Trends in Availability & Consumption of Whitebark Pine – Yellowstone Ecosystem

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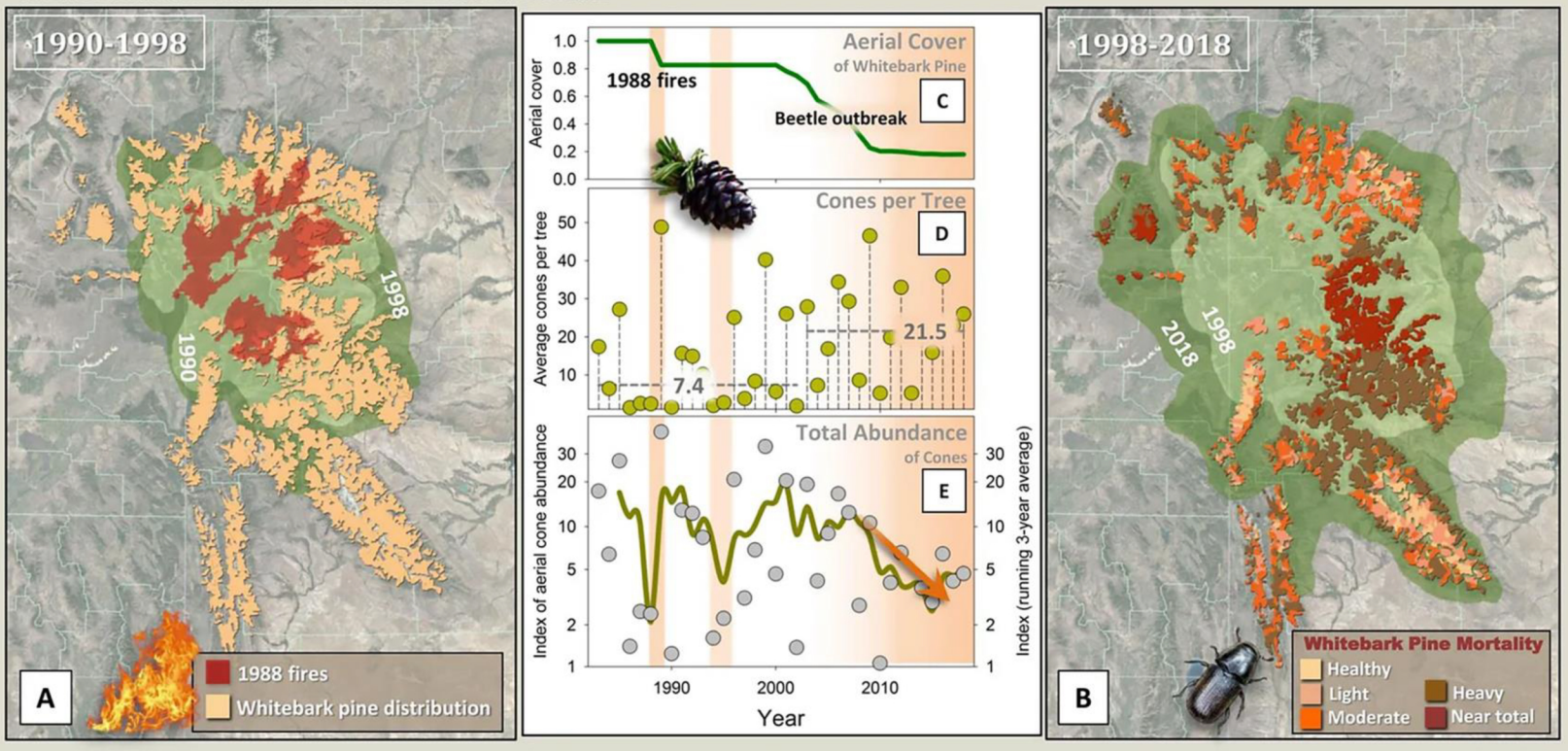

These graphics show losses of whitebark pine in the Greater Yellowstone Ecosystem (GYE) between 1988 and 2018 to wildfires (A) and an unprecedented outbreak of mountain pine beetles unleashed by a warming climate (B). Healthy whitebark pine forests are shown in tan, in contrast to areas of near-total mortality as dark brown to burgundy. Figures (C-E) show annual trends in the extent of whitebark pine forests (A), cone crop size (i.e., cones per surviving tree; [B]), and total whitebark pine seed availability as a function of both tree and cone abundance (E). Losses of mature whitebark pine trees were temporarily offset by large cone crops during 2002-2009, after which landscape-level availability of cones/seeds entered a phase of terminal decline. Maps (A) and (B) also show changes in distribution of grizzly bears during two different time periods, with little increase in distribution between 1990 and 1998, in contrast to a major increase during 1998-2018, coincident with major losses of whitebark pine. This latter increase in distribution was proportionally far in excess of any increase in grizzly bear population size during this period.