Burn Severity and Whitebark Pine (*Pinus albicaulis)* Regeneration in the North Cascades

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Extensive population declines throughout the range of Whitebark pine due to fire exclusion and an exotic fungus (*Cronartium ribicola*), which produces white pine blister rust, have raised alarm over the fate of this essential subalpine species. This study examined the relationship between post-fire whitebark pine regeneration and burn severity in the North Cascades of Washington. Any increase in whitebark pine seedling success could accelerate the process of natural selection towards blister rust resistance. The relationship between successful whitebark regeneration and burn severity had not previously been established in the North Cascades. Regeneration data was collected eleven years after two 1994 fires, the Boulder Creek Burn in the North Cascades NP and in the Tyee Complex Burn in the Wenatchee NF. This study questioned if there are more whitebark pine seedlings on burned or unburned sites, what level of burn severity produced the most whitebark pine seedlings, and if these relationships are different on moist and dry sites. Burn severity was determined by basal area mortality, char depth in the soil, and char height on the standing trees. This thesis presents an ecological model of the relationships between environmental and biological factors, which can assist in predicting the system's response to fire. The Boulder Creek site showed a strong negative quadratic relationship between basal area mortality and Whitebark pine seedling densities; whereas, the Tyee Complex Fire site showed a strong positive relationship between the Whitebark pine seedling establishment and the distance to the edge of the burn. Understanding the natural regeneration process for whitebark pine and it's response to fire is essential for successful implementation of whitebark pine restoration efforts.