Fires, Conservation and Fire Management in the Halifax Backlands

Download slide-deck and view links to reference materials at
www.versicolor.ca/fire

Online presentation by **David Patriquin**
to the Nova Scotia Wild Flora Society,
7:30 p.m. Monday Oct 23, 2023.

The "Backlands", located only a few kilometers from from peninsular Halifax, Nova Scotia, are a Thompsonesque urban wilderness of approximately 1350 hectares which include nine lakes, hills with spectacular views and dozens of kilometers of informal hiking and biking trails. Erratic blocks, whalebacks and boulder fields are prominent features of the glacially scoured rocky landscape. It is also one of the most fire-susceptible landscapes in Nova Scotia, with recurrent fires pre-dating European settlement. One result is the presence of highly fire-adapted plant communities including the globally rare and nationally unique 'Jack Pine/Broom Crowberry Barrens'.

David will describe the plant communities, their fire ecology, and discuss what's involved in managing fire to conserve these ecosystems while at the same time protecting structures and people at the Urban-Wildland Interface.

For more about the area, visit www.backlandscoalition.ca

David Patriquin, Professor of Biology at Dalhousie University (retired 2008), is involved in conservation-oriented activities with several local natural history, trail and environmental organizations.

www.nswildflora.ca

Geoffrey Grantham and Ron Kuwahara paint en plein air in the Jack Pine-Crowberry barrens on Nov 2, 2015, 6 years after 2009 'Spryfield Fire'.

Acknowledgements

Jennifer Escott, Williams Lake Conservation Co., and Backlands Coalition, info. on properties recently protected in the Backland

James MacKinnon, Provincial Forest Fire Science Officer, NRR Fuel type map

Katharine Studholme, Williams Lake Conservation Co., and Backlands Coalition, info. on Species at Risk

Martha Leary, Williams Lake Conservation Co., and Backlands Coalition, info. & graphics related to the Nighthawk Project and special thanks to Fulton **Lavender**, **Joshua Barss Donham** & **Cindy Staicer** for work on this project

What's Ahead

1. Fires in Canada and NS recently and historically
2. The Backlands, Where, Geology, etc. (Maps)
3. Plant Communities of the Backlands
4. Adaptations of Backlands plants to Fire
5. Post-Spryfield Fire Early Succession (1-2 years)
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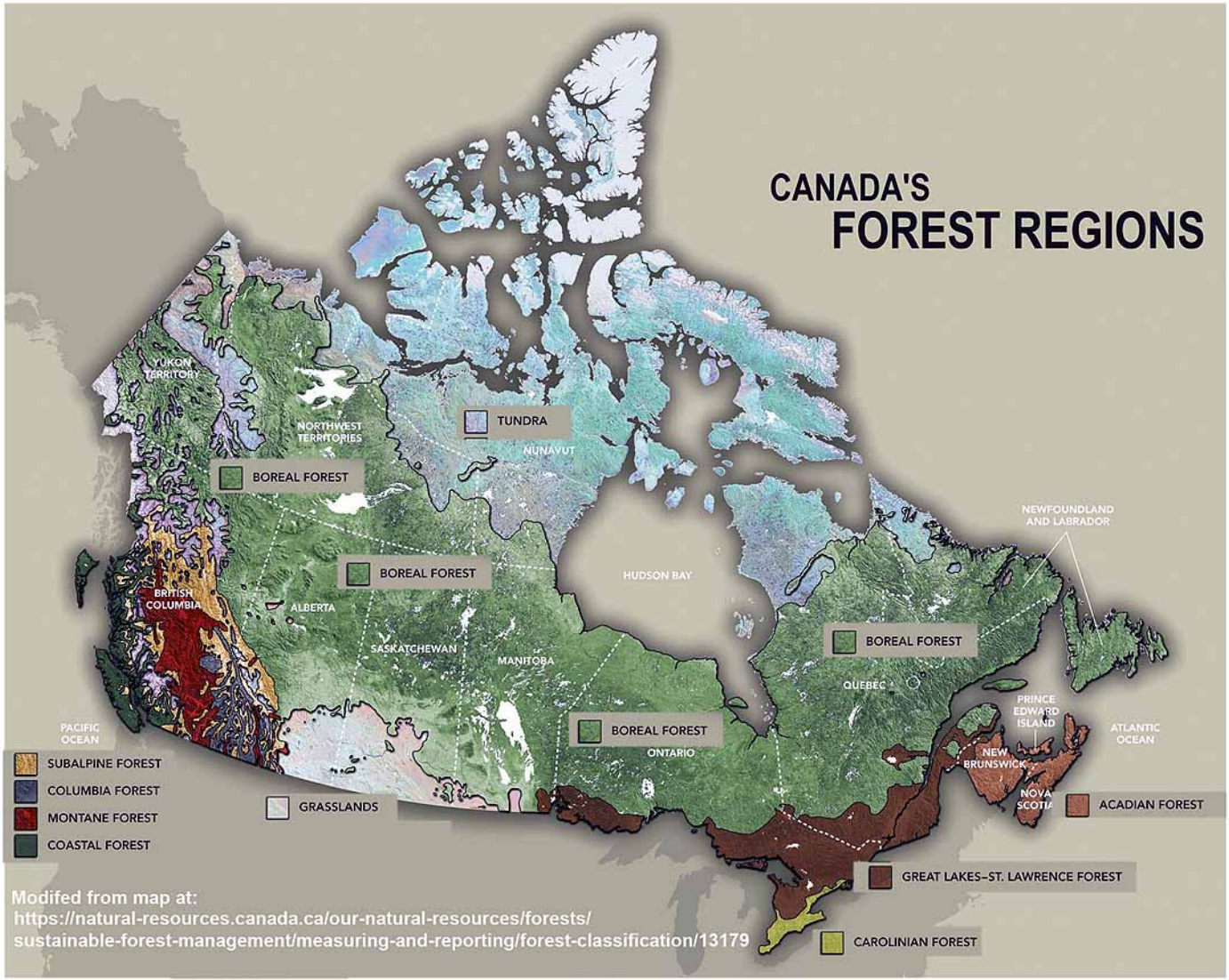
Satellite Forest Monitoring in Canada
1985-2011
https://forests.foundryspatial.com
Map
About
Search
Visible Extent: 31,355,152 km²
Fire
455,551 km²
Infrastructure
Harvest
Untyped
Select All
Canada
United States
North
North Atlanti
© Mapbox © OpenStreetMap © Maxar © NRCan | Foundry Spatial


https://natural-resources.canada.ca/sites/nrcan/files/cfs/assets/file/484
Citation: Brandt, J.P. 2009. The extent of the North American boreal zone. Environmental Reviews 17: 101-161. doi:10.1139/A39-004
Digital Cartography by G. Sean Hanna, Data Dissemination Division
© Her Majesty the Queen in Right of Canada 2010
ALASKA
YUKON
NORTHWEST TERRITORIES
NUNAVUT
GREENLAND
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
NEWFOUNDLAND AND LABRADOR
PRINCE EDWARD ISLAND
NEW BRUNSWICK
NOVA SCOTIA
Pacific Ocean
Hudson Bay



Modifed from map at:
https://natural-resources.canada.ca/our-natural-resources/forests/sustainable-forest-management/measuring-and-reporting/forest-classification/13179

Frequency of Forest Fires & Other Natural Disturbances in Nova Scotia

From: Taylor et al., 2020. A review of natural disturbances to inform implementation of ecological forestry in Nova Scotia, Canada. *Environmental Reviews* Aug. 18, 2020

Fire Return Intervals by NS Ecosites for period 1800 to 250 years B.P. (~200 – 1750 AD)

Fires usually either F1(high>60% stand killed) or F2 (Moderate, 30-60% of stand killed)

- Black Spruce-Pine 250-300 years
- Black Spruce-White Pine 350-400 years
- Acadian Tolerant Softwood 500 years
- Acadian Tolerant Hardwood 500 years
- Lowland (wet) Black Spruce 600 years

Note: our estimate for a Backlands Fen: 208 years*

Wind by Type
Hurrricane Track
- High Severity Windthrow 1250 years
- Moderate Severity 715 years

Windstorm
- High (>60% downed) & Moderate Severity 5000 years
- Low Severity (5-30%) 71 years (GAP disturbance)

"In Canada, boreal forests are dominated by high intensity crown fires that occur relatively infrequently (return interval 167-180 years)"

de Groot et al.,2013. Climate change impacts on future boreal fire regimes.in Forest Ecology and Management. 294:35-44

Last 250 years:
FRI <100-200 years,
97% human-caused.

*Last 75 years, especially since 1980: >>>Natural FRI (due to effective supression)***

**>>2000 years, but if every year like 2023, FRI~165 years!

Spruce Budworm by softwood species
- Balsam Fire: 48 years
- White Spruce 66 years
- Red Spruce: 100 years
- Black Sprue: 200 years

*Hill & Patriquin, 2014.

General agreement that Jack Pine Barrens are naturally very fire-prone

There is agreement, however, between disparate camps that Jack Pine communities in areas such as the WLB are naturally fire structured while recognizing that human intervention increased the frequency above natural frequencies (Neily et al., 2008; Anon 2005):

"Throughout Nova Scotia Loucks (1962) noted the presence of fire origin species such as jack, red and white pine, red maple, wire and Paper Birch, and red oak in his forest districts. Although he acknowledges that the occurrence of fire and its frequency has probably increased since European settlement the conditions conducive to fire are a product of the topography, soils and climate and that these conditions exist mainly in the lowland ecodistricts and western ecoregion. Fernow (1912) states "approximately one-fourth of the present forest area of the Province is semi-barren of commercial trees. This condition has been brought about by repeated fires in situations possessing naturally the coarser soils. Johnson (1986) states that "although most settlers tried to be careful with fire, burning only at what they considered to be safe times, fires often got out of control and burnt extensive areas". In the Atlantic Coastal ecoregion fires have been common but they appear to have been started by settlers to extend their pasture land (Loucks 1962). However, **the presence of Jack Pine in several places on the Canso peninsula, and on Isle de Madame, suggests that the constant winds may create a droughtiness that is conducive to fire.**" (From Neily et al., 2008; bolding ours.)

"In my view, there are only a handful of site types in Nova Scotia where geomorphology, soils, climate, etc., create the conditions that permit the frequent, stand-replacing disturbance of ecological processes and hence produce a non-climatic climax or non-subclimax (eg. edaphic climax) vegetation. Some examples are: **Jack Pine on Target Hill and a few other prominent granitic knobs in Halifax County**; the pines on the sand plains of Annapolis Valley; black spruce-Jack Pine on the sand plain near Oxford; and balsam fir-Paper Birch on exposed spur ends in the steep-sided canyons of northern Cape Breton Island." (From Anon, 2005; bolding ours.)

Hill & Patriquin 2014, p 27

S6b

Fire Record in a Backlands Fen

Table 6.1

Site:	Site 1	Site 2
Horizons with darkened debris (extruded)	13-22 38-44 38-43 46-50 66-70 75-78*	0-15 30-40 50-60
Total length of extruded chunks	90	85
Depth to rock base	83	75

*Charcoal fragments carbon dated

1250 years BP

= FRI of 208 years

Above: Fire-adapted/dependent Jack Pines in a wet Tussock Sedge Fen.
Below: the peat record reveals several layers of charcoal (see black stripes below right) that extend to the base of the metre long core which is laid out below at left.

Nova Scotia's Largest Fires (1990 to present)

1. Porters Lake/Lake Echo,Halifax Co. 21 km perimeter, more than 50 agencies involved in response, 5,000 evacuated, 2 houses lost, no fatalities.	June 13, 2008	1925 ha
2. Woods Harbour, Shelburne Co.	April 28, 1999	810 ha
3. Wallace Lake, Shelburne Co.	May 20, 2003	795 ha
4. Spryfield, Halifax Co.	April 29, 2009	681 ha
5. Goff's, Halifax Co.	June 12, 1992	595 ha

Largest fire since the 1950s

Porcupine Lake near Trafalgar, Guysborough County. Started on June 4th, 1976 and burned for six days burning a total of about 13000ha.

From: Media Guide to Forest Fires - Fire Information
https://novascotia.ca/natr/forestprotection/wildfire/media-guide/fire-info.asp 19Oct2023

2023:
- Barrington Lake : 23,525 ha
- Tantallon: 950 ha

From NRR News Release June 13, and June 4, 2023

2009 SPRYFIELD FIRE
April 30-May1..

Apr 30, 2009 view of Halifax Hbr from Dartmouth "A Wall of Flame above Haifax Mainland south"

Photo by Ross O'Flattery

Fires in NS are 97% Human-caused;
3% lightening (avg. Canada: lightening causes 50 % of all fires, but 85% of area burned, re: boreal forest).

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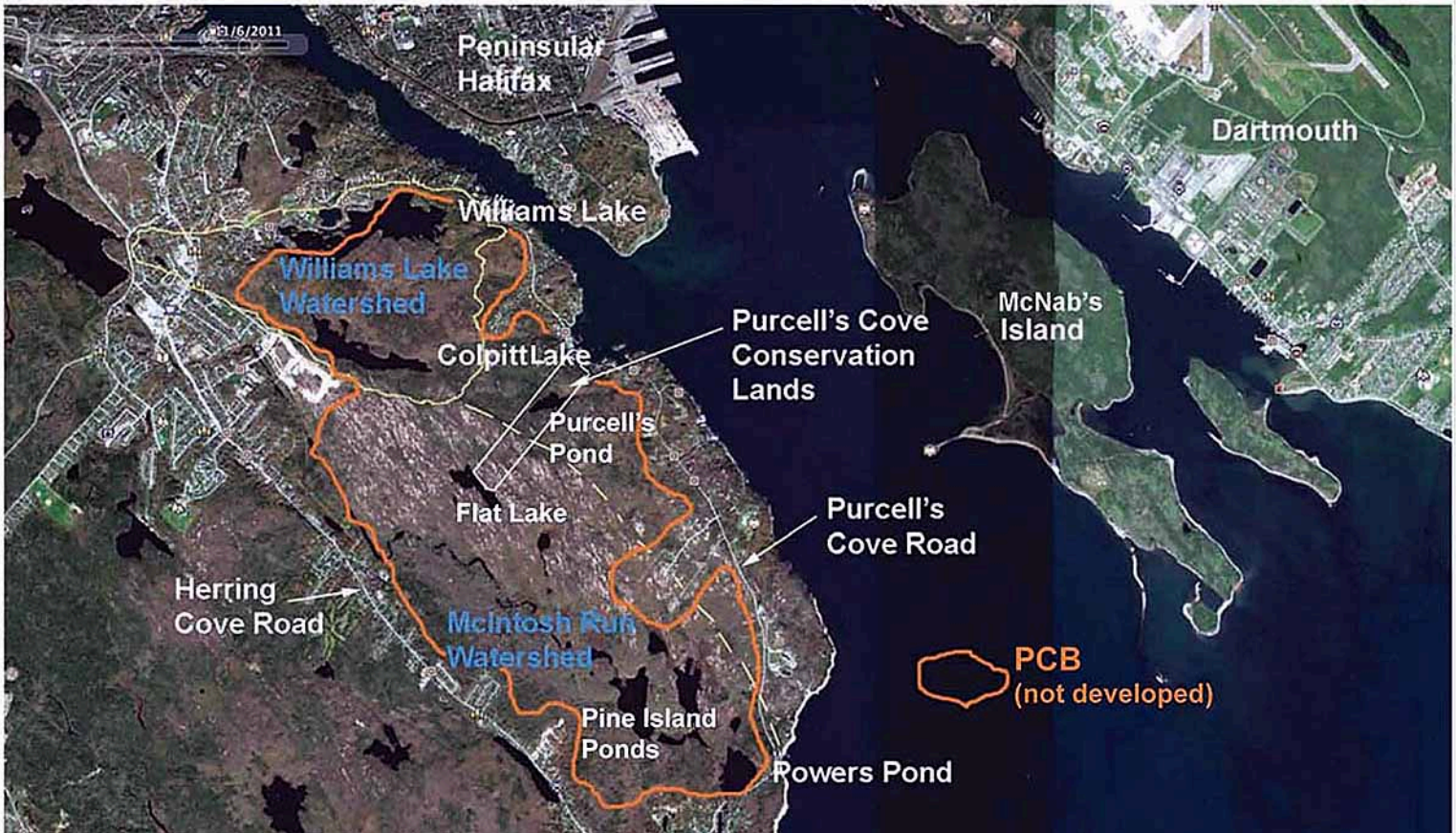
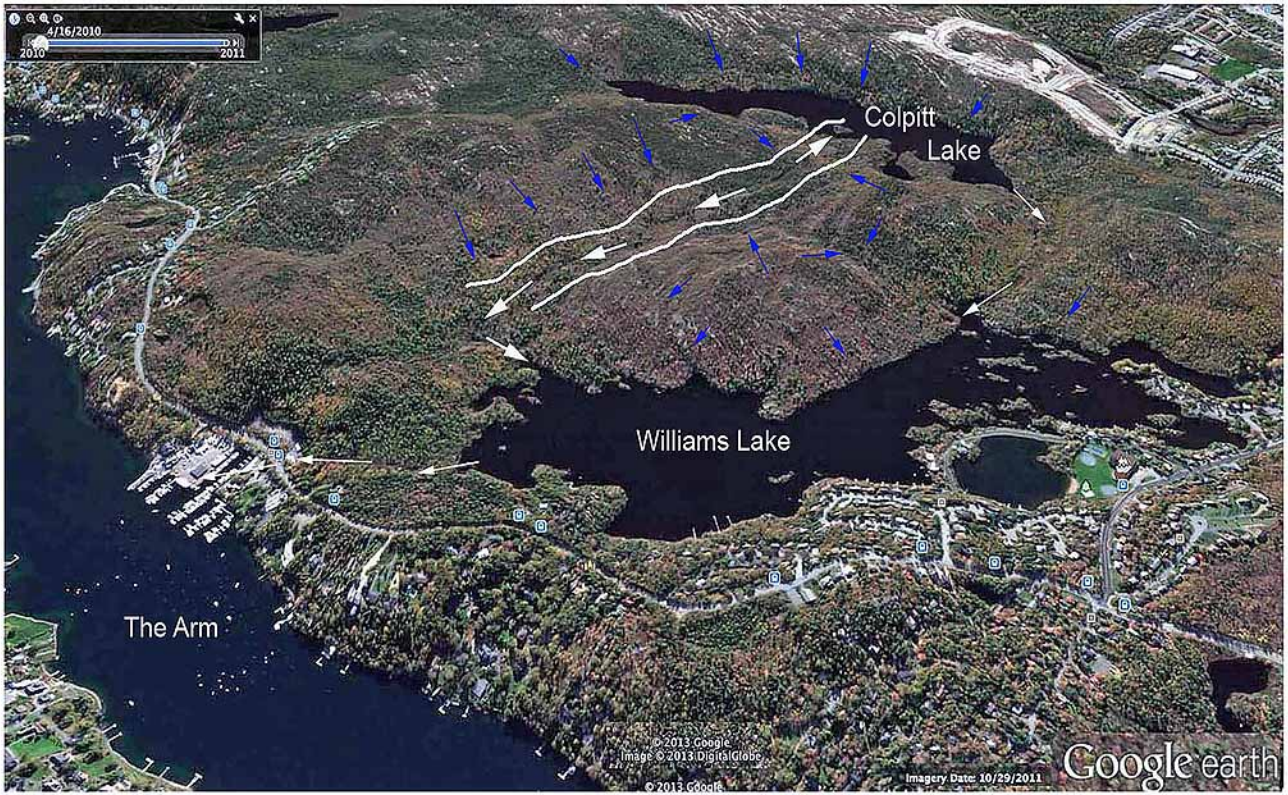


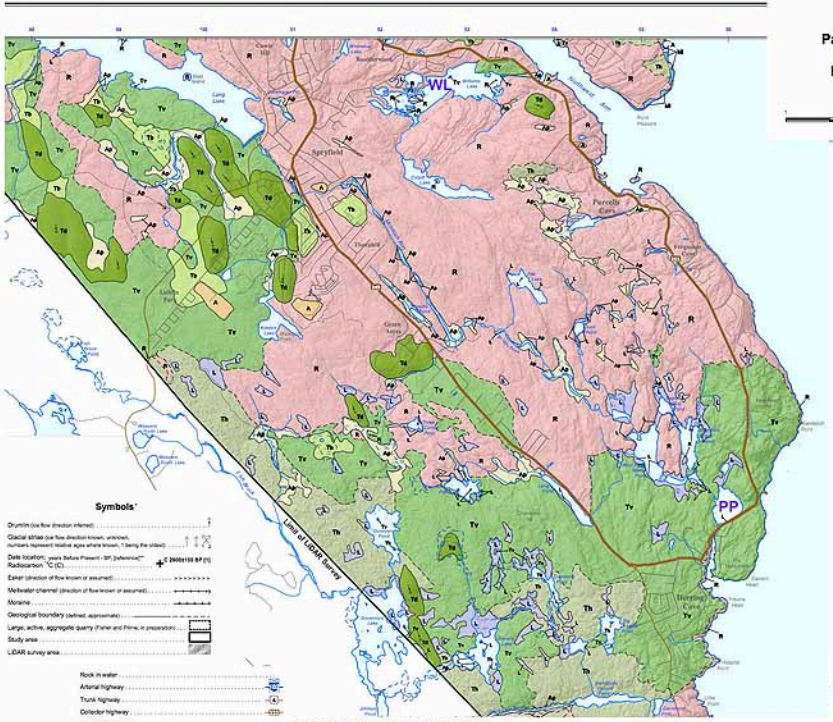
The **Purcell's Cove Backlands (PCB)**, approximately 1350 ha on the Halifax south mainland only a few km from where we are an area of rough terrain with shallow soils and outcroppings of hard rock that have remained without roads or significant settlement except at their periphery until recently. There are many trails and several lakes are popular for swimming. There are frequent fires in this area.

In the Williams Lake Backlands, the larger swamps & fens are located along the Geological Contact Zone

South Mountain Batholoth Granites // **Metamorphosed Halifax black slates & siltstones of Meguma Supergroups**



"The WLB present a mosaic of landscapes and plant communities associated with high variability on a fairly small scale in the topography, depth of soil/till, drainage and surface water storage and in the ages since disturbance of the associated plant communities. That variability in turn is related to the presence of glacially scoured hard granite outcrops of South Mountain Batholith, outcroppings of highly folded and metamorphosed Halifax Group black slates and siltstones of the Meguma Supergroup, a contact zone between the two rock types, and glacial till. Overall, the plant communities are those of nutrient-poor, acidic environments and of fire-, wind-, and pest-driven disturbance regimes within a moist temperate, coastal region." - Hill & Patriquin, 2014



Nova Scotia Department of Natural Resources
Mineral Resources Branch
Open File Map ME 2011-011

Surficial Geology Map, Part of the Herring Cove Claim Reference Sheet 11D/12A, Halifax County, Nova Scotia

D. J. Utting

Scale 1:25 000

Halifax, Nova Scotia 2011

QUATERNARY

HOLOCENE (postglacial)

A — ***Anthropogenic***
Artificial or geological material that has been disrupted and redistributed by human activity; texture highly variable. Note that many areas of residential communities and till veneer are mapped as the original material because of the sporadic and shallow nature of the modification.

Ao — ***Alluvial***
Gravel, sand, silt, minor clay and organic deposits. Deposited by active streams and rivers in channels and floodplains. Thickness estimated from 1–10 m.

Ml — ***Marine littoral***
Boulders, cobbles, sand and organic deposits. Coarser material predominant where drumlins form headlands; finer material forms beaches, barrier bars and spits. Sediments deposited or reworked in the littoral zone (i.e. foreshore and backshore) by wave action, longshore drift and eolian processes. Thickness estimated from 1–5 m.

L — ***Lacustrine***
Sand, silt, clay and organic deposits. Sediments deposited from suspension in freshwater lakes, ponds and wetlands; includes shoreline material deposited or reworked by wave action. May be underlain by till or glaciolacustrine material (sand, silt and clay with some dropstones). Thickness estimated from 1–5 m.

PLEISTOCENE (last glaciation)

Th — ***Hummocky till***
Beaver River Till is a diamicton with loose, sandy matrix and locally derived clasts. Surface topography is irregular with small mounds of till deposits. Sediments derived from subglacial erosion and meltout processes. These deposits may represent areas occupied by stagnant ice. Thickness estimated from 1–10 m.

Tb — ***Till blanket***
Beaver River Till is a diamicton with sandy matrix and locally derived clasts. Sediments deposited by ice and derived from subglacial erosion. Thickness estimated from 5–10 m (thick enough to mask irregularities of the underlying bedrock).

* **Tv** — ***Till veneer***
Beaver River Till is a diamicton with sandy matrix and locally derived clasts. Sediments deposited by ice and derived from subglacial erosion. Thickness estimated from 0.5–5 m. Some areas include exposed bedrock and thicker till deposits (>5 m) of locally derived till.

Td — ***Drumlins***
Elongate landforms with long axes parallel to ice flow, composed of up to three tills: a core of Harbten Till (observed only at coastal sections), overlain by Lawrencetown Till, and in some areas, overlain by Beaver River Till (described above). Harbten Till is a diamicton with dark grey, compacted, clayey silt matrix, and predominantly locally derived and lesser distally derived clasts. Lawrencetown Till is a diamicton with brownish-red, compacted, clayey silt matrix, and predominantly distally derived clasts. Thicknesses of drumlins are affected by the surface relief of the landforms they are sitting on. In some instances depth to bedrock (determined from water well data, cf. Kennedy et al., 2009) exceeds the surface relief, suggesting material filled a preglacial topographic low or paleovalley. These thicknesses may exceed 30 m.

PALEOZOIC

* **R** — ***Bedrock***
Bedrock exposed at surface or beneath shallow soil. It may include minor fluvial, lacustrine and till deposits. Exposed surface is glacially scoured with ice movement features, such as striae, which are indicated by symbols where identified. Obvious 'strike ridges' seen on the LiDAR hillshade image represent more durable rocks within individual formations.

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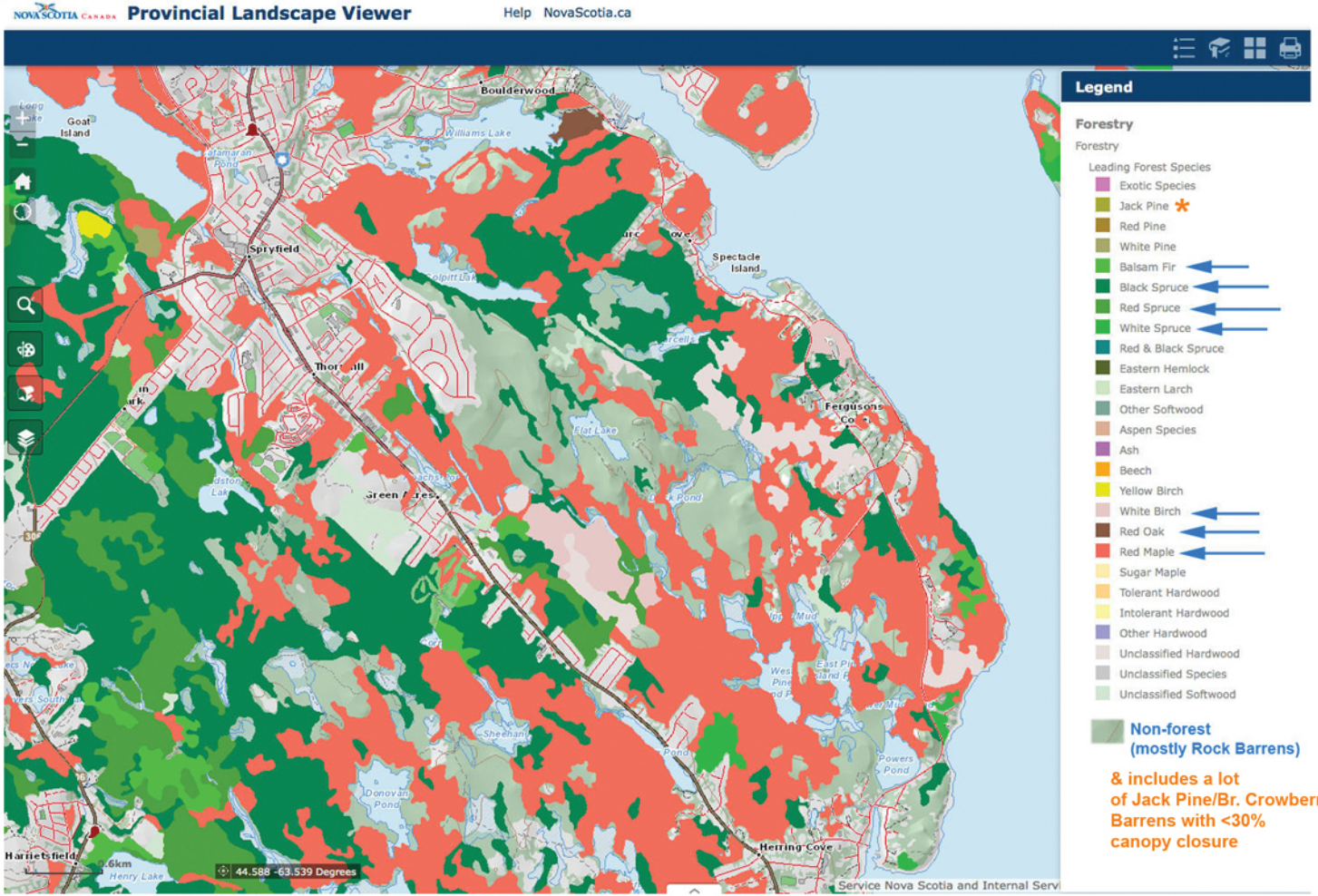
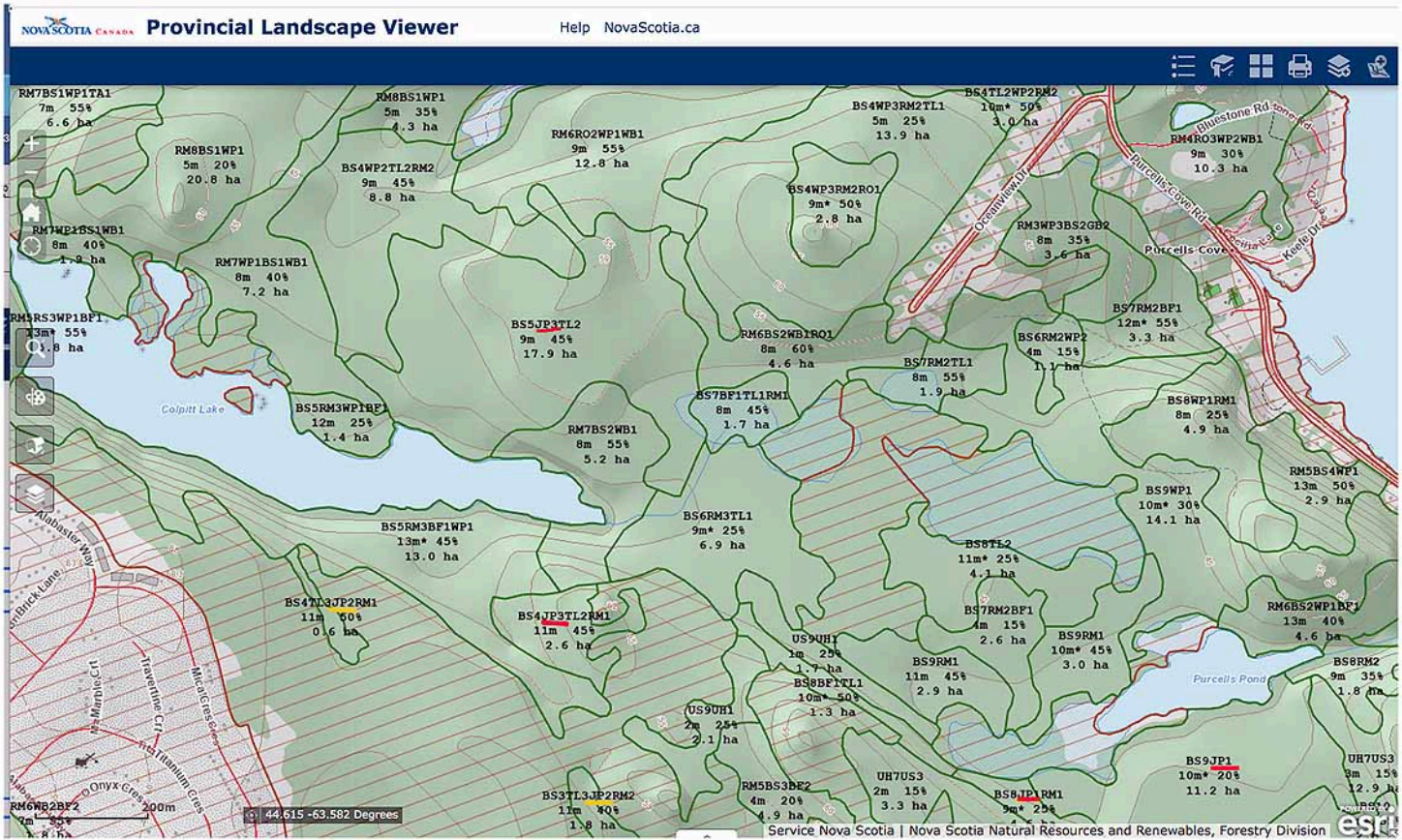
Leading Forest Species

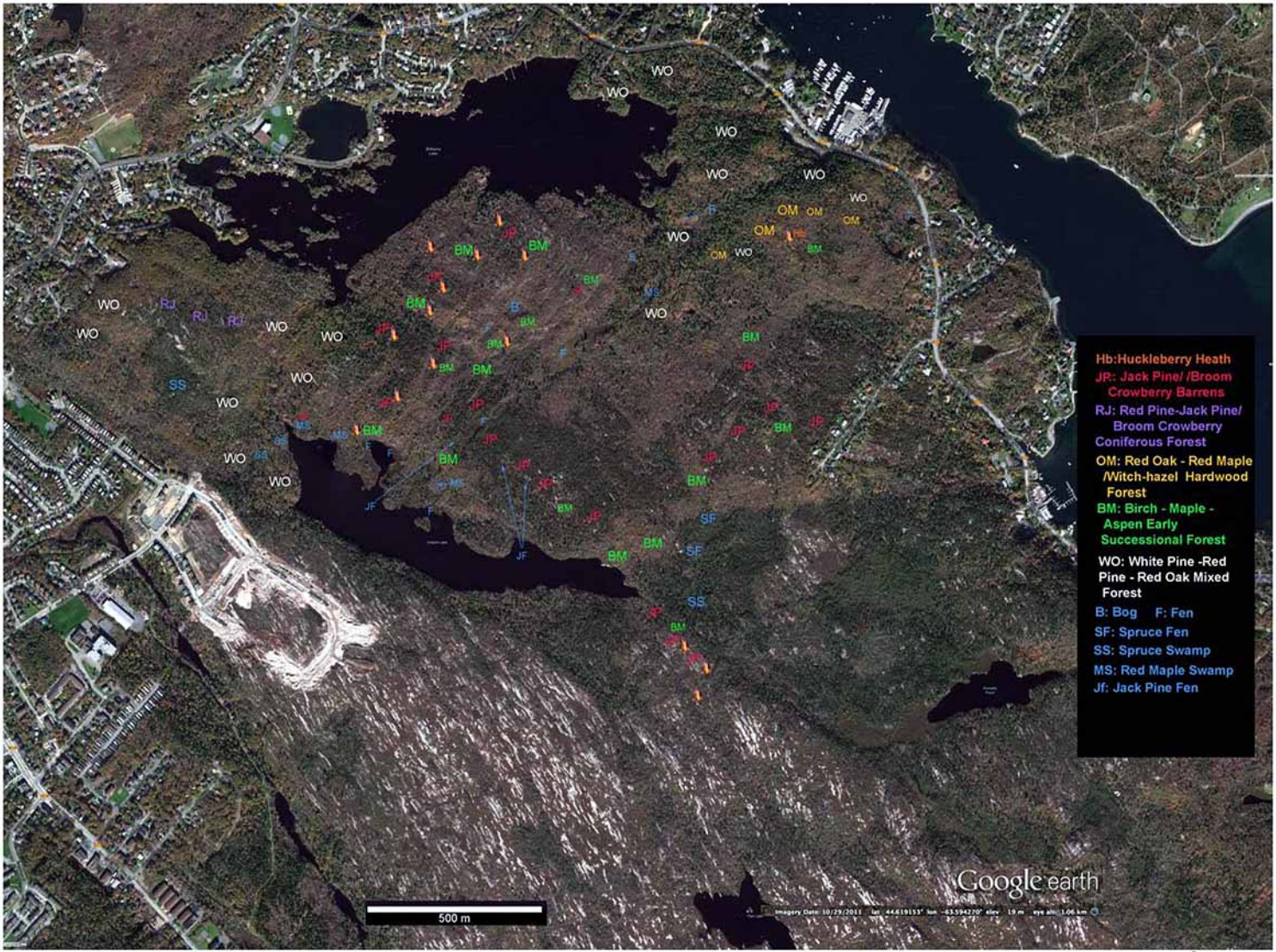


Forest Stand Details



JP second in abundance

JP third



Ground-truthed Wetlands & Upland Plant Communities (larger units).

Jack Pine under-represented in maps; terminology issues

Treeless: ***Barrens*** (Porter et al., 2020)
10-30% tree cover: ***Woodland*** (CNVC)
>30% tree cover: ***Forest*** (CNVC)

Mature JP Forest (a) burns, making a Barrens (b); after ~10+ years: Woodland (c); after 30+ yrs: Forest (a)

NRR Forestry Maps:
>30% tree cover is ***Forest***
0-30% tree cover is ***Non-Forest***

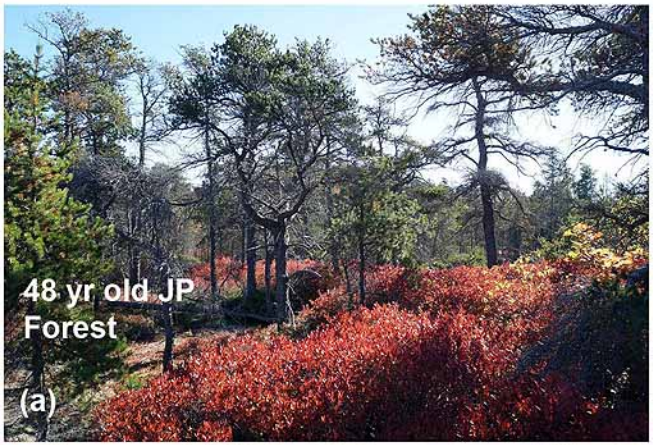
In NRR Forestry Maps, Backlands area

- Mature JP Forest (a) is id'd as BS4WP3RM2RO1 (no Jack Pine), i.e. *Photo-Interpretation error*

- Burnt JP/Young JP stands in (b) (c) (f) are classified as *Non-Forest*

In areas of whalebacks (c; less pronounced in b) JP stands may never be "Forest" because of high proportion of area that remains treeless.

Similar issue: wetlands and watercourses in the troughs are too small to be protected, but collectively are v. significant



Fuel Type 2021

- C1 Conifer
- C3 MatureSoftwoods
- C2 Boreal Spruce
- C4 Immature Dense Softwoods
- C5 Red/White Pine
- C6 Conifer Plantation 2-6m crown base HT
- D1/D2 Leafless/Green Hardwood; D2; D1/D2
- M1/M2-25 Leafless/Green Mixedwood 21-39% Conifer
- M1/M2-50 Leafless/Green Mixedwood 40-59% Conifer
- M1/M2-75 Leafless/Green Mixedwood 60-79% Conifer
- M3/M4-30 Leafless/Green Mixedwood 26-50% Dead
- M3/M4-60 Leafless/Green Mixedwood 51-75% Dead
- M3/M4-100 Leafless/Green Mixedwood 76%+ Dead
- CC10 Clearcut
- NS1 Nova Scotia Special (Ericaeous heath)
- O1/O2 Cured/Green Grass; O-1a / O-1b
- S1 Slash
- S2 Spruce/Fir Slash
- S3 Heavy Slash/ Windthrow
- SF Seasonal Fuel
- Nonn/UR Nonfuel/Urban
- XX Not Classed
- WAT Water

Note: Map is for demonstration purposes only.
For accurate fuel types conduct a ground truthing survey
Fuel Type data is from 2021 Date: 2023-10-17

Halifax Backlands

Fuel Types

WILDFIRE MANAGEMENT NOVA SCOTIA
FOREST PROTECTION
NOVA SCOTIA

N

1:20,000

S17

NS1 Nova Scotia Special (Ericaeous heath)

fire

MDPI

Article

Fire Behaviour Observation in Shrublands in Nova Scotia, Canada and Assessment of Aids to Operational Fire Behaviour Prediction

Anne-Claude Pepin [1,*] and Mike Wotton [2]

1 Parks Canada, Cape Breton Highlands National Park, 37486 Cabot Trail, Ingonish, NS B0C 1L0, Canada
2 Canadian Forest Service, Graduate Department of Forestry, University of Toronto, Toronto, ON M5S 3B3, Canada; mike.wotton@utoronto.ca
* Correspondence: anne-claude.pepin@canada.ca

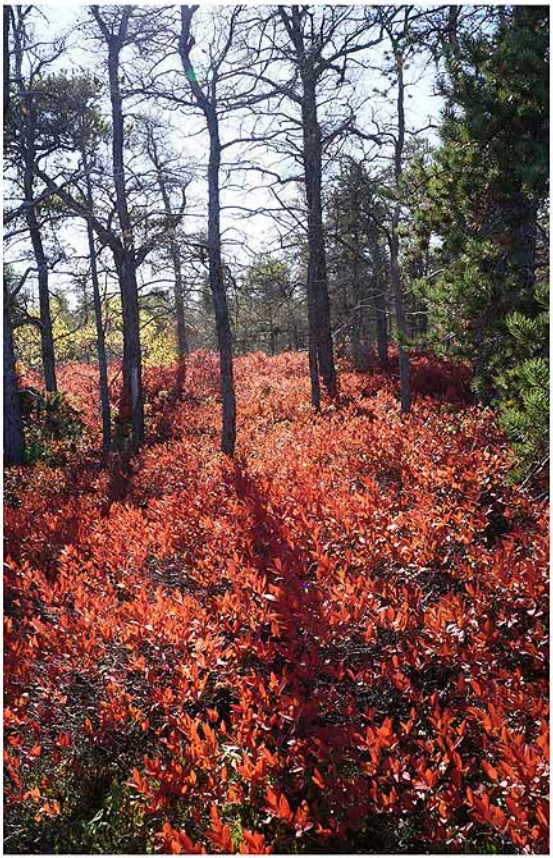
Received: 31 May 2020; Accepted: 18 July 2020; Published: 26 July 2020

check for updates

Fire **2020**, *3*, 34; doi:10.3390/fire3030034

"In Nova Scotia, shrublands, also known as coastal barrens or highland barrens, represent 6% of the province area and 12% of Cape Breton Highlands National Park...

"**Intense fire behaviour** has been observed in this type of vegetation under weather conditions that would, in other more typical forest stands, be considered low risk. Operationally, these observed differences warranted a special fuel typing on the province's GIS fuel type layer; fire specialists in Canada refer to this fuel type as the **"Nova Scotia Special Fuel Type (NS-1)".** Although of different species composition, other shrub types in Australia, New Zealand, Portugal and Scotland exhibit **extreme fire behaviour under low fire danger** as well. This has been commonly explained by the high proportion of dead fuel in the shrub canopy and direct exposure to wind."



Shrubland/Jack Pine Interface in the Backlands Oct 25, 2013

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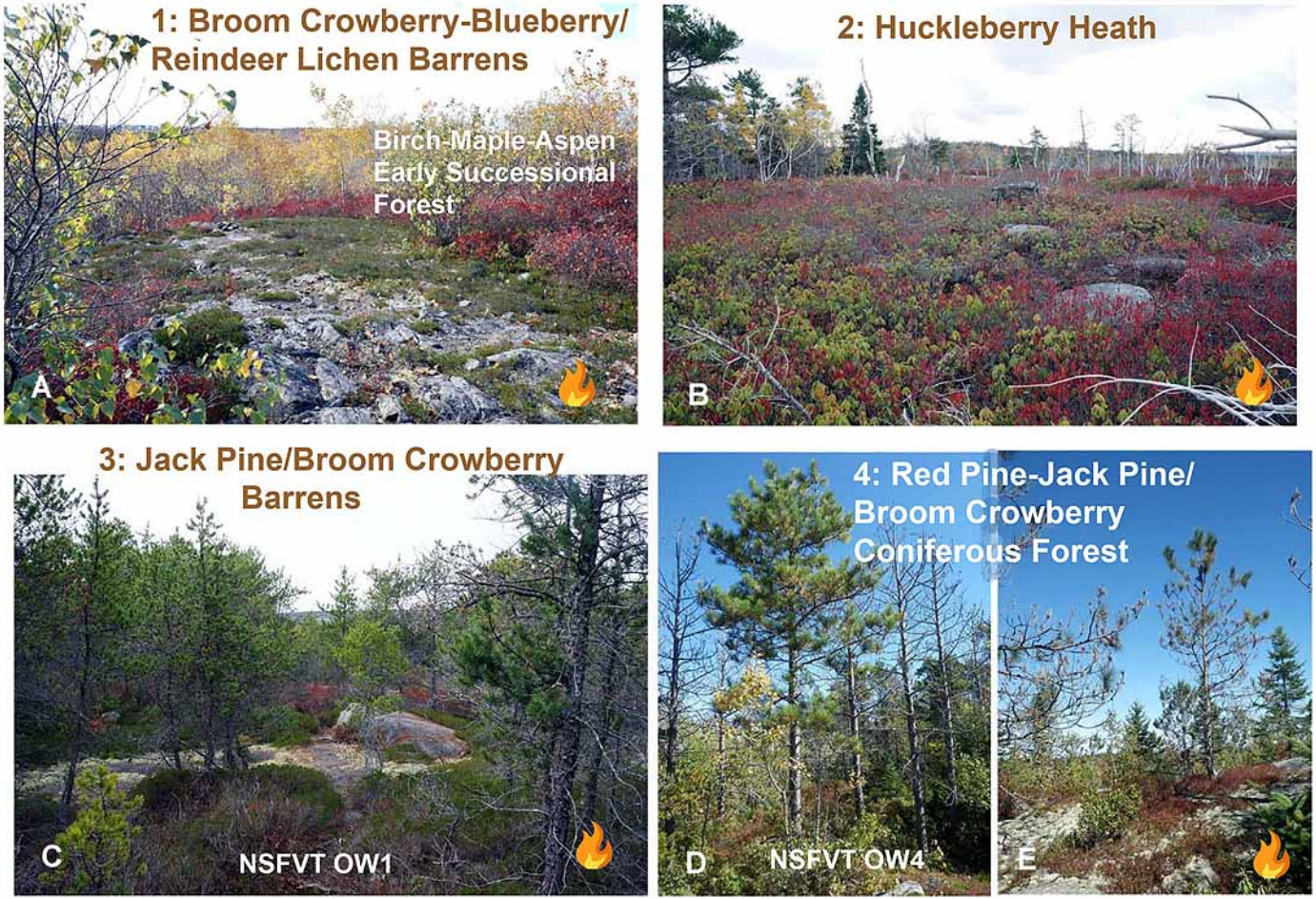


Fig. 5.1 Upland Plant Communities. A: Broom Crowberry-Blueberry/Reindeer Lichen Barrens; Black Huckleberry (red) at border continues under Adjacent Birch-Maple-Aspen Early Successional Forest. B: Huckleberry Heath. C: Jack Pine/Broom Crowberry Barrens. D, E: Red Pine-Jack Pine/Broom Crowberry Coniferous Forest, Red Pines are partially or wholly dead.

5: Birch-Maple-Aspen Early Successional Forest

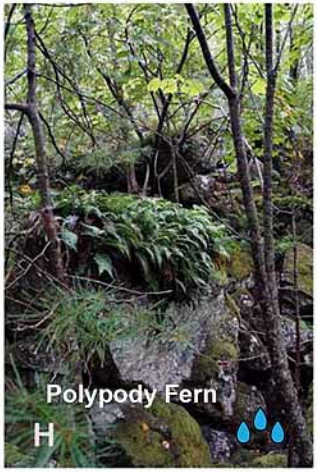
6: Red Oak - red Maple/Witchhazel Hardwood Forest

S22

7: White Pine-Red Oak Mixed Forest

NSFVT SP3 & SP4

A,B,C: on better drained sites



E,F,G: In stream corridor H: At "The Gully"

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Plant Adaptations

With a long history of frequent fire in the landscape, many plants in our region are adapted to survive in environments with fire. Some plants even depend on fire to help them grow and disperse. There are various adaptations plants use to survive and live with fire. Plant species can typically be classified into 5 different categories based on their adaptations, though some can fit into more than one category.

Sprouters

Sprouters are the species that endure fire. Sprouters resprout from their roots, trunks, limbs, and/or crown after a burn. Many shrubs are sprouters. Some of these species also have hard shelled seeds relying on fire to crack them open. While the parent plant may be injured in a fire, the new sprouts are able to grow in nutrient rich soil and have less competition. Some examples include: oak, aspen, and madrone.

Seeders

Seeders are adapted to evade fire by shedding lots of seeds that sprout after fire. These sprouts thrive from the rich nutrients recycled into the soil. Right after a fire is a prime time for a plant to disperse its seeds and germinate because there is more space to grow and less competition for resources like sunlight, water, and nutrients. Many Seeders are dependent on fire to create the habitat needed for their seedlings to sprout and grow. Seeders are not invaders because they already inhabited the area before the fire and their population does not spread as rapidly as invaders. Some examples include: buckbrush, lodgepole pine, and manzanita.

Resisters

Resisters are the species that can survive moderate to low-intensity fires with little to no damage. Some adaptations of Resisters include: thick bark to shield them from fire; deep roots protected from fire; the shedding of their lower branches to prevent fire from climbing; and moist, short needles or leaves that are hard to burn. Some examples include: ponderosa pine, sugar pine, and Douglas-fir.

Invaders

Invaders take over recently burned areas. Their populations are either limited or unknown prior to fire. Invaders tend to have seeds that are highly dispersive by wind, animals, or people. Many invaders are noxious weeds that take over areas after disturbances such as a fire, flood, or development. Some examples include: star thistle, fireweed, and scotch broom.

Avoiders

Avoiders are least adapted to fire because they grow in areas where fire does not normally occur. They are typically found near water or in high elevations. Avoiders are a late successional species, thus they are not found in recently burned areas. Avoiders have thin bark, shallow roots, and lots of resin, which can help a fire spread.

From:
U.S. Bureau of Land Management

Table Rocks
Curriculum: Fire Ecology

Table Rocks Management Area

Plant "Adaptations" to Fire in the Backlands

1. SPROUTERS – Tops burn off; new sprouts arise from underground buds on or in:

(a) root crown at base of stem and/or on roots

wire birch

big tooth aspen

witherod

(Photos Aug 27 at LMP)

Plant "Adaptations" to Fire in the Backlands

1. SPROUTERS – Tops burn off; new sprouts arise from underground buds on or in:

(b) rhizomes

black huckleberry

(Photos Aug 27, 2010 at LMP)

teaberry

bunchberry

(c) bulb or bulblike structures

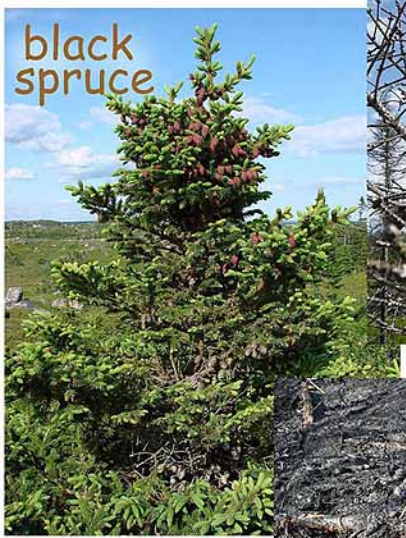
pink lady's slipper

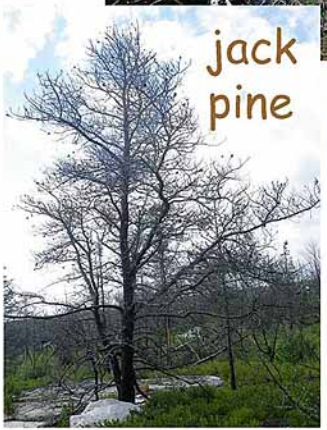
(May 25, 2009)

Plant "Adaptations" to Fire in the Backlands

2. SEEDERS: Above-ground seedbank

(on-site): Tops killed by fire but (some) serotinous or semi-serotinous cones/seed survive & release seed





Cones on burnt ground, May 14 2009 (PCCL)

seedling Sept.21, 2010 (LMP)

open cones & released seed May 4, 2009 (LMP)

Plant "Adaptations" to Fire in the Backlands

2. SEEDERS - Below-ground seedbank

Plants are totally destroyed by fire. Seeds in soil survive abd are stimulated to germinate by smoke, heat associated with the fire

broom crowberry

pre-fire

July 21, 2010

pinweed Aug 27, 2010

Aug 27, 2010

broom crowberry

Plant "Adaptations" to Fire in the Backlands

3. Resisters - Thermal Insulation

Thick bark towards the base of older trees shields them from moderate to low intensity fires.

White Pine

Plant "Adaptations" to Fire in the Backlands

3. Resisters - Thermal Insulation

Thick bark towards the base of older trees shields them from moderate to low intensity fires.

Red Pine

Red Oak

Plant "Adaptations" to Fire in the Backlands

4. Invaders

High potential because of proximity of WUI

"Invaders take over recently burned areas. Their populations are either limited or unknown prior to fire. Invaders tend to have seeds that are highly dispersive by wind, animals, or people. Many invaders are noxious weeds that take over areas after disturbances such as a fire, flood, or development."

BUT Very few ruderals from urbanized habitats observed on burnt Backlands even 14 years after the Spryfield Fire.

Invasive, Exotic and Native "riderals" - species of recently distrubed habitats

Plant "Adaptations" to Fire in the Backlands

5. Avoiders

"Avoiders are least adapted to fire because they grow in areas where fire does not normally occur. They are typically found near water or in high elevations. Avoiders are a late successional species, thus they are not found in recently burned areas. Avoiders have thin bark, shallow roots, and lots of resin, which can help a fire spread."

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Regeneration of Forest and Barrens after the Spryfield Fire of April 30, 2009

A set of photos illustrates the regeneration of vegetation over 16 months after an intense fire swept through forest and barrens in the vicinity of Spryfield, Nova Scotia on April 30, 2009. The fire destroyed twelve homes.

The materials were prepared by Richard Beazley and David Patriquin for a talk given to the Halifax Field Naturalists (HFN) on September 2, 2010. The text, with a few modifications to suit the web page format, is taken from their report for HFN's quarterly newsletter, the *Halifax Field Naturalist*. (David and Richard are members of HFN.)

- Photos and text as web page (5 MB)
- Photos and text as PDF (9 MB)
- More Info. on fires and barrens
- Common Names/ Scientific Names
- Use of Materials

David and Richard visited two areas affected by the fire:

- the Purcells Cove Conservation Lands which lie in a strip extending from Purcells Cove to Flat Lake approximately 1 km inland
- the Lower Mud Pond area which lies on Crown land close to Purcells Cove Road just past York Redoubt.

They visited and took photos in these areas at one to two month intervals through the spring, summer and fall of 2009 and again in 2010.

The photos illustrate the rapid regerneration of vegetation after the fire. The prominence of two fire-dependent species. jack pine and broom crowberry, highlight the fire-susceptible nature of this landscape.

Please send any corrections or comments to hfninfo@yahoo.ca.

Above: bracken fern on a burned area of the Purcells Cove Conserations Lands, June 6, 2009. (Photo by Richard Beazley)

2

Richard: "My interest in seeing and photographing the damage created by the fire and the later recovery was piqued by my initial sadness over the human-caused devastation of this wilderness habitat's fauna and flora, and later by the excitement of HFN members over the learning possibilities presented by the fire. Over 14 months, I visited the area seven times."

David: "To me it presented a special opportunity to observe the recovery of barrens and associated forest flora after a fire. I was particularly interested in two fire-stimulated species that occurred in the affected area: jack pine and broom crowberry."

15

May 25, 2009 in the Purcells Cove Conservation Lands

Life was already emerging from the thin, burned-over soil, as illustrated by this four-inch high (10 cm) bracken fern and a small painted trillium already in bloom (next photo). (Photo by Richard Beazley)

June 6 2009

(Purcell's Cove Conservation Lands)

Richard: On the 6th of June 2009, a foggy day, I went back for a second visit. My photos show blackened tree skeletons, scorched jack pine needles, and 12- to 15-inch-high (30 - 40 cm) bracken fern, a pink lady's slipper, and six-inch-high (15 cm) saplings growing from the base of a burned red maple tree. I was heartened by the persistence of life exhibited so soon after the fire.

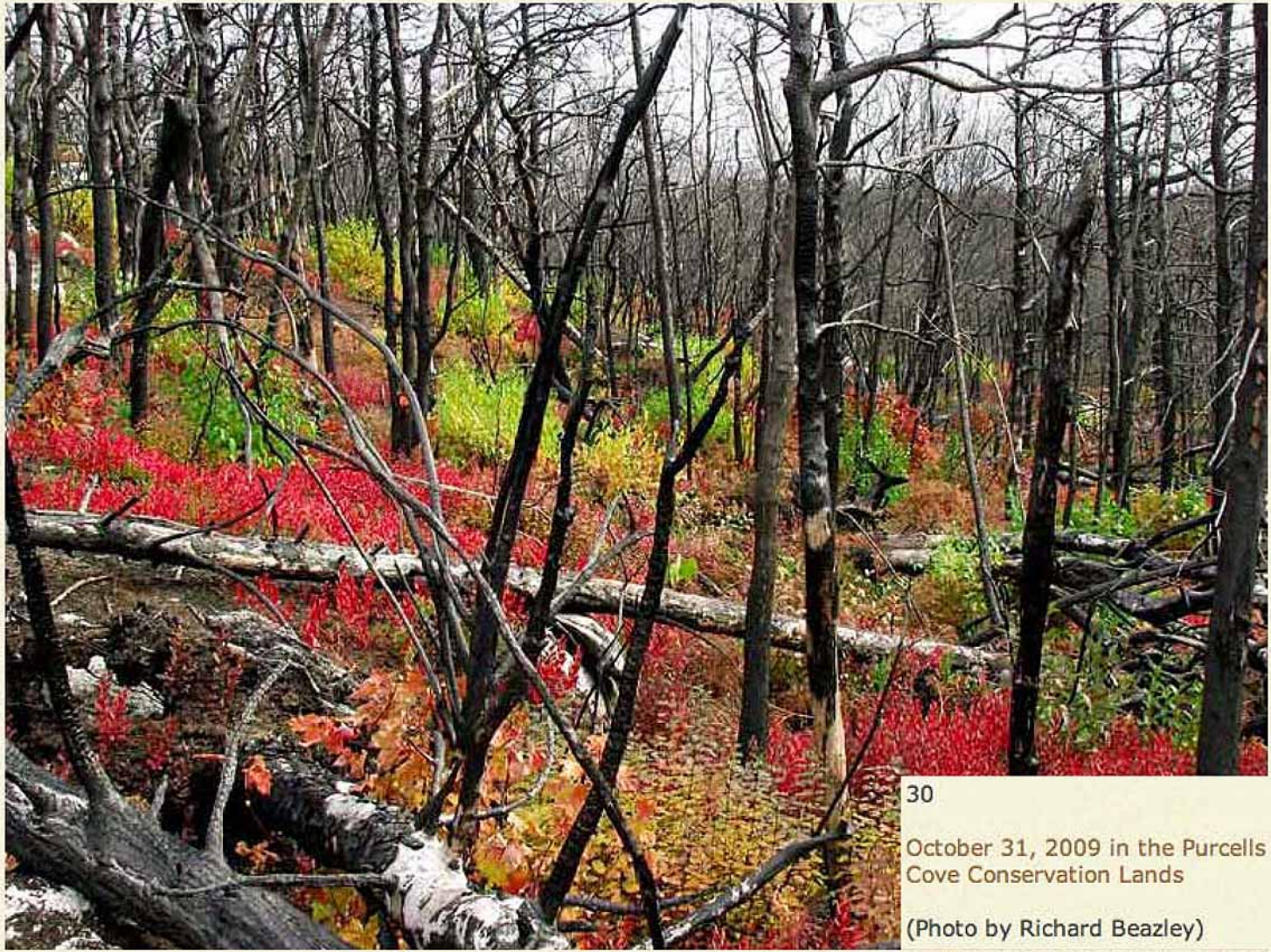
(Photos by Richard Beazley)

I made two visits in October, one on October 9th and the second on October 31st, five to six months post-fire. Images from my first visit showed leaves still green on wire birch, the beginning of color changes in huckleberry leaves, fern fronds turned brown, and suckers with fully reddened leaves on an otherwise lifeless-looking red maple tree.

Oct. 9, 2009

(Purcell's Cove Conservation Lands)

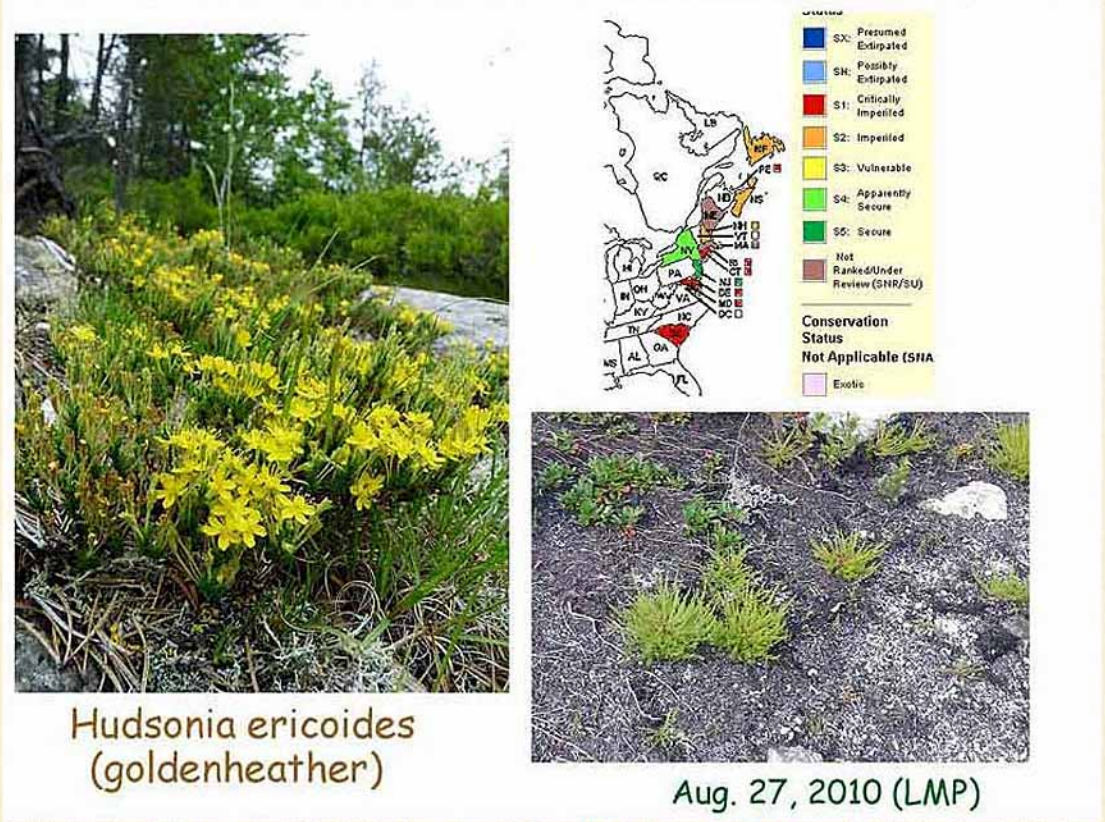
(Photos by Richard Beazley)



30

October 31, 2009 in the Purcells Cove Conservation Lands

(Photo by Richard Beazley)



Goldenheather in flower, June 20, 2009, Inset map is from NatureServe Explorer page for *Hudsonia ericoides*). (Photo by David Patriquin)

62

Goldenheather (*Hudsonia ericoides* is another coastal plain species and creeping shrub that occurs on shallow soils over granite and survives fire through an below-ground seedbank. As was the case for broom crowberry, I observed seedlings for the first time only in the late summer of 2010. They seem to get a bit of a jump start over the crowberry, however, as they were much larger thanthe crowberry seedlings, either germinating earlier (but unseen), and/or growing faster.

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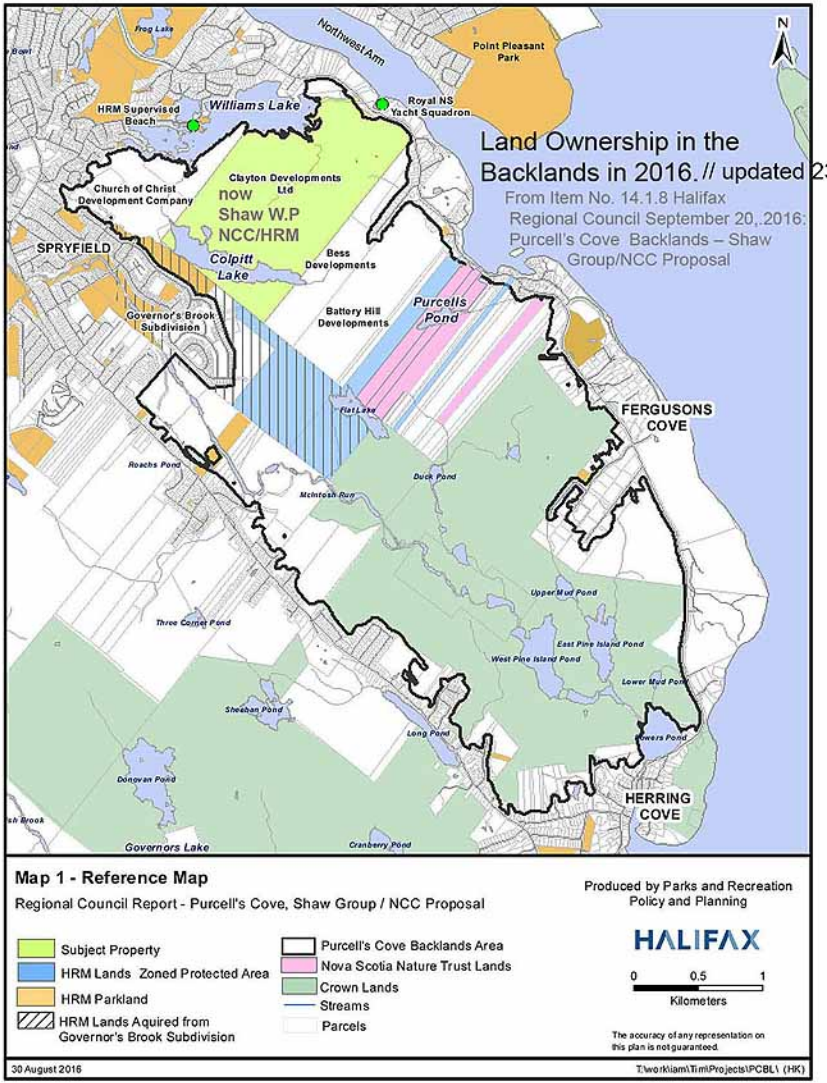

Land Ownership in the Backlands in 2016. // updated 23 Oct 2023
From Item No. 14.1.8 Halifax Regional Council September 20,.2016: Purcell's Cove Backlands – Shaw Group/NCC Proposal
N
Northwest Arm
Point Pleasant Park
Royal NS Yacht Squadron
Frog Lake
HRM Supervised Beach
Williams Lake
Church of Christ Development Company
Clayton Developments Ltd
now
Shaw W.P
NCC/HRM
SPRYFIELD
Colpitt Lake
Bess Developments
Battery Hill Developments
Purcells Pond
Governor's Brook Subdivision
FERGUSONS COVE
Flat Lake
Roachs Pond
Duck Pond
McIntosh Run
Upper Mud Pond
Three Corner Pond
East Pine Island Pond
West Pine Island Pond
Lower Mud Pond
Sheahan Pond
Long Pond
Bowers Pond
Donovan Pond
HERRING COVE
Governors Lake
Cranberry Pond
Map 1 - Reference Map
Regional Council Report - Purcell's Cove, Shaw Group / NCC Proposal
Produced by Parks and Recreation Policy and Planning
HALIFAX
Subject Property
HRM Lands Zoned Protected Area
HRM Parkland
HRM Lands Aquired from Governor's Brook Subdivision
Purcell's Cove Backlands Area
Nova Scotia Nature Trust Lands
Crown Lands
Streams
Parcels
0 0.5 1
Kilometers
The accuracy of any representation on this plan is not guaranteed.
30 August 2016
T:\work\am\Tim\Projects\PCBL\ (HK)

S42b

The Case for Conservation of the Backlands: Ecological Values

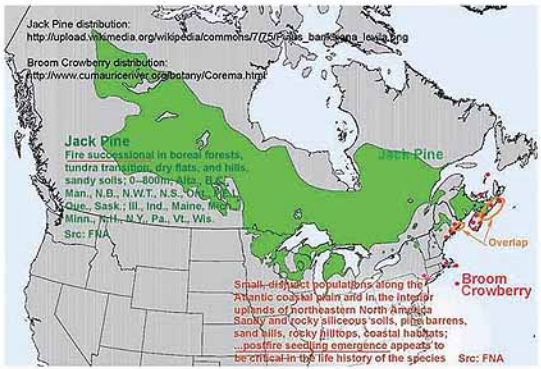
The Jack Pine/Broowm Crowberry Barrens

The backlands include some of the best representatives of this ***nationally unique*** & ***globally rare*** ecosystem. The Jack Pine/Broom Crowberry Barrens share many features of Pitch Pine Barrens on hard surfaces to the south, but are characterized by a **unique combination of the boreal Jack Pine, and the Coastal Plain Broom Crowberry.**

This combination occurs only on scattered outcrops along the Atlantic coast of Nova Scotia from the Aspotogon Peninsula to Canso, and to very limited extent in Maine, where Jack Pine is replaced by Pitch Pine.

Jack Pine is not rare in Nova Scotia, but it is rare on the Atlantic coast.

Broom Crowberry is not rare in Nova Scotia, but it has a **very restricted distribution globally and is threatened or endangered outside of Nova Scotia**. This is the only area where populations are considered secure (S4). However populations in Nova Scotia are declining. We have lost most of its sand barren habitats in the Annapolis Valley, now we are losing the rock barren habitats.



Patches on high, windswept outcrops of hard rock within a few kilometres of the Atlantic coast, from the Aspotogan Penin. east to Canso. A few on coastal barrens (within 500 of coast).

"A nationally unique and globally rare ecosystem for which Nova Scotia would seem to have the primary global responsibility for conservation"

Broom Crowberry fruits have fleshy structures termed **elaisomes** which facilitate dispersal of seed by ants. They carry the seed to nests in the ground and eed upon the fat- and protein-rich elaiosomes while leaving the seeds intact. Such burial may be a factor contributing to survial of seeds after fires that destroy the vegetative plant.

The Jack Pine/Broom Crowberry Barrens also host **several,rare fire-dependent or fire-stimulated species** including **Golden Heather** (*Hudsonia ericoides*) **Burnt Sedge** (*Carex adusta*), **Mountain Stitchwort** (*Minuartia groenlandica*).

The Case for Conservation of the Backlands: Ecological Values

The Collective Rocky Pine Barrens

1. (BVT) Broom Crowberry-Blueberry/Lichen Barrens

2. (BVT) Huckleberry Heath

3. (BVT--FVT) Jack Pine/Broom Crowberry Barrens (equivalent to NSFVT OW1*)
As a FVT, "This nationally unique, range-limited ecosystem is one of the least common VTs" - NRR.. The most prominant VT in the Backlands area-wise.

4. (FVT) Red Pine-Jack Pine/Broom Crowberry Coniferous Woodland (equivalent to NSFVT OW4)
"Global occurrences of this provincially uncommon ecosystem are limited to Nova Scotia."). Very restricted occurrence in the Backlands

5. (FVT) Paper Birch-Red Maple-Big-toothed Aspen Early Successional Forest (equivalent to NSFVT IH6)

6. (FVT) Red Oak-Red Maple/Witch-hazel Hardwood Forest (equivalent to NSFVT IH2)

7. (FVT) White Pine-Red Pine-Red Oak Mixed Forest (equivalent to NSFVTs SP3 and and SP4)

Collectively, the upland plant communites of the Backlands constitute a Pine Barrens*; such Pine Barrens in other areas of Canada, and in the U.S., are recognized as of very high conservation value.

As mostly rockland (rather than sandy) barrens they are additionally special, and the most common VT is "Nationally Unique & Globally Rare"

In addition, it is remarkable or very pecial that this this suite of 5 fire-affected FVTs all occur within the Backlands, a relatively small area (circa 1350 ha), and are the equivalent of the diversity of FVTs found in much larger pine barrens, e.g., see description of the Northwest Wisconsin Pine Barrens by Radeloff et al., 2001.

BVT: Barrens Vegetation Type
FVT: Forest Vegetation Type

The Case for Conservation of the Backlands: Ecological Values

Wetlands & Water Flow in the Backlands

MOSAIC LANDSCAPE

Forest Forest Forest

Huckleberry Heath

Ridges (Barrens, Whalebacks)

Rapid runoff

Boulder Fields*

Vernal* Pools

Washes* (Mt Holly, rM)

& "Whaleback Troughs"

Fens Swamps

Shoreline Wetlands

LAKE

Floodplains

Slow, Cool, Filter

Broken arrows: Above &/or Belowground movement of water

* Generally not recognized or protected (N. Hill, P. Manual, D.P.)

Water movement in Boulder Fields & Washes is always or mostly below-ground

Vernal Pools are small wetlands; flooded over winter or after intense rainfall, not saturated in summer

After N. Hill in Hill & Patriquin, 2014: Ecological Assessment of the Plant Communities of the Williams Lake Backlands.

The Case for Conservation of the Backlands: Ecological Values

The Ecology Action Centre and Nature Nova Scotia Lunch and Learn: Wetlands, Adaptation and Extreme Weather Events.

Date & Time Aug 15, 2023 12:30 PM in Halifax

Description As climate change continues, the severity and frequency of extreme weather in Nova Scotia will grow, as will the need for adaptation. Dr. Danika Van Proosdij, Director of TransCoastal Adaptations Centre for Nature-based Solutions, will be discussing her work on making room for wetlands to adapt to climate change. Dr. David, retired biology professor and active citizen scientist, will share his observations studying the wetlands in the Purcells Cove Backlands in HRM, how they've reacted to extreme weather events, and what this can tell us about planning for the future. Register for the webinar to attend.

Watersheds, Watercourses & *Wetlands* of the Halifax Backlands

David Patriquin

TOPICS

Introduction: The Backlands

Main Topic: Too often overlooked (N Hill, P Manual, DP): The existence and role of Boulder Fields, Washes & "Whaleback Troughs", and Vernal Pools in watercourses

Brief Comment/Photos

- 2009 Spryfield Fire: Impact On and Of wetlands
- July 2023 Big Precipitation Events: where the water was stored
- Invasive Species in wetlands and watercourses
- Salinization of watercourses receiving urban runoff

Access slides and notes at
www.backlandscoalition.ca
Go to Current Issues/Wetlands Webinar

The Case for Conservation of the Backlands: Ecological Values

Birds

Diverse habitat mosaic near the coast in a settled landscape provides wetland, upland open, wooded and forest habitats, including early to mid-succession forests with components of old growth that support

- Birds in Migration
- Migratory Breeders
- Permanent Residents
- Forest, Open Habitat & Wetland species

Betts et al., 2022. Forest degradation drives widespread avian habitat and population declines. In *Nature Ecology & Evolution*.

Species	Forest	Obs.	Breed
Black-and-white Warbler	I	+	+
Black-capped Chickadee	I	+	+
Blue Jay	I	+	+
Downy Woodpecker	I	+	+
Eastern wood-pewee	I		
Hermit Thrush	I	+	+
Nashville Warbler	I	+	
Rose-breasted Grosbeak	I	+	
Ruffed Grouse	I	+	+
Veery	I		
Yellow-bellied Sapsucker	I	+	

SUMMARY STATS

Forest Type	Betts Total No. Species	Backlands No. Species Observed	Backlands No. Species Breeding
Immature	11	9	6
Regenerating	21	14	14
Mature (Old)	22	17	13

Species	Forest	Obs.	Breed
Yellow Warbler	R	+	+
Alder Flycatcher	R	+	+
American Goldfinch	R	+	+
American Redstart	R	+	+
American Robin	R	+	+
Canada Warbler	R		
Cedar Waxwing	R	+	+
Chestnut-sided Warbler	R	+	+
Chipping Sparrow	R		
Common Yellowthroat Warbler	R	+	+
Fox Sparrow	R		
Grey Catbird	R	+	+
Lincoln's Sparrow	R		
Mourning Warbler	R		
Northern Flicker	R	+	+
Palm Warbler	R	+	+
Philadelphia Vireo	R		
Purple Finch	R	+	+
Ruby Throated Hummingbird	R	+	+
Ruby-crowned Kinglet	R		
White-throated Sparrow	R	+	+

Species	Forest	Obs.	Breed
Bay-breasted Warbler	M		
Black-throated blue Warbler	M	+	
Black-throated Green Warbler	M	+	+
Blackburnian Warbler	M	+	
Blue-headed Vireo	M	+	+
Boreal Chickadee	M		
Dark-eyed Junco	M	+	+
Golden-crowned Kinglet	M	+	+
Hairy Woodpecker	M	+	+
Least Flycatcher	M	+	
Magnolia Warbler	M	+	+
Northern Parula Warbler	M	+	+
Northern Waterthrush	M		
Olive-sided flycatcher	M		
Ovenbird	M	+	+
Pileated Woodpecker	M	+	+
Red-breasted Nuthatch	M	+	+
Red-eyed Vireo	M	+	+
Swainson's Thrush	M	+	
Winter Wren	M	+	+
Yellow-bellied Flycatcher	M		
Yellow-rumped Warbler	M	+	+

"Forty of the 54 these species cited by Betts were observed in the Backlands during the 2021 species survey and since.

"There is evidence that 33 of those same species nest in the Backlands, including 6 species characteristic of immature forest, 14 characteristic of regenerating forest and 13 characteristic of mature (old) forest." - Joshua Barss Donham

WLCC Common Nighthawk Project

WHAT WE DID

- Funded by WLCC
- Small team led by Fulton Lavender and Joshua Barss Donham
- Field trips dawn and dusk
- Data: observations, photos
- Collaborate with Dr Staicer, Dal
- ARU placement, interpretation
- Prepare recommendations for Best Management Practices for Backlands habitat preservation

Panels & Text courtesy of M. Leary of the Williams Lake Conservation Co.

Images of Nighthawk at left are from a video by Joshua Barss Donham in the Backlands in July 2023

Photo in left graphic below by JBD

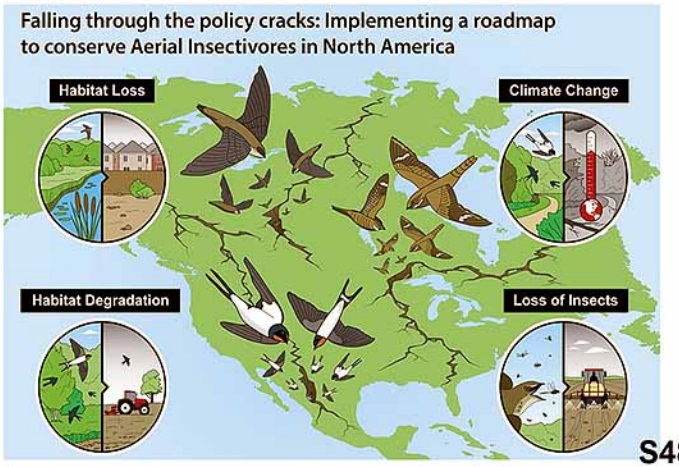
Right Graphic below: "Infographic of key threats encountered by aerial insectivores throughout their annual life cycles. In: Nebel, S. et al.,2020.Falling through the policy cracks: implementing a roadmap to conserve aerial insectivores in North America. *Avian Conservation and Ecology* 15(1):23

COMMON NIGHTHAWK

NEITHER COMMON

NOR A HAWK

- Among Nova Scotia's Species at Risk
- Status as Threatened
- Insectivore: Eats only insects
- Insectivores' numbers are declining faster than any other group of bird species in Canada.
- Loves to eat Beetles !



WLCC Common Nighthawk Project

"The Common Nighthawk Project was funded by WLCC and accomplished through the volunteer work of many Backlands Coalition members.

"Joshua is working on analyzing the recent data, but we already have evidence of breeding Nighthawks for at least two years 2021 and 2023. For this year we also have 'sound' evidence which is respected by the scientific community and observations ground truthed by Joshua and Fulton (July 8, 2023 4:30 AM 2 adults feeding, young calling from the nest on the ground). **Our Jack Pine-Crowberry rock barrens with numerous wetlands appear to be a "Happy Place" for the Common Nighthawk."**

From COSEWIC Assessment and Status Report on the Common Nighthawk *Chordeiles minor* in Canada THREATENED 2007:

Habitat: The breeding habitat of the Common Nighthawk is varied and includes open habitats where the ground is void of vegetation such as sand dunes, beaches, logged areas, forest clearings, burned-over areas, rocky outcroppings, rocky barrens, prairies, peatbogs and pastures. Since the 1900's they have lost habitat or it has been degraded for their use. Fire suppression, destruction of wetlands and extensive agricultural use of insecticides are examples of habitat degradation.

Diet and Feeding; The Common Nighthawk is an aerial insectivore that feeds primarily at dusj and dawn..at heights varying from 1m to more than 80 m...[it] visually detects its prey...The diet includes a wide variety of insects...flying ants and coleoptera represent 25% and 20% respectively of the total food eaten (Gross, 1940).

From COSEWIC: Breeding (red) wintering (blue) and migratory (yellow) locations of the Common Nighthawk (from Ridgeley et al. 2003

Photo by Gary L. Clark in Wikipedia

Recreational / Health / Touristic / Educational /... Values of the Backlands

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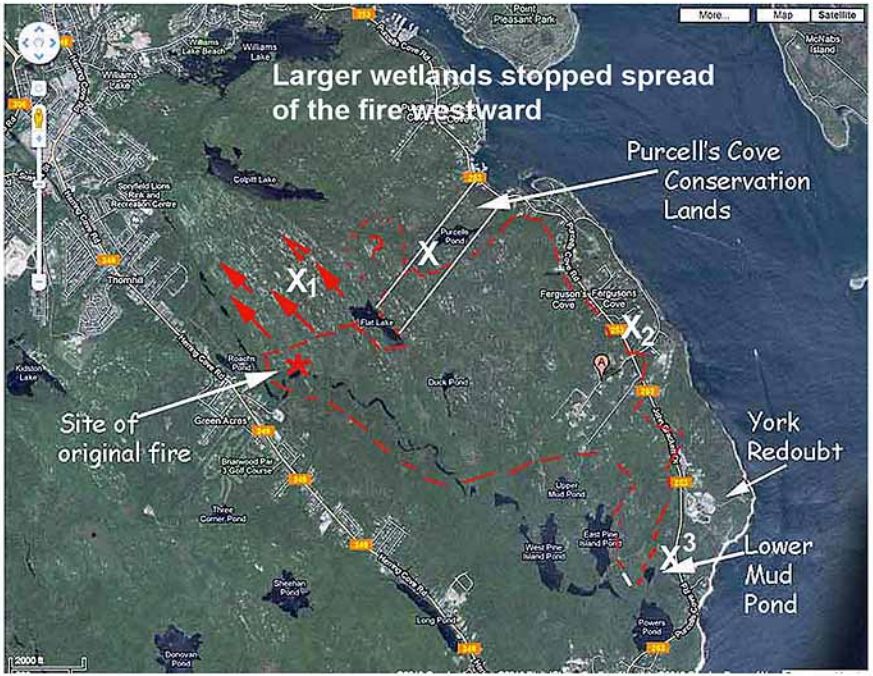
Fire & Wetlands in the Backlands



S52

Fire & Wetlands in the Backlands

Smaller wetlands burned over but recovered in 3-4 years

49

Aug. 27, 2010 in the Lower Mud Pond area

In places on small fire-damaged damaged wetlands, cranberry and hairy cap moss were growing over the still largely dead mats of sphagnum moss; there were a few spots where sphagnum appeared to be regrowing again. (Photo by David Patriquin)

Aug 27, 2010

S52b

How often and how severe are the fires in the Backlands?

* **2012** ~ 15 ha south side Wms Lake

2009 ~ 681 ha, >1/2 of the Backlands

2006/2007 ~ 5ha drumlin east of Wms Lk

1964: Residents "Fire extended into the forest on the eastern side of Williams Lake, sparing only the large red and white pines that today bear prominent fire scars at their bases." ?~100 ha

Circa 1969: Resident, "Big Fire Lower Mud Pond area" ?~100 ha

1917, Jill Alexander: "Last big fire on the Captain Arnell property was in 1917
? How extensive ?100s ha

* As documented in Hill& Patriquin (2014), Likely many more limited fires

* To be sustained in abundance and as even-aged stands, Jack Pine stands require fire intervals that are not too long (roughly, in excess of 100-150 years) or too short (5-10 years); Jack pine forests that burn more frequently than every 5 to 10 years become barrens...

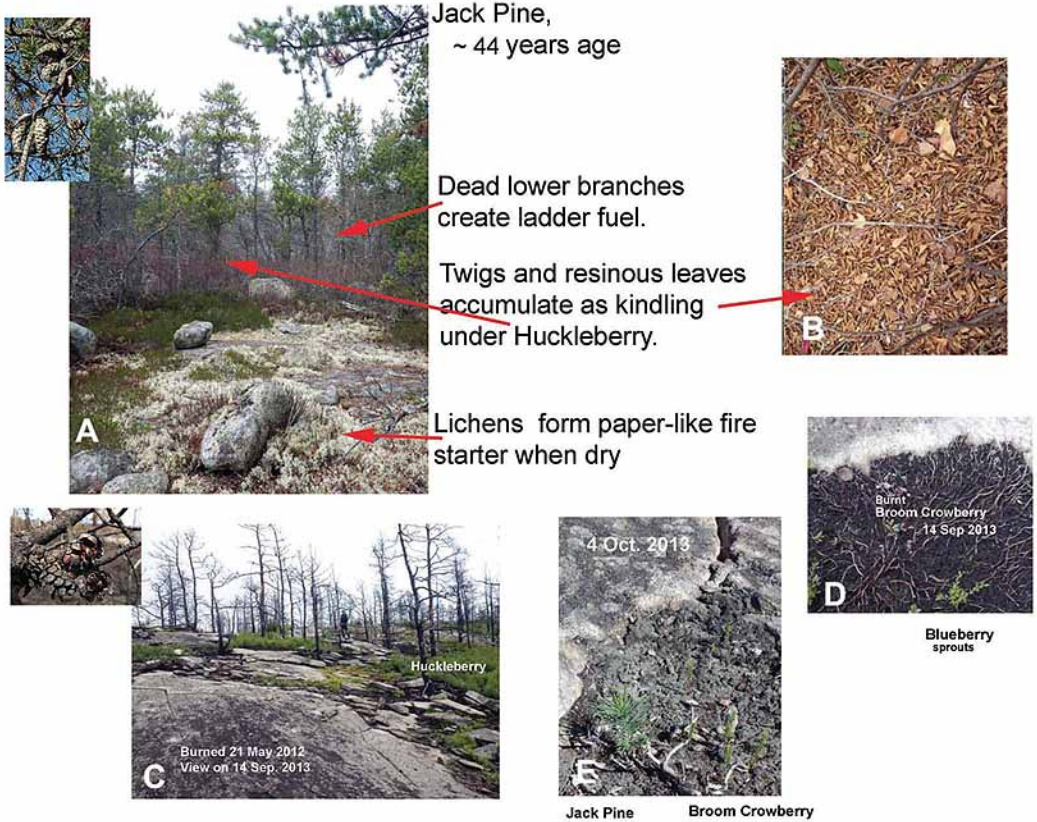
Estimates of **fire intervals in jack pine forests are generally less than 50 years**

15 yrs 40-50 years

JP Barrens — JP Woodland — JP Closed Forest →

Low Severity Surface Fires — High Severity Canopy Fires →

Open Barrens are the "Match-sticks", adjacent Jack Pines provide ladder fuels...



S7. These are **fire-stimulating as well as fire-dependent and fire-adapted ecosystems**. We saw some of these features on the field trip yesterday.The Jack Pines are mostly serotinous (i.e., with closed cones which require the heat of a fire to open). There is rapid recovery of vegetation after fires. Jack Pine in this locale becomes reproductive at 4-5 years of age and ready to burn in its teens. Huckleberry deposits a highly flammable litter, and lichens in the more open areas are highly flammable. The more open areas drain dry very quickly after rain. We consider them to be **"matchsticks"** for fires in the PCB, which is also suggested by the modeling of **fires in the area by** Ellen Whitman and colleagues (Ellen Whitman, personal communication): "...large fires generally occurred much more often around the barrens, with some escaping downslope towards Purcell's Cove Rd., as has happened in the past two fires in that area."

Possible Components for a Combined Conservation/Fire Management Strategy for the Backland

---#1 Conserve AMAP of existing undeveloped Backlands so as not to increase WUI, re: both conservation & reduction of fire hazard

....#2 Make Fire-Smart Practices with 10-30 m of "Defensible Space" essential for all structures on periphery of Backlands

....#3 Institute Fuel Reduction (e.g. As "Shaded Fuelbreak") over an additional 30 (+) m

... #4 Map and Age Jack Pine stands, area of 2009 & 2012 fires, and areas of future fires throughout Backlands (re: generating a fire-probability map/ models).

...#5 Seek Assessment of Backlands & Advice from Pine Barrens fire management folks in the U.S. including on use of prescribed fire.

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