

Example of Analytical Essay, Part 1: Management of Prairies with Prescribed Fire in the Olympic Peninsula

Although most famous for temperate rainforests and magnificent alpine areas, the Olympic peninsula is also home to bogs, prairies, and savannas that serve important ecological functions. Native Americans on the peninsula most likely maintained several of these open areas through prescribed fire. Without these prescribed fires during the past 100 to 150 years, several of these historic bogs, prairies, and savannas have partially or completely disappeared through forest encroachment (Anderson, 2009; Peter & Shebitz, 2006). This essay examines whether the Olympic National Park (ONP) should more fully incorporate prescribed fire into its existing management strategy as a way to preserve existing prairies and restore historic prairies as cultural landscapes.

The current ONP fire management plan recognizes the ecological value of fires and the harmful consequences of fire suppression during the 20th century, observing that “continued exclusion of natural (lightning) fires from the ecosystem would cause undesirable effects, including the loss of diversity in vegetation and wildlife and the degradation of ecosystem health.” For this reason, the plan allows for some naturally ignited fires to continue burning while they are being carefully monitored. The plan also allows—“where appropriate”—the possibility of prescribed fire “to maintain historic landscapes or to maintain prairies traditionally used by Native Americans.” (ONP, 2005, p. 7)

In practice, ONP has not incorporated prescribed burning to maintain prairies. According to the ONP website:

At Olympic National Park, prescribed fire for restoration is not used because fire suppression by humans has not significantly altered the ecosystem to the degree that it has in other parts of the country where fires used to occur more frequently. However, prescribed fire is used for research in some cases to better understand the effects of fire on forest ecosystems and wildlife habitat (ONP, “Fire Policy,” 2017).

This approach follows the overall approach to land management by the National Park Service, which views most backcountry as essentially wilderness areas. This management strategy has a long history that dates to the beginning of the National Park. In contrast, agencies like the Forest Service and Bureau of Land Management, take a “multiple use” strategy toward non-wilderness areas that includes habitat protection, recreation, and extraction of natural resources like timber and minerals.

The alternate position, advocated in this essay, is to incorporate selective harvest and prescribed fires at sites where forest is encroaching upon bogs, prairies, and savannas. Selective harvest prior to controlled burning would contain the fire to the understory. Following the traditional practice of Native Americans, burning would be done in early autumn after the first rains have vastly reduced the danger of uncontrolled canopy fires. This policy would prevent rare habitats from disappearing and promote a more diverse ecological landscape in ONP lowland areas, which are currently dominated by forests. Moreover, this policy would recognize—through concrete management priorities—the historical stewardship of Native Americans in maintaining parkland habitat for subspecies like Roosevelt Elk and black-tailed deer.

Protecting and restoring critical habitat

Lowland bogs and prairies are unique ecosystems that provide critical habitat for many rare species. For example, the Ozette Prairies on the westside of the Olympic Peninsula contain seven plant species that are designated by Washington State as threatened, sensitive, or review species, as well as the Makah copper butterfly, a federal species of concern (Anderson, 2009, pp.

8-9). These prairies are also home to several important food plants harvested by the Makah tribe, including bracken fern, bog cranberries, and huckleberries. The open areas also attracted Roosevelt Elk and black-tailed deer, which the Makah hunted. Despite their ecological and cultural importance, the Ozette prairies are in danger from encroaching tree species like Sitka spruce and Western redcedar. Aerial photos show that the two prairies within this complex, Ahlstrom's Prairie and Rouse's Prairie, decreased in size by 53.5% and 32.7%, respectively, between 1964 and 2000 (Ramsden, 2004 in Anderson, 2009, p. 2). A significant decrease was also found in prairies just outside the Olympic Peninsula on San Juan Island and at Mima Mounds (Hegerty, Zabowski & Bakker, 2011).

On the eastside of the Olympic Peninsula, the Skokomish tribe burned areas to create prairies and bear grass savannas that likely supported diverse understory species. Although these areas have largely disappeared with the cessation of prescribed fire in the late 19th century, surveys of the understory reveal that the historically more open prairie sites have greater plant diversity than the more closed savanna sites (Peter & Shebitz, 2006, p. 612). In 1995, the Olympic National Forest initiated a plan to restore this bear grass savanna at one 13-hectare site. They adopted the method advocated in this essay, thinning in 2001 followed by prescribed burn in 2003 (Peter & Shebitz, 2006, p. 614).

Recognizing Native stewardship of cultural landscapes

ONP estimates that humans have occupied the peninsula for at least 6,000 (ONP, "Prehistoric Inhabitants," 2017). Multiple lines of evidence suggest that Native Americans maintained prairies by burning every two to five years over the span of centuries and likely millennia (Anderson, 2009). This elimination of this practice in the name of preserving wilderness environments within in ONP does not adequately consider the history or value of

these cultural landscapes. As one Makah elder observed, “Now there are lots of trees on the marsh because nobody takes care of it anymore” (Anderson, 2009, p. 2). Maintaining these areas through prescribed fire would recognize this historical stewardship and promote greater awareness of Native heritage on the peninsula.

South Puget Sound prairies as a model for prescribed fire management

The prairies and oak savannas of the Puget Trough and Willamette Valley offer a well-studied parallel for lesser known bogs, prairies, and savannas of the Olympic Peninsula. Beginning around 1850, most anthropogenic burning ended and many prairies were converted to agriculture production. During the past twenty years, land managers have adopted prescribed fire as an important management tool in these prairies to control invasive species and to prevent encroachment by conifers. While this controlled burning program involves intensive coordination and public outreach, these efforts appear to be increasing both the quantity and quality of prairie habitat (Hamman, Dunwiddie, Nuckols & McKinley, 2011).

Response to Concerns

One concern is that prescribed burning will eliminate critical forest habitat within ONP, one of the few places where such habitat is protected from timber harvest. A central objective of the Northwest Forest Plan (1994) was to protect existing mature forests and to produce new mature forests as quickly as possible in order to provide critical habitat for the Northern spotted owl and other Old Growth-obligate species. Under such circumstances, critics might argue, why would one destroy new forests by burning them? Don't we need all the forest we can get?

Two things are important to recognize in response to this concern. First, the forests that are encroaching on bogs and prairies are typically still fairly immature forests. Many other

forested areas are farther along in succession and closer to the structural complexity of mature Old Growth. Second, there is growing scientific consensus about the ecological importance of both prairies and early seral stages, where grasses and shrubs dominate the landscape. Early seral stage ecosystems typically have high species diversity, including many early successional-obligate species, as well as complex food webs and large nutrient fluxes. In the past decade, forest ecologists have criticized high-pesticide, high-density plantation forestry and called for protecting early seral characteristics in forests (Swanson et al., 2011). Many bogs, prairies, and savannas are early seral stage ecosystems maintained through frequent fire disturbance.

Conclusion

Native Americans occupied the area that is now Olympic National Park for millennia. Growing evidence, including their own oral histories, shows a long history of controlled burning to create or maintain bogs, prairies, and savannas. These areas provided bracken fern, bog cranberries, and huckleberries for eating; bear grass for basket-making and weaving; and attractive habitat for elk and deer. ONP should consider, in crafting its next management plan, developing and funding a program of prescribed burning to maintain these cultural landscapes.

References

- Anderson, M. K. (2009). *The Ozette Prairies of Olympic National Park: Their Former Indigenous Uses and Management* (Port Angeles: Olympic National Park).
- Hamman, S. T., Dunwiddie, P. W., Nuckols, J. L., McKinley, M. (2011). Fire as a Restoration Tool in Pacific Northwest Prairies and Oak Woodlands: Challenges, Successes, and Future Directions. *Northwest Science*, 85, 317-328.
- Hegarty, J., Zabowski, D., and Bakker, J. D. (2011). Use of Soil Properties to Determine the Historical Extent of Two Western Washington Prairies. *Northwest Science*, 85, 120-129.
- Olympic National Park (n.d.), "Prehistoric Inhabitants of the Olympic Peninsula." Retrieved on Nov. 1, 2017, from www.nps.gov/olymp/learn/historyculture/prehistoric-inhabitants.htm
- Olympic National Park (n.d.), "Fire Policy." Retrieved on Nov. 1, 2017, from www.nps.gov/olymp/learn/management/fire-policy.htm
- Olympic National Park Fire Management Plan (2005). www.nps.gov/olymp/learn/management/upload/FINAL-OLYM-FMP-11212005.pdf
- D. Peter & D. Shebitz (2006) Historic Anthropogenically Maintained Bear Grass Savannas of the Southeastern Olympic Peninsula. *Restoration Ecology*, 14, 605-15.
- Swanson, M. E., Franklin, J. F., Beschta, R. L., Crisafulli, C. M., DellaSala D. A., Hutto, R. L., & Lindenmayer, D. B. (2010) The Forgotten Stage of Forest Succession: Early-successional Ecosystems on Forest Sites. *Frontiers in Ecology and the Environment*, 9, 117-125.

Example of Analytical Essay, Part 2: Interpretation of Quantitative Data

Source: David and Shebitz (2006) Historic Anthropogenically Maintained Bear Grass Savannas of the Southeastern Olympic Peninsula. *Restoration Ecology* 14: 605-615 (p. 613).

For this study David Peter and Daniella Shebitz examined General Land Office surveys from 1895 and aerial photographs taken in 1929. They also interviewed Skokomish tribal members about historical land management practices. Based on these materials, they identified historical savannas that were likely managed through prescribed fires. They determined the age class for 40 living or dead Douglas fir individuals (26 increment cores of dominant or co-dominant live trees and 19 basal stump slabs of dead trees). They also documented fire scars and growth pulses following these fire events.

Figure 6 shows the number and age class (in 25-year intervals) of the oldest trees or stumps in the forest matrix and historical savanna sites. Some establishment of D. fir occurred in both sites throughout this period. However, establishment times show that, following large fires in 1668 and 1701, D. fir typically became the dominant species in the forest matrices 100-150 years earlier than in the historical savannas. Specifically, D. fir became established in most forest matrices between 1725 and 1775 whereas D. fir became established in most historical savannas between 1875 and 1925.

This age-class data supports the hypothesis that indigenous people used fire to manage this landscape during the period between 1700 and 1875 (and likely for centuries or millennia). Prescribed fire maintained bear grass savannas by preventing the growth of D. fir trees in these areas. This data also supports the observation that a few mature trees can survive in savanna areas managed by low-intensity prescribed fires. This interpretation of land use is confirmed by historical data from Skokomish oral history, General Land Office surveys, and aerial photographs.

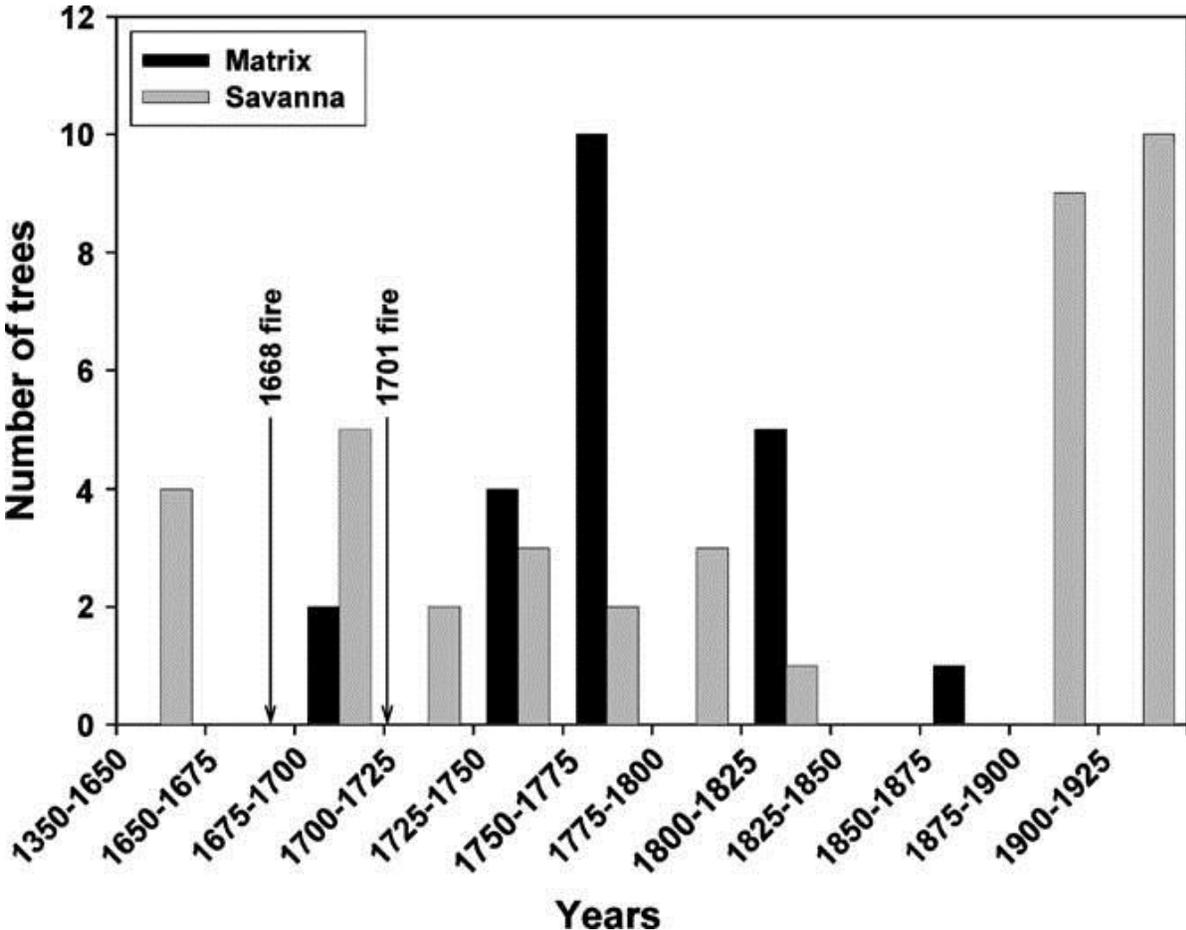


Figure 6. The number of tree ages by 25-year age classes in savanna and matrix forest. Most establishment after 1900 occurred before 1920. No matrix forest trees established between 1815 and 1859. Note that the first bar is for 300 years.