017–2022^a. Shaded values indicate undersubscribed (applications less than permits available).

BMU	2017			2018			2019			2020			2021			2022		
	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	774	113	12	703	109	16	711	104	21	751	107	18	891	110	15	931	82	18
13	772	200	25	682	177	47	712	199	26	734	195	30	944	198	27	939	192	33
14																51	7	3
22	47	34	16	76	36	14	61	35	14	69	32	18	73	40	10	51	38	12
24	945	158	17	928	155	20	840	153	22	909	155	20	1072	157	18	1144	122	13
25	1651	354	46	1561	355	44	1520	348	52	1627	367	33	1806	356	44	1836	313	47
27	1297	197	28	1265	204	21	1280	200	25	1338	207	18	1532	200	25	1675	203	22
28	330	52	8	309	52	8	318	51	9	312	49	11	358	59	1	351	55	5
31	2076	441	59	2074	428	71	1907	432	67	2022	444	57	2297	428	72	2222	351	74
41	614	109	16	648	114	11	661	143	7	663	154	21	841	155	20	848	167	33
45	2323	161	14	2383	160	15	2351	178	22	1978	186	14	2241	190	10	2308	222	28
451 ^c												1038			769			595
46	2774	319	31	2769	317	33	2662	313	37	2853	364	36	3340	364	36	3596	391	59
47	214	33	7	182	35	5	198	34	6	216	33	7	244	33	7	263	34	6
51	4411	783	117	4344	779	123	3956	798	102	4058	885	115	4766	897	105	5106	926	149
Total^b	18228	2954	396	17924	2921	428	17177	2988	410	18577	3178	1454	20405	3187	1158	21343	31460	1097

^a Beginning in 2011, all licenses not purchased by permittees were sold as “surplus”. In all cases but three (see footnote b), all of the surplus licenses were purchased. Surplus = Permits available (Table 2) minus Bought licenses (± 5 to account for groups applying together).

^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 apply 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, 2013–2022. For 2016–2022, BMUs 27 and 28 were grouped into old BMU 26 and BMUs 46 and 47 were grouped into old BMU 44. BMU 45 has a thicker line because applications there surged over this period. The number of applications in all areas (except 31) increased or remained stable in 2022 from 2021.

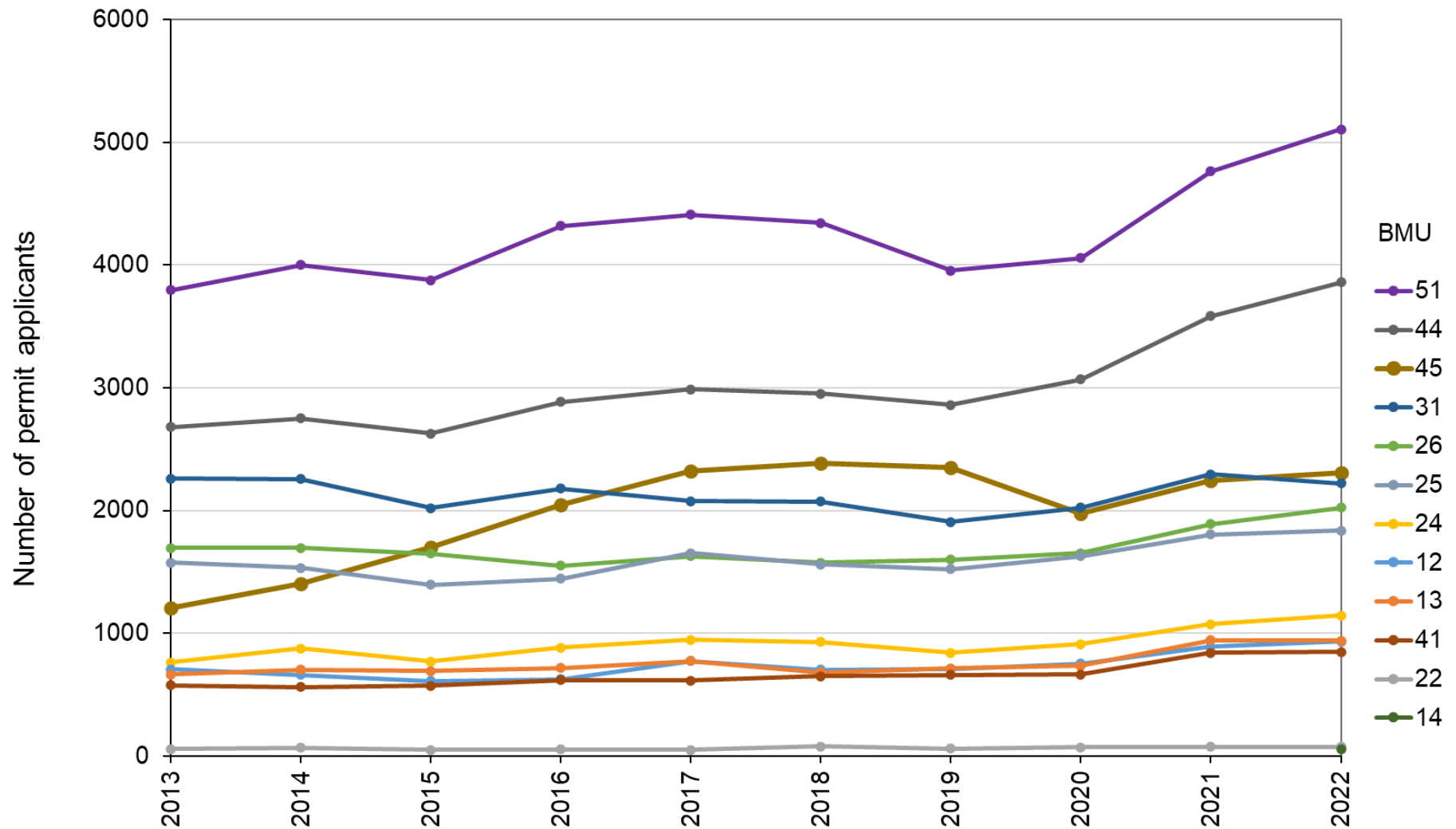


Table 4. Proportion of resident bear hunters (2018–2022) for each bear management unit (BMU) in Minnesota.

BMU	2018	2019	2020	2021	2022
10 ^a	93.8%	93.0%	97.7%	96.3%	91.8%
11 ^a	78.6%	74.9%	78.6%	75.1%	69.4%
12	83.2%	88.8%	85.6%	86.4%	90.0%
13	87.9%	79.2%	77.8%	77.8%	79.6%
14					100.0%
22	94.0%	91.8%	92.0%	94.0%	92.3%
24	94.3%	94.9%	98.3%	96.0%	88.3%
25	81.2%	81.3%	82.0%	78.8%	83.8%
27	91.1%	88.5%	86.7%	88.0%	89.5%
28	60.0%	83.3%	71.7%	68.3%	69.4%
31	80.5%	81.6%	73.8%	77.4%	78.6%
41	90.4%	86.7%	90.9%	86.9%	90.5%
45	99.4%	97.5%	98.0%	96.5%	98.8%
46	94.9%	93.2%	92.0%	92.8%	92.5%
47	62.5%	90.0%	92.5%	82.5%	82.5%
51	94.6%	92.6%	93.1%	92.9%	92.8%
52 ^a	89.8%	91.9%	92.7%	90.8%	91.7%
451			97.2%	96.7%	95.8%

^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 2019–2022. 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	2019					2020					2021					2022					
	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 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 6
12	0	0	13			0	0	0	72		0	0	58			0	0	0	25		
13	0	0	92			0	0	93			0	0	66			0	0	43			
14																0	0	0	80		
22	76					65					56					60					
24	0	0	11			0	0	0	93		0	0	0	78		0	0	0	35		
25	0	0	58			0	0	45			0	0	32			0	0	97			
27 ^b	0	0	0	66		0	0	0	49		0	0	0	20		0	0	0	0	93	
28 ^b	0	0	0	5		0	0	0	2		0	0	0	0	77	0	0	0	0	61	
31	0	0	38			0	0	33			0	0	9			0	0	0	91		
41	0	0	6			0	0	26			0	0	26			0	0	15			
46 ^b	0	0	0	1		0	0	0	0	83	0	0	0	0	58	0	0	0	0	41	
47 ^b	0	0	0	50		0	0	0	18		0	0	0	0	72	0	0	0	0	31	
45	0	0	0	0	42	0	0	0	0	23	0	0	0	0	5	0	0	0	0	0	91
51	0	0	0	22		0	0	24			0	0	18			0	0	20			

^a As an example, in 2019: BMU 12: 0% of preference level 1 and 2 applicants were drawn, 13% of preference level 3, and 100% of preference level 4 and above were drawn for a permit; BMU 22: 76% preference level 1 applicants were selected, 100% all higher preference levels; BMU 45: no preference level 1–4 applicants were drawn, 42% of hunters with preference 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 2022 by Bear Management Unit (BMU)^a and sex^b compared to harvests during 2017–2021 and record high and low harvests (since establishment of each BMU, not counting current year).

BMU	2022				2021	2020	2019	2018	2017	5-year mean	Record low harvest (yr)	Record high harvest (yr)
	M	(%M)	F	Total								
Quota												
12	32	73	13	48	71	84	62	66	54	67	38 (14)	263 (01)
13	87	78	23	110	110	126	105	119	100	119	71 (88)	258 (95)
14	0	0	0	0								
22	1	100	0	1	3	7	3 ^d	4	8	5	3 (03)	41 (89)
24	33	57	25	58	81	97	86	60	81	81	50 (14)	288 (95)
25	112	64	64	176	215	251	224	223	212	225	149 (96)	584 (01)
26					[174]	[186]	[169]	[141]	[162]	[163]	117 (14)	513 (95)
27	71	70	30	101	140	148	128	105	120	128	105 (18)	148 (20)
28	26	81	6	32	34	38	41	36	42	38	36 (18)	42 (20)
31	137	70	60	197	296	325	212	211	262	261	157 (88)	697 (01)
41	53	62	32	85	75	74	76	58	61	69	35 (15)	201 (01)
44					[228]	[256]	[203]	[154]	[158]	189	130 (11)	643 (95)
46	119	56	92	211	201	231	181	139	141	179	139 (18)	231 (20)
47	9	56	7	16	27	25	22	15	17	21	15 (18)	25(16,20)
45	57	47	64	121	108	85	108	51	77	86	32 (11)	178 (01)
451	45	61	29	74	110	168						
51	217	62	134	350	477	511	411	185 ^d	372	391	185 (18)	895 (01)
Total	999	63	579	1578	1948	2210	1659	1272	1547	1591	1192 (88)	4288 (01)
No-Quota												
11	179	66	89	268	386	487 ^f	269	287	179	322	38 (87)	351 (05)
10	30	68	14	44	50	29 ^f	26	21	18	29	15 (16)	29 (20)
52	212	61	140	351	587	476 ^f	386	186	295	386	105 (02)	476 (20)
60 ^c	0	0	0	0	0	1	0	0	1			
888 ^g	5	55	4	9								
Total	426	63	247	672	1023	993 ^e	681	494	493	674	198 (87)	993 (20)
State	1413	63	821	2251	2971	3203	2340	1766	2040	2225	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. 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. *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, 1987–2022.

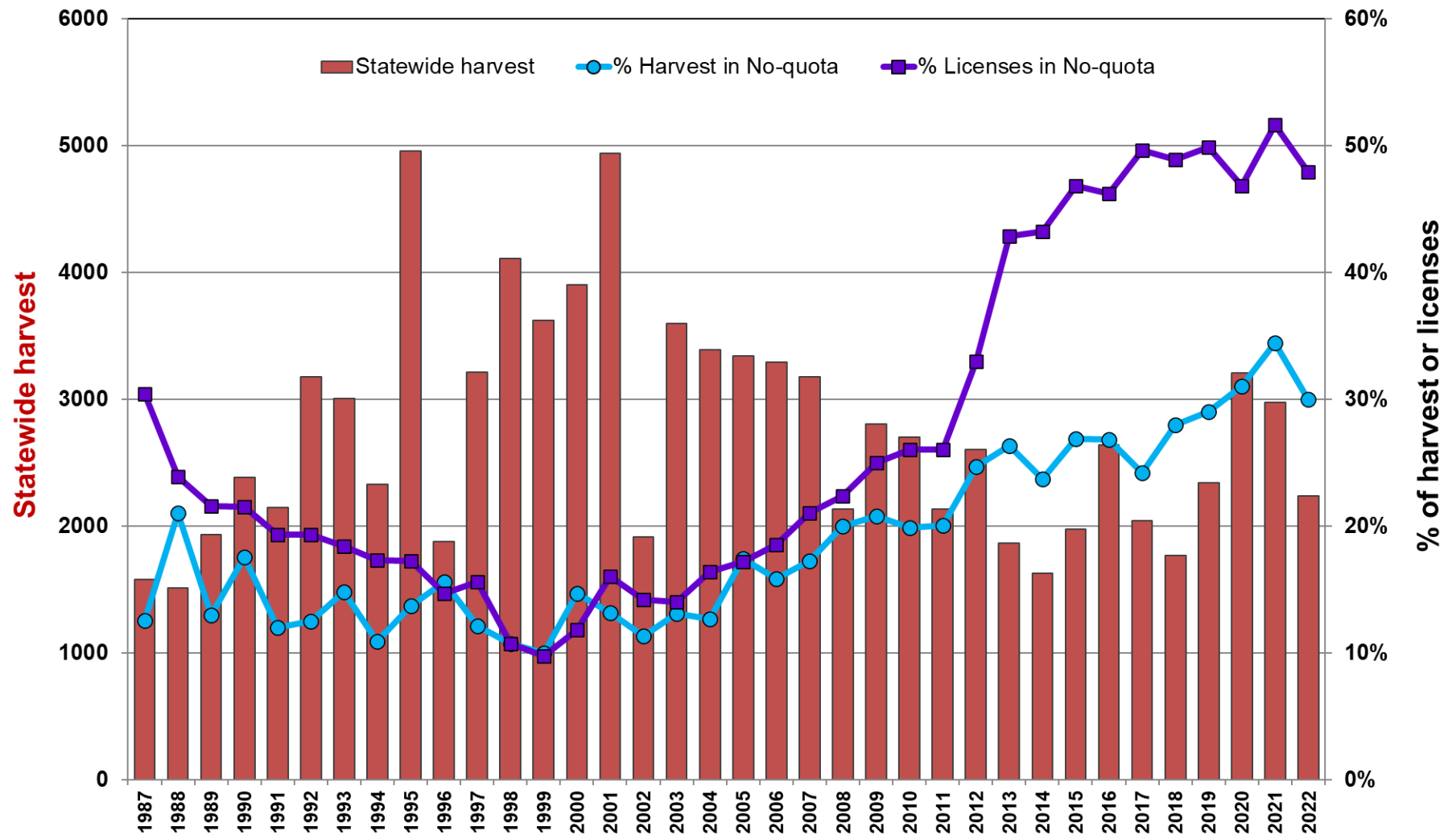


Table 7. Bear hunting success (%) by BMU, measured as the registered harvest divided by the number of licenses sold^a, 2017–2022^a.

BMU	Max success (yr) before 2022		Mean success 2017–2021	2022	2021	2020	2019	2018	2017
12	67	(20)	54	45	55 ^c	67 ^b	53	43	52
13	59	(95,16)	50	47	49	56 ^c	53	45	59 ^b
14				0					
22	18	(92)	10	2	6	14	8	16	10
24	55	(20)	46	43	46	55 ^b	34	46	48 ^c
25	63	(20)	56	49	54	63 ^b	56	53	57 ^c
26	65	(20)	58	46	61 ^c	65 ^b	49	57	52
27	66	(20)	56	44	62 ^c	66 ^b	47	53	52
28	70	(18)	61	53	57	63 ^c	60	70 ^d	53
31	65	(20)	52	46	59 ^c	65 ^b	42	52	56
41	50	(95)	46	43	43	42	46	49 ^c	46
44	58	(20)	48	46	52 ^c	58 ^b	39	41	48
46	58	(20)	47	46	50 ^c	58 ^b	39	40	47
47	63	(20)	53	40	68 ^b	63 ^c	38	43	50
45	54	(21)	45	48 ^c	54 ^b	43	29	44	40
451			15	12	14	16			
51	51	(20)	41	33	47 ^c	51 ^b	21	41	46
Quota ^e	57	(20)	45	42	51 ^c	57 ^b	38	46	50
11 ^f			23	21	24	23	25	17	28
10 ^f			10	12	12	12	9	8	9
52 ^f			17	15	23	19	10	14	19
No Quota	32	(95)	20	17	22	24	15	15	21
Statewide	40	(95)	33	35	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. Table shows % indicating where they planned to hunt (number of hunters in parentheses for BMU 60 and Quota zone):

BMU	2022	2021	2020	2019	2018
11	32.4	34.7	34.3	30.9	34.6
10	9.1	9.3	8.6	14.3	7.4
52	58.3	56.0	56.8	52.0	55.3
60 (n)	0.3 (10)	0	0.3 (13)	0.3 (11)	0.1 (4)
Quota zone (n)	0	0	0.6 (27)	2.5 (94)	2.6 (83)

Table 8. Cumulative bear harvest (% of total harvest) by date, 1998–2022.

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

^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 2003–2022, including number of conflict bears killed and translocated, and bears killed in vehicular collisions.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 ⁱ	2018 ⁱ	2019 ⁱ	2020 ⁱ	2021 ⁱ	2022 ⁱ
Number of personnel participating in survey ^a	39	34	42	46	46	37	51	40	34	56	63	64	61	55	86 (51,35)	78 (56,23)	126 (60,66)	112 (70,42)	94 (36,58)	95 (39, 56)
Complaints examined on site	81	75	61	57	63	59	65	70	37	113	69	79	97	118	71 (22,49)	40 (21,19)	82 (37,45)	87 (3,84)	83 (6,77)	68 (2,66)
Complaints handled by phone ^b	424	507	451	426	380	452	535	514	396	722	623	570	840	780	644 (450,194)	438 (369,69)	736 (599,137)	784 (591,193)	595 (450,145)	461 (339,122)
Total complaints received	505	582	512	483	443	511	600	584	433	835	692	649	937	898	715	478	818	871	753	529
• % Handled by phone	84	87	88	88	86	88	89	88	91	86	90	88	90	87	90	92	90	90	79	87
• Calls handled by the information center ⁿ																		281	364	281
Bears killed by:																				
• Private party or DNR	13	25	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)
• Hunter before season ^c																				
– from nuisance survey	3	3	6	2	18	3	4	3	3	11	0	0	1	13	1	2	0	20	4	4
– from registration file	8	4	13	6	25	5	15	10	5	12	0	1	4	6	3	11	5	34	24	8
• Hunter during/after season ^d	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	0	0	3	23	1
• Hunter by Area 888 license ^e															1		3 ^m	40 ^m	45 ^m	9 ^m
• Permittee ^f	6	1	5	4	5	1	3	5	0	0	1	0	3	0	0	1	2	5	2	2
Bears translocated ^g	1	3	3	3	1	3	2	2	2	0	3	2	0	0	0	0	0	3	2	2
Bears killed by cars ^h	25	16	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)

^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 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 rehab.
- ^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.
- ⁱ 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). 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 29 hunters were authorized to take conflict bears in the quota area in 2022, of which 9 (31%) were successful. Data are from the registration files only until 2020. After which, it was cross-validated with validation letters.
- ⁿ 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, 1981–2022, showing dramatic effect of change in human-bear conflict policy, and a stable trend over the past decade.

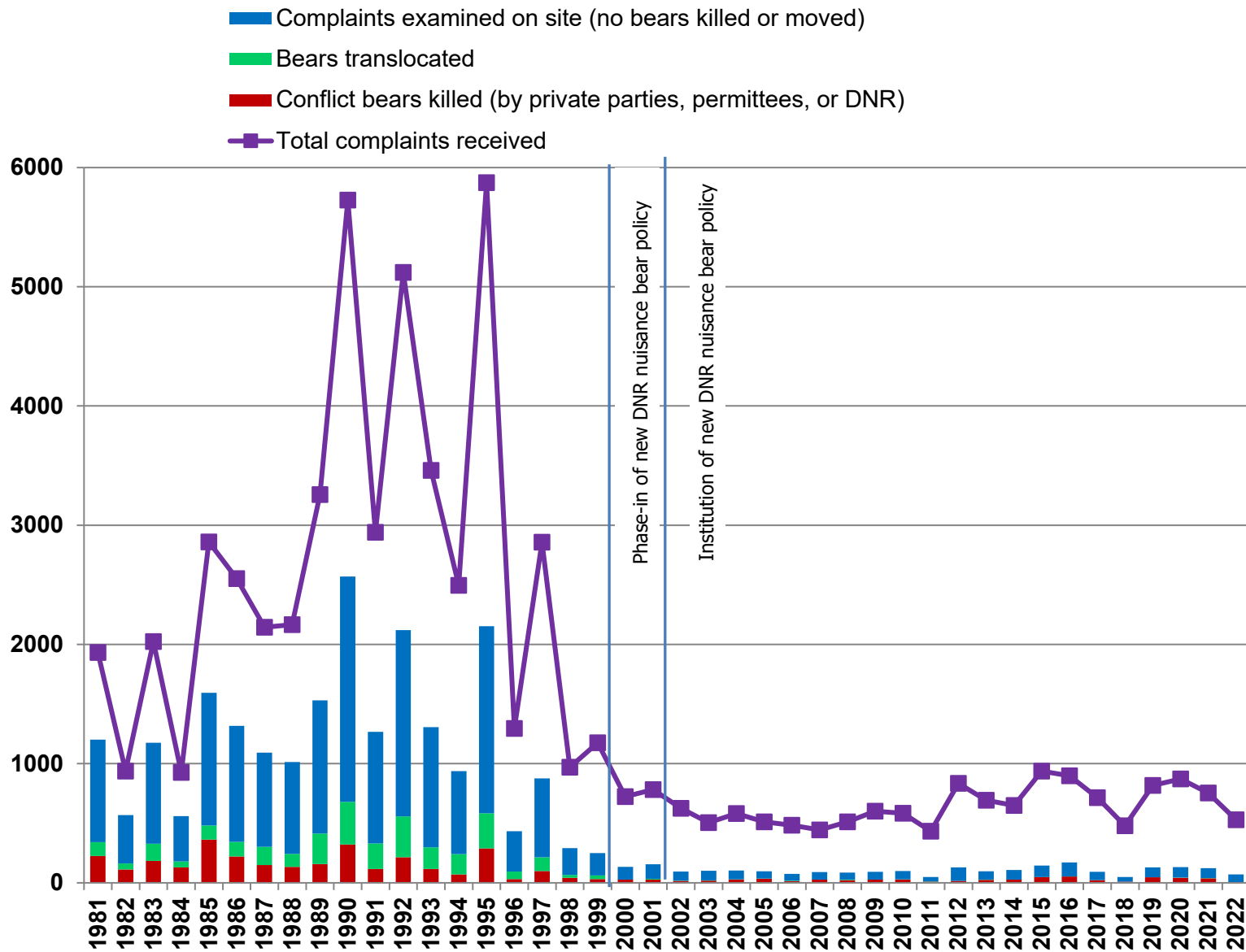


Table 10. Regional bear food indices^a in Minnesota's bear range, 1984–2022. Shaded blocks indicate particularly low (<50; pink) or high (≥70; green) values.

Year	Survey Area					Rangewide
	NW	NC	NE	WC	EC	
1984	32.3	66.8	48.9	51.4	45.4	51.8
1985	43.0	37.5	35.3	43.5	55.5	42.7
1986	83.9	66.0	54.7	74.7	61.1	67.7
1987	62.7	57.3	46.8	67.4	69.0	61.8
1988	51.2	61.1	62.7	54.4	47.3	56.0
1989	55.4	58.8	48.1	47.8	52.9	51.6
1990	29.1	39.4	55.4	44.0	47.9	44.1
1991	59.7	71.2	64.8	72.1	78.9	68.4
1992	52.3	59.9	48.6	48.1	63.3	58.2
1993	59.8	87.8	75.0	73.9	76.8	74.3
1994	68.6	82.3	61.3	81.5	68.2	72.3
1995	33.8	46.5	43.9	42.0	50.9	44.4
1996	89.5	93.2	88.4	92.2	82.1	87.6
1997	58.2	55.5	58.8	62.0	70.1	63.9
1998	56.9	72.8	66.4	72.3	84.5	71.1
1999	63.7	59.9	61.1	63.2	60.6	62.0
2000	57.7	68.0	54.7	69.2	67.4	62.3
2001	40.6	48.7	55.6	62.2	66.0	55.8
2002	53.1	63.4	60.4	68.6	68.3	66.8
2003	59.1	57.5	55.2	58.6	49.7	58.8
2004	57.0	60.5	61.1	70.3	67.9	64.4
2005	53.4	65.9	61.4	59.9	72.6	62.3
2006	51.0	64.9	53.4	51.0	52.1	56.9
2007	68.4	79.0	67.3	67.6	70.0	69.4
2008	58.6	74.1	64.7	66.6	71.4	65.4
2009	59.9	67.8	63.2	69.2	69.5	66.5
2010	70.0	71.3	79.0	60.8	57.3	68.0
2011	61.4	59.6	57.9	66.7	63.5	62.5
2012	49.1	50.3	59.4	50.5	41.5	50.7
2013	71.9	77.1	76.0	59.1	63.2	71.8
2014	71.4	70.7	71.4	61.0	66.5	70.2
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 ^b

^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 2022 compared to the previous 37-year mean (1984-2021) 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	
	37yr mean	2022 (n = 13 ^b)	37yr mean	2022 (n = 7)	37yr mean	2022 (n = 8)	37yr mean	2022 (n = 7)	37yr mean	2022 (n = 11)	37yr mean	2021 (n = 36 ^c)
SUMMER												
Sarsaparilla	4.7	4.6	5.8	8.0	5.2	4.3	4.4	4.0	5.2	4.5	5.0	5.4
Pincherry	3.4	4.3	4.4	6.0	4.3	6.5	3.7	3.0	3.7	4.8	3.9	4.9
Chokecherry	5.9	9.8	5.4	8.4	4.7	10.0	5.4	9.7	4.6	5.9	5.3	8.7
Juneberry	5.1	3.6	4.7	4.0	4.9	5.8	3.6	4.3	3.9	3.3	4.4	4.0
Elderberry	1.7	7.0	2.9	5.7	3.7	7.3	3.1	5.6	3.2	6.6	3.0	6.4
Blueberry	5.0	2.5	5.3	4.5	5.0	7.0	3.6	4.0	3.9	6.7	4.4	5.3
Raspberry	6.4	7.3	7.8	9.3	7.8	7.0	7.0	5.0	6.9	5.3	7.1	7.1
Blackberry	1.4	7.1	2.5	9.8	1.4	9.0	3.6	7.3	4.5	6.8	3.0	7.7
FALL												
Wild Plum	2.4	3.0	1.9	4.5	1.5	4.5	2.8	5.3	2.5	4.8	2.3	4.4
HB Cranberry	5.2	7.4	4.3	5.1	4.0	6.1	3.7	6.2	3.8	5.0	4.1	6.0
Dogwood	6.2	7.4	5.6	6.4	4.9	5.1	5.9	6.7	5.9	7.4	5.7	6.8
Oak	3.6	5.9	3.2	6.9	2.1	4.0	5.9	7.7	5.7	7.3	4.5	6.4
Mountain Ash	1.6	2.7	2.6	4.8	4.7	6.3	1.8	3.5	2.4	3.6	2.7	4.2
Hazel	6.4	7.7	7.3	8.0	6.8	6.5	7.6	6.7	7.4	6.7	7.1	7.3
TOTAL^d	58.9	80.2	64.0	91.4	60.9	89.4	62.1	78.9	63.6	78.5	62.6	84.7

^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), 1984–2022. Particularly low (≤ 5.0 ; yellow) or high (≥ 8.0 ; tan) values are shaded.

Year	Survey Area					Entire Range
	NW	NC	NE	WC	EC	
1984	4.2	7.6	7.0	6.2	7.0	6.5
1985	4.9	2.8 ^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

^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, 2022.

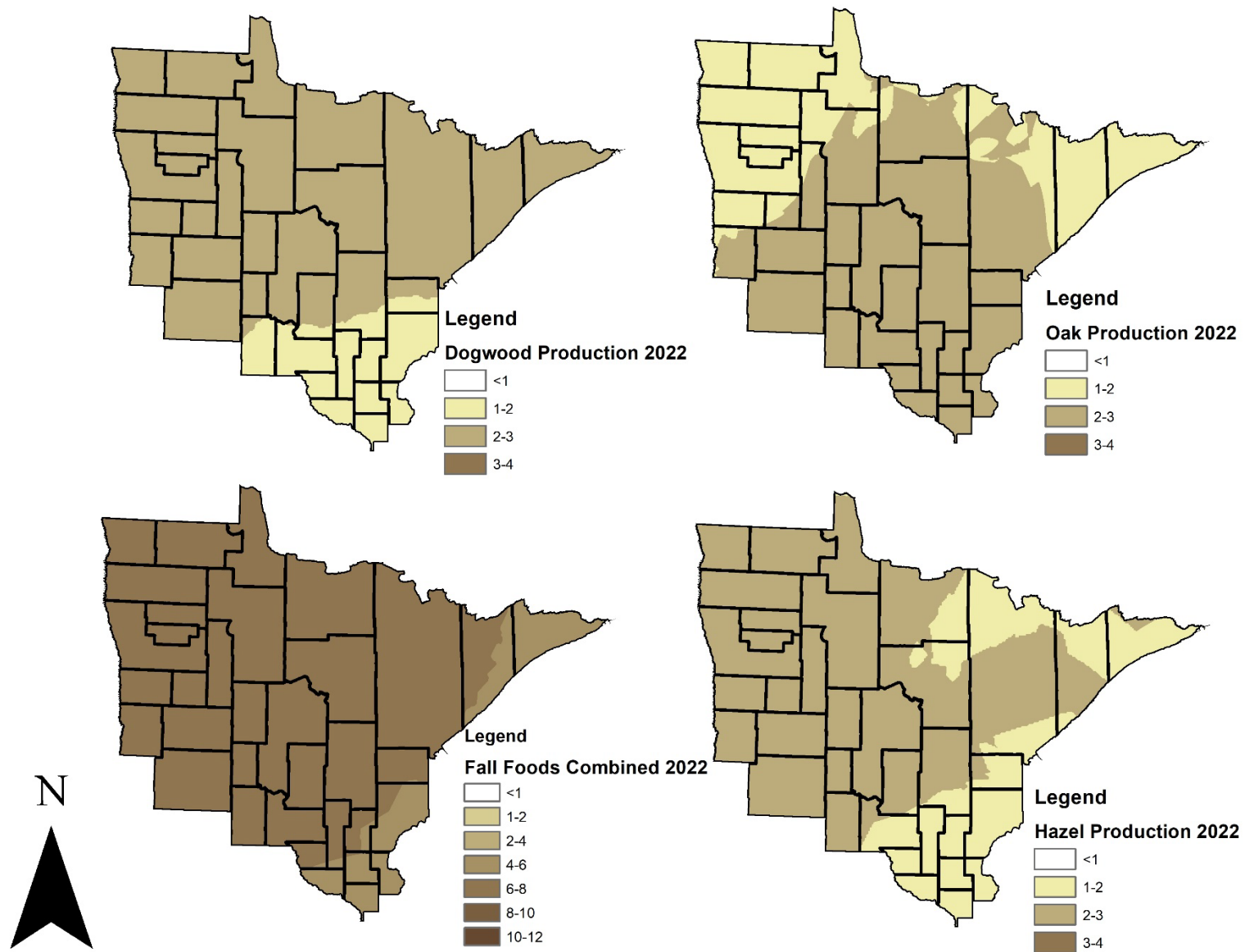


Fig. 7. Number of bears harvested vs. number predicted to be harvested based on number of hunters and fall food production — top panel: statewide 1984–2022; bottom panel: quota zone only (including area 451 hunters and harvest), most recent 15 years. The regression has been less effective explaining overall harvest in the last 15 years. Regression for both datasets included an interaction term between food and hunters to better predict changes in harvest when foods were extremely high or low.

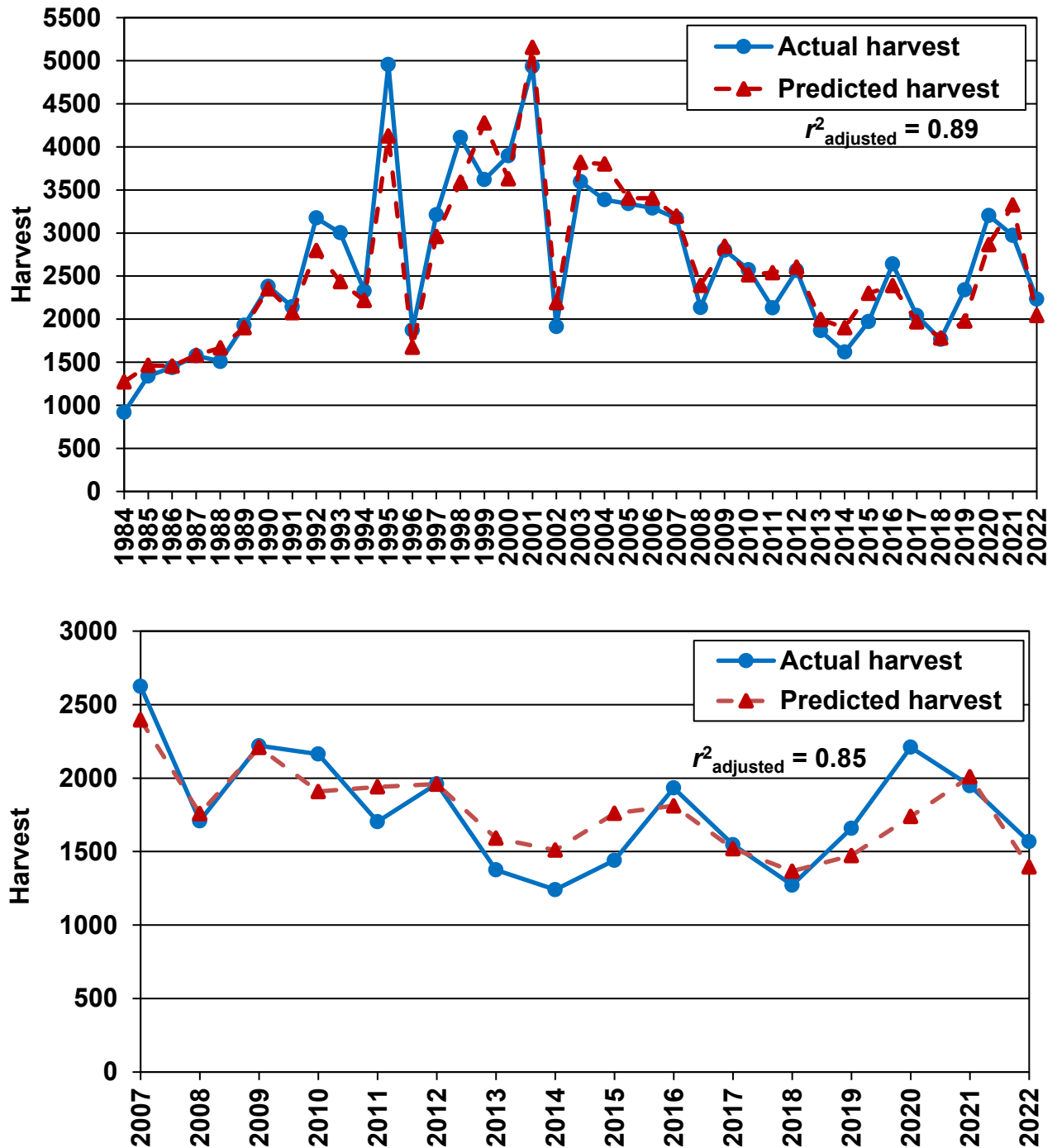


Fig 8. Percent of hunters submitting useable bear teeth for aging (vital for population monitoring, see Figs. 10–12). Cooperation levels exceeded 80% when registration stations were paid to extract teeth (this practice ended in 1993), and in recent years after a series of reminder letters (no letter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

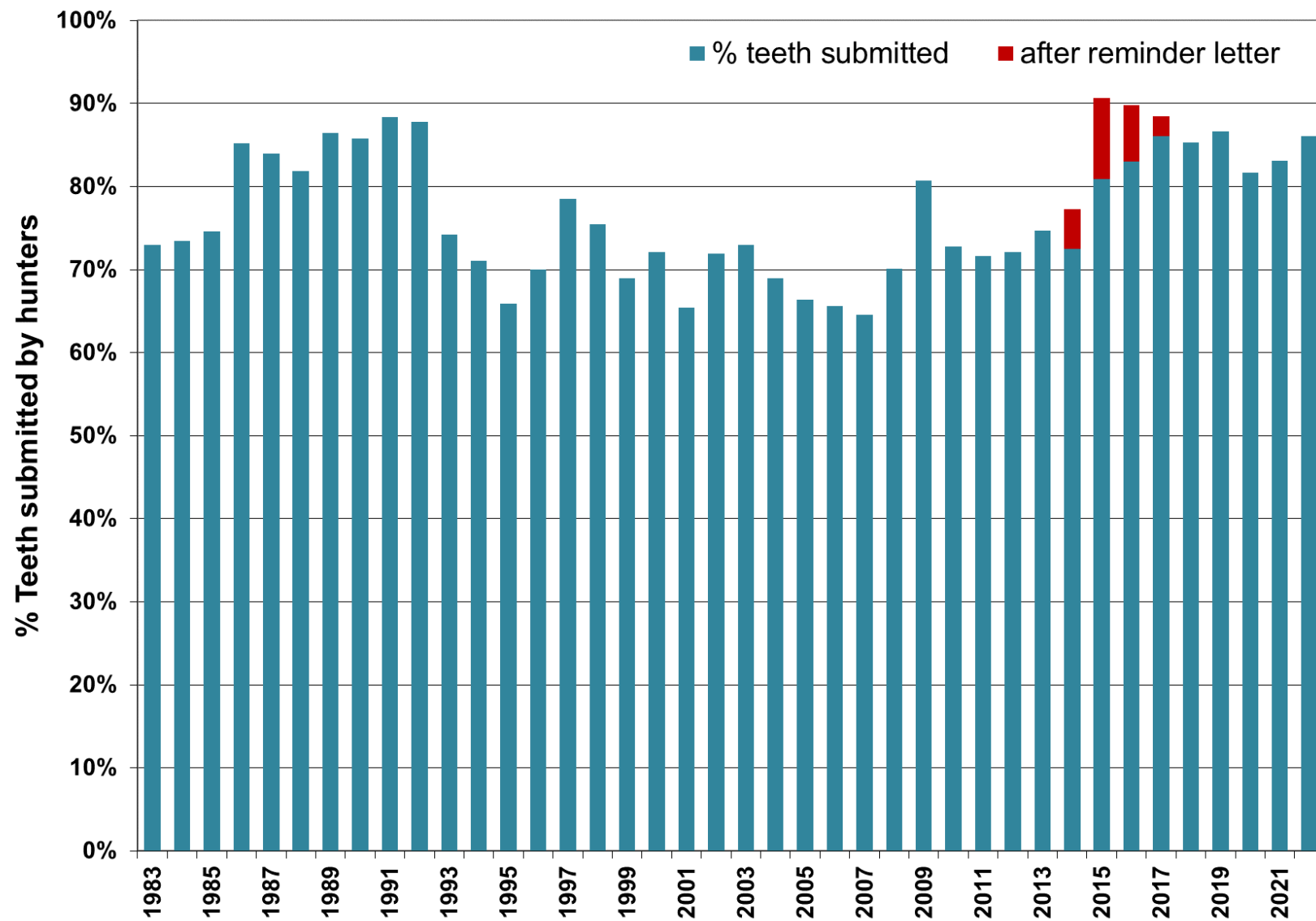


Fig. 9. Percent of hunters who submitted a bear tooth in 2022 by method of registration (top panel) and by BMU (bottom panel). Beginning in 2013, hunters could register their bear by phone or internet, as well as in person at a station. The 2022 statewide submission average (84%) was above the long-term average (77%).

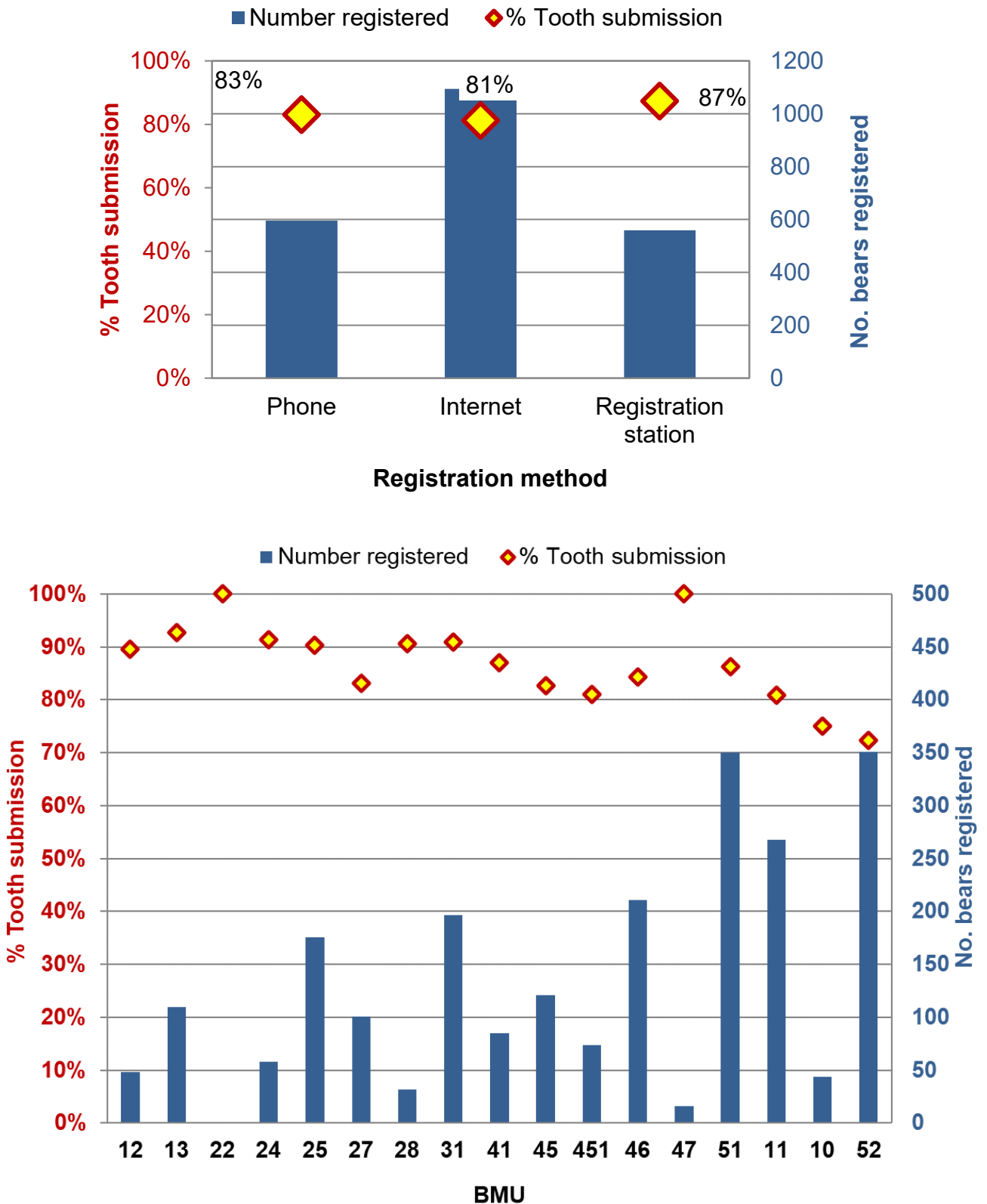


Fig. 10. Population trends during 2000s derived from Allen et al. (2018) model statewide estimates (\pm 95% credible intervals), Downing population reconstruction, and population estimates for quota and no-quota zones. Note the actual scale of the population estimates is an underestimate to true population size (based on previous tetracycline estimates), but population trend seems consistent with the BMU-level models and the Downing.

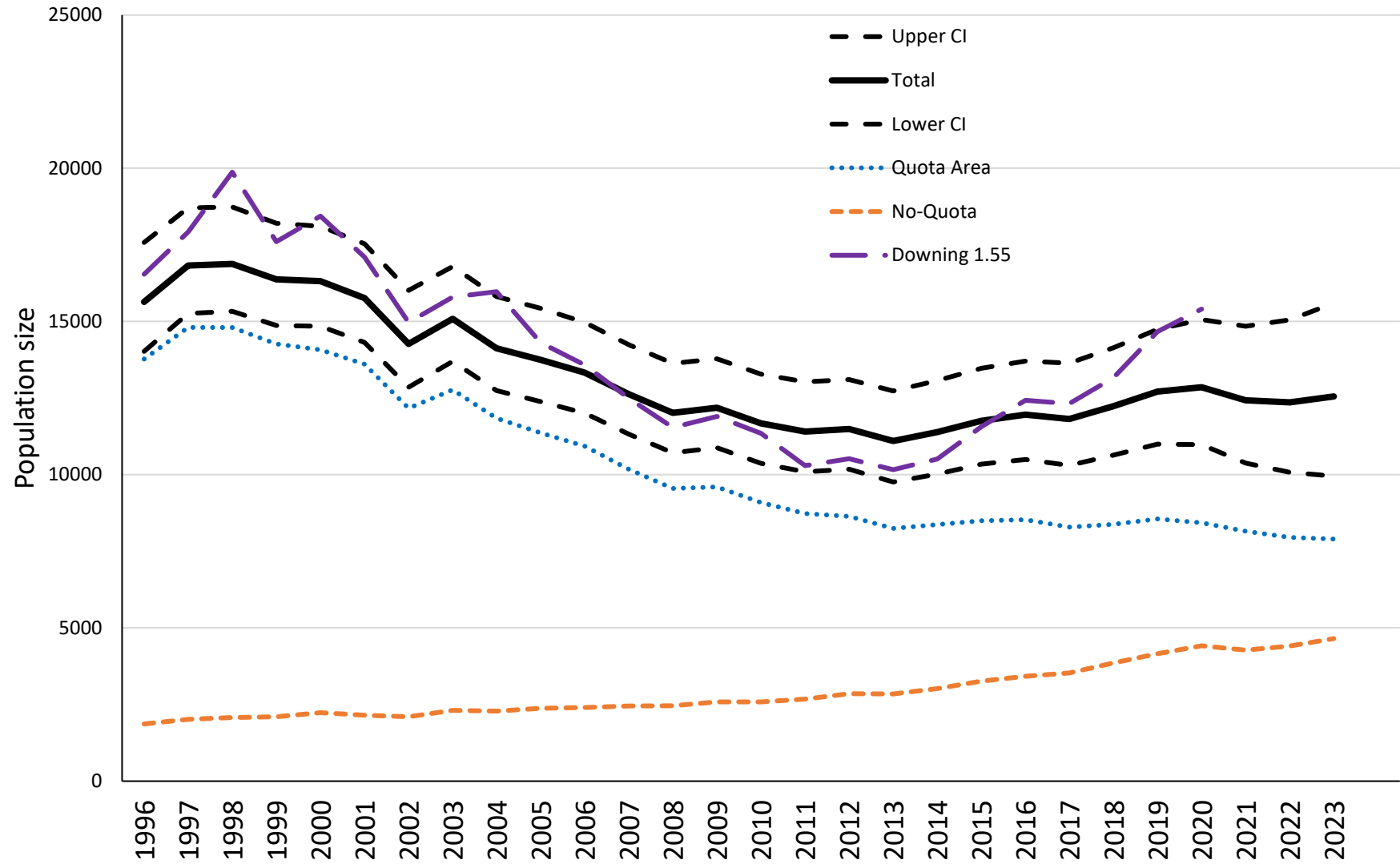


Fig. 11. Trends in proportion of male bears in statewide harvest at each age, 1–10 years, grouped in 5-year time blocks, 1980–2022. Higher harvest rates result in steeper curves because males in the living population are reduced faster than females. Fitting a line to the data for each time block and 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., 2015–20 lower than 1980–84), but a slight increase in recent years.

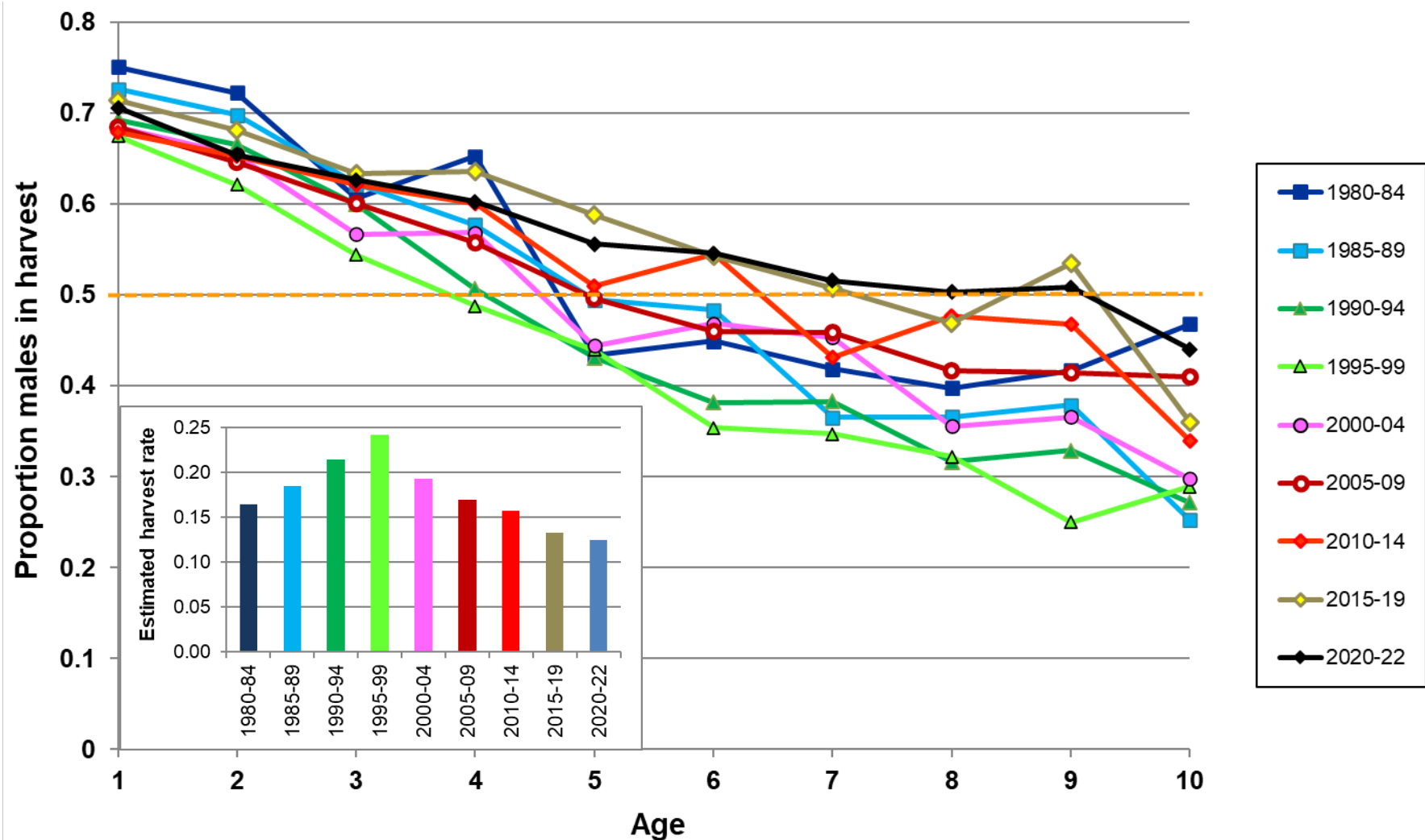


Fig 12. Allen et al. (2018) BMU-level, pre-hunt estimates 2000–2022. The vertical black line in 2012–2013 represents when quota permits were cut by >50% and have remained stable at low levels since then. The dashed lines represent the 95% pointwise credible intervals of the population estimate. With 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).

Population trend over time—Area 12

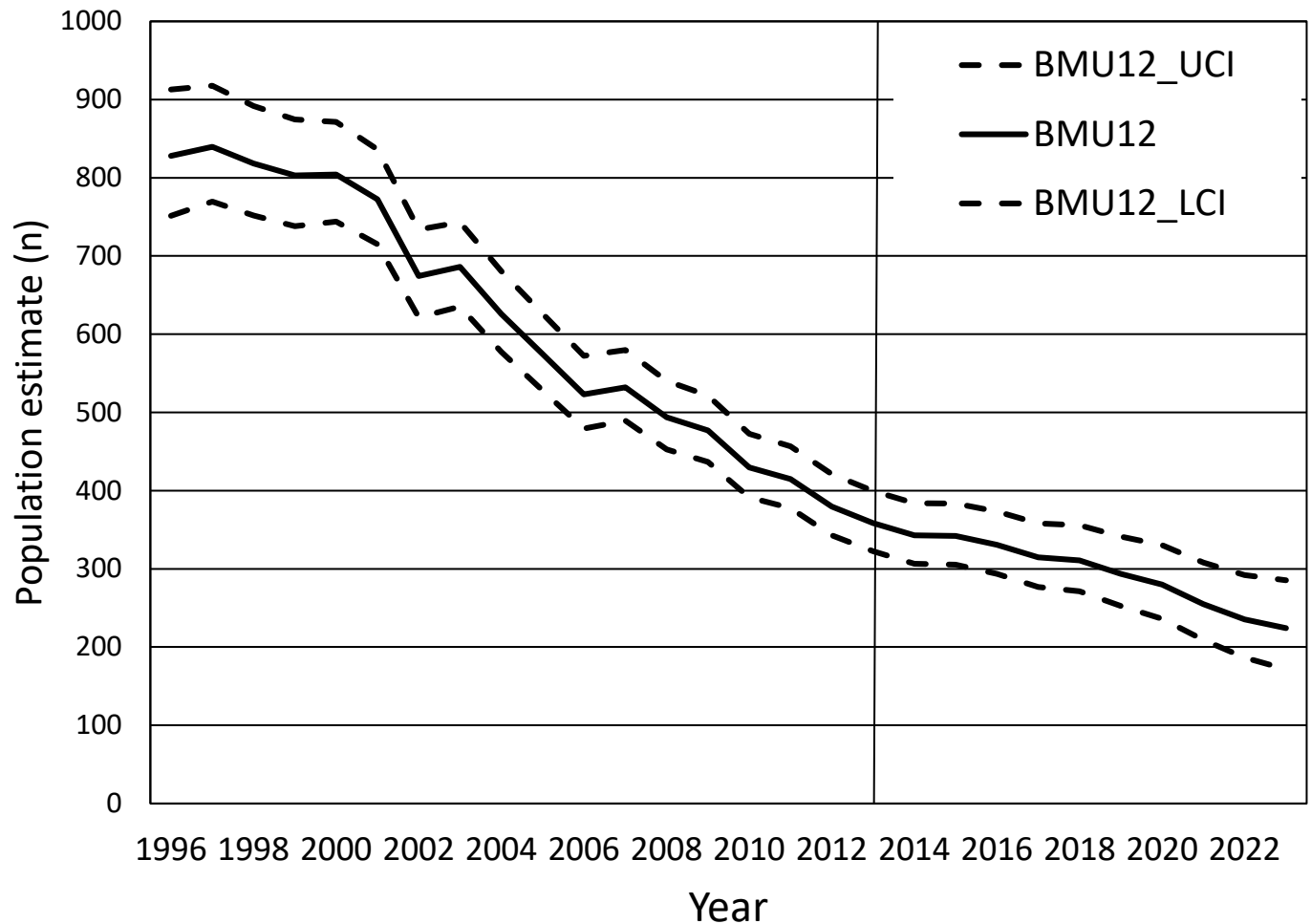


Fig. 12 cont'd.

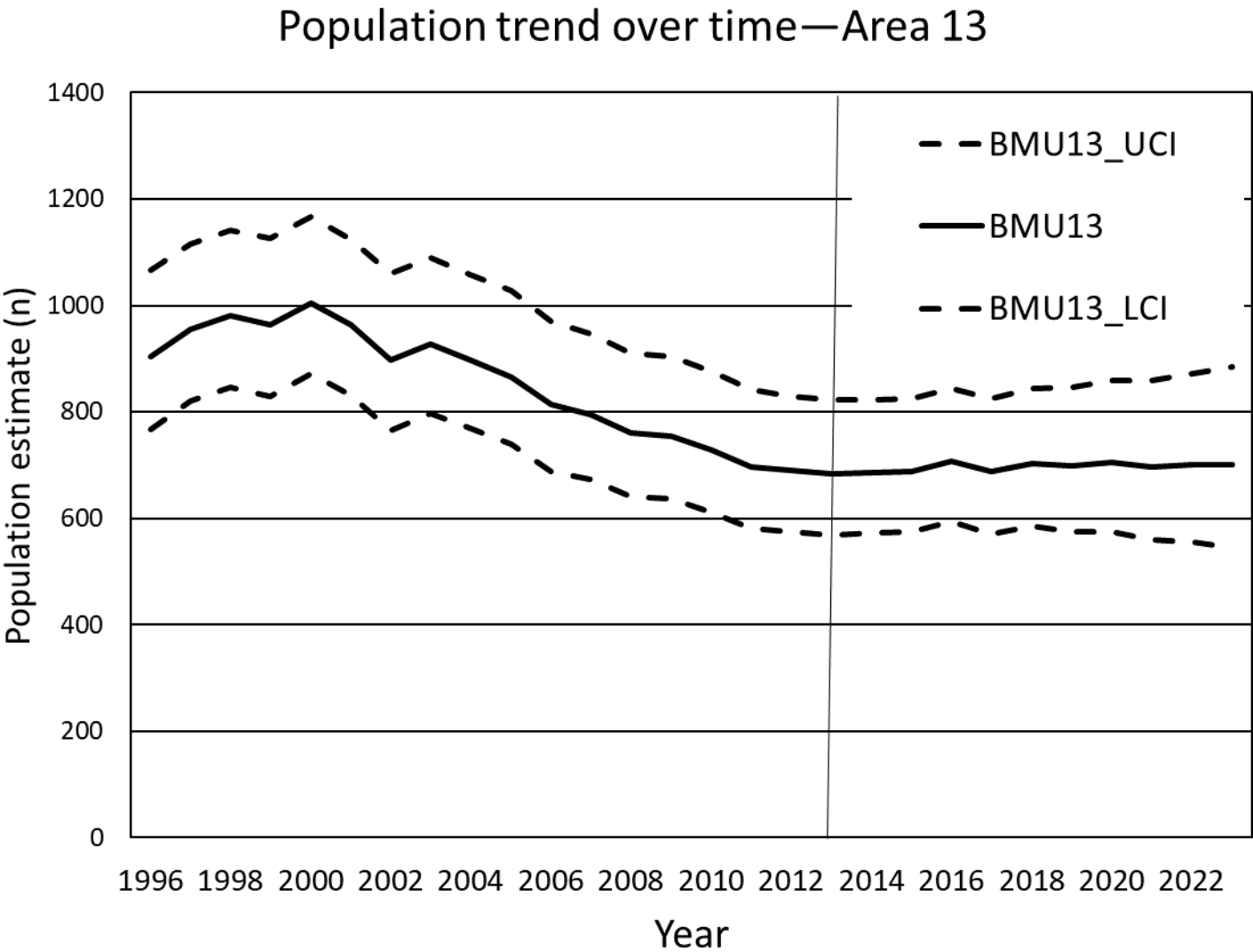


Fig. 12 cont'd.

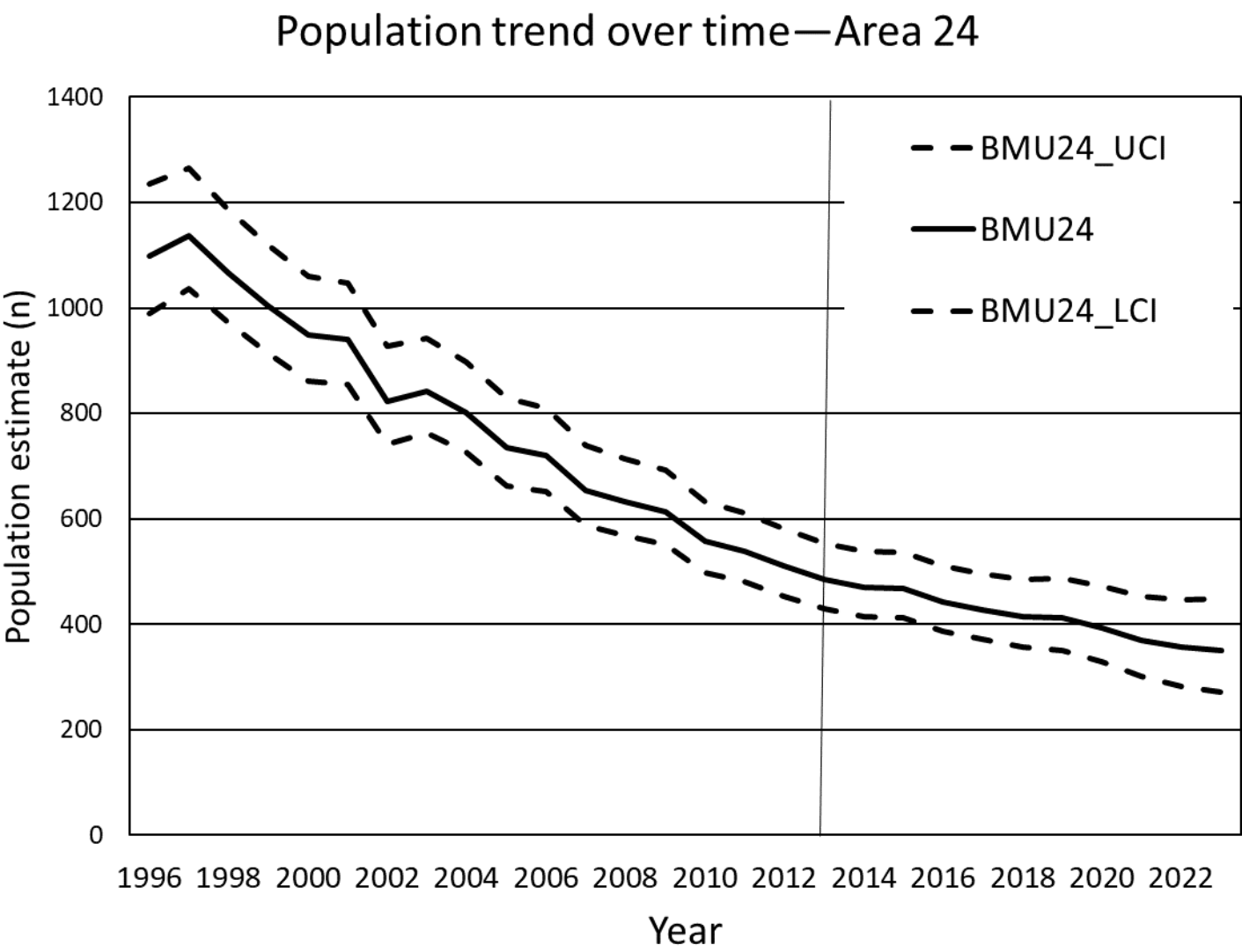


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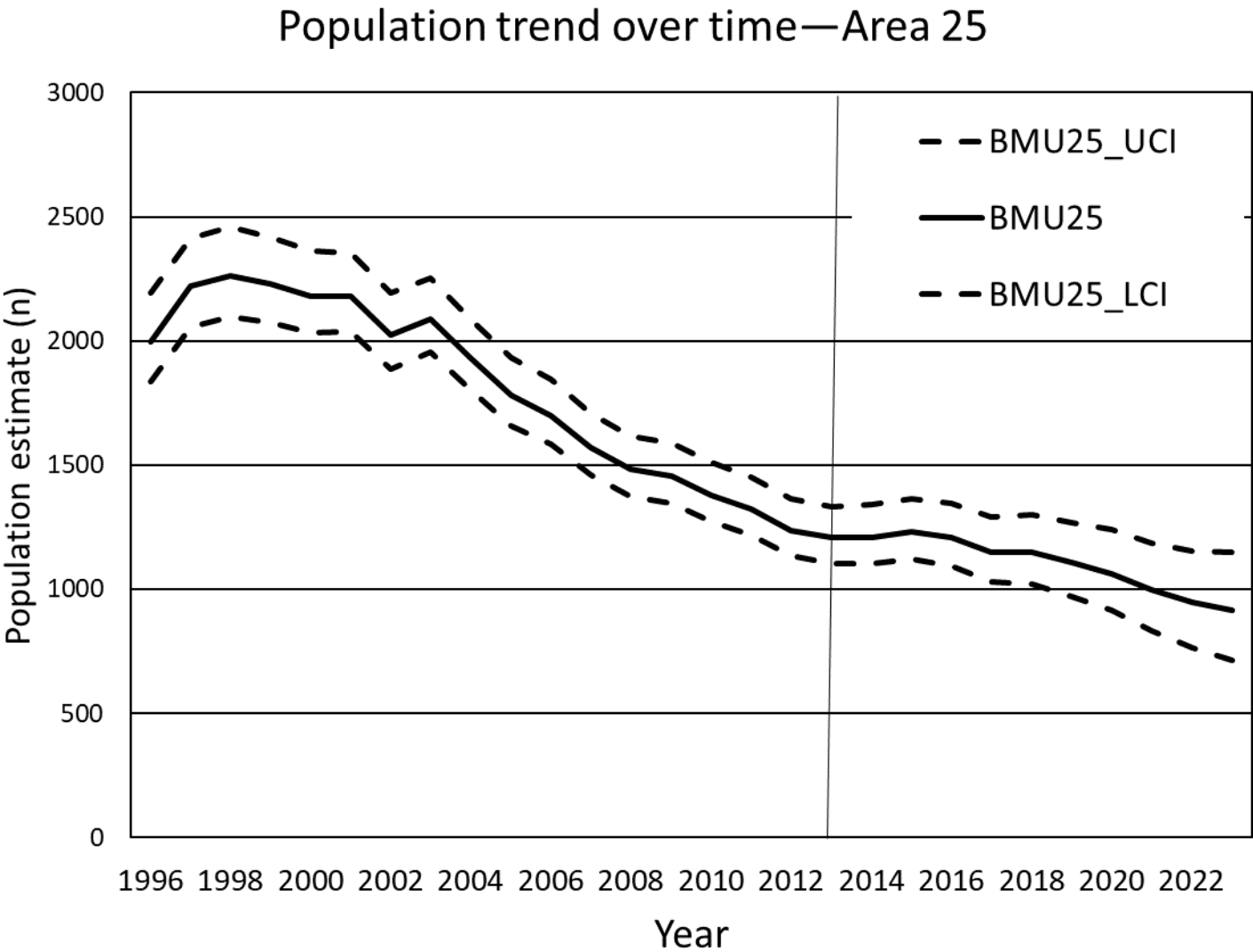


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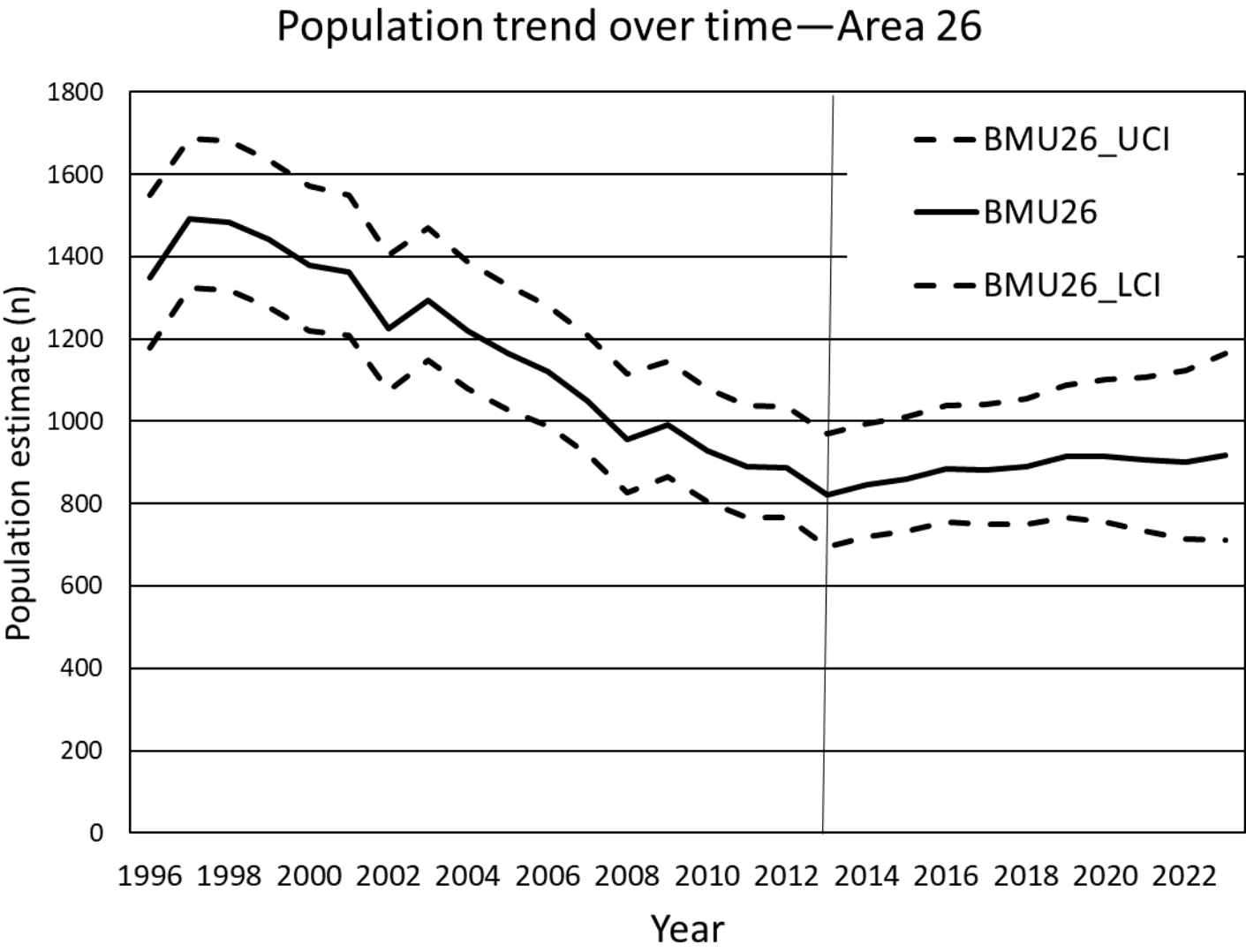


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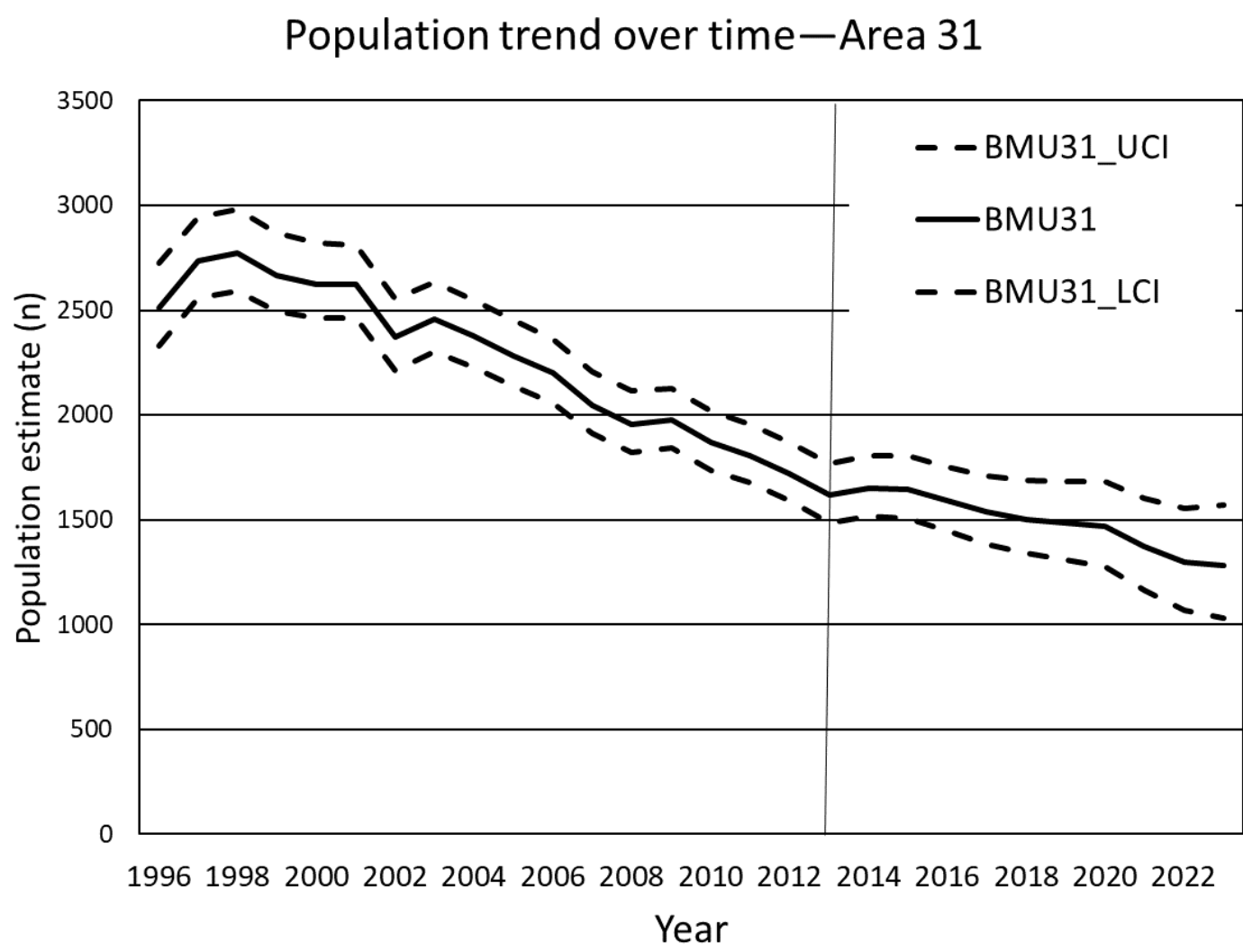


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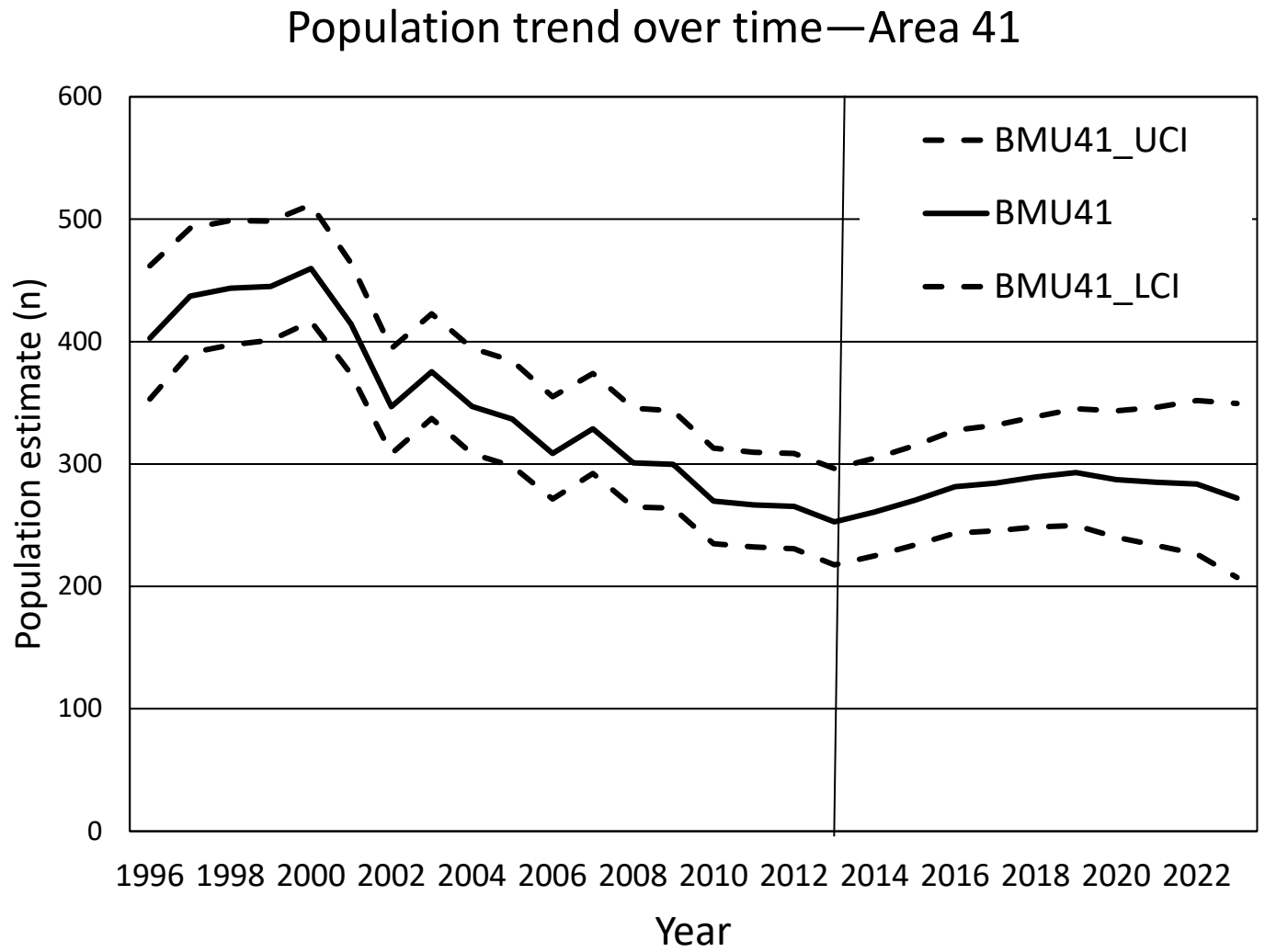


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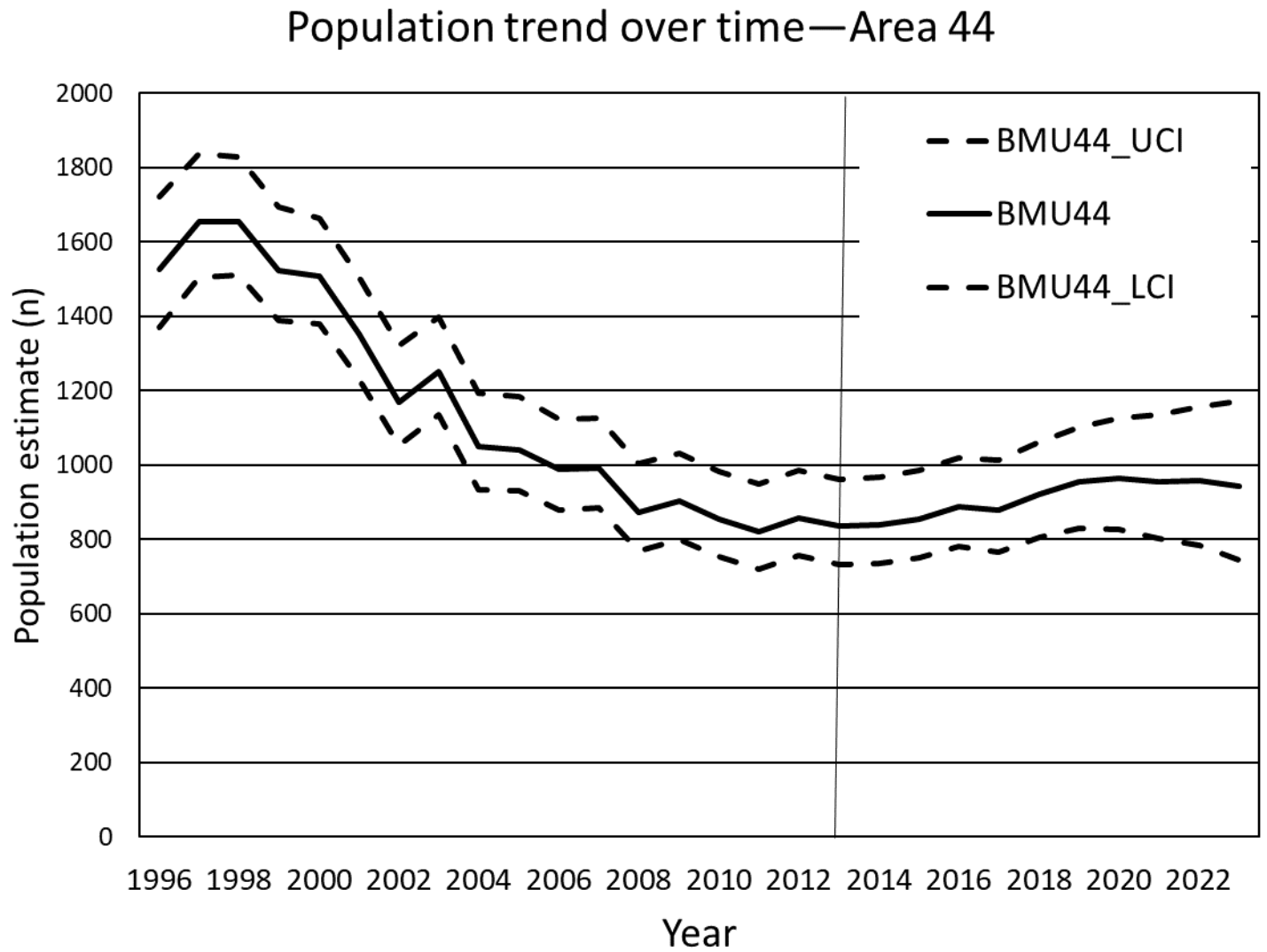


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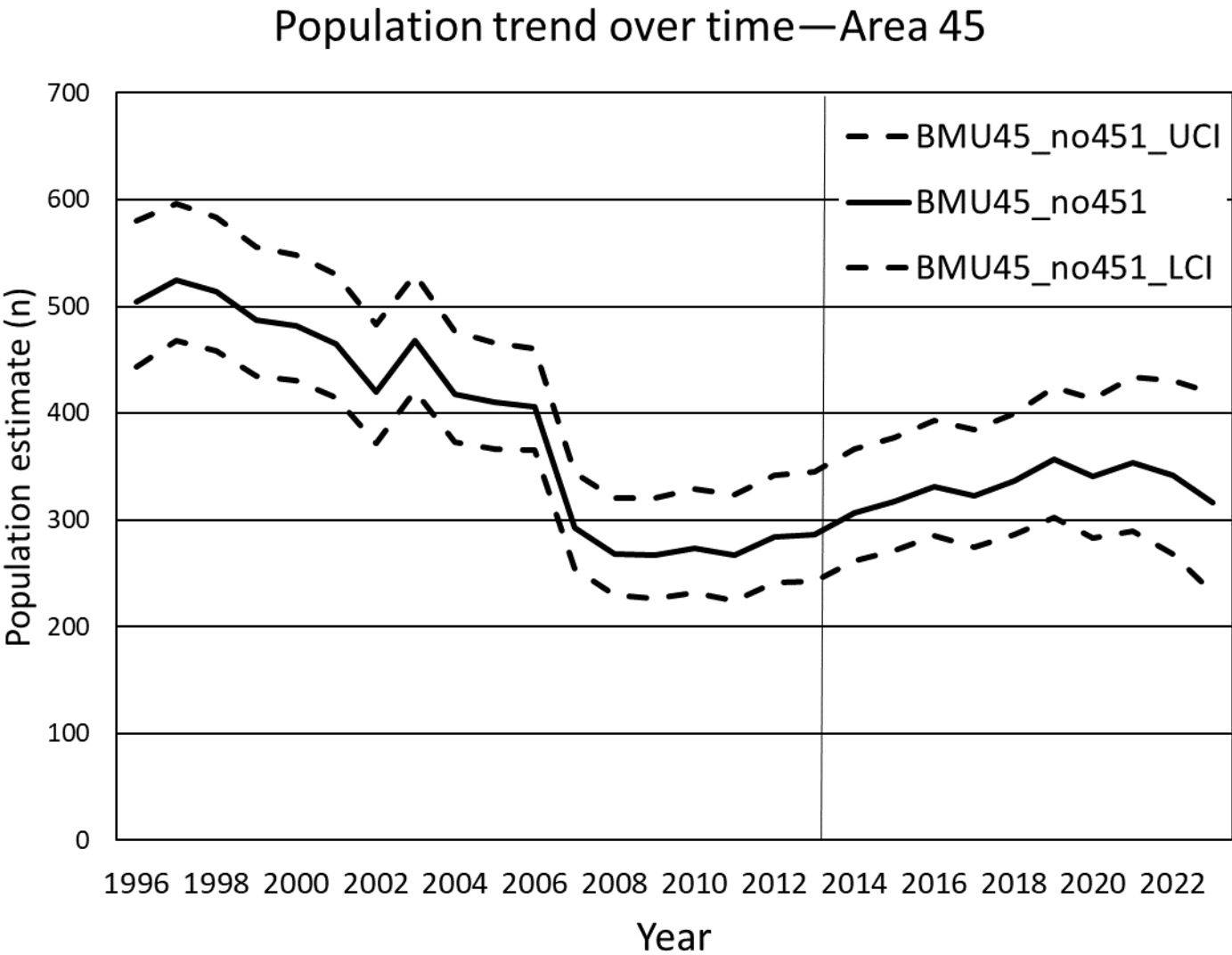


Fig. 12 cont'd

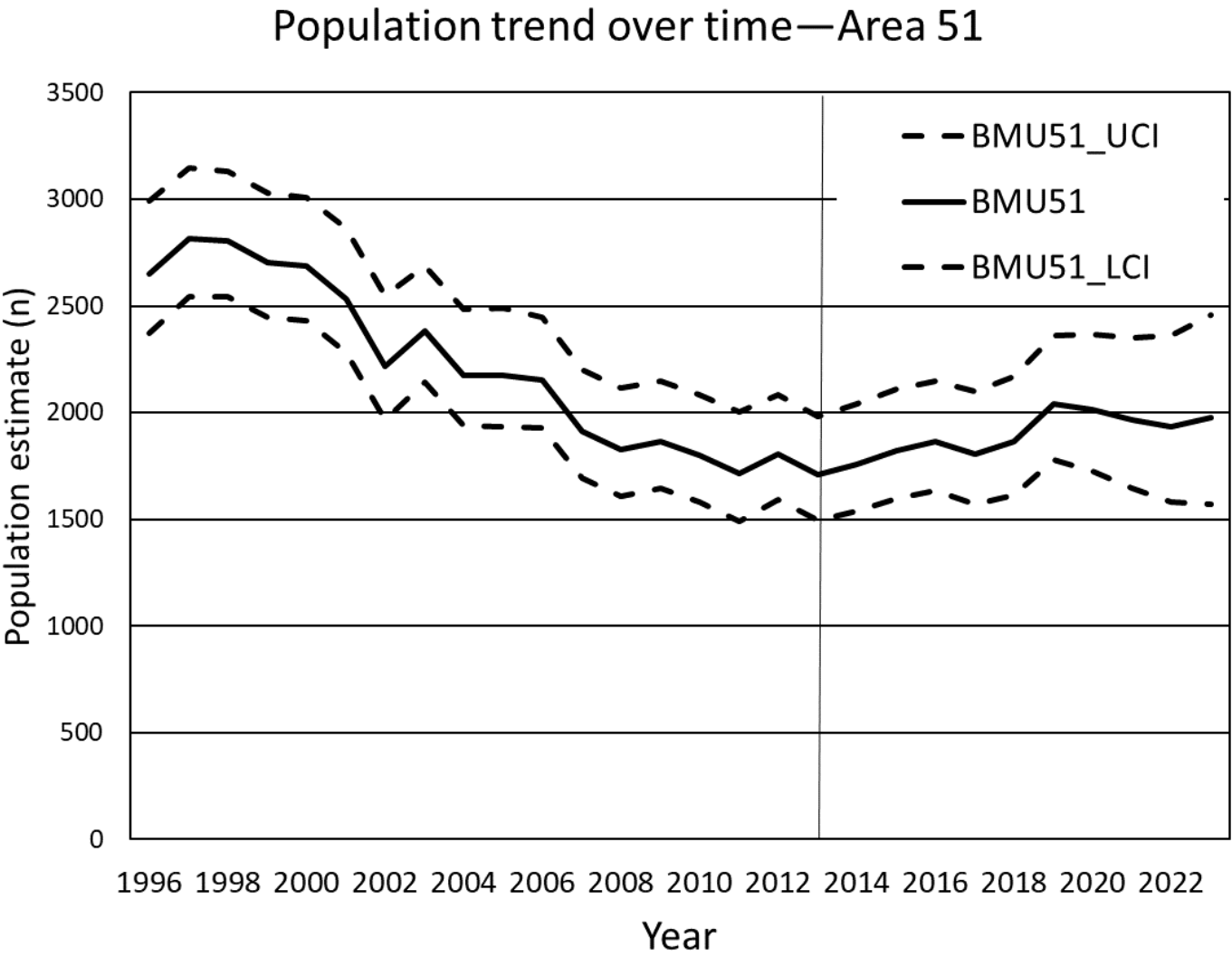


Fig. 12 cont'd

Population trend over time—Areas 11 & 52

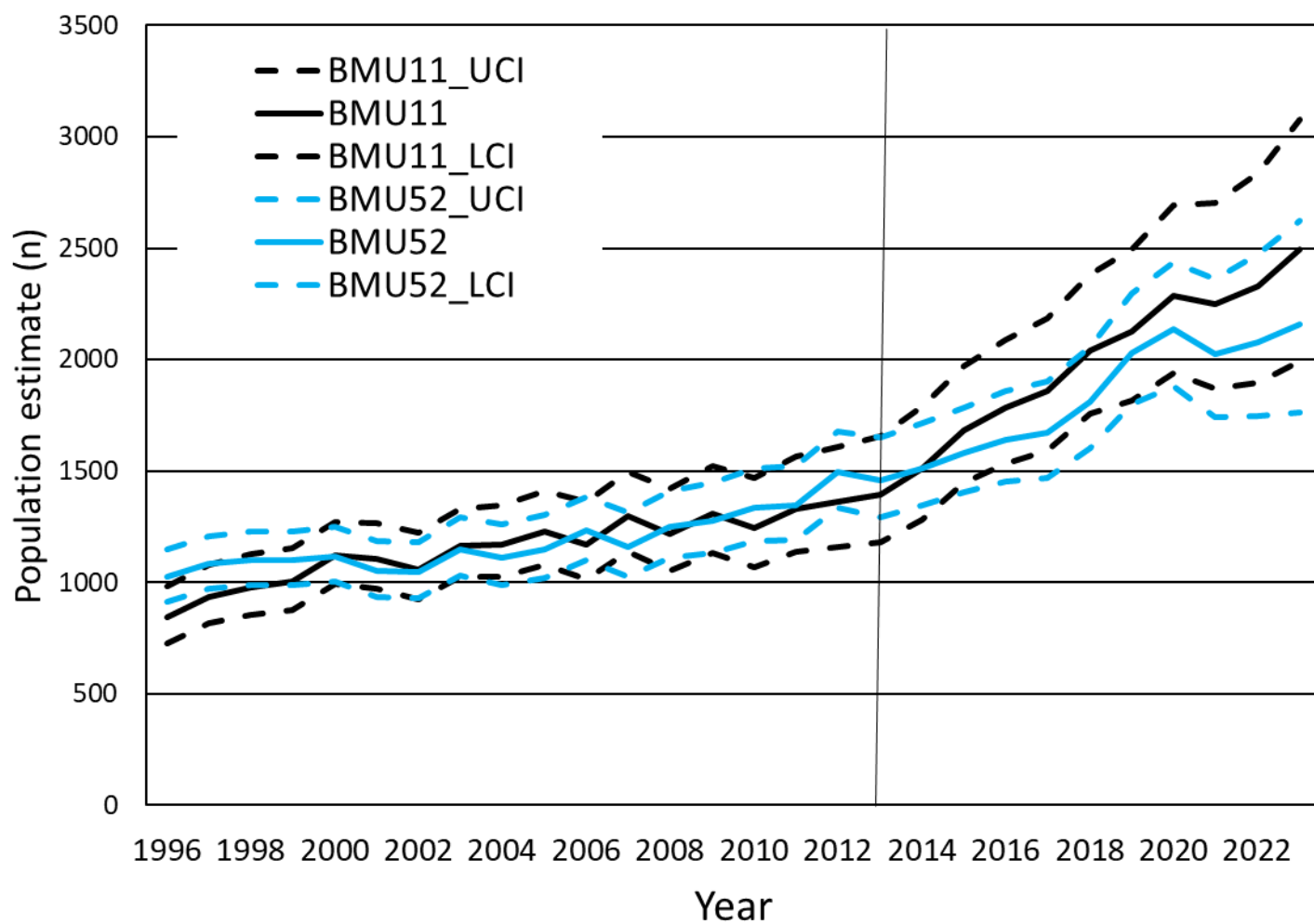


Table 13. Results of 2022 hunter survey versus hunter surveys conducted over the past 30 years, on issues that may relate to hunter selectivity. Blank spaces represent questions not asked in that year (or data not obtainable).

	1988	1991	1998	2001	2009	2018	2022
% 1 st year bear hunter	47%	45%	32%	25%	25%	24%	25%
% >5 years previous bear hunting			18%	21%	35%	36%	47%
% License-holders hunting	91.0%	92.6%	86.8%	93.9%	95.3%	92.7%	92.8%
Mean days hunted ^a	6.3	6.1	6.3	8.3 ^e	6.8	6.3	7.2
% Used bait	74%	78%	82%	92%	89%	91%	91% ^c
Pounds of bait/hunter (median)			100	200	150	150	100
% Used guide	7%	11%	10%	15%	17%	13%	12%
% Used bow	21%	21%		21%	32%	25%	19%
Bears seen (excl cubs)/hunter-day ^b	0.20	0.22	0.19	0.19		0.23	0.23
Bears seen (excl cubs)/hunter			1.1	1.2		1.5 (0–40)	1.6 (0–20)
% Passed up shot		73% ^d		70% ^e		37% (42% ^d)	40% ^f (39% ^d)
% Used trail camera						83%	85% ^c
Est. no. bears at bait: mean (median)						5 (4)	6 (4)

^a This line and all lines below pertain only to those who hunted.

^b Total bears (excluding cubs) seen by all hunters/total hunter-days (not the mean number of bears seen per hunter-day for individual hunters).

^c Excluding guided hunts. Used bait: Quota zone 95%, No-quota 84%. Used trail camera: Quota zone 88%, No-quota 78%. Average number of stations per hunter was 1.8.

^d Calculated as: % hunters seeing more bears than they shot (among hunters seeing at least 1 bear).

^e Hunters could kill 2 bears on 1 license this year; this was designed to discourage passing up a shot at small bears, and allow continued hunting (hence unusually high number of days hunted). Nevertheless, only 30% of hunters said they shot at first bear that presented a good shot.

^f % of hunters who said they passed up shooting a legal bear for any reason: 40% in quota zone, 41% in no-quota zone.

Fig. 17. Hunters who indicated they passed up a shot at a legal bear for various reasons, in quota and no-quota zones, based on 2022 hunter survey. The same proportion (74%) of licensed hunters were surveyed in each area, although response rates differed: 60% quota, 29% no-quota.

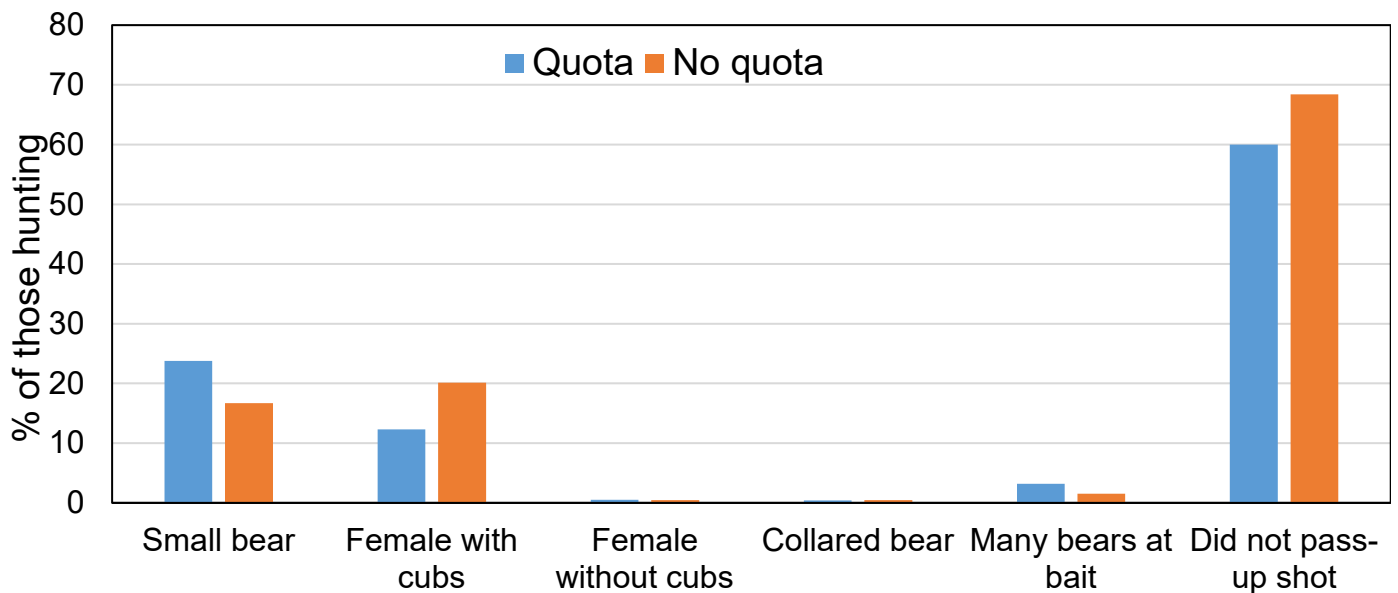


Fig. 18. Hunters' opinions about number of other hunters in their general hunting area, based on 2022 bear hunter survey, comparing quota zone versus BMUs in the no-quota zone.

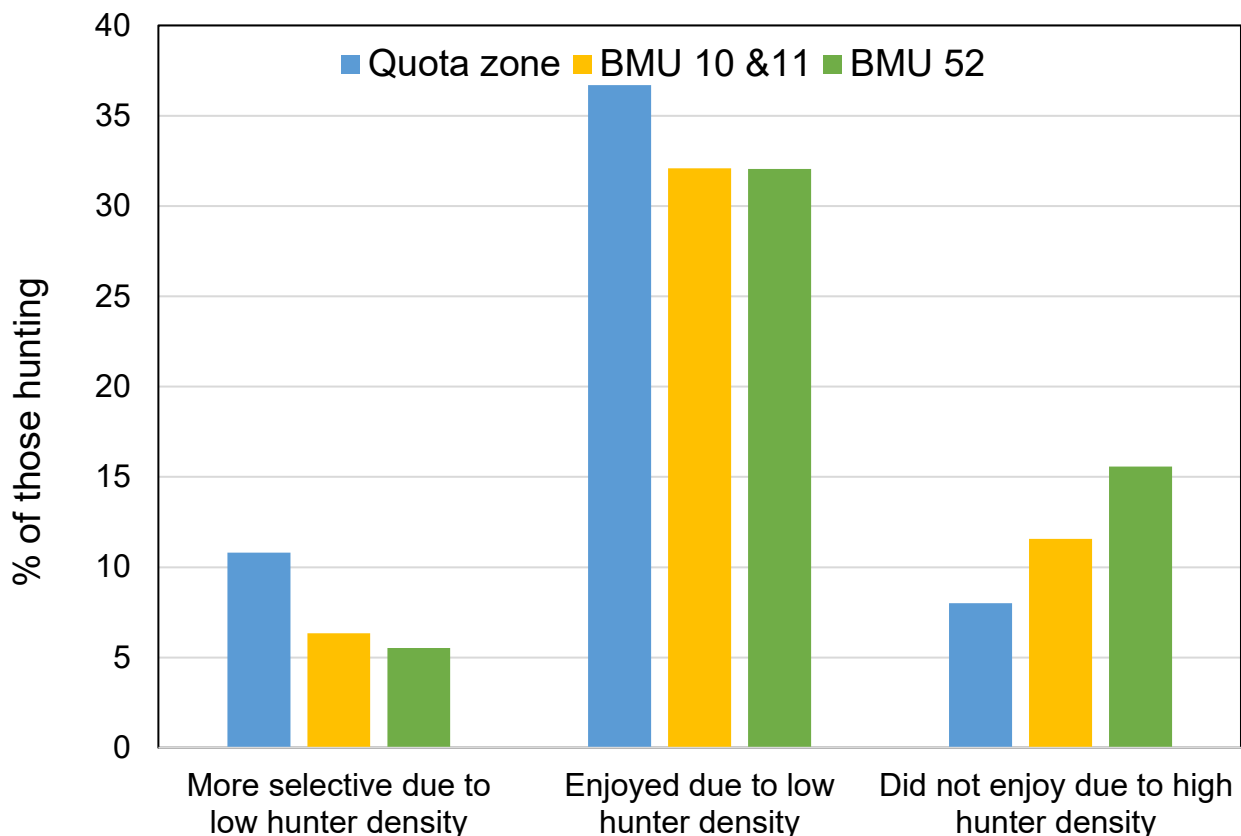


Fig. 19. Opinions of hunters about the status of the bear population in the area where they hunted, based on a 2022 survey.

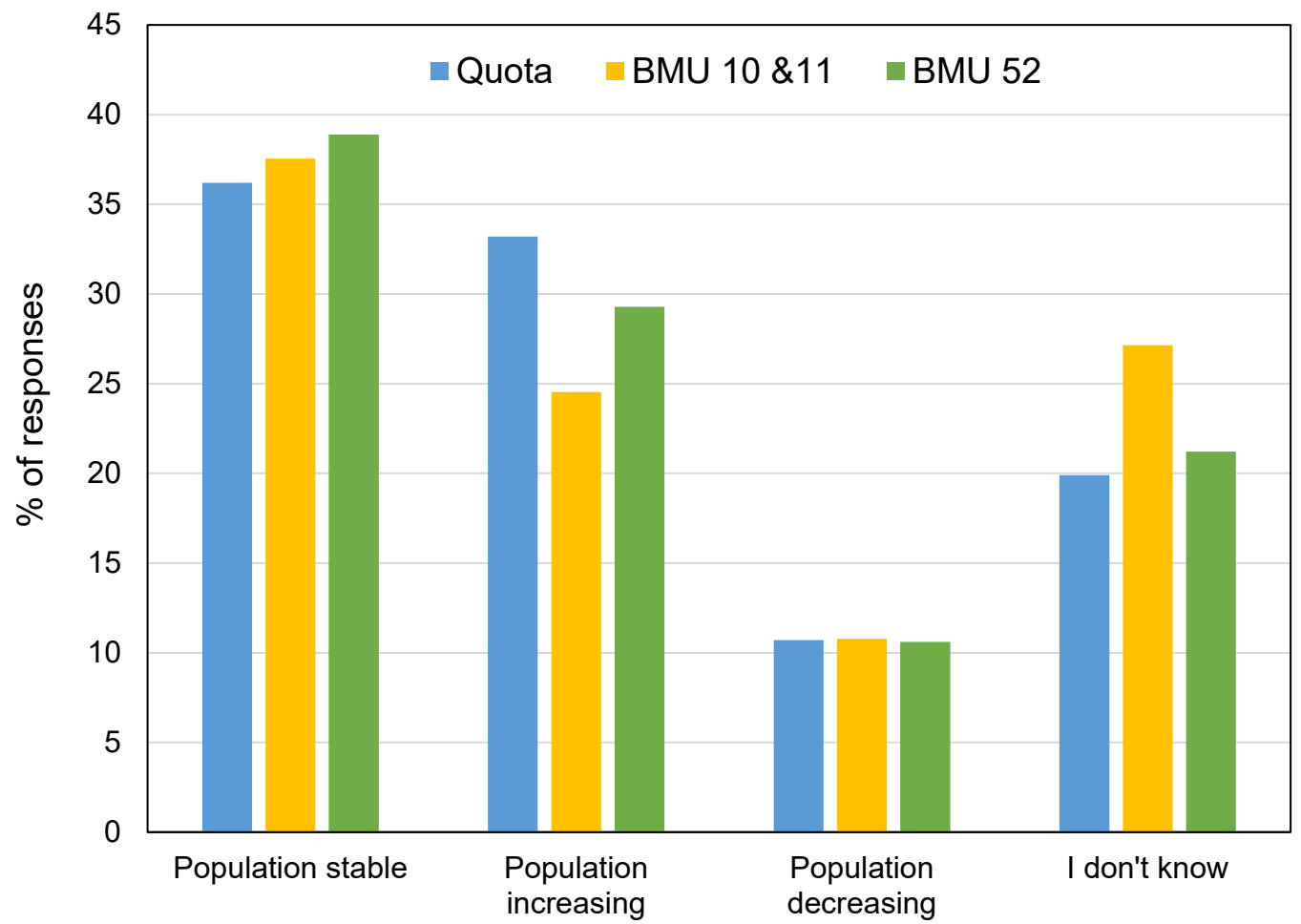


Fig. 20. Percent of hunters in each BMU who consider the population in their hunting area to be increasing (bottom bars) or stable (top bars), based on a 2022 survey. Percentages exclude hunters who had no opinion of population trend.

