Patterns and Processes of Indigenous Burning

How to Read Landscape Signatures of Past Human Practices

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This paper suggests that one can learn to read ecological indicators of past human practices where fire was used to promote and maintain culturally important plant resources. Such indicators include the ecological stage and condition of the plant community, the composition and presence of ethnobotanically significant plants, soil characteristics, and other indicators of burning. Confirmation of such indicators is often possible through ethnographic literature, early accounts and Indian place name records (Waterman 1920, 1922), Government Land Office (GLO) survey records and maps (Galatowitsch 1990; Radeloff et al. 1999), as well as present day remnant indicators of fire. These indicators can be used to identify and recover important cultural resource places as well as inform what management practices may be necessary to maintain and restore these plant communities and ecosystems (Anderson 1996).

To illustrate these points, the role and function of indigenous burning practices are reviewed and a case study is described where patches of culturally important plant species and habitats remain. These species include camas (*Camassia quamash)*, Garry or Oregon white oak (*Quercus garryana),* and chocolate lily (*Fritillaria lanceolata* now *F. affinis*) among other prairie/oak savanna plants.

OVERVIEW OF INDIGENOUS BURNING PRACTICES

Fire has been acknowledged as a keystone ecological process integral to the maintenance of grassland, prairie, and oak woodland ecosystems in North America (Agee 1993; Collins and Wallace 1990; Pyne 1982, 1983). More recently, the role of regular and intentionally set fires by native North American Indians has been recognized as one of the primary agents that has maintained and promoted the distribution and abundance of grassland and oak woodland eco-

systems (Blackburn and Anderson 1993; Bonnicksen 2000:143-218; Boyd 1999a & b; Lewis 1973, 1993:55-116, 389-400; MacCleery 1999; Minnis and Elisens 2000).

Fire was a principal management tool which led to the creation of patches, mosaics and corridors that provided multiple resource uses and benefits to native peoples (Lewis and Ferguson 1999). By using fire, native peoples were able to manage large landscapes and promote greater abundance of certain species or groups (geophytes, grasses, oaks and other fruit and nut bearing shrubs and trees). Firing the land to promote open grassland and oak savannas provided forage for deer and elk and increased the productivity of important perennial plants that were food staples to people (Anderson 1993, 1996; Lewis 1993; Norton 1979a & b, 1985; Turner 1999; Turner et al. 2000). These practices created disturbance regimes at levels of frequency and intensity that lead to increased species richness and habitat complexity by diversifying ecosystems on patch, landscape and even bioregional scales (Anderson 1996, 1997; Lewis and Ferguson 1999; MacCleery 1999; Peacock and Turner 2000). Use of such intermediate disturbance regimes, combined with the selective harvest of plant resources, influenced the traits that certain plants were favored to reproduce. They affected the selection of certain attributes of plant species as well as perpetuated their abundance and variety (Shipek 1989:159-170, 1993:379-400).

Indigenous burning not only helped maintain grassland and savanna woodland ecosystems, but also was the process that promoted, expanded and in some areas formed them. The extent to which this may be true is still hotly contested (Baker 2000). However, there seems to be a growing consensus among fire ecologists and ethnoecologists that prior to European settlement and fire suppression, repeat burning did maintain and expand certain ecosystems (Agee 1993; Anderson 1996; Bonnicksen 2000; Boyd 1999b; Lewis 1973, 1993; Lewis and Ferguson 1999; Johnson 1999; Peacock and Turner 2000). The difficulty lies in finding absolute evidence because many of these fires were frequent, low severity fires which do not leave the same signatures as less frequent, more intense fires (Agee 1993:354, 1998, pers. comm. 2000). While it is difficult to tease out which specific fires were due to lighting strike and which fires were lit by humans, when one compares known use areas to areas without evidence of human use there are often clear patterns of increased fire frequencies in areas associated with human use.

The practice of firing the land reduced woody material from shrubs and fallen trees, keeping the fuel load to a minimum with repeated and frequent burning. In oak woodland and other systems (such as eastern Washington ponderosa pine) understory communities were maintained for perennial grasses and forbs, leaving trees spaced broadly apart (Agee 1993). Fires in such conditions burn for shorter duration because they are fueled by less woody debris and minimize the density of ladder fuels and the potential for canopy fires (Agee

1998). These "cooler fires " (the actual temperature of the flame is not cooler, but the intensity of the fire is reduced) do not kill growing roots or rhizomes, but maintain and replenish soil nutrients, enriching the soil for next season's "crop" (Kuhnlein and Turner 1991). Repeat burns on annual and semi-annual cycles are also more easily controlled as a result.

The work of Nancy Turner and her colleagues in British Columbia (1999; Turner et al. 2000) and Helen Norton in the Puget Sound region (1979a, 1979b, 1985) document Salish peoples' active management of "root" foods, acorns and other ethnobotanically important resources with the deliberate use of fire as an ecosystem management tool. Washington State Archaeologist Rob Whitlam (Washington Archaeology Week Lecture 9/25/95) is quoted:

Prairies can be considered cultural landscapes, created by Indian people through their systematic manipulation of landscape to produce open areas for different resources and habitat types. Many open areas which had been maintained as prairies in the past by selective burning and other forms of vegetation management, have now (in the last 100-150 years . . .) converted back to forest habitats.

In the wetter climate of western Washington this statement is indisputable. In this region, Indian fire was the agent responsible for maintaining prairies and oak woodlands after the climatic cooling period of approximately 4500 years ago (Tsukata and Sugita 1982). This period is marked in the pollen record by an increase in western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*). Leopold and Boyd (1999:142) note the development of the rich black prairie soils of southwestern Washington to be between 9500 and 4500 years ago, corresponding with the developing Indian cultures of the region. Pollen records show charcoal increases associated with increases in non-arboreal pollen, bracken fern (*Pteridium aquilinum*), and alder (*Alnus rubra*), two disturbance indicator or early successional species (Tsukada and Sugita 1982). In the present-day long winter rainy seasons of western Washington, forests tend to naturally succeed to coniferous dominant climax conditions without disturbance (Agee 1993). Thus, much of the grassland and oak woodlands of the Puget Sound region would not have persisted without anthropogenic fire.

So, what are the purposes of such burning? In the Pacific Northwest fire was deliberately used to maintain and promote more abundant "crops" of certain species of food plants such as bracken fern, camas, chocolate lily, wild onion and other bulbs and corms, as well as berries, acorns and hazel nuts (Norton 1979a, b; White 1999; Turner 1999). While camas is generally recognized as a wetland plant, it grows best in seasonally saturated systems followed by a period of drought (Statham 1982). In the Puget Sound region camas grows in both seasonally wet and dryer-end prairies. Camas beds are burned at the end of the dry season. This promotes their growth and that of other perennial forbs

and some native grasses, while at the same time assisting to control unwanted competitors (Anderson 1996; Turner et al. 2000). Burning camas prairies and meadows may also stimulate seed germination (Turner and Kuhnlein 1983). Other plant resources used for food (including other edible Liliaceous species such as fawn lily, tiger lily, and wild hyacinth), fiber and medicine also benefit from repeat, low intensity fires. The benefits of burning the land were numerous. In the recent book *Indians, Fire and the Land* edited by Boyd (1999b) the ubiquitous use and reliance upon fire by peoples of the Pacific Northwest is aptly demonstrated.

Recent mapping efforts by the Department of Natural Resources Natural Heritage Program show much of what is left of the once more expansive grassland, rocky balds and oak woodlands of Washington State (Chappell 1999; Gee 1998). I have additionally identified small remnant prairie and oak woodland habitats in the newly incorporated City of Covington, King County, Washington (S30, T22N, R6E and S25, T22N, R5E).

JENKINS CREEK CAMAS MEADOW, REMNANT PRAIRIE AND OAK WOODLAND CASE STUDY

In March of 2000 I received information through personal correspondence with Fred Weinmann, past President of the Native Plant Society, about three sites for which reconnaissance level data had been collected. The first was a camas meadow, the second a remnant prairie at Jenkins Creek Park, and the third a Douglas fir (*Pseudotsuga menziesii*) woodland with unique understory flora on 23-acres (the "fawn lily" site). Approximately 400 camas plants found at the first site were identified as *Camassia quamash* var. *azurea* (Weinmann pers. comm. 2000). The presence of camas in this area, records of a remnant prairie in the vicinity (Antieau and Gaynor 1990), and the 23-acre forested site with fawn lily (*Erythronium oreganum*), chocolate lily (*Fritillaria lanceolata* syn. *affinis)*, tiger lily (*Lilium columbianum),* dog tooth violet (*Viola adunca*), and ladies tresses (*Spiranthes romanzaffiana*), compelled further investigation. Based on the ecological and ethnobotanical significance of these plants (Gunther 1988; Moerman 1998; Turner 1997, 1998), I conducted additional field surveys.

Methods

Methods involved site reconnaissance data collection, voucher specimen collection, special collections and archives literature review, and area expert interviews. Interviews involved local area botanists, ecologists, archaeologists,

King County staff, and a field visit with Muckelshoot tribal elders. Site field surveys were conducted in spring and summer of the year 2000. Observed plant species were recorded, burn indicators on tree trunks noted and photographed, and soil samples collected from the camas meadow and Garry oak sites adjacent to Jenkins Creek (S25, T22N, R5E). Voucher specimens of camas, oak and soil samples and a complete species list are in the possession of the author.

Results

Camas Meadows and Oak Groves

Two Garry oak groves were identified within the same general vicinity during my first visit to the camas meadow. The first grove hosts 48 oaks that range from approximately 65 to 200 years old and from 1.5 to 3-feet in diameter[2]. This oak grove site is contiguous with the camas meadow. The camas meadow is adjacent to Jenkins Creek. The second oak grove of approximately 15 trees is located across the street from Jenkins Creek Park.

Three additional parcels with camas were identified (Grijalva pers. comm. 2000). Two are near the oak grove and camas meadow described above. The third is a large and dense stand of camas (4.5-acre meadow described as 70% camas dominated) located east of Covington in the town of Maple Valley.

Other Remnant Prairie Patches

Another remnant patch of prairie was found across the street from the camas meadow/oak grove complex. It is dominated by non-native grasses and thistle, but wild strawberry (*Fragaria virginiana*), Idaho fescue *(Festuca idahoensis*) and dense patches of moss were identified underneath. All three of these patches (oak grove, camas meadow and prairie) are located together and are demarcated on early GLO survey maps (Department of Interior 1884).

Jenkins Creek Park

Just northeast of the remnant camas meadow and Garry oak grove a number of ethnobotanically significant species were noted at Jenkins Creek park. Prairie plant species at this site include Idaho fescue, chocolate lily, yarrow (*Achillea millefolium*), Junegrass (*Koeleria macrantha*), wild strawberry (*Fragaria virginiana*), camas (*Camassia quamash*), and two oak saplings. Other important ethnobotanical species at this site include blue elderberry (*Sambucus cerulea*), more common on the eastside of the Cascades, as well as Indian plum (*Oemleria cerasiformi*s) and oceanspray (*Holodiscus discolor*), common to the Puget lowlands. Ten large maples *(Acer macrophyllum*), some up to 2-meters diameter breast height, have burn marks on their trunks. Tree ring sections were not

sampled, but the fire history could be reconstructed by sectioning (or coring) each tree and then analyzing the combined tree ring count data with fire scar frequency information (Agee 1993:88-93).

Fawn Lily Site

Another site, located just north of Jenkins Creek Park, with interesting cultural resource indicator species was documented at a 23-acre site that has since been cleared and developed. This woodland site was comprised of distinctly different sizes (two age classes) of Douglas fir and a salal (*Galtheria shallon*) dominated understory. Underneath the salal were numerous fawn lily, tiger lily, chocolate lily, kinnickinnick (*Arctostaphylos uva-ursi*), and dog-tooth violet indicating that at one time this understory may have been more open. It is possible that the smaller Douglas fir cohort and salal encroached after cessation of more frequent fires, which kept the understory clear. The older stand of trees was more widely dispersed, indicating this may have been the case.

Echo (Cedar) Mountain and Spring Lake Bog

Echo Mountain remnant rocky bald and Spring Lake bog are approximately 4 miles north of Jenkins Creek watershed. The rocky bald community includes fawn lily, tiger lily, a wild onion (*Allium* sp.), chocolate lily, sea blush (*Plectritis congesta*), Pennsylvania sedge (*Carex pensylvanica* syn. *C. inops*), common wild strawberry (*Fragaria virginiana*), hyacinth brodiaea (*Tritelia hyacinthina*), and prairie wood rush (*Luzula compestrus*) among other prairie/bald species. This site also shows evidence of historic burning. Charcoal and ash are evident in the soil horizon just below the duff layer and can be seen in the recently cut trail up to Echo Mountain. Snowberry *(Symphoricarpos albus*) and wild rose (*Rosa gymnocarpa*) have grown over beds of fawn lily, chocolate lily and other bulbs that now lie hidden in the understory of these dense shrubs. These bulb species are generally found in more open areas or at the edges of shrub and tree habitats.

Deliberate use of fire to control snowberry and wild rose from encroaching on gathering grounds is described in Boyd (1999b). Present day distribution of snowberry and wild rose combined with the remnant bald communities and evidence of past burning, suggest the historic expanse of this open rocky bald habitat was once larger with repeat burning.

Trails and Patch Networks

The 1884 GLO map shows Indian trails that branch both east and north from a central trail that originated at the Green River to the west. The eastward branching trail says “Trail to Rattle Snake Prairie” and goes to the Cedar River watershed. Lynn Larsen, archaeologist, identifies the trail to Rattlesnake prairie as

the route to Yakima (Naches) pass, which was used for several thousand years by the Indians who traveled east and west across the Cascades (Weinmann pers. comm. 2000). The other branch goes northward in the direction of Spring Lake bog (also called Otter Lake) and Echo Mountain. In a memo to Lisa Madjiak in 1987, Larsen suggests this trail may have tied into other trail networks to Cougar and Tiger mountains, each of which have documented remnant oak patches and ethnobotanically significant bulb and berry food resources.

DISCUSSION

Cultural Resource Significance of the Jenkins Creek Area

Overall my observations of plant resources at the described sites led me to hypothesize that Native peoples had utilized the Jenkins Creek area and larger landscape (including Echo Mountain). The presence of oak, camas and remnant prairies indicate the potential cultural resource significance of the area. As mentioned above, such systems were unlikely to persist in this region without the assistance of Native peoples who managed the land by burning to maintain the early and mid seral stage patches of camas, prairie and oak plant resources. Evidence to justify this hypothesis include:

- Fire stained bark on trees of significant size at Jenkins Creek Park
- Remnant prairies and oak groves, which would not persist in this high rainfall environment without frequently set fire
- Abundant ethnobotanically useful and unique species of different types in patches at close proximity to one another along a creek and recorded Indian trail networks
- Contiguous nature of these sites—camas meadows, oak groves, remnant prairies, cranberry bog (noted on GLO map), with the confluence of two trails that meet up with a larger trail to the Green River
- On the larger landscape scale, the connectivity between these patches along Jenkins Creek, other camas patches and additional prairie/bald plant resource harvest areas on Echo Mountain and Rattlesnake ridge/prairie

First Peoples of the Land

The peoples of this land were and are the people of the Green River, "***Sqwəd'Pábs***" or the Skopamish Indians. When the point *Elliot* treaty was signed in 1855 the Skopamish and the White River Indians were moved to the

Muckleshoot Reservation, though many continued to live on and utilize the land outside of it. According to Smith (1940:31) the Muckleshoots are classified as an "inland" group, which means they were reliant upon hunting and gathering as well as fishing. Larsen indicates that their "villages were located along the Green and White Rivers as near as possible to berry patches, root areas and other food resources."

Cultural Resource Indicator Species and Habitats

In western Washington oaks are important cultural resource indicators. The oak groves in Covington are located in strategic places along a traditional and well-traveled trail, suggesting that acorns were important to these "inland" peoples. Norton (1985:340) describes *Quercus garryana* acorns as "an important managed crop" that were "widely traded and stored for later use" by peoples of Puget Sound country. Thus, it is unlikely that the oak in Jenkins Creek watershed would be there today if it had not been for the direct management of people who harvested their acorns.

In King County a number of remnant oak stands have corresponding Indian place names (Waterman 1920, 1922). For example, on the *Seattle Region Index Map to Indian Place Names*, numbers 86, 102, 101 correspond to known locations of Garry oak stands (Waterman 1922:179). The recorded names of these places are, respectively: ***Tllutsa'lus***,"tying a mesh"; ***SkEba'Kst,*** "nose" (***bE'ksid,*** "nostril"), and ***Cka'lapsEb,*** "the upper part of one's neck." A designated place name confirms that there was some kind of people-land relationship. The name may not always imply what this relationship was, but is important corroborating information for reconstructing the history of people and their place (Hunn 1996).

In other cases, place names do describe a place. The word ***Ba'xab*** (including the variants ***ba'kwob***, ***Baba'kwob, Ba'qbaqwob, Bebqwa'bEbs*** and ***SbEqwa'bEqs***) is the most popular name in Waterman's list of place names (1922:185). The stem means "prairie" or "open place among the trees." The fact that this is the most common place name indicates that these "open patches among the trees" were important to the Puget Sound peoples. The distribution patterns of named places, the meaning of the names and knowledge about the cultural significance of plant resources of those places together provide a deeper understanding of the importance of those places and the past interactions between a people and their land (Hunn 1996). The predominance of prairie place names implicates the importance of camas meadows, prairies and other "root" food harvest areas.

Camassia species are also significant cultural resource plants. Camas bulbs were usually dug after flowering, in the summer, although some people dug

them in the spring and still others harvested both in spring and fall (Stevens 1999; Hunn pers. comm. 2000). Turf or sod was turned systematically in small sections with a digging stick and replaced after the larger bulbs were removed (Turner and Kuhnlein 1983; Stevens 1999). The smaller bulbs were left in the ground to mature for future years' crops (Turner and Kuhnlein 1983:211). The process of disturbing the ground and thinning bulbs or corms by selectively harvesting larger ones has been described as effectively tilling and aerating the soils (Turner and Kuhnlein 1983; Anderson 1996, 1997; Anderson and Rowney 1999). By leaving the smaller bulbs in the ground and turning the soil, a healthy and robust future crop was assured. Harvest timing when flower stalks are dry and seeds are ready for dispersal also may have facilitated direct re-seeding by broadcast or turning the seeds back into the soil. Camas meadows and grasslands were burned during the dry season, in early autumn before the first rains. Frequent, low temperature fires replenished soil nutrients and effectively fertilized the ground. This system of tending, tilling, harvesting and firing the land represents a form of indigenous horticulture that was sustainable for both the people and the land (Turner et al. 2000).

Archaeologic and Historic Evidence

This ethnoecological analysis of past interactions between people and the land is strengthened with evidence from the archaeological and ethnohistoric records. Interviews with archaeologists (including Holly Taylor, King County Cultural Resources Program and Dr. Rob Whitlam, Office of Archaeology and Historic Preservations) confirmed the Jenkins creek case study area has a recorded archaeologic site (11/8/2000). The Jenkins Creek prairie/oak woodland sites, according to a 1987 memo from Lynn Larson to lisa Madjiak, lie within two miles of two Skopamish (Muckleshoot) village sites. Identification of a registered archaeological site #45KI7, located in the same quadrangle (NE1/4, NE1/4 S25, T22N, R5E) as the two oak groves, camas meadows, fawn lily and prairie patches, confirmed the cultural resource significance of this area (Holmes 1964). Artifacts uncovered at this registered site included a corner notched projectile point, a scraper and several flakes, which are described as being associated with a "low mound on gently rolling prairie" (Holmes 1964:6).

Historic accounts of traditional use of this landscape included proofs for an interpretive sign (found in King County's files) for the Jenkins Creek Park. These proofs note that homesteaders of the area remembered Indians pitching teepees in the area and harvesting camas as late as the 1930s. Finally, evidence for fire in exactly these patches and landscape mosaics are shown as burned areas on the "Map of Washington Showing Classification of Lands" (Plummer et al. 1902).

Thus, the Jenkins Creek case study remnant camas, fawn lily, prairie and oak patches indicate the ethnoecological importance of this landscape. Together these sites may represent what is left of a once larger complex of gathering sites and traditional use areas along a trail network that extended from two known village sites to the west, connecting with trails to the north and east. These trail networks were used as part of a seasonal round, connecting with other plant gathering sites in the Cedar River watershed and, likely, to berry picking and processing sites at higher elevations. Recent archaeological reconstructions of berry processing sites support this idea (Julie Stein pers. comm. 2000).

CONCLUSION

This paper began with the claim that one could "read" something of the cultural history of a landscape if one understands what the plants are telling us. Certain plants "speak" of their past in a language that reflects how they have adapted to both edaphic environmental conditions and human use interactions. In western Washington these plants include oaks and camas along with other prairie species, a number of which are in the lily family. These plants and the ecosystems where they occur tell a story about the past patterns (patch networks) and practices (use of fire and harvest) between the land and the people of that land. Such relationships are illuminated by the presence of these cultural resource indicator plants and habitats along with fire history information. The power of these indicators is enhanced when combined with ethnohistoric and archaeological evidence. Such information can be used to document culturally significant remnant habitats, the traditional use practices that maintained and promoted them, and provide data for recovering and restoring traditional use areas.

NOTES

1. The later age estimate was provided by Dr. Clayton Antieau, Botanist, 5/2000.

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