



The 2016 Clark Fire had significant impacts on late-seral Jeffrey pine forests of the Indiana Summit Research Natural Area, with the exception of areas previously treated with prescribed fire.

Effects of the 2016 Clark Fire on the Indiana Summit Research Natural Area

In 2016, the 2800-acre Clark Fire burned the entire Indiana Summit Research Natural Area (ISRNA), which was designated in 1932 to protect one of the remaining late-successional eastside Jeffrey Pine forests on the Inyo National Forest. Prior to 2016, over a century of fire exclusion led to stand densification and elevated surface fuel loading in Jeffrey pine stands of ISRNA, prompting concerns over the effects of the 2016 Clark Fire on the integrity and resilience of forest ecosystems in ISRNA.

Key Findings

- Monitoring and remote-sensing data suggest that 24% of Jeffrey pine forests in ISRNA burned outside the Natural Range of Variation (NRV), about 50% experienced significant declines in large trees, and 27-36% are at risk of tree regeneration failure that could impair long-term forest ecosystem integrity.
- Forest stands in ISRNA that were treated with prescribed fire in the mid-1990s exhibited reduced fire effects within NRV during the 2016 Clark Fire. In contrast, nearby untreated stands exhibited more severe fire effects outside NRV.
- Most late-successional Jeffrey pine stands in ISRNA exhibit clear signs of resilience to the 2016 Clark Fire, but the effects of interacting stressors (bark beetles, drought, climate change) may exacerbate ecosystem recovery in the coming decades.



Low severity fire effects in a Jeffrey pine stand of the Indiana Summit Research Natural Area. This stand was prescribed burned about 20 years prior to the 2016 Clark Fire.

Source:

Meyer, M., A. Wuenschel, and M. Slaton. 2020. Indiana Summit Research Natural Area Post-Fire Ecological Assessment. Unpublished report. USDA Forest Service Pacific Southwest Region. Bishop, CA.



Project Summary:

- We assessed the ecological condition of a late-seral Jeffrey pine (*Pinus jeffreyi*) forest in the Indiana Summit Research Natural Area (ISRNA) on the Inyo National Forest one year before and after the 2016 Clark Fire. Our assessment included analysis of remote-sensing indicators of fire severity and ecological monitoring data collected from plots located in prescribed (Rx) burned and untreated portions of ISRNA.
- Fire effects based on remote-sensing derived indicators (e.g., fire severity index, high severity patch size) were uniformly greater and more severe in untreated than Rx burned areas of ISRNA.
- Plot-based ecological monitoring indicators (e.g., char height, percent crown scorch) showed more severe fire effects in untreated than Rx burned areas.
- One year after the 2016 Clark Fire, Rx burned stands relative to untreated stands were characterized by: (1) greater large tree (≥ 30 inch dbh) and total tree densities, (2) lower snag densities, (3) greater canopy and shrub cover, (4) higher shrub species richness, (5) greater conifer regeneration densities, (6) greater surface fuel loading (1-100- and 1000-hour fuels), (7) similar percentage of trees within clusters, and (8) more fully-represented but similarly shaped size class distribution that approximated reference conditions.
- Rx burned plots had substantially greater overlap with the natural range of variation (NRV) than untreated plots with respect to all fire severity and post-fire vegetation variables, with the exception that both Rx burned and untreated plots had tree regeneration densities below or at the lower end of NRV.
- 36% of ISRNA burned in two large high severity patches that contained very low densities of regeneration.
- Comparisons of fire effects in Rx burn and untreated stands were complicated by limitations in our study design, but results suggest that Rx burning may have benefited Jeffrey pine stands in ISRNA by restoring stand structural conditions to NRV and enhancing ecosystem resilience to the 2016 Clark Fire.



High severity burned Jeffrey pine stand in the Indiana Summit Research Natural Area. Prior to the 2016 Clark Fire, this stand had not experienced fire for over a century and was characterized by elevated tree densities and surface fuels.

Future Monitoring and Research in the Indiana Summit Research Natural Area:

- Post-fire monitoring of forest structural changes to examine long-term effects of wildfire
- Inventory of Jeffrey pine regeneration within ISRNA and other burned areas of the Inyo National Forest to determine potential limitations in post-fire regeneration
- Survey for nonnative invasive plant species in areas of greater fire effects to minimize their impact
- Analysis of tree spatial structural patterns to establish reference conditions (PSW Research Station)