Aboriginal Burning for Vegetation Management in Northwest British Columbia

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Introduction

The Gitxsan and Wet'suwet'en peoples live in the drainage of the Skeena River in Northwest British Columbia. The Gitxsan are a Northwest Coast people who speak a Tsimshian language. The Wet'suwet'en of the Bulkley Valley are Athapaskan speakers who live in close proximity to the Gitxsan and have a long history of interaction and mutual borrowing. Their traditional way of life involved fishing for salmon along the major rivers; hunting and trapping; and gathering of berries, tree cambium, and wild root foods. The Wet'suwet'en village of Hagwilget is 7 km upstream from the Gitxsan village of Gitanmaax. They are culturally similar groups in many ways and occupy a similar environment.

The environment and vegetation of the Gitxsan and Wet'suwet'en territories are transitional between the Northwest Coast and the boreal interior. The landscape is mountainous except where major river valleys occur. It is densely forested with coniferous forests to timberline, except in the valleys around Hazelton, where substantial areas of deciduous and mixed-wood forests occur. The forests are in the interior cedar-hemlock, coastal western hemlock, and mountain hemlock biogeoclimatic zones in the west, and in the sub-boreal spruce and Englemann spruce-subalpine fire biogeoclimatic zones in the east.[2]

The vegetation communities of the Skeena and Bulkley valleys around Hazelton, an ancient center of aboriginal population, show the influence of relatively frequent fires. The vegetation of this area has been designated the "Hazelton variant" (ICHmc3)[3] of the interior-cedar hemlock zone. It is characterized by a high prevalence of seral communities dominated by aspen (*Populus tremuloides* Michx.) and birch (*Betula papyrifera* Marsh.) with scattered conifers, or by pine (*Pinus contorta* Dougl.) stands.[4] The present prevalence of seral vegetation suggests the influence of the aboriginal populations, although certainly settlers, prospectors, and railroad crews contributed as well.[5]

The influence of pre-European burn practices on the local vegetation is corroborated by geologist George Dawson's descriptions of the Skeena in 1879, where he described a distribution of vegetation types quite similar to that found today. At the time of Dawson's visit, significant Euro-Canadian influence

on the vegetation probably was confined to the previous two decades.[6] The inference that aboriginal people modified the fire regime of the area also is corroborated by anecdotal accounts of deliberate burning for berry production by Gitxsan and Wet'suwet'en people. Annual spring burning of sites around modern villages continues to the present, largely on reserve land, which, like private land, is not subject to the policies and regulations of the B.C. Forest Service, which suppressed traditional burning practices in the 1930s and 1940s.

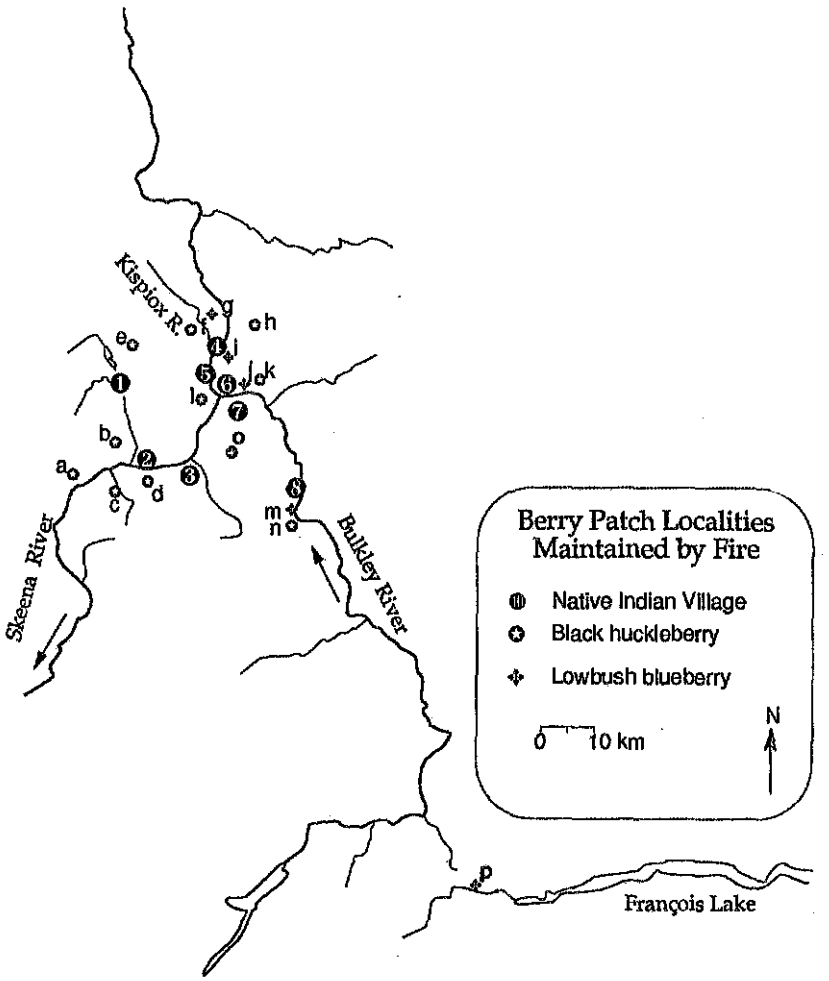
The principal berry species managed by burning were black mountain huckleberry (*Vaccinium membranaceum* Dougl.) and lowbush blueberry (*V. caespitosum* Michx.). Soapberries (*Shepherdia canadensis* (L.) Nutt.) also may have been managed by burning in some locations. The other main function of burning was to clear areas around village sites. The clearing of floodplain sites for garden patches by burning is a relatively recent phenomenon.

Methods

To investigate the role of fire in traditional land management, I interviewed fourteen Gitxsan elders and other knowledgeable Gitxsan, and four Wet'suwet'en elders with an interest in traditional practices regarding burning practices. These interviews were conducted in English. Additional information from a fifteenth Gitxsan elder was obtained in 1996. I also monitored and mapped spring burning for the 1991 season in Kitwancool (Gitanyow), Gitwangak, and Gitanmaax (Gitxsan villages); and Hagwilget and Moricetown (Wet'suwet'en villages). I mapped freshly burned areas during weekly visits to the reserves from March 15 through May 7 using large-scale aerial photographs as a base. As background to the ethnographic investigation, I also researched archival sources to define the nature of the regional vegetation and the historical occurrence of fires, and for references to aboriginal burning.

Results

Gitxsan and Wet'suwet'en informants are aware that they formerly used prescribed burning for vegetation management. The most important form of vegetation management by burning was the renewal of berry patches. Berries of many species were the most significant plant foods utilized by the Gitxsan and Wet-suwet-en. In traditional times, the collecting of large stores of berries was a late summer activity that involved the congregation of groups of people at productive berry patches, a sustained harvesting effort, and processing of the berries into large dried berry cakes which were then transported back to village sites for winter provisioning. In the annual round of the Gitxsan and



Map 1. Locations of berry patches identified by consultants as having been managed by burning. Gitxsan villages: (1) Kitwancool, (2) Gitwangak, (3) Kitsegukla, (4) Kispiox, (5) Glen Vowell, (6) Gitanmaax. Wet'suwet'en villages: (7) Hagwilget, (8) Moricetown. Berry patches: (a) Wilson Creek, (b) Mountain by Gitwangak, (c) Price Creek, (d) Shandilla (e) Moonlit Creek, (f) Mountain by Kispiox, (g) Valley by Kispiox, (h) Cariboo Mountain, (i) Flat between Salmon River and Pinenut Creeks, (j) Two Mile, (k) Nine Mile Mountain, (l) Mountain west of Hazelton, (m) Valley by Moricetown,(n) Hills by Trout Creek, (o) Nadina Crossing.

Wet'suwet'en peoples, obtaining enough berries to dry and preserve for the long winters was of paramount importance. Given the low caloric value and small size of individual fresh berries, the location and maintenance of large and productive berry patches with predictable harvests was necessary, so that enough fruit could be collected and processed to be worth the travel time, and the time and effort of picking and drying the fruit.

The principal species used for berry cake production were black huckleberry (supplemented by high-bush blueberry, *Vaccinium ovalifolium* Smith, not preferred because of its lower sugar content), low-bush blueberry, and soapberry. Saskatoons, *Amelanchier alnifolia* Nutt., also were processed for berry cakes.[7] Blueberries and huckleberries also could be preserved for winter in grease. The only species listed above that is not mentioned as being managed by burning is the saskatoon.

Berry patch burning occurred throughout the territories of the Gitxsan and Wet'suwet'en. I have accounts of specific berry patches managed by burning near most of the modern Gitxsan and Wet'suwet'en villages (Map 1, Table 1). In addition, low-elevation areas are reported to have been burned for berries adjacent to Kispiox, Gitanmaax, and Hagwilget, and near Kitsegukla and Moricetown.

Table I. Localities of Known Managed Montane Berry Patches

Designations are English names for the areas; the Gitxsan names for these localities were not collected. The names of informants mentioning each area are given in parentheses.

1. Cariboo Mountain (Sadie Howard)
2. Mtn. by Gitwangak and "Wilson Creek"(several different patches)
3. Mtn. west of Hazelton (Neil Sterritt Jr., Neil Sterritt Sr.)
4. Babine Trail (Nine Mile Mountain)
(Percy Sterritt, Alfred Joseph, Elsie Tait)
5. Price Creek (Buddy Williams)
6. Mountain across from Kispiox (Percy Sterritt)
7. Shandilla area (Dora Johnson, Emsley Morgan, Ray Morgan)
8. Ridge up Moonlit Creek east of Kitwancool (Peter Martin)
9. Juniper Creek, Rocher DeBoule "Kslaawt" (Olive Ryan)

Among the Gitxsan and Wet'suwet'en, ownership of resources is primarily through the house group (*Wilp* or *Yikh*), or its matrilineal kinship extension, termed the *wilnat'aahl* in Gitxsan. These corporate institutions own and manage resources such as fishing sites, berry patches, and hunting and trapping territories on behalf of their members. The chief (*Sim'oogit* or *Dineza*) nominally owns and exercises control over the resources. Berry patches were

owned and managed under this system, although by common consent the owners of significant berry patches near village sites frequently opened these to all villagers, who later acknowledged the ownership by making small public gifts to the chief of the owning group.[8] Among the duties of the chief was deciding when and where to burn berry patches. Pat Namox (Wet'suwet'en chief Gaslebah) described the duties of a chief:

> When it is the right time he [the chief] burns the berry patches so the berries are fat and plump. If he didn't do that the berry patches would become old and overgrown and there would be berries but they would just be small. But he knows when to burn so that it cleans up just the berry patch and doesn't spread to the trees.

Montane Berry Patches

Black mountain huckleberry does not occur widely in the valley bottoms, and huckleberry patches vary considerably in their productivity. Gitxsan informants refer to traditional berry patches as occurring "half way up the mountain," that is, in the montane and lower subalpine forest zones dominated by conifers (principally western hemlock [*Tsuga heterophylla* (Raf.) Sarg.] and subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) at about 3,000—4,000 feet in elevation. These berry patches traditionally were burned to maintain or enhance their extent and productivity. Special berry camps adjacent to productive patches were used year after year for harvesting and processing berries.

Traditionally, Gitxsan huckleberry patch burning took place in the early fall. Burning was frequently done by groups of men who were engaged in mountain goat hunting in areas above the berry patches. (Berry harvests were and are conducted by women, while men assisted when not occupied by autumn hunting). In at least some instances, berry patch burning might be done by groups of women. A berry patch adjacent to the village of Kispiox at relatively low elevation is reported to have been burned off by a group of women in the 1920s. Traditionally burning was done by the "father's side" (*wilksi 'wiitxw*) and the service was paid for with a feast (Kathleen Mathews, interview). This is consistent with the ideology of balanced reciprocity between houses that informs most Gitxsan and Wet'suwet'en social relations.[10] In practice, the "father's side" used and had access to the berry resource of the territory it would burn on behalf of spouses and children, and the men likely would be intimately familiar with the territory being managed, although not responsible for managing and regulating the harvest.

Late August and September are mentioned by the Gitxsan as the time when burning was done. At this time, nights are cool and fall frontal storm systems are likely to bring precipitation. Also, in clear weather, night fog or

frost usually follow clear, warm weather. Thus the hazard of intense, uncontrolled burning is reduced. Informants agree that in the old days they knew how to burn to avoid extensive wildfire and hot burns. This kind of a burn would severely curtail berry patch production by consumption of the organic surface layer of the soil and the destruction of huckleberry rhizomes. By contrast, a light burn stimulates vigorous sprouting and enhances berry patch production.[11]

Wet'suwet'en informants did not mention fall burning, but apparently did manage black mountain huckleberry patches on the ridges between Trout Creek and Moricetown. The time of year that these patches were burned was not mentioned, but my informant said that those who decided the time for burning could tell when it would rain and would set the fires prior to a rainfall to ensure that they did not spread excessively.

Informants' recollections of burn intervals and the length of time required after a burn for a berry patch to become productive also varied. Some people believe that berry patches were burned every four years to maintain productivity. Others suggest that four years after a burn, the berry patch would be at peak productivity, and that knowledgeable elders (women) would monitor productivity and decide when the next burn was needed. Informants agreed that berry patches now have lost their productivity because of burn suppression by the Forest Service. Olive Ryan said that the berry patch she harvested as a child is all grown over because "The Forestry don't agree with the Native People, you know . . . Big tree now." Both fewer and smaller fruits now are produced in overgrown berry patches.

Huckleberry patches lose their productivity when invaded by taller shrubs and conifers. However, they have extensive rhizome systems and sprout vigorously if the aboveground stems are removed. A surface burn that does not consume the organic soil horizons will stimulate vigorous sprouting of black mountain huckleberry and, within a couple of years, production of large and abundant berries on the new growth.[12]

Low Elevation Berry Patches

The principal berry species was lowbush blueberry. It occurs from valley bottom (ca 450') to timberline (ca 4,500'). This species now is not significantly utilized, perhaps because many formerly productive localities are now private land or farms. It occurs generally on well-drained, droughty, gravelly soils and often is found as an understory in open pine stands. In the vicinity of Hazelton, many areas in the valley bottom formerly were burned for lowbush blueberry production. Most of these areas are either (non-Indian) private land or have undergone forest succession and no longer support a significant lowbush blueberry resource. Anecdotal reports state that formerly the rolling upland

between Gitanmaax and Hagwilget looked blue with berries. This area was reported to have been maintained by frequent burning (Alfred Joseph, interview). Today, productive lowbush blueberry localities rarely are encountered.

Lowbush blueberry patches were reported by one elder to have been burned about every four years. Burning for lowbush blueberry may have been done in the spring as well as fall by the Gitxsan. Spring burning is possible for lowland sites; burning in such areas is done soon after the snow melts and before the days lengthen and humidity decreases. Often, more shaded and moister sites still are snow covered, providing effective firebreaks.

Wet'suwet'en elders report spring berry patch burning on the valley flat or lower hills between Hagwilget and Two Mile and adjacent to Moricetown (S. to Evelyn, around Trout Creek). This burning probably was primarily for lowbush blueberry. In addition, hills south of Moricetown may have been burned for black huckleberry. Burning for berries formerly was carried out near Francois Lake also (no specific locality described). No evidence of fall burning by Wet'suwet'en people has yet been obtained.

Soapberry is another low-elevation species that is reported to have been managed by burning. Soapberries are nitrogen-fixing shrubs that typically occur on excessively drained gravelly soils and frequently occur in seral pine stands. Soapberry plants are long lived; however, older stems grow very slowly and fruit sparsely, if at all. Soapberries are highly valued as a feast food; they formed (and still form) an important trade item, as they do not occur on the coast but are utilized in feasts there. Soapberries are relatively laborious to pick; variation in plant productivity therefore is significant. If large volumes of soapberries are desired, a large area of highly productive plants is needed. Both burning and pruning are reported as practices that enhance soapberry productivity by promoting growth of new branches.[13]

Suppression of Berry Patch Burning

Interviews suggest that the last berry patch burns occurred in the early 1930s to early 1940s. Consultants mention that the "forestry" forced the termination of berry patch burning, and that "you would get arrested if you tried to burn a berry patch now." I was told of an instance of a fire crew being mustered to put out a set berry patch fire in 1931 on the mountain just west of Gitwangak. Deliberate suppression of aboriginal burning is documented in the annual Reports of the Prince Rupert Forest District from the 1930s.

> Indian-caused fires have decreased during the past two years. As early as possible in the spring, all Indian settlements were visited and our policy explained in plain words. Notices were written out and posted at Indian trading posts which seemed to get results. Three fires were

> started in what we call Siawash [sic] country. Two of these were extinguished by the Indians before we arrived. The other one was being fought by Indians and settlers when our patrol arrived on the scene. . . . It appeared to be of incendiary origin.[14]

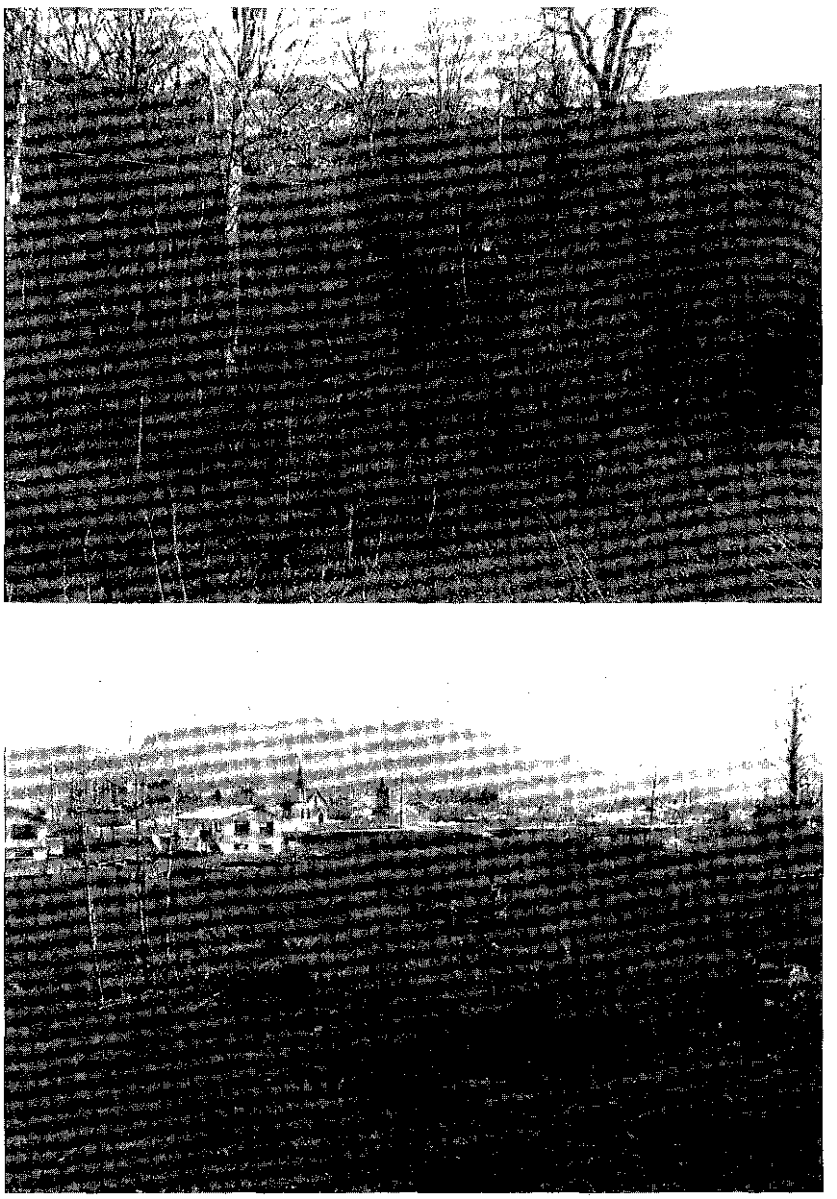
An extensive public education and propaganda campaign to reduce forest fires included indoctrination sessions for Indians on the importance of care with their camp fires as they returned from the coastal canneries, and special presentations at pow-wows.[15] Anyone suspected of deliberately setting fires was subject to criminal prosecution, and several convictions were obtained. The Forest Service offered rewards for information on incendiary fires to increase the effectiveness of the law.[16] It also attempted to remove any economic incentive to start fires by deliberately circulating rumors in Indian communities that the government lacked money to pay or feed fire-fighting crews, although the government continued to pay non-Indian fire fighters:

> The Indians are very hard up . . . but our propaganda suggesting that no men will be put on fire payrolls appears to have put a stop to the usual large number of fires in Siawash country.
>
> The Indians in the back country were told that the Government had no money and could not fight fires. Fortunately we had a favorable season and were able to stick with this to a large extent.
>
> Recently visible signs of restiveness has been apparent among the Red man, presumably due to the gradual infiltration of knowledge that the White men are not only paid for fighting fire, but receive their board in addition.[17]

Grass and Brush Burning

Burning in the springtime around village sites, on south-facing slopes, and on floodplain sites to control brush and encourage growth of grass continues today. I have observed modern spring burning in the Kitwanga River valley near Kitwancool and adjacent to all of the Gitxsan and Wet'suwet'en villages. Discussions with informants suggest that this is not a recently introduced practice, although production of forage for domestic animals and clearing of floodplain garden sites clearly are associated with post-contact activities. Informants maintain that they "always" did that. Clearing village sites for defensive purposes and reducing summer fire hazard may have been pre-contact reasons for village site burning. It is possible that forage for game species may have been a motivation as well. Management of rice root (*Fritillaria camschatcensis* (L.) Ker-Gawl) patches may have been an antecedent of the modern practice of floodplain garden site burning.[18]

Modern Indian burning is mostly on reserve lands, both because villages and many garden areas are reserves, and because reserve lands (which are



(Top) Unburned cottonwood floodplain forest at Gitwangak Village, April 16, 1991. (Below) Burned cottonwood floodplain forest across highway from first site, burned April 12, 1991. This area was the location of a smokehouse (now burned down and replaced with a new one) for many years and has undergone repeated burning. Note very sparse cottonwood cover and (burnt) grass understory with very sparse shrubs.

under federal jurisdiction) are not subject to Provincial Forest Service regulation. Many sites around villages are subject to annual burning. Some areas are burned at longer intervals. Decisions as to which areas will be burned and when are largely individual decisions and reflect land ownership of different parcels on reserves. The vegetation burned is either grass or scrub dominated by aspen, hazel (*Corylus cornuta* Marsh.), red osier (*Cornus stolonifera* Michx.), rose (*Rosa acicularis* Lindl.), and willow (*Salix* spp.). Some areas with young lodgepole pine also are burned. The effects of burning are to encourage grass growth, in particular earlier green-up, and to kill or damage above-ground parts of shrub species or young conifers. All the deciduous shrub species resprout after fire and are not eliminated by burning. Succession to forest with a dense shrub understory, however, is retarded by repeated burning.

Floodplain sites in cottonwood (*Populus balsamifera* ssp. *trichocarpa* [Torr. and Gray ex Hook] Brayshaw) forest also may be burned (depending on the location of the house sites, smoke houses, or gardens). The photographs on the facing page show burned and unburned sites in a cottonwood forest. Burning in cottonwood forest thins the canopy by scarring or killing some trees (though mature cottonwoods have thick bark and are fairly fire resistant); eliminates cottonwood reproduction; and suppresses shrub species such as black twinberry (*Lonicera involucrata* (Rich.) Banks), red osier, rose, willow, and hazel.

A relatively recent phenomenon is the clearing of floodplain sites for garden patches by burning. Garden site burning was reported to me by an elder from Kitwancool, and confirms my casual observations of burning in the Kitwanga River valley south of Kitwancool. The practice obviously is a post-contact phenomenon, but may have an antecedent in management of floodplain meadows for rice root bulb production, formerly an important carbohydrate food. Practices that discourage brush and cottonwood invasion would encourage rice root, which occurs today in grassy and herb-dominated openings on the floodplains of the Kitwanga, upper Skeena, and Kispiox rivers. As this plant has not been actively gathered for approximately the past 60 years, it is difficult to gather specific information on harvesting and management practices.

The third type of site burned is steep, south-facing, grassy or brushy slopes. A site adjacent to Gitwangak (Snake Hill; see photograph on page 248), and a site above the Kitwancool garden/floodplain fall into this category, as well as sites in the Bulkely Canyon adjacent to Hagwilget and along Moricetown Canyon.

I observed no differences between Gitxsan and Wet'suwet'en spring burning around village sites, except for the absence of Wet'suwet'en sites in floodplain cottonwood. The lack of Wet'suwet'en cottonwood sites may be due to ecological differences in the village sites, as the two Wet'suwet'en villages are

Snake Hill burn, Gitwangak, March 21, 1991. This south-facing slope is subject to annual spring burning.

located above bedrock canyon fishing sites, which lack extensive floodplain forest. The facing page shows maps of spring burning for Gitwangak and Gitanmaax, Gitxsan villages, and Moricetown, a Wet'suwet'en village, all in the ICHmc3 (Hazelton variant).

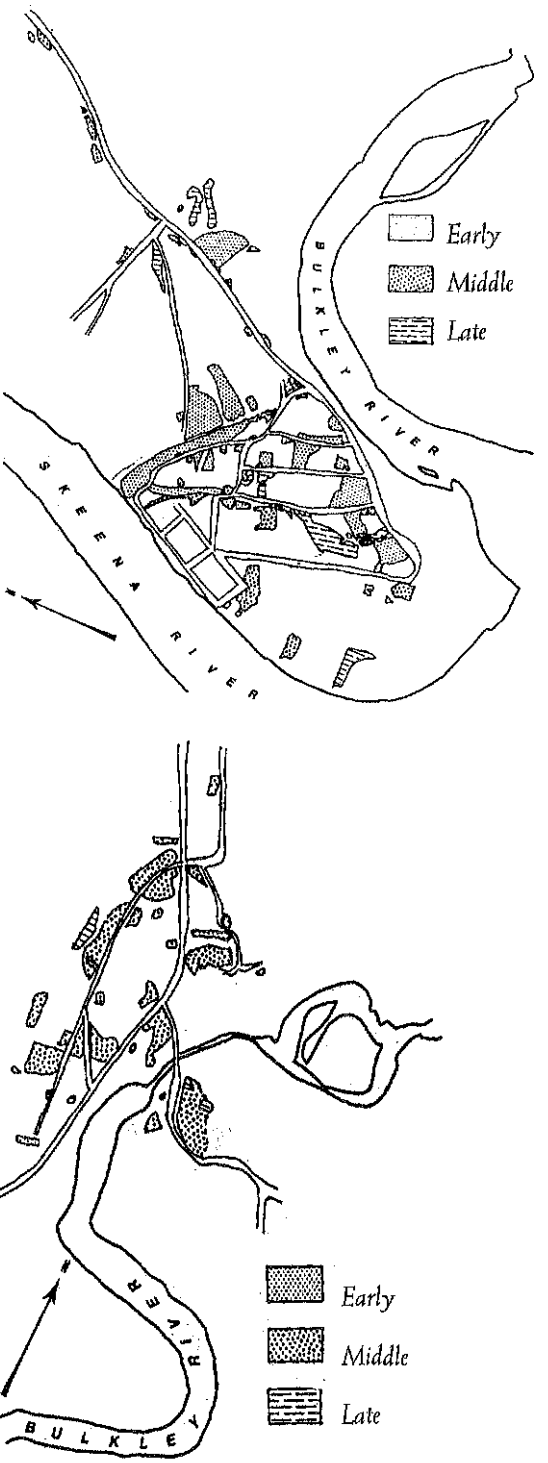
The Wet'suwet'en practice spring burning around village sites. There also is evidence of frequent burning of meadows and slopes around other reserves no longer occupied but still utilized for fishing and trapping.

Discussion

Burning by Other Northwest Indian Groups

Nisga'a burning for berry production was reported in the early 1970s, although species managed were not identified. Burning was reported to occur in the spring. The Nisga'a occupy the Nass River drainage to the west of the Gitxsan territories. No information was found on Tsimshian burning. It is likely that the "Canyon Tsimshian" of the Terrace area, whose territories meet the Gitxsan territories between Terrace and Hazelton, once practiced berry patch burning.

The Haisla, despite their wet coastal environment, apparently once burned to enhance berry production. In 1945, the ethnographer of the Haisla wrote, "Berries were especially important, and the Haisla burned areas to encourage their growth." [19] No modern Haisla burning has been observed or reported. The principal berry species used by the Haisla are Alaska blueberry (*Vaccinium alaskaense* Howell), highbush blueberry (*V. ovalifolium* Smith), red huckleberry (*V. parvifolium* Smith), and red elderberry (*Sambucus racemosa* L.). These



Spring burning 1991, for Gitanmaax, a Gitxsan village (above), and Moricetown, a Wet'suwet'en village (below). The sites are in the ICHmc3 (Hazelton variant). Early, mid season and late burned area is shown. For Gitanmaax, early = 3/27 and 4/3, middle = 4/10, and late = 4/25. For Moricetown, which is a higher elevation and slightly later site, early = 4/3, middle = 4/10 and 4/16, late = 4/25.

species produce abundantly under partial forest canopies such as those produced by windthrow or avalanche disturbance, and in natural openings bordering wetlands and along streams. They also may respond to fire.

The Dakelhne (Carrier) of British Columbia's central interior practice spring burning of grass and marsh areas at present.[20] Berry patch burning by the Dakelhne has not been reported or observed.

Comparison with Aboriginal Burning Practices in Northwest North America

In other areas, native peoples practiced landscape burning to encourage berry and root crops and seed production. Burning for berry production has been reported for the Nlaka'pamux (Thompson), Stl'atl'imx (Lillooet), Okanagan-Colville, Kootenai, Nuxalk (Bella Coola), Kwakwa̲ka̲'wakw (Southern Kwakiutl), Nuu-chah-nulth, and Haida. Berry patches were burned by Indians in western Washington. Burning for improvement of berry yield was reported of the Dene-thah (Slavey) Indians of northern Alberta. Burning for production of root crops such as avalanche lily corms (*Erythronium grandiflorum* Pursh.) and camas (*Camassia quamash* (Pursh.) Greene and *C. leichtlinii* (Baker) Wats.) was practiced by the Straits Salish, Stl'atl'imx, and Nlaka'pamux. The Indians of western Washington apparently burned prairies annually to promote root and rhizome production. The Kalapuya Indians of the Willamette Valley burned native grasslands to enhance production of tarweed (*Madia* spp.) seeds, which were collected in quantity for human consumption, and the Wiyot Indians of northern California burned prairies to enhance sunflower seed production.[21]

Certainly the Gitxsan and Wet'suwet'en used fire to manage and enhance production of berry patches. It is not known whether fire was used to enhance root crops. It was possibly a factor in burning valley bottom meadows, the environment where rice root occurs. The other significant root crop, the spiny wood fern (*Dryopteris expansa* [K. B. Presl] Fraser-Jenkins & Jermy), grows best in organic surface horizons and so probably would not be enhanced by burning. Burning around village sites likely would have increased hazelnut production, but no elders have mentioned burning as a factor in hazel abundance or productivity.

Landscape burning was carried out by aboriginal peoples for several reasons other than enhancement of plant food gathering. The Sierra Miwok of California burned areas with California redbud (*Cercis occidentalis* Torr. ex Gray) to produce sprouts suitable for basketry. Deergrass (*Muhlenbergia rigens*) was managed similarly for culm production. The Dene-thah Indians of Alberta burned for a number of reasons, including reduction of fire hazard around

living areas, improvement of forage for furbearers and game species, and reduction of brush to promote ease of cross-country travel. The Kalapuya and others used fire as a hunting tool to encircle and drive deer. Various Indian groups of northern California and southern Oregon also are reported to have burned for game management and maintenance of travel corridors. Hazard reduction and enhancement of forage may have been reasons for Gitxsan and Wet'suwet'en burning. Spring burning encourages grass, which was valued in historic times for horse and cattle feed.[22]

Changes in Gitxsan and Wet'suwet'en Use and Collection of Berry Resources

Modern berry collection now focuses on highly productive patches in clearcut areas and on fortuitous natural burns that are accessible by truck. Elders comment that a 1959 burn at "Meziadin" (300 km to the north along Highway 37 from Hazelton) should be reburned. This burn has been invaded heavily by willow 4 to 5 m tall and young pine and spruce, and the highly productive berry area has been reduced significantly in size over the eleven years I have observed it.

The principal species still collected are black mountain huckleberry, highbush blueberry, and soapberry. Lowbush blueberry no longer is an important resource, probably because of changes in both land management and access. Many low-elevation sites have been eliminated by land clearing, gravel pit development, or forest succession. Higher elevation sites are not accessible by logging roads and suppression of burning has allowed forest succession to proceed. Although these changes have occurred, some Gitxsan and Wet'suwet'en families consider the regular burning of brush and grassland, especially berry patches, one of their hereditary, aboriginal rights and, as such, to be part of native land-claims campaigns and negotiations.

Summary and Conclusions

Aboriginal landscape burning was important in northwest British Columbia. It had two main purposes: enhancement of berry patches and reduction of brush around living and gardening areas. Burning was widespread.

Berry patch burning was suppressed by the B.C. Forest Service in the 1930s and early 1940s and has not been practiced since that time. Termination of burning has resulted in forest succession and ecological changes in former berry patches. Land clearing for agriculture and industrial clearcut logging in many lower elevation areas have masked ecological change resulting from

diminished fire frequency. Modern Gitxsan and Wet'suwet'en subsistence activities reflect these changes, with lowbush blueberry no longer an important economic species, and black mountain huckleberry collection conditioned by logging disturbance and/or road access. As families are integrated into the market economy of modern Canada, wild berries now play a minor role in annual nutrition, but they retain a high cultural value. They remain required items at many weddings, special family gatherings, and especially at funeral potlatch feasts and totem pole raising feasts.

Originally published in Human Ecology 22(2): 171–188 (1994a)

Acknowledgments

I would like to thank the Gitxsan and Wet'suwet'en people who shared their knowledge about traditional burning practices with me: the late Andy Clifton, Dora Johnson, Alfred Joseph, Sadie Howard, Solomon Marsden, Kathleen Marsden, Peter Martin, the late Art Mathews Sr., Kathleen Mathews, Ray Morgan, the late Emsley Morgan, Roy Morris, Lucy Namox, Pat Namox, Olive Ryan, Neil Sterritt Sr., Neil Sterritt Jr., Percy Sterritt, and the late Buddy Williams. I would like to thank Richard Daly for helpful discussions and Henry T. Lewis for encouragement and support. I also would like to acknowledge Allen Gottesfeld for helpful discussions and support in the field.

Notes

1. Formerly Gottesfeld. University of Alberta, Department of Anthropology, Edmonton, Alberta, Canada T6G 2H4. See also the companion articles by Johnson [Gottesfeld], "Conservation, Territory, and Traditional Beliefs: An Analysis of Gitksan and Wet'suwet'en Subsistence, Northwest British Columbia, Canada" (*Human Ecology* 22(4): 443–65, 1994b), "Wet'suwet'en Ethnobotany: Traditional Plant Uses" (*Journal of Ethnobiology* 14(2): 185–210, 1994c), "The Role of Plant Foods in Traditional Wet'suwet'en Nutrition (*Ecology of Food and Nutrition* 34(2): 149–69, 1995), and (with Sharon Hargus) "Classification and Nomenclature in Wet'suwet'en Ethnobotany: A preliminary examination" (*Journal of Ethnobiology* 18(1), 1999).
2. British Columbia Ministry of Forests and Lands, *Biogeoclimatic and Ecoregion Units of the Prince Rupert Forest Region* (2 maps, 1988).
3. B.C. Ministry of Forests and Lands (*ibid.*).
4. Sybille Haeussler *et al.*, *A Guide to the Interior Cedar-Hemlock Zone, Northwestern Transitional Subzone* (ICHg), *in the Prince Rupert Forest Region, British Columbia* (Victoria, 1985).

5. Lightning-caused ignition is rare in the area, particularly for the valley bottom locations where the "Hazelton variant" is prevalent.
6. George Dawson, *Report on an exploration from Port Simpson on the Pacific coast to Edmonton on the Saskatchewan, embracing a portion of the northern part of British Columbia and the Peace River Country, 1879* (Montreal, 1881).
7. People of 'Ksan, *Gathering What the Great Nature Provided: food traditions of the Gitksan* (Vancouver, 1980).
8. On family ownership, see Richard Daly, *Anthropological opinion on the Nature of the Gitksan and Wet'suwet'en Economy, in Opinion Evidence in Delgamunkw et al. v. the Queen in the Right of the Province of British Columbia and the Attorney-General of Canada* (British Columbia Supreme Court, 0843, Smithers Registry, 1988); the information on public use comes from Richard Daly, personal communication, 1991.
9. Pat Namox, quoted by Antonia Mills in *Eagle Down Is Our Law: Witsuwit'en Law, Feasts, and Land Claims* (Vancouver, 1994), 135–36.
10. R. Daly, personal communication, 1991.
11. Cf. Don Minore, *The Wild Huckleberries of Oregon and Washington—A Dwindling Resource* (USDA Forest Service Research Paper PNW-143, 1972), and *Observations on the Rhizomes and Roots of Vaccinium Membranaceum* (USDA Forest Service Research Note PNW-261, 1975).
12. Minore, 1972 and 1975 *ibid.*
13. Kathleen Marsden, interview notes; Sadie Howard, personal communication.
14. Anonymous, *1932 Annual Report of the Prince Rupert Forest District* (manuscript, Prince Rupert Forest Regional Office Library, Smithers), 3.
15. 1935, 1936, 1940, and 1942 *Annual Reports of the Prince Rupert Forest District.*
16. *Ibid.*, 1933, 1935.
17. *Ibid.*, 1933:3, 1934:4, 1939:4.
18. Euro-Canadian settlers also burned brush and fields (Sheila Ryan, personal communication April 1991; *Annual Reports of the Prince Rupert Forest District,* 1931, 1932). Some non-Indians still burn brush, fields, or roadsides, as well as windrows from modern land clearing.
19. Ivan Lopatin, "Social Life and Religion of the Indians in Kitimat, British Columbia" (*University of Southern California Social Science Series* 26, 1945), 14.
20. Allen Gottesfeld, personal communication, 1992 for Tache/Middle River area and personal observation, 1991, for Stelat'en by Fraser Lake.
21. Sources include Nancy Turner, "Time to Burn" (1991 and this volume, revised); Wayne Suttles, "Variation in Habitat and Culture on the Northwest Coast" (pp. 522–37 in *Proceedings of the 34th International Congress of Americanists,* 1962); Helen H. Norton, "Evidence for bracken fern as a food for aboriginal peoples of western Washington" (*Economic Botany* 33(4): 384–96, 1979a), "The association beween anthropogenic prairies and important food plants in western Washington" (*Northwest Anthropological Research Notes* 13(2): 175–200, 1979b), and Norton *et al.*, "Vegetable food products of the foraging economies of the Pacific Northwest" *(Ecology of Food and Nutrition* 14(3): 219–78, 1984); Henry Lewis, "A Time for Burning" (*Boreal Institute for Northern Studies Occasional Publication* No. 17, 1982); Robert Boyd, "Strategies of Indian Burning in the Willamette Valley" (1986 and this volume, revised); and H. Lewis and Theresa Ferguson, "Yards, corridors and mosaics" (1988 and this volume).

22. Sources include M. Kat Anderson, "California Indian horticulture: Management and use of redbud by the Southern Sierra Miwok" (*Journal of Ethnobiology* 11(1): 145–57, 1991) and "The Ethnobotany of deergrass (*Muhlenbergia rigens*) Poaceae: Its uses and fire management by California Indian Tribes" (*Economic Botany* 50(4): 409–22, 1996); Lewis, "A Time for Burning," and Lewis and Ferguson, "Yards, corridors and mosaics"; and Boyd, "Strategies of Indian Burning in the Willamette Valley."