

# Black Bear Population Analyses 2012

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## **Abstract**

Bear visitation rates averaged 55% for 18 bait station surveys conducted in the primary range (Zones A, B, and D), and 34% for 6 surveys conducted in the peripheral range (Zone C). Revised population models produced a statewide estimate of approximately 22,350 bears in Fall, 2012. A harvest of 4,600 bears was approved by the Natural Resources Board for the 2012 season.

## **Methods**

Bear bait station surveys were conducted by wildlife management and research personnel in the 18 counties comprising the primary bear range and 6 counties within the peripheral range in 2012. The surveys were run between 15 June and 15 July, and consisted of 50 bait stations placed at 0.5-mile intervals along drivable roads. A plastic mesh overwrap bag filled with approximately 2 lb. of fresh meat was securely wired to a tree about 7 ft above the ground at each bait station. Bait stations were checked for bear visitations after 7 nights.

A station was considered to have been visited by bears if the bag of meat was gone and the wire securing it had been stretched or broken, or by marks on the trees and/or trails leading to the station. Bait stations were considered inoperable and not included in the calculations if they could not be found or if animals other than bears had taken the bait.

Three-year running average visitation rates ( $[\text{year} \times 2 + \text{year}^{+1}]/3$  for first year;  $[\text{year}^{-1} + \text{year} \times 2]/3$  for last year, and  $[\text{year}^{-1} + \text{year} + \text{year}^{+1}]/3$  for all other years) were used as an index to bear population trends. Combining years reduced annual fluctuations resulting from small sample sizes and annual changes in the abundance of natural foods.

All harvested bears are required to be registered at DNR or cooperative stations. An upper first premolar was collected as the bears were registered, and the sex and county of kill were recorded for each bear. Registration personnel were provided instructions and envelopes for storing the teeth. Teeth were sent to the Matson's Lab in Milltown, MT for processing, and ages were assigned by counting annuli in the cementum.

Wisconsin's Bear Population Model was adapted from one developed and used in Minnesota (Garshelis 1990). The model was updated in 2011 to include the most recent bear harvest, age, and bait station data, and used to estimate bear populations in each Bear Management Zone (Figure 1). Starting population size in the model was increased in all zones in 2008 and again in 2010 in zones B and C to improve the correlation between model simulated population trends and trends in bait-station visitations and in consideration of the results of the tetracycline mark-recapture study conducted by MacFarland (2009).

## **Results**

Bear visitation rates in the 2012 bait station survey averaged 62% in Zone A, 48% in Zone B, 56% in Zone D, and 55% in the primary bear range (Zones A, B, and D combined) (Table 1). Bear visitation rates in Zone C (peripheral range) averaged 34%.

The 3-year mean visitation rates in the primary bear range increased steadily during the mid 1980s and early 1990s, was fairly stable during the mid-to-late 1990s, slowly increased during the 2000s, and has been decreasing since the late 2000s (Fig. 2). In the peripheral range (Zone C), bait station data suggests a substantial increase in the bear population during the late 1990s and early 2000s; 3-year average visitation rates doubled from 17% to 35% during 1996-2004. Visitation rates during the last 5 years have been stable to slowly increasing in Zone C, averaging about 30%.

Teeth were collected from 3,889 of the 4,257 bears harvested in 2011. Age data from bears harvested in 2011 are not available at this time. The age structure of female bears harvested during 1989-2010 has been relatively stable (Table 2); mean age of harvested female bears averaged 4.6 years (range 4.2 - 5.3). The age structure of harvested male bears has shifted to a younger distribution over the last 22 years with the mean age of harvested males declining from approximately 4 years to about 3 years over the period.

Adjustments made in 2008 to the starting population size for the bear population model in all zones and in 2011 to zones B and C improved the correlation between simulated population trends and trends in bait-station visitations (Fig. 2). The models produced a statewide population estimate of approximately 22,350 bears in Fall, 2012 (Table 3). This included 9,700 bears in Zone A, 5,000 in Zone B, 3,850 in Zone C, and 3,800 in Zone D. The 2012 population estimates equate to bear densities of 1.6 bears/mi<sup>2</sup> of bear range in Zone A, 0.9 bears/mi<sup>2</sup> in Zone B, 0.5 bears/mi<sup>2</sup> of occupied range in Zone C, and 0.7 bears/mi<sup>2</sup> in Zone D.

## **Discussion**

MacFarland (2009) estimated the statewide population of bears in autumn 2006 to be 33,657 ± 7,042 bears >1 year old based on a tetracycline mark-recapture study. This was considerably higher than the prior model-based estimates for 2006 (11,100 yearlings and adults, 14,300 bears including cubs) and was also higher than the revised model-based estimates for 2006 (15,450 yearlings and adults, 19,800 bears including cubs). Reasons for this difference are unclear. MacFarland (2009) suggested that the tetracycline mark-recapture estimate could be biased high due to violation of the assumption of equal capture probability. Alternatively the model-based estimates that are calibrated to bait-station indices could be biased low if the functional relationship between population size and the index is non-linear (i.e., the rate of increase of the population is faster than that indicated by the bait-station index) (MacFarland and Van Deelen 2011).

A second tetracycline based mark-recapture population estimate was initiated in 2011. Tetracycline laced baits were deployed in spring 2011. Rib samples were collected from hunter harvested bears in 2011 and will again be collected in 2012. Initial study results will be available in fall 2012 with final results available in fall of 2013.

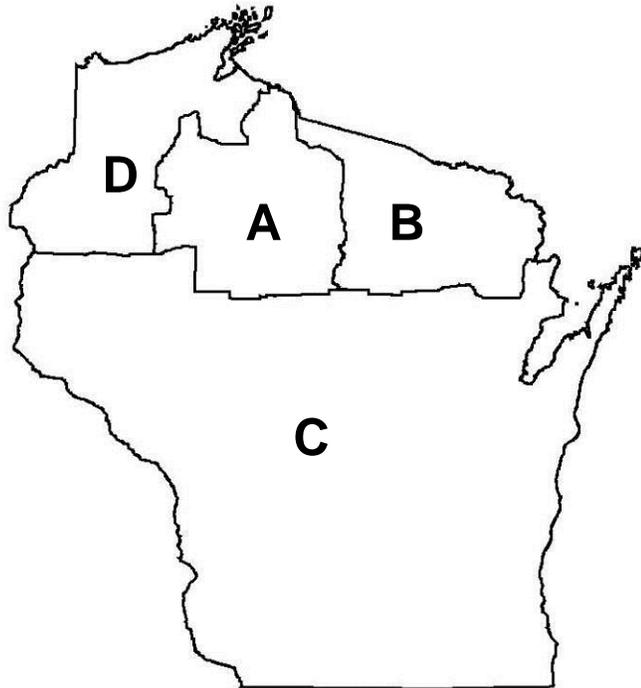
The Natural Resources Board approved a harvest quota of 4,600 bears for the 2012 season. This included 1,900 bears in Zone A, 900 in Zone B, 900 in Zone C, and 900 in Zone D.

## **Literature Cited**

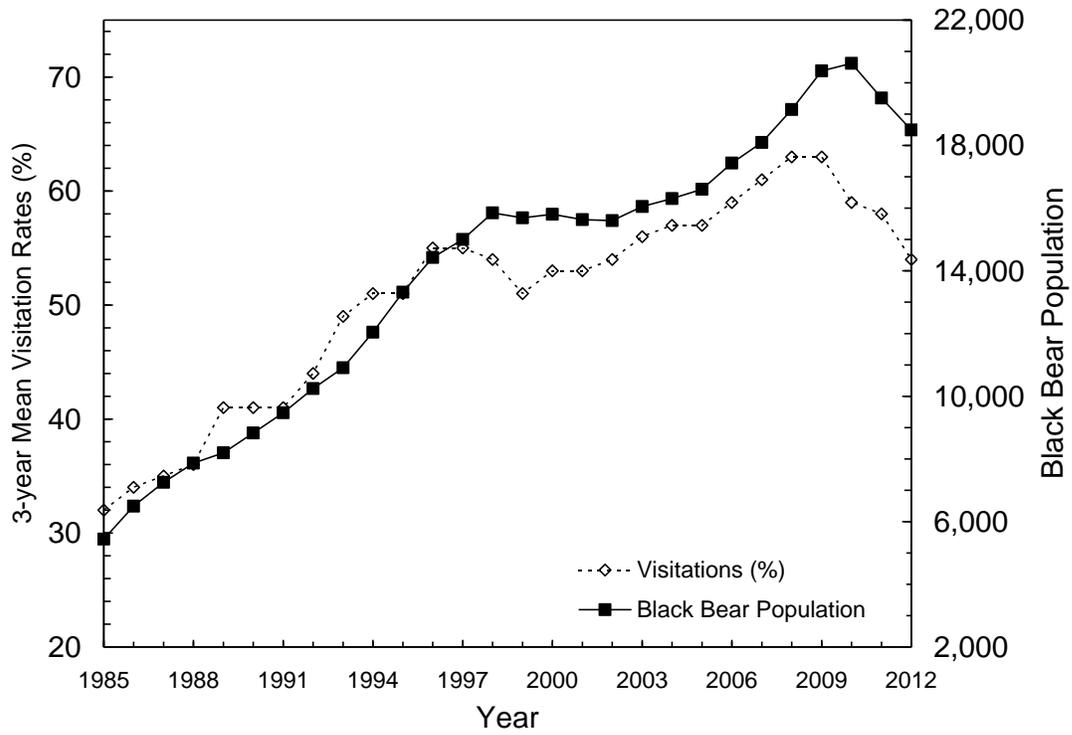
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**Figure 1.** *Wisconsin's Black Bear Management Zones, 2012.*



**Figure 2.** Bear visitation rates on bait station surveys (3-yr running average) and population estimates calculated by the revised models for the primary range (Zones A, B, and D), 1985-2012.

**Table 1.** *Percent of bear bait stations visited by bears, 2000-2012.*

County	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ashland	82	63	51	57	86	71	76	52	59	66	33	42	27
Bayfield	67	64	79	65	46	75	52	76	67	44	67	64	56
Burnett	71	84	53	36	32	46	43	37	35	5	51	48	43
Douglas	61	30	33	33	30	30	30	41	73	49	63	33	50
Florence	54	----	34	53	67	83	66	86	75	68	79	30	59
Forest	61	55	58	60	74	62	63	88	78	76	84	58	76
Iron	41	42	47	55	79	64	69	71	58	88	77	94	76
Langlade	48	44	56	53	54	63	53	44	46	48	46	61	57
Lincoln	55	33	68	44	27	30	39	73	61	64	68	37	42
Marinette	35	39	65	24	47	50	48	64	31	32	57	34	41
Oconto	6	25	47	28	31	23	17	23	53	39	48	43	24
Oneida	23	36	63	95	70	48	54	57	54	39	62	49	60
Price	50	50	42	68	78	26	33	50	66	69	84	67	53
Rusk	84	91	72	58	80	98	68	98	92	92	93	78	98
Sawyer	68	91	91	79	67	90	77	87	80	70	60	60	46
Taylor	42	36	50	57	58	90	66	92	86	89	76	75	62
Vilas	31	34	26	47	33	32	56	39	68	34	41	28	29
Washburn	91	74	88	85	84	92	70	88	87	70	80	78	76
<b>Primary Range</b>	<b>51</b>	<b>52</b>	<b>56</b>	<b>54</b>	<b>58</b>	<b>60</b>	<b>53</b>	<b>65</b>	<b>65</b>	<b>58</b>	<b>66</b>	<b>54</b>	<b>55</b>
Barron	30	28	17	11	20	30	5	3	19	40	29	44	34
Chippewa	41	20	44	50	42	47	17	35	44	40	53	72	78
Clark	16	39	54	52	64	48	28	45	47	55	33	42	36
Jackson	28	11	20	15	14	8	24	13	14	13	15	20	11
Marathon	13	32	66	69	65	53	45	38	51	42	44	44	42
Menominee	46	6	11	9	35	14	0	6	26	9	13	---	---
Polk	9	7	2	---	---	---	---	---	---	---	---	---	---
Shawano	0	7	0	---	11	3	0	0	4	10	0	0	3
<b>Peripheral Range</b>	<b>23</b>	<b>19</b>	<b>27</b>	<b>37</b>	<b>38</b>	<b>30</b>	<b>18</b>	<b>22</b>	<b>31</b>	<b>31</b>	<b>27</b>	<b>32</b>	<b>34</b>

**Table 2.** *Age classes of bears harvested in Wisconsin, 1989-2010.*

Year	Sex	Percent in age class			No. aged	Mean age
		1-2 yr	3-9 yr	10+ yr		
1989	Male	53.9	39.0	7.1	397	4.2
	Female	42.5	47.9	9.6	261	5.0
1990	Male	67.0	30.4	2.6	454	3.4
	Female	46.8	48.1	5.1	331	4.6
1991	Male	56.9	37.3	5.8	448	4.0
	Female	38.9	54.9	6.2	306	4.7
1992	Male	63.9	32.1	4.0	474	3.5
	Female	48.4	45.0	6.6	380	4.3
1993	Male	50.9	41.7	7.4	405	4.3
	Female	37.8	57.3	4.9	286	4.6
1994	Male	62.6	31.4	6.0	441	3.9
	Female	50.9	45.0	4.1	271	4.2
1995	Male	55.7	41.4	2.9	600	3.6
	Female	37.7	52.0	10.5	435	5.3
1996	Male	60.0	37.3	2.7	771	3.6
	Female	46.8	45.6	7.6	536	4.7
1997	Male	65.0	32.6	2.5	765	3.5
	Female	47.9	44.2	7.9	620	4.6
1998	Male	65.0	33.4	1.6	1,134	3.3
	Female	49.0	44.2	6.9	904	4.5
1999	Male	67.6	29.9	2.4	1,058	3.3
	Female	51.5	39.3	9.2	954	4.7
2000	Male	68.1	29.0	2.9	1,227	3.3
	Female	49.8	41.5	8.7	1,046	4.7
2001	Male	67.8	29.2	3.0	1,250	3.4
	Female	51.2	40.8	8.0	1,023	4.6
2002	Male	59.5	34.6	5.9	1,094	3.9
	Female	44.5	43.7	11.8	946	5.2
2003	Male	64.3	33.3	2.4	1,349	3.1
	Female	48.4	43.0	8.2	1,065	4.6
2004	Male	62.9	33.9	7.9	1,332	3.2
	Female	48.4	43.7	3.2	1,177	4.3
2005	Male	57.1	40.1	2.8	1,267	3.4
	Female	44.7	47.8	7.6	898	4.5
2006	Male	58.8	38.7	2.5	1,421	3.4
	Female	44.8	47.0	8.2	1,258	4.6
2007	Male	61.0	36.6	2.3	1,367	3.3
	Female	42.0	48.3	9.7	1,135	4.8
2008	Male	58.1	38.5	3.4	1,456	3.6
	Female	42.9	49.0	8.0	1,169	4.7
2009	Male	59.6	38.4	2.0	1,794	3.3
	Female	45.6	47.2	7.3	1,523	4.4
2010	Male	68.5	30.0	1.4	2144	2.9
	Female	50.0	42.1	7.9	2190	4.3

**Table 3.** *Modeled bear population estimates by Management Zone, 1988-2012.*

Year	Bear Management Zone				State
	A	B	C	D <sup>a</sup>	
1988	3,600	1,600	700	2,700	8,600
1989	3,600	1,700	800	2,900	9,000
1990	3,800	1,900	900	3,100	9,700
1991	4,000	2,000	1000	3,500	10,500
1992	4,300	2,100	1,100	3,800	11,300
1993	4,400	2,300	1,150	4,200	12,050
1994	4,800	2,400	1,250	4,800	13,250
1995	5,400	2,600	1,400	5,300	14,700
1996	6,100	2,700	1,500	5,600	15,900
1997	6,400	2,800	1,650	5,700	16,550
1998	6,900	3,000	1,800	5,900	17,600
1999	6,800	3,100	1,950	5,700	17,550
2000	6,900	3,300	2,150	5,600	17,950
2001	6,800	3,500	2,350	5,300	17,950
2002	6,700	3,800	2,550	5,200	18,250
2003	7,000	4,000	2,900	5,000	18,900
2004	7,200	4,300	3,150	4,800	19,450
2005	7,600	4,500	3,300	4,600	20,000
2006	8,100	4,700	3,500	4,600	20,900
2007	8,700	4,900	3,550	4,500	21,650
2008	9,300	5,300	3,700	4,600	22,900
2009	10,000	5,500	3,800	4,800	24,100
2010	10,300	5,600	3,850	4,800	24,550
2011	9,900	5,400	3,800	4,200	23,500
2012	9,700	5,000	3,850	3,800	22,350

<sup>a</sup> Formally Zone A1.