

# Interagency Grizzly Bear Study Team

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## Whitebark Pine Cone Production



Whitebark pine (*Pinus albicaulis*) surveys on 21 established transects indicated slightly above average cone production during 2017 (Figure 1). Overall, the mean number of observed cones/tree was 23.1 (Table 1) compared with the overall average of 16 for the period 1980–2017 (Figure 2). Cone production was above average on 12 transects, and below average on 9 (Table 2).

We continue to observe occasional tree mortality caused by mountain pine beetle (*Dendroctonus ponderosae*) in stands that contain our cone production transects. However, during 2017 we did not observe additional beetle-caused mortality among individual trees surveyed since 2002. Thus, total mortality on these transect trees since 2002 remains at 75.8% (144/190) with 100% (19/19) of transects containing beetle-killed trees. Although tree mortality from mountain pine beetle is still occurring, the rate of loss among our cone production transects has slowed substantially (Figure 3). This suggests that at least in the vicinity of these transects, the current beetle outbreak has run its course. Six of the 7 transects established during 2007 also exhibited beetle-caused mortality among transect trees.

Grizzly bears (*Ursus arctos*) typically search for whitebark pine seeds at elevations above 8,000 ft. However, extensive areas of beetle-killed whitebark pine and fire events may reduce local cone abundance and availability. Indeed, a recent study indicated that selection for whitebark pine

## 2017 PROJECT SUMMARY

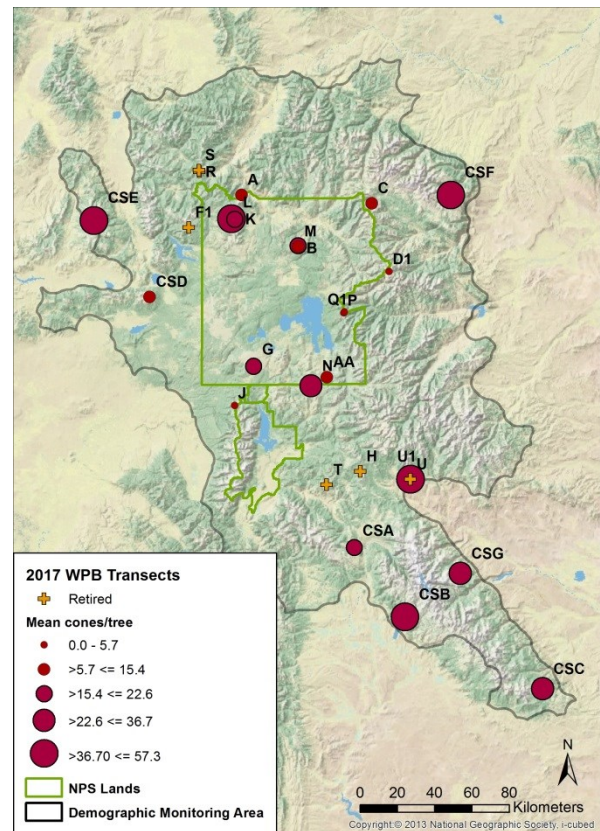


Figure 1. Locations and mean number of cones/tree for 21 whitebark pine cone production transects surveyed in the Greater Yellowstone Ecosystem, 2017. Labels reflect transect identifiers (see Table 2).

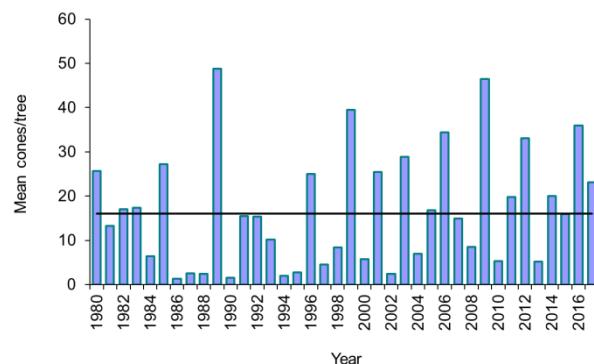
stands has declined since the early 2000s and is now in proportion to stand availability within fall ranges of grizzly bears. Historically, numbers of grizzly bear-human conflicts and management actions have been lower during years with good food production, including whitebark pine. In areas with widespread whitebark pine mortality, this effect may now be diminishing. Increases in bear numbers and range expansion during the last 2 decades likely also influence the frequency of fall conflicts.

Table 1. Summary statistics for whitebark pine cone production surveys, Greater Yellowstone Ecosystem, 2017.

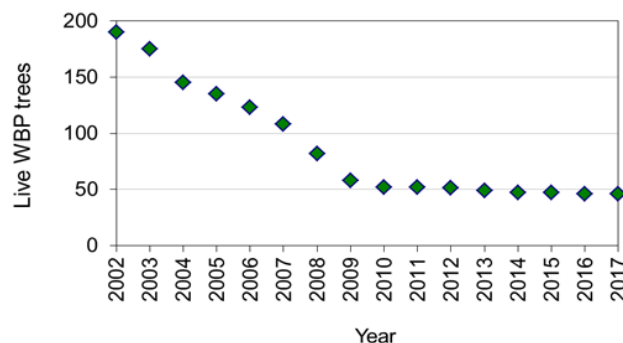
| Total |       |           | Trees      |    |     |     | Transect   |       |     |     |
|-------|-------|-----------|------------|----|-----|-----|------------|-------|-----|-----|
| Cones | Trees | Transects | Mean cones | SD | Min | Max | Mean cones | SD    | Min | Max |
| 4,269 | 185   | 21        | 23.1       | 28 | 0   | 177 | 203.3      | 149.0 | 38  | 572 |

**Table 2. Results of whitebark pine cone production surveys, Greater Yellowstone Ecosystem, 2017.**

| Transect | No. of cones                       | No. of trees | Mean no. cones/tree | SD   |
|----------|------------------------------------|--------------|---------------------|------|
| A        | 61                                 | 5            | 12.2                | 26.2 |
| B        | 176                                | 10           | 17.6                | 10.8 |
| C        | 154                                | 10           | 15.4                | 7.4  |
| D1       | 57                                 | 10           | 5.7                 | 5.3  |
| F1       | -----Transect retired in 2008----- |              |                     |      |
| G        | 171                                | 9            | 19.0                | 20.3 |
| H        | -----Transect retired in 2008----- |              |                     |      |
| J        | 54                                 | 10           | 5.4                 | 4.2  |
| K        | 378                                | 7            | 54.0                | 21.5 |
| L        | 181                                | 8            | 22.6                | 18.6 |
| M        | 140                                | 10           | 14.0                | 10.2 |
| N        | 295                                | 10           | 29.5                | 54.5 |
| P        | 40                                 | 10           | 4.0                 | 5.5  |
| Q1       | 38                                 | 10           | 3.8                 | 4.7  |
| R        | -----Transect retired in 2009----- |              |                     |      |
| S        | -----Transect retired in 2010----- |              |                     |      |
| T        | -----Transect retired in 2008----- |              |                     |      |
| U        | -----Transect retired in 2016----- |              |                     |      |
| U1       | 528                                | 10           | 52.8                | 46.1 |
| AA       | 129                                | 10           | 12.9                | 13.2 |
| CSA      | 173                                | 10           | 17.3                | 19.0 |
| CSB      | 572                                | 10           | 57.2                | 40.7 |
| CSC      | 280                                | 10           | 28.0                | 20.4 |
| CSD      | 135                                | 10           | 13.5                | 10.4 |
| CSE      | 111                                | 2            | 55.5                | 9.2  |
| CSF      | 229                                | 4            | 57.3                | 9.4  |
| CSG      | 367                                | 10           | 36.7                | 18.9 |



**Figure 2. Annual mean number of cones/tree observed along whitebark pine cone production transects, Greater Yellowstone Ecosystem, 1980–2017. The overall average of 16 cones/tree is shown as a solid horizontal line.**



**Figure 3. Number of live whitebark pine (WBP) trees on cone production transects among 190 individual trees monitored since 2002 in the Greater Yellowstone Ecosystem, 2002–2017.**

Regardless of increases in range extent, bear numbers, or the availability and abundance of fall foods; recreationists, hunters, and those who live in bear country are urged to use appropriate measures to avoid encounters with grizzly bears. These include securing attractants and foods in frontcountry and backcountry settings, particularly during fall months. Backcountry users are strongly encouraged to carry and know how to use bear spray. Studies have shown bear spray is effective in self-defense situations.

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