NATURAL DISTURBANCE:

Indigenous Fire Stewardship

Indigenous fire stewardship is the use of cultural burning practices by Indigenous Peoples to mange the landscape for multiple values. **Cultural burning has been used since time immemorial to enhance biodiversity, reduce wildfire risk, maintain cultural connections to the land, and manage the natural resources vital for sustaining diverse aspects of Indigenous life.**[1] Through cultural burning practices, Indigenous communities shaped fire regimes, adapted to climate variations, and managed local environmental conditions.[1]

Deep rooted in traditional knowledge and historical culture, Indigenous fire stewardship offers unique insights from centuries of observation and adaptation. Wildfire is one of the most complex land management challenges in Canada and bringing together Indigenous and western knowledge can strengthen efforts to use fire stewardship to manage the whole landscape for multiple values.

A History of Fire Stewardship

Indigenous Peoples have a rich history of **coexisting with fire-prone ecosystems,** ingrained in their traditions and cultures through their deep understanding of fire-dependent species and ecological processes.[2] The intergenerational teachings of Indigenous fire stewardship encompass a comprehensive understanding of fire regimes, the consequences of fire, and the cultural significance of controlled burns.[1] This holistic approach integrates diverse elements such as climatic cycles, ignition sources, fire behavior, landscape topography, and vegetation, providing a nuanced comprehension of fire threats, impacts, and benefits.[1,3]

Indigenous fire knowledge uses **proactive methods, incorporating intentional burning to reduce fuel loading, thereby mitigating the intensity and severity of fires across the landscape.**[2] Through the practice of frequent, low-intensity fires, Indigenous communities actively promote fire-adapted vegetation, fostering increased biodiversity and creating a heterogeneous landscape.[1,4]

Fire-adapted plants, understory species, and early seral vegetation often hold cultural significance as keystone species, providing valuable resources such as wildlife habitat, food, materials, and medicine for Indigenous communities.[1]

Indigenous fire applications differ from natural ignitions in frequency and seasonal timings and align with plant and fungus phenology and the timing of animal breeding and migration cycles.[2] This intentional approach to fire management demonstrates a connection between Indigenous knowledge and the ecological well-being of their environments.

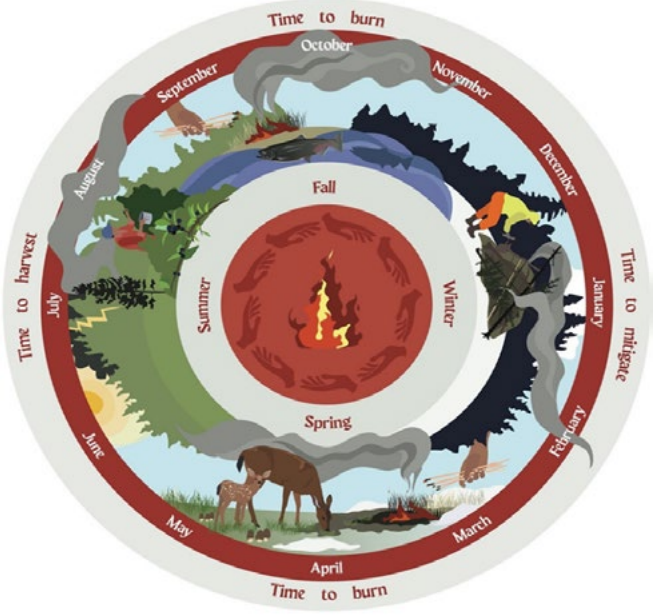

Figure 1. A seasonal calendar illustrating aspects of Indigenous fire stewardship.[5]

Fire Stewardship Supports Biodiversity

A history of fire suppression and restrictions on Indigenous rights to practice cultural burning, has led to a notable decline in understory biodiversity.[5,6] Changes to the wildfire regime and fuel loading are recognized as a significant threat to biodiversity on a global scale.[7]

Low-severity fires play an important role in enhancing biodiversity by creating diverse habitats across different seral stages. Low-severity fires leave behind fire refugia or unburnt patches, promoting the germination of fire-adapted species' seeds and providing essential habitat features like fallen logs or snags for wildlife. Wetlands can play an important role supporting species during low-severity fires, with intact wetlands providing wildfire refugia where species can shelter during fire.

Low severity wildfire can support biodiversity in the boreal forest. By promoting regular, low-severity fires through cultural burning practices, Indigenous Peoples are able to promote and support biodiversity on their lands.

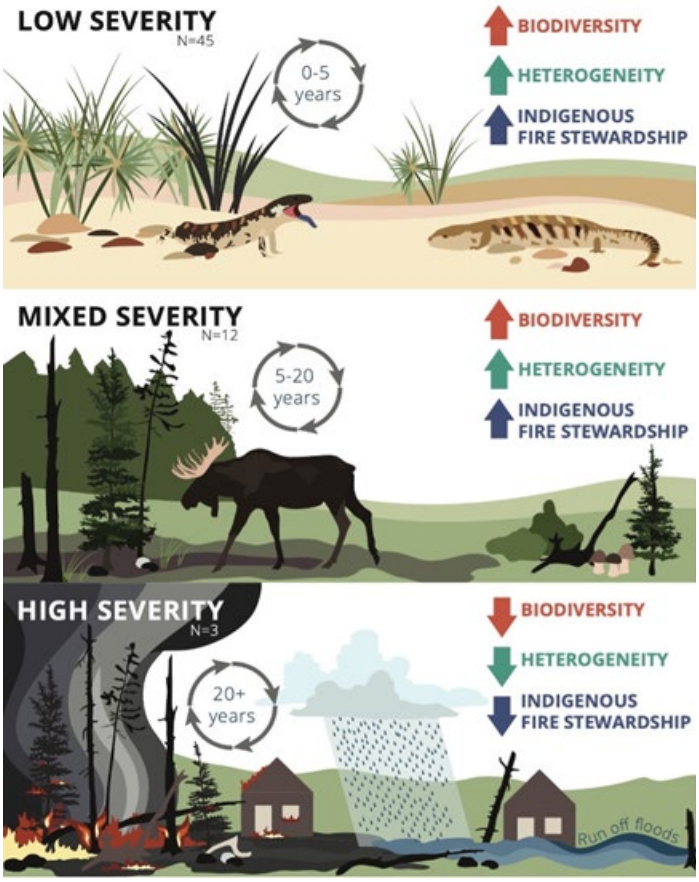

Figure 2. Conceptual illustration of the relationship between the severity of wildfires, biodiversity, heterogeneity, and Indigenous fire stewardship.[16]

A CASE STUDY WITH HISTORICAL CONTEXT

In a study of a dry mixed-conifer forest in Knife Creek, British Columbia, historic ignitions were caused by a combination of lightning and Indigenous fire stewardship.[8] These fires were typically low-severity surface fires with burn intervals under 50 years and occasional high-severity fires every 250 years.[9] This region now faces an increased threat of more frequent and severe fires due to climate change and fire suppression.[10,11]

Evidence from tree ring studies paired with oral histories and documented community records, indicate a shift away from Indigenous fire stewardship towards fire suppression. This can be attributed to the arrival of European colonization in the 1860s, which severely restricted Indigenous fire stewardship.[12,13] The suppression of fire was enforced through:

- **Bush Fire Act (1874):** Enforced fines or imprisonment if an individual purposely set fire and damaged private or crown land.[10]
- **Forest Act (1912):** Financially supported and maintained a fire prevention management strategy.[10,12]

Due to colonization and western perspectives of fire as destructive to timber supply and dangerous to communities, Indigenous fire stewardship practices were severely limited.[1] Today, many Indigenous communities face high risks of destructive wildfires.[14] A potential solution lies in cross-cultural fire stewardship that integrates western science and Indigenous knowledge, offering protection to communities and fostering social acceptability of controlled fire in the wildland-urban interface.[15]

Fire Stewardship and Ecosystem-Based Management

Indigenous fire stewardship supports wetland stewardship by enhancing biodiversity, managing natural resources, and mitigating the risk of high-severity fires. After a fire, a nutrient flush can stimulate vegetation growth and enhance peat accumulation in organic wetlands, further highlighting the interconnectedness between Indigenous fire stewardship and wetland health and resilience.

Indigenous fire stewardship can support multiple natural resource management objectives. Cultural burning can promote drought-tolerant, fire-adapted species and remove fire-intolerant species or diseased trees, as well as remove woody vegetation, shift vegetation communities, and alter hydrologic regimes in wetlands.[2] These changes can enhance biodiversity and culturally important species, maintain below-ground carbon stores (by reducing likelihood of severe wildfires), and reduce overall wildfire risk.[2]

Barriers to Indigenous Fire Stewardship

1. **Perceptions, authority, and jurisdiction:** There is insufficient understanding by wildfire agencies, decision-makers, and the public about the relationship between Indigenous Peoples and fire.
2. **Governance, laws, and management:** Colonial impacts pose barriers to engaging in and leading cultural burning. Historically under colonial rule and persisting today in government land management regulations, Indigenous communities have been restricted from practicing cultural burning.
3. **Access, accreditation, and training:** Wildfire science and management courses do not adequately address cultural burning and there are knowledge gaps amongst western science practitioners and government decision-makers.
4. **Liabilities and insurance:** Insufficient financial support and requirements for extensive insurance hinders all forms of fire stewardship, but Indigenous fire stewardship faces additional barriers.
5. **Capacity and resources:** Limited funding for Indigenous fire stewardship and loss of knowledge within many communities due to historic and ongoing restrictions on use of cultural burning practices.[5]

Resources:

- The Good Fire Podcast
- Blazing the Trail: Celebrating Indigenous Fire Stewardship
- Media Relations. (2021). Indigenous fire stewardship promotes global biodviersity. Waterloo News.
- Brookes, W., Daniels, L. D., Copes-Gerbitz, K., Baron, J. N., & Carroll, A. L. (2021). A Disrupted Historical Fire Regime in Central British Columbia. Frontiers in Ecology and Evolution, 9. https://doi.org/10.3389/fevo.2021.676961
- Hoffman, K. M., Christianson, A. C., Dickson-Hoyle, S., Copes-Gerbitz, K., Nikolakis, W., Diabo, D. A., McLeod, R., Michell, H. J., Mamun, A. Al, Zahara, A., Mauro, N., Gilchrist, J., Ross, R. M., & Daniels, L. D. (2022). The right to burn: barriers and opportunities for Indigenous-led fire stewardship in Canada. Facets, 7. https://doi.org/10.1139/FACETS-2021-0062
- Hoffman, K. M., Christianson, A. C., Dickson-Hoyle, S., Copes-Gerbitz, K., Nikolakis, W., Diabo, D. A., McLeod, R., Michell, H. J., Mamun, A. Al, Zahara, A., Mauro, N., Gilchrist, J., Ross, R. M., & Daniels, L. D. (2022). The right to burn: barriers and opportunities for Indigenous-led fire stewardship in Canada. Facets, 7. https://doi.org/10.1139/FACETS-2021-0062

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2. Lake, F. K. (2021). Indigenous fire stewardship: Federal/Tribal partnerships for wildland fire research and management. Fire Management Today, 79(1).
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6. Hart-Fredeluces, G. M., Ticktin, T., & Lake, F. K. (2021). Simulated Indigenous fire stewardship increases the population growth rate of an understorey herb. Journal of Ecology, 109(3). https://doi.org/10.1111/1365-2745.13542
7. Coop, J. D., Massatti, R. T., & Schoettle, A. W. (2010). Subalpine vegetation pattern three decades after stand-replacing fire: Effects of landscape context and topography on plant community composition, tree regeneration, and diversity. Journal of Vegetation Science, 21(3). https://doi.org/10.1111/j.1654-1103.2009.01154.x8. (Coogan et al., 2021)
9. (BC Ministries of Environment and Forests, 1995)
10. Brookes, W., Daniels, L. D., Copes-Gerbitz, K., Baron, J. N., & Carroll, A. L. (2021). A Disrupted Historical Fire Regime in Central British Columbia. Frontiers in Ecology and Evolution, 9. https://doi.org/10.3389/fevo.2021.676961
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