

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 2018 (Figure 1). Overall, the mean number of observed cones/tree was 26.0 (Table 1) compared with the overall average of 17 for the period 1980–2018 (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 2018 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). These data show that in the vicinity of the transects, the recent 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 grizzly bear selection for whitebark pine stands has declined since the early 2000s and

2018 PROJECT SUMMARY

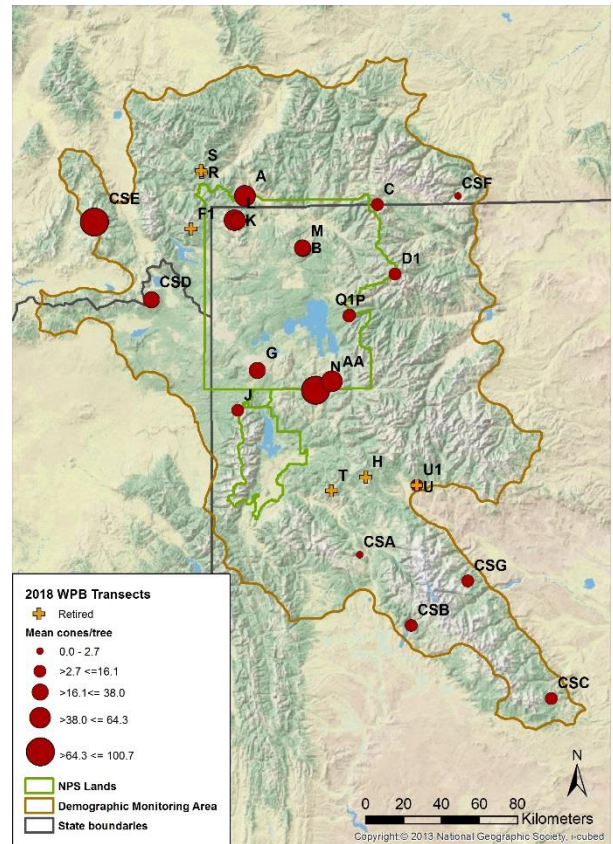


Figure 1. Locations and mean number of cones/tree for 21 whitebark pine cone production transects surveyed in the Greater Yellowstone Ecosystem, 2018. Labels reflect transect identifiers (see Table 2).

is now in proportion to stand availability within fall ranges of grizzly bears. Historically, grizzly bear-human conflicts and management actions were reduced 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, 2018.

Total			Trees				Transect			
Cones	Trees	Transects	Mean cones	SD	Min	Max	Mean cones	SD	Min	Max
4,862	187	21	26.0	35	0	217	231.5	225	3	1,007

Table 2. Results of whitebark pine cone production surveys, Greater Yellowstone Ecosystem, 2018.

Transect	No. of cones	No. of trees	Mean no. cones/tree	SD
A	245	4	61.3	103.9
B	313	10	31.3	14.7
C	90	10	9.0	6.5
D1	159	10	15.9	8.2
F1	-----Transect retired in 2008-----			
G	217	10	21.7	21.2
H	-----Transect retired in 2008-----			
J	161	10	16.1	16.0
K	450	7	64.3	24.7
L	380	10	38.0	26.3
M	315	10	31.5	21.5
N	1007	10	100.7	42.7
P	61	10	6.1	5.8
Q1	78	10	7.8	10.1
R	-----Transect retired in 2009-----			
S	-----Transect retired in 2010-----			
T	-----Transect retired in 2008-----			
U	-----Transect retired in 2016-----			
U1	77	10	7.7	5.0
AA	573	10	57.3	42.3
CSA	27	10	2.7	3.4
CSB	113	10	11.3	10.4
CSC	90	10	9.0	12.1
CSD	252	10	25.2	18.6
CSE	177	2	88.5	102.5
CSF	3	4	0.8	1.5
CSG	74	10	7.4	7.3

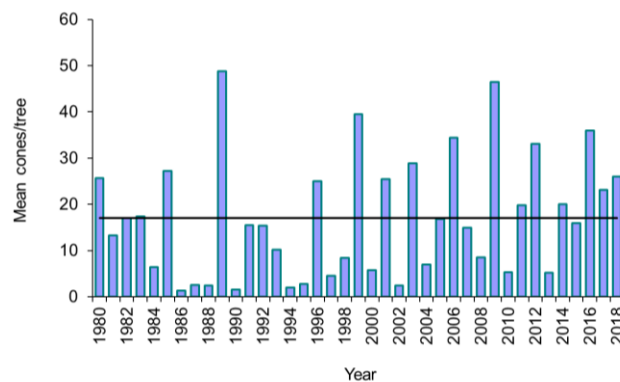


Figure 2. Annual mean number of cones/tree observed along whitebark pine cone production transects, Greater Yellowstone Ecosystem, 1980–2018. The overall average of 16 cones/tree is shown as a solid horizontal line.

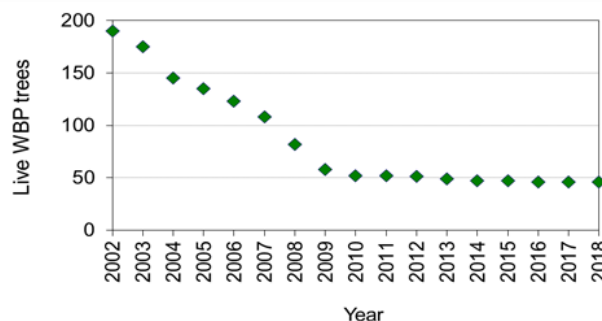


Figure 3. Number of live whitebark pine (WBP) trees on cone production transects among 190 individual trees monitored since 2002 in the Greater Yellowstone Ecosystem, 2002–2018.

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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