

# Black Bear Population Analyses 2008

By Robert E. Rolley and Michael L. Worland

## **Abstract**

Bear visitation rates averaged 65% for 18 bait station surveys conducted in the primary range (Zones A, B, and D), and 31% for 7 surveys conducted in the peripheral range (Zone C). Population models produced a statewide estimate of approximately 13,050 bears in Fall, 2008. Bear populations appear to be within 15% of goals in Bear Management Zones A and D but are estimated to be more than 30% above goal in zones B and C. A harvest of 2,950 bears was recommended for the 2008 season.

## **Methods**

Bear bait station surveys were conducted by wildlife management and research personnel in the 18 counties comprising the primary bear range and 7 counties within the peripheral range in 2008. 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 rather small sample sizes and large annual changes in the abundance of natural foods.

All bears legally harvested were 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 the one developed and used in Minnesota (Garshelis 1990). That model was updated in 2007 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 slightly in zone B in 2007 to improve the correlation between model simulated population trends and trends in bait-station visitations.

## **Results**

Bear visitation rates in the 2008 bait station survey averaged 73% in Zone A, 59% in Zone B, 65% in Zone D, and 65% in the primary bear range (Zones A, B, and D combined) (Table 1). Bear visitation rates in Zone C (peripheral range) averaged 31%.

The 3-year mean visitation rates in the primary bear range increased rather steadily from 1985 (32%) to 1996 (55%) and then largely stabilized (1997-2005 average = 54%, Fig. 2). Average visitation rates have increased during the past 3 years, but how much this reflects an increase in the northern bear population or greater attractiveness of baits because of reduced natural foods due to drought conditions in 2006 and 2007 and the prolonged winter of 2007-08 is unclear.

In Zone C, the Bear Bait Station Survey suggests a marked increase in the bear population during the late 1990s and early 2000s; 3-year average visitation rates increased from 17% to 35% during 1996-2004. Visitation rates appear to have declined in the last few years in Zone C.

Teeth were collected from 2,536 of the 2,797 bears harvested in 2007. Age data from bears harvested in 2007 are not available at this time. The age structure of female bears harvested during 1986-2006 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 tended to shift to a slightly younger distribution over the last 20 years with the mean age of harvested males declining from about 4 years to less than 3.5 years over the period.

Adjustments made in 2007 to the starting population size for the bear population model in zone B improved the correlation between simulated population trends and trends in bait-station visitations. The models produced a statewide population estimate of approximately 13,050 bears in Fall, 2008 (Table 3). This included 5,000 bears in Zone A, 3,550 in Zone B, 1,600 in Zone C, and 2,900 in Zone D. The 2008 population estimates equate to bear densities of 0.9 bears/mi<sup>2</sup> of bear range in Zone A, 0.7 bears/mi<sup>2</sup> in Zone B, 0.3 bears/mi<sup>2</sup> of occupied range in Zone C, and 0.5 bears/mi<sup>2</sup> in Zone D. Population trends calculated by the models for the primary range generally paralleled those suggested by the Bear Bait Station Surveys during the mid 1980s – late 1990s (Fig. 2). However, during the past 10 years the models have been suggesting a slowly declining population in the northern 1/3 of the state while the bait-station data have suggested a stable to slowly increasing population.

The population model for Zone C suggests a steady increase in the population during 1988-2003. The model suggests the Zone C population has stabilized and may have declined slightly in the last few years.

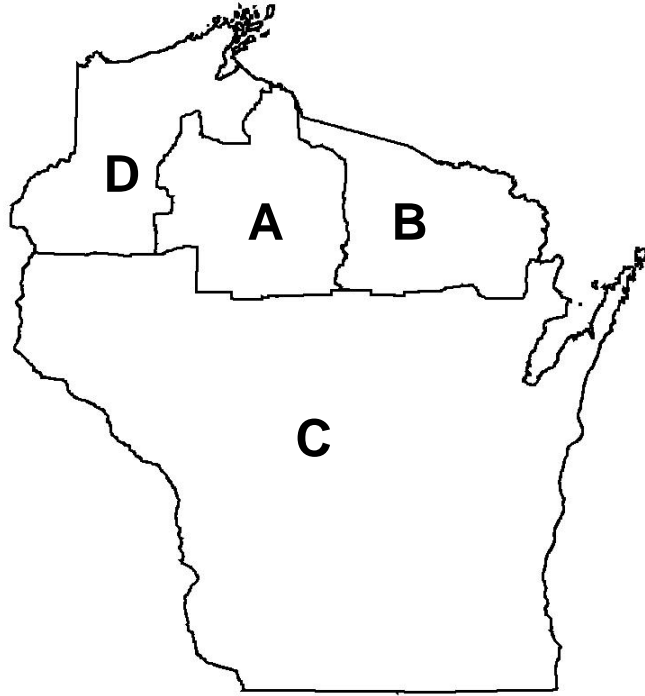
Current bear population estimates in zones A and D are within 15% of goals, whereas the bear population estimates in zones B and C are more than 30% above the prescribed goal. The WDNR Bear Advisory Committee recommended a harvest of 2,950 bears for the 2008 season. This included 1,100 bears in Zone A, 700 in Zone B, 600 in Zone C, and 550 in Zone D.

## **Discussion**

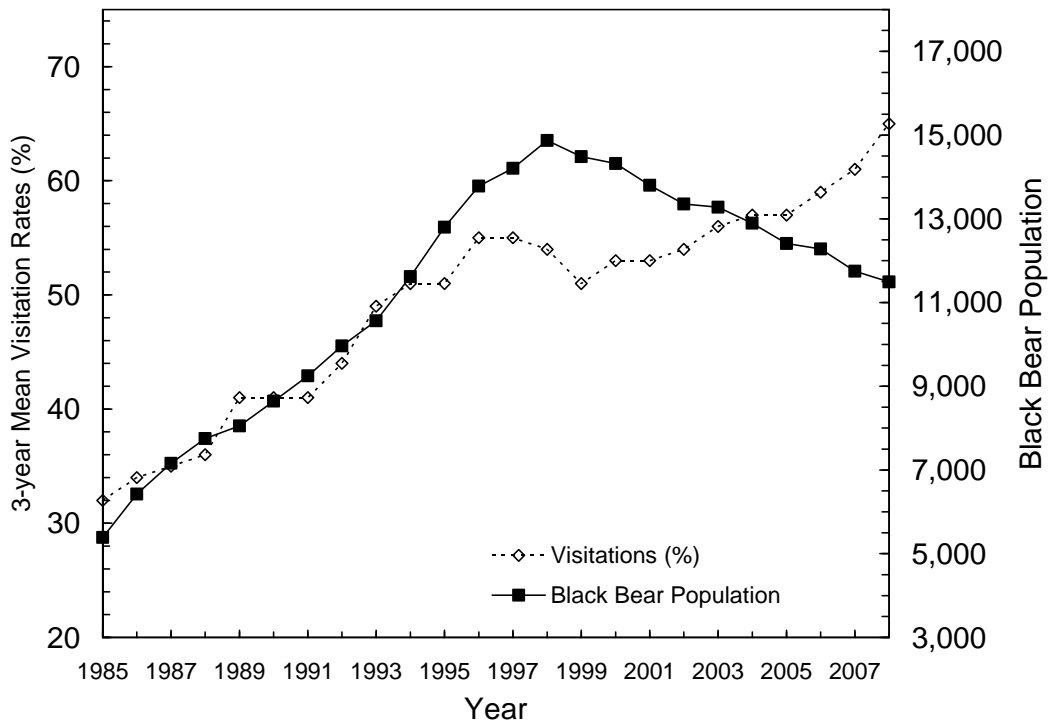
Further adjustments to the population models may be appropriate in the future. These adjustments should consider not only the population trend suggested by bait-station visitations but also the results from on-going research by UW-Madison to estimate the size of the statewide bear population using tetracycline mark-recapture methods as well as data from demographic studies conducted by UW-Stevens Point.

## **Literature Cited**

Garshelis, D. L. 1990. Monitoring effects of harvest on black bear populations in North America: a review and evaluation of techniques. *East Workshop Black Bear Res. and Manage.* 10:120-144.



**Figure 1.** Wisconsin's Black Bear Management Zones, 2008.



**Figure 2.** Bear visitation rates on bait station surveys (3-yr running average) and population estimates calculated by the model for the primary range (Zones A, B, and D), 1985-2008.

**Table 1.** *Percent of bear bait stations visited by bears, 1997-2008.*

| County            | 1997      | 1998      | 1999      | 2000      | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      | 2008      |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Ashland           | 68        | 48        | 68        | 82        | 63        | 51        | 57        | 86        | 71        | 76        | 52        | 59        |
| Bayfield          | 32        | 83        | 83        | 67        | 64        | 79        | 65        | 46        | 75        | 52        | 76        | 67        |
| Burnett           | 39        | 63        | 60        | 71        | 84        | 53        | 36        | 32        | 46        | 43        | 37        | 35        |
| Douglas           | 43        | 37        | 62        | 61        | 30        | 33        | 33        | 30        | 30        | 30        | 41        | 73        |
| Florence          | 38        | 46        | 64        | 54        | ----      | 34        | 53        | 67        | 83        | 66        | 86        | 75        |
| Forest            | 88        | 26        | 43        | 61        | 55        | 58        | 60        | 74        | 62        | 63        | 88        | 78        |
| Iron              | 86        | 58        | 48        | 41        | 42        | 47        | 55        | 79        | 64        | 69        | 71        | 58        |
| Langlade          | 62        | 29        | 30        | 48        | 44        | 56        | 53        | 54        | 63        | 53        | 44        | 46        |
| Lincoln           | 76        | 52        | 41        | 55        | 33        | 68        | 44        | 27        | 30        | 39        | 73        | 61        |
| Marinette         | 19        | 26        | 44        | 35        | 39        | 65        | 24        | 47        | 50        | 48        | 64        | 31        |
| Oconto            | 16        | 6         | 18        | 6         | 25        | 47        | 28        | 31        | 23        | 17        | 23        | 53        |
| Oneida            | 67        | 23        | 66        | 23        | 36        | 63        | 95        | 70        | 48        | 54        | 57        | 54        |
| Price             | 88        | 43        | 31        | 50        | 50        | 42        | 68        | 78        | 26        | 33        | 50        | 66        |
| Rusk              | 85        | 71        | 84        | 84        | 91        | 72        | 58        | 80        | 98        | 68        | 98        | 92        |
| Sawyer            | 93        | 66        | 76        | 68        | 91        | 91        | 79        | 67        | 90        | 77        | 87        | 80        |
| Taylor            | 46        | 62        | 52        | 42        | 36        | 50        | 57        | 58        | 90        | 66        | 92        | 86        |
| Vilas             | 57        | 36        | 52        | 31        | 34        | 26        | 47        | 33        | 32        | 56        | 39        | 68        |
| Washburn          | 84        | 60        | 90        | 91        | 74        | 88        | 85        | 84        | 92        | 70        | 88        | 87        |
| <b>Primary</b>    |           |           |           |           |           |           |           |           |           |           |           |           |
| <b>Range</b>      | <b>60</b> | <b>47</b> | <b>56</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> |
| Barron            | 16        | 26        | 11        | 30        | 28        | 17        | 11        | 20        | 30        | 5         | 3         | 19        |
| Chippewa          | 27        | 15        | 52        | 41        | 20        | 44        | 50        | 42        | 47        | 17        | 35        | 44        |
| Clark             | 6         | 12        | 33        | 16        | 39        | 54        | 52        | 64        | 48        | 28        | 45        | 47        |
| Jackson           | 13        | 27        | 0         | 28        | 11        | 20        | 15        | 14        | 8         | 24        | 13        | 14        |
| Marathon          | 32        | 7         | 8         | 13        | 32        | 66        | 69        | 65        | 53        | 45        | 38        | 51        |
| Menominee         | 14        | 8         | 5         | 46        | 6         | 11        | 9         | 35        | 14        | 0         | 6         | 26        |
| Polk              | 2         | 8         | 4         | 9         | 7         | 2         | ---       | ---       | ---       | ---       | ---       |           |
| Shawano           | 0         | 0         | 0         | 0         | 7         | 0         | ---       | 11        | 3         | 0         | 0         | 4         |
| <b>Peripheral</b> |           |           |           |           |           |           |           |           |           |           |           |           |
| <b>Range</b>      | <b>13</b> | <b>13</b> | <b>14</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> |

**Table 2.** *Age classes of bears harvested in Wisconsin, 1986-2006.*

| Year | Sex    | Percent in age class |        |        | No. aged | Mean age |
|------|--------|----------------------|--------|--------|----------|----------|
|      |        | 1-2 yr               | 3-9 yr | 10+ yr |          |          |
| 1986 | Male   | 59.5                 | 37.2   | 3.3    | 210      | 3.6      |
|      | Female | 43.8                 | 41.3   | 9.9    | 121      | 4.2      |
| 1987 | Male   | 52.6                 | 43.2   | 4.2    | 401      | 4.1      |
|      | Female | 41.5                 | 52.0   | 6.5    | 200      | 4.6      |
| 1988 | Male   | 60.4                 | 35.0   | 4.6    | 439      | 3.7      |
|      | Female | 40.9                 | 51.9   | 7.2    | 345      | 4.7      |
| 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      |

**Table 3.** *Modeled bear population estimates by Management Zone, 1988-2008<sup>a</sup>.*

| Year | Bear Management Zone |       |       |                | State  |
|------|----------------------|-------|-------|----------------|--------|
|      | A                    | B     | C     | D <sup>b</sup> |        |
| 1988 | 3,500                | 1,550 | 700   | 2,700          | 8,450  |
| 1989 | 3,500                | 1,700 | 750   | 2,850          | 8,800  |
| 1990 | 3,700                | 1,850 | 850   | 3,100          | 9,500  |
| 1991 | 3,900                | 1,950 | 900   | 3,400          | 10,150 |
| 1992 | 4,100                | 2,050 | 1,000 | 3,750          | 10,900 |
| 1993 | 4,200                | 2,200 | 1,050 | 4,150          | 11,600 |
| 1994 | 4,550                | 2,350 | 1,100 | 4,750          | 12,750 |
| 1995 | 5,100                | 2,550 | 1,250 | 5,200          | 14,100 |
| 1996 | 5,700                | 2,600 | 1,300 | 5,450          | 15,050 |
| 1997 | 5,950                | 2,650 | 1,350 | 5,550          | 15,500 |
| 1998 | 6,350                | 2,800 | 1,500 | 5,700          | 16,350 |
| 1999 | 6,150                | 2,850 | 1,550 | 5,450          | 16,000 |
| 2000 | 6,050                | 3,000 | 1,650 | 5,300          | 16,000 |
| 2001 | 5,800                | 3,100 | 1,800 | 4,850          | 15,550 |
| 2002 | 5,400                | 3,250 | 1,850 | 4,650          | 15,150 |
| 2003 | 5,450                | 3,400 | 2,100 | 4,450          | 15,400 |
| 2004 | 5,300                | 3,600 | 2,150 | 4,000          | 15,050 |
| 2005 | 5,250                | 3,500 | 2,100 | 3,650          | 14,500 |
| 2006 | 5,250                | 3,600 | 2,050 | 3,450          | 14,350 |
| 2007 | 5,150                | 3,500 | 1,750 | 3,100          | 13,500 |
| 2008 | 5,000                | 3,550 | 1,600 | 2,900          | 13,050 |
| Goal | 4,600                | 2,200 | 1,200 | 3,300          | 11,300 |

<sup>a</sup> Population estimates for zone B and the statewide estimates differ from those previously reported due to adjustments to the starting population size in the model.

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