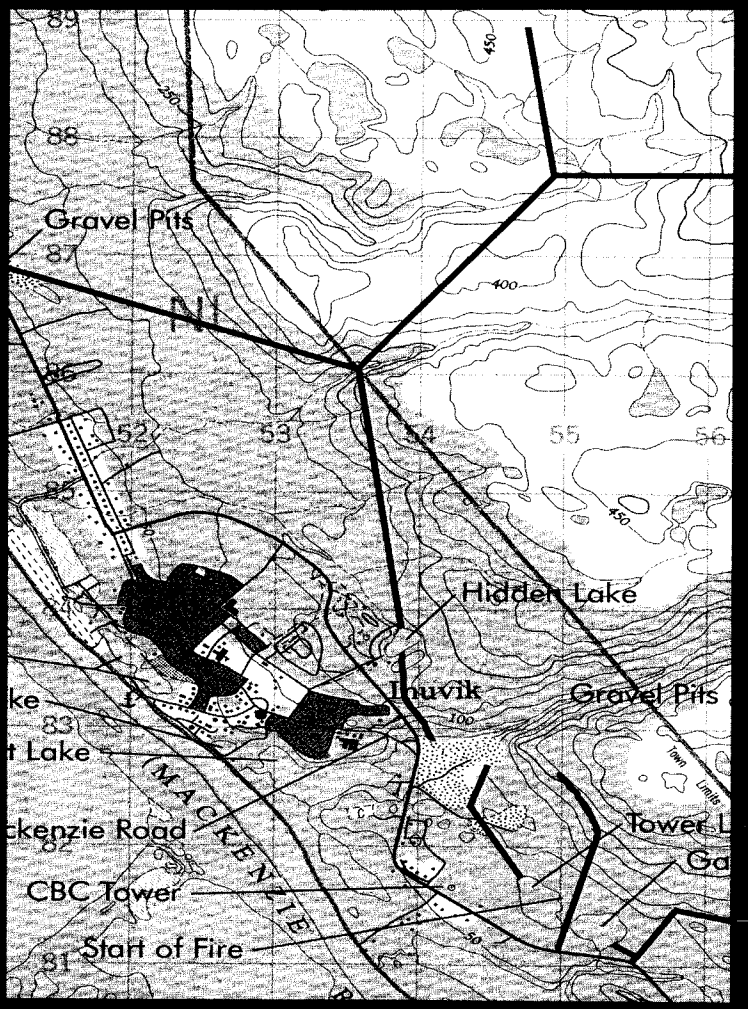
Forest Fires and Northern Communities
Lessons from the 1968 Inuvik Fire



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Inuvik Research Centre

Foreword

Visitors who drive along the Airport Road toward the Town of Inuvik may not notice a grown-over fireguard that runs eastward and up the hill across from the Juk Campground. To residents of Inuvik who were in town during the month of August in 1968, this cutline has a special meaning. On hot days in summer when smoke drifts into town from distant fires, these people remember that the fire guard was built to protect the Town from a fire that broke out on August 8 and burned for 10 long days...

About The Author

Ross W. Wein is a Professor in the Department of Renewable Resources and Adjunct Professor in the Circumpolar Institute at the University of Alberta. He and his graduate students have been conducting research on forest fires in the Northwest Territories since 1970; the first fire to receive his attention was the Inuvik Fire. He then turned his attention to fires in the Maritime Provinces because he was stationed at the University of New Brunswick, where he directed the Fire Science Centre. Early work of the research team was summarized in the volume:

Wein, R.W. and D.A. MacLean. (eds.). 1983. The role of fire in northern circumpolar ecosystems. S.C.O.P.E. 18. John Wiley and Sons Ltd., Chichester, UK. 322 pp.

Since then, he has been the first Chief Editor of the *International Journal of Wildland Fire*, has studied fire ecology in Australia and East Africa and more recently has been examining fire-related, climate-change hypotheses in the Wood Buffalo National Park and other boreal forest areas. He is currently working on non-industrial forestry alternatives with the Gwich'in. He returns to the North each summer after teaching duties are completed at the University of Alberta.

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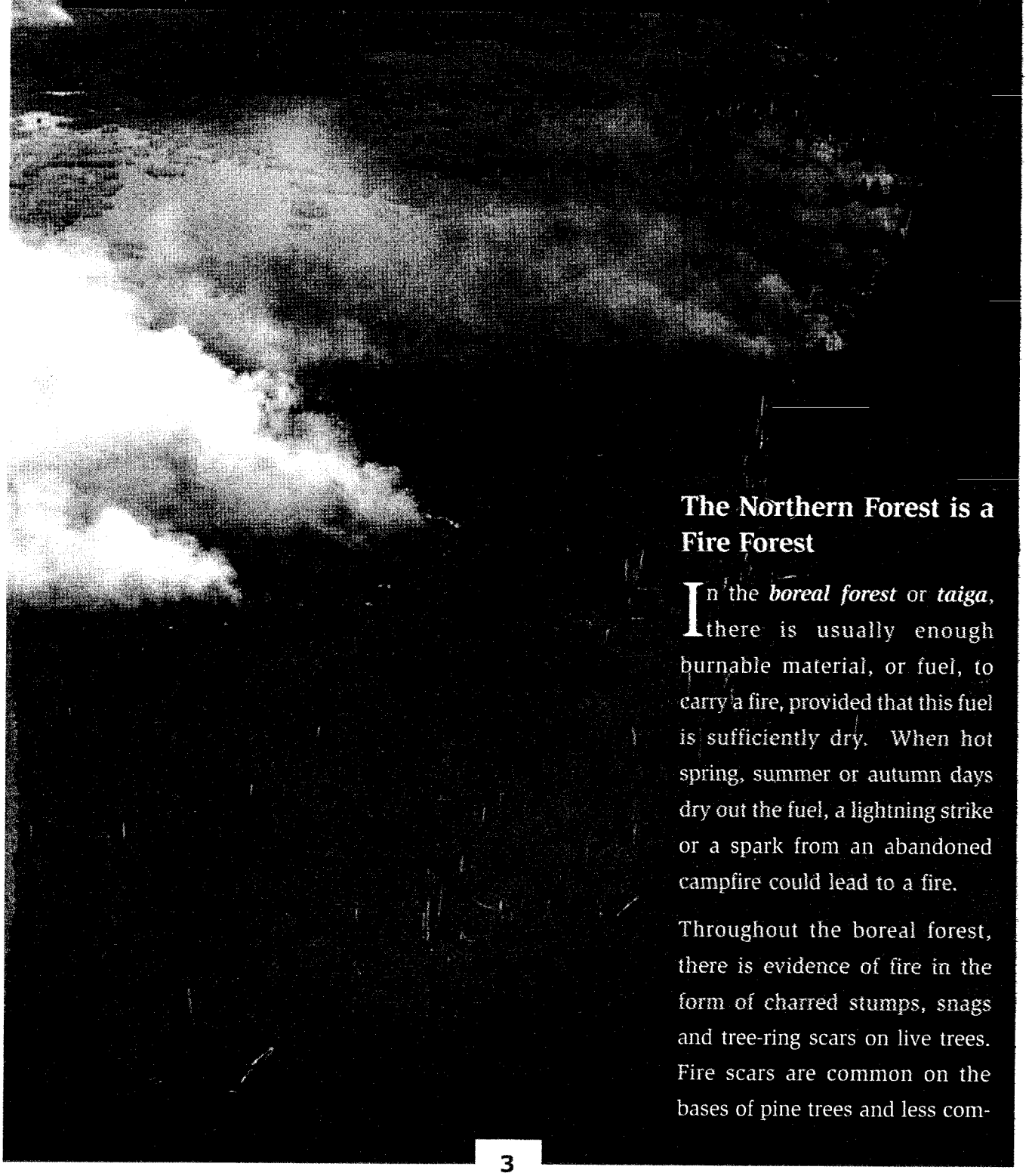


The Northern Forest is a Fire Forest

In the ***boreal forest*** or ***taiga***, there is usually enough burnable material, or fuel, to carry a fire, provided that this fuel is sufficiently dry. When hot spring, summer or autumn days dry out the fuel, a lightning strike or a spark from an abandoned campfire could lead to a fire.

Throughout the boreal forest, there is evidence of fire in the form of charred stumps, snags and tree-ring scars on live trees. Fire scars are common on the bases of pine trees and less com-

mon on thin-barked spruce and larch that grow in the wetter parts of the landscape. Fire scars on trees can be dated by counting the number of annual growth rings after fire damages a tree. Because of this, we know that there is one fire every 30 to 60 years in pine forests and one fire every 100 to 200 years in black and white spruce forests. Wetlands burn less frequently. Bog and lake sediments have layers of charcoal that provide an even longer fire history, often extending to thousands of years. These studies tell us that fire frequencies have been low during cool and wet climate periods such as during the Little Ice Age (in the years 1300 to 1700) and much higher during the past few decades.

During the late summer of 1968, the Inuvik Fire (68-34) was not the only fire in the region: 68-8, 68-21, and 68-36 also contributed to the pall of smoke hanging over the region.

The amount of snow and rain during the autumn, winter and spring strongly determine the dryness of the fuel in the spring and early summer, but it is the summer weather that has an even greater influence on fire behavior. The long day lengths of summer lead to much water loss from the soil (evaporation) and from forest vegetation (transpiration). Thunderstorms ignite fuels with lightning and the accompanying rain may not be sufficient to put out a fire. Most fires occur in July; but some of the largest and deepest-burning fires have occurred in August.

Fires are especially common in the Mackenzie Valley. Fire history maps (*available from the Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories*) show many large fires southeast and northwest of Great Slave Lake. North of the tree-line, fires generally become less frequent and smaller. However, even at the tree line, fires can still be many square kilometres in size. Over the last 25 years the number of fires per year in the Northwest Territories has varied widely. While fire occurrence records in the 1950's may not be complete, there is general agreement that the number of fires was lower. The years 1973, 1989, 1993 and 1994 were spectacular fire years with

The Northwest Territories has seen some very large fires in recent years: in 1989 there was a fire of 189,000 hectares, in 1993 one of 250,000, and in 1996 three that were over 100,000 hectares.

Community protection from fire is a high profile issue in the North; almost every summer some community is threatened.

the number of fires reaching over 400.

Community protection from fire is an important issue in the North; almost every summer some community is threatened. Children and adults with respiratory problems can suffer because of the smoke and evacuation of the community may be necessary. The table found at the bottom of this page gives a few examples.

The Inuvik Area Fire Regime

Fires have long influenced the upland landscapes of the Inuvik area. The roots of Black Spruce trees killed by fires stay frozen in the permafrost and decompose slowly. For decades the trees remain as weathered, gray sticks, while the young forest grows up around them. Many black and white spruce trees along streams have fire scars on the lower part of their trunks, which shows that fire reached them but was not intense enough to kill the trees. From fire suppression and other records, we know that there have been several large fires northeast of Sitidgi Lake that burned in 1954 and another that burned in 1962. The year 1968 was a special year since three major fires burned near Inuvik.

Conditions Before the 1968 Inuvik Fire

Fire was a constant threat to the newly constructed Town of Inuvik. The Town was built in the bush; all buildings were constructed of wood and sup-

YEAR	COMMUNITY THREATENED	ACTION TAKEN
1968	Inuvik, NT	Fire guards built around town
1982	Fort Smith, Pine Point, & Hay River, NT	Highways closed, Hay River prepared for evacuation
1993	Norman Wells, NT	Community threatened
1995	Tulita & Norman Wells, NT	900 residents evacuated
1998	Ingraham Trail, NT	State of Emergency declared, area closed to traffic and residents
1999	Tsiigehtchic, NT	Town threatened, highway closed
1999	Edzo, NT	Community evacuated

ported about one metre above the ground on wooden piles. The Town was isolated and transportation to the south was by small planes or by barge in the open water season. Most of the winter supply of food and other goods, which had arrived by barge, was stored at the Hudson Bay Company Warehouse located in the northern part of the town.

Normally, average daily air temperatures in Inuvik first rise above zero in May. Temperatures typically reach 10°C in June, 12°C in July and 10°C in August, dropping back to zero in September. Precipitation in the Inuvik region averages 18 mm in May, 22 mm in June, 26 mm in July, 42 mm in August, and 22 mm in September.

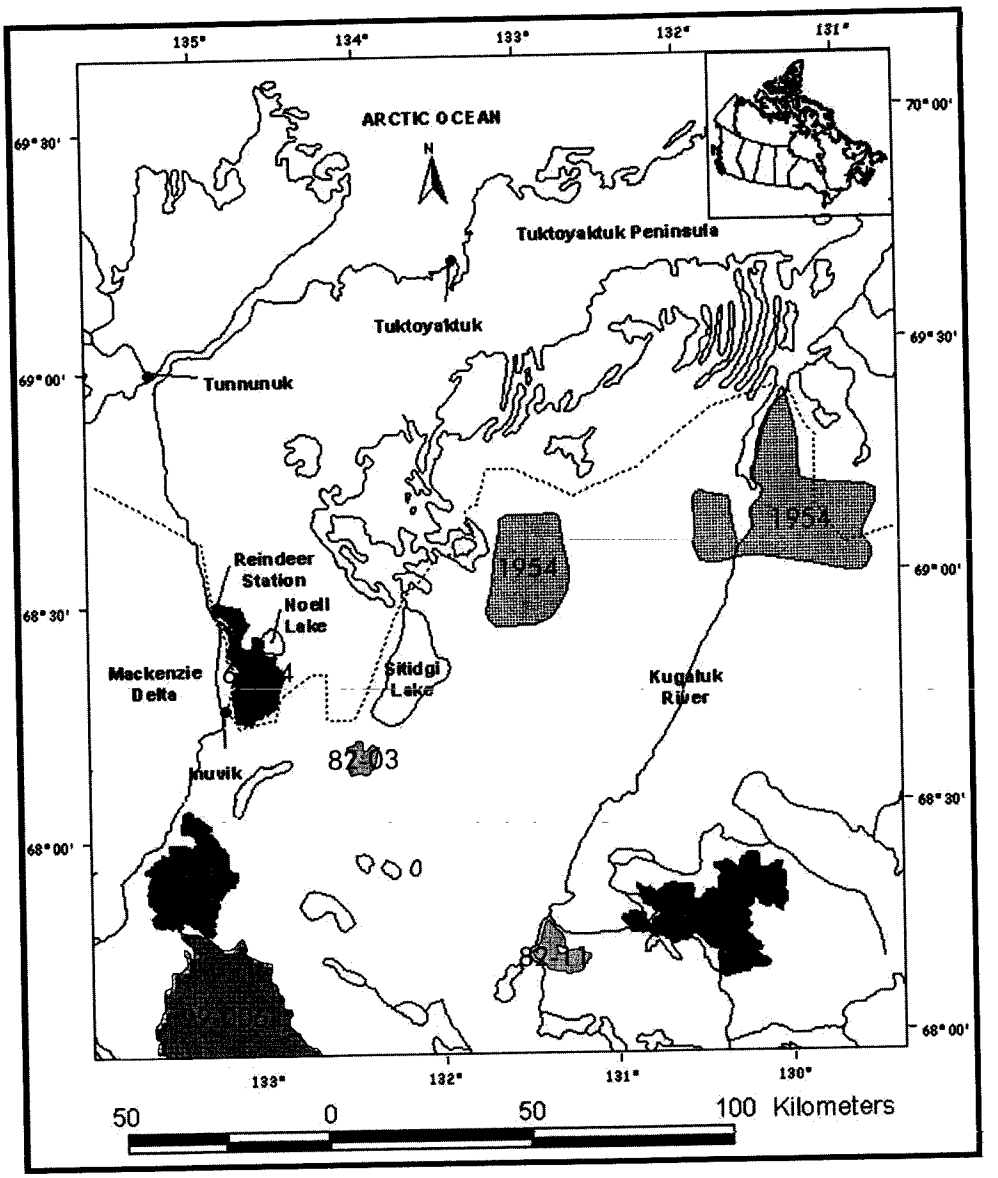
The summer weather for 1968 was not normal. Only 8.3 mm of precipitation fell between May 12 and August 18. The fuel in the shrubby forests around Inuvik was dry and there was plenty of it - there had not been a fire in the immediate area for about 100 years. Paper birch grew on the south, southwest and west slopes on the hills behind Town. White spruce grew along the sides of streams. In the lower and wetter areas, black spruce grew among shrubs and mosses.

The Fire Begins

August 8 had weather conditions that were favourable for a serious fire. It was a day waiting for a spark and an unattended campfire behind the CBC Tower provided that spark! Fire # 21, located southeast of Arctic Red River, was already contributing smoke in the area and fire managers were watching the weather closely. Marty Alexander of the Canadian Forestry Service has calculated the fire weather indices to help us understand the fire behaviour during the summer. The ***Fine Fuel Moisture Code*** was over 90, indicating that the dead grass and small sticks on the forest floor were dry and would burn readily. The ***Drought Code*** was also high at 440, indicating long-term drought and dry soil surface organic matter. Under these conditions, fire would smoulder to the mineral soil through the peat and around tree roots, making it very difficult for fire fighters to locate and put out the hot spots. These are permafrost soils, so they supply melt water to the soil all summer and keep some of the peat moist. The moist peat contributes to smoky fires that reduce visibility and make fire fighting

The conditions in Inuvik on August 8th, 1968, were perfect for a serious fire.

Major Forest Fires in the Inuvik Region:



YEAR	FIRE #	LOCATION	SIZE (HA)	LENGTH OF BURN
1954	n/a	Kugalik River	~200,000	unknown
1954	n/a	North Miner River	50,000	unknown
1968	68-22	Hyndman Lake	50,770	unknown
1968	68-34	Inuvik	35,120	Aug 8-18
1968	68-36	Campbell Lake	32,980	? - Aug 19
1982	82-03	Campbell Creek	3,700	June 26-July 16
1982	82-11	North Nineline Lake	18,731	July 4-Winter
1999	99-006	Cardinal Lakes	175,000	June 18-September

uncomfortable and dangerous.

Under low wind speeds, the fire burned slowly through the shrubs. On reaching a spruce tree with branches that touched the ground, the fire climbed the **ladder fuels** and enveloped the tree. Under paper birch, the flames crept through the leaf litter and sometimes licked up the tree trunk through the papery, outer bark. Under high wind conditions, and where white and black spruce trees grew close together, flames were more spectacular and the radiation was intense enough that fire fighters had to retreat.

The Fire - August 8 - 18

The *Inuvik Drum, News of the North* and the *Edmonton Journal* included details on fire suppression of this high profile fire. One Inuvik resident, Dick Hill, (at that time Manager of the Northern Research Laboratory) kept a detailed record of the fire-related activities (*his accounts are listed in the Bibliography at the back of this book under Hill 1969a,b*).

Thursday, Aug. 8

11:00 - A campfire is spotted behind the CBC Tower, 3 km southeast of Inuvik.

14:00 - Fire Number 34 is officially reported as spreading; an alarm is given and 12 firefighters of the Inuvik Fire Brigade, along with Inuvik Forestry Officer Wilf Taylor, respond. The fire truck cannot reach the site - although the fire at this point is only 15 metres in diameter, the fire pump fails and the fire escapes.

18:30 - The fire has traveled uphill a distance of 1.6 km.

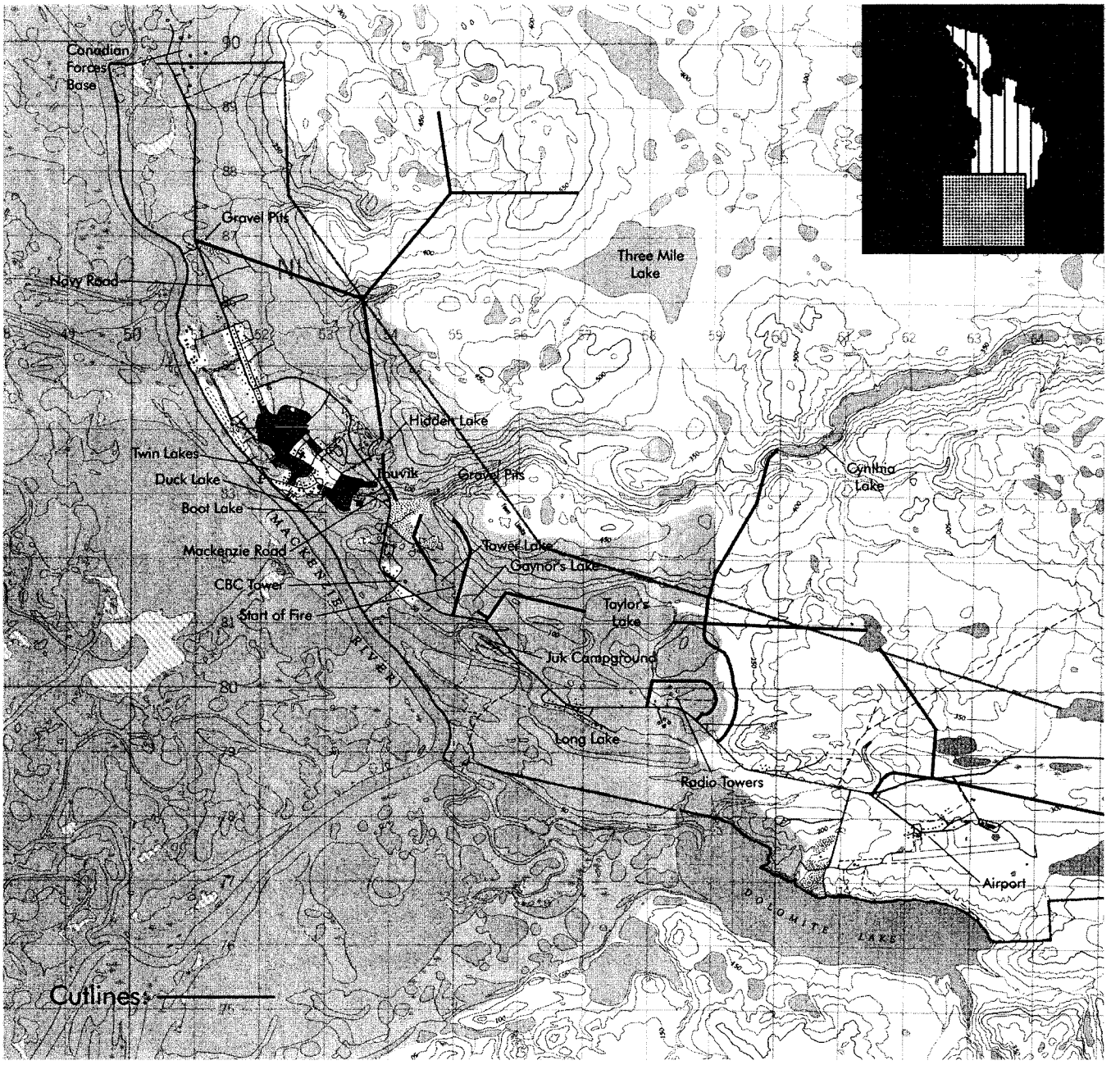
21:00 - The fire approaches the Town pump house at the west side of Hidden Lake. Small bulldozers owned by Fred Norris and Northern Affairs clear a fire guard around the pump house; an airplane is dispatched to Aklavik, Fort McPherson and Reindeer Station to bring in extra fire fighting equipment and men.

21:30- 30 km/hr winds push the fire around to the east side of Hidden Lake and towards Inuvik; smoke is thick over Inuvik and 150 volunteers both in and out of town are now involved.

Friday, Aug. 9

A high wind turns to the southwest and blows all day; fire fighters arrive from other settlements; 6 bulldozers are operating and 45 men are fighting the fire on the

By the evening of the day the Inuvik fire started, 150 volunteers are involved in trying to control it.



By Saturday, August 10th, the threat to the Town of Inuvik has become real enough that the Liquor store and bar are temporarily closed.

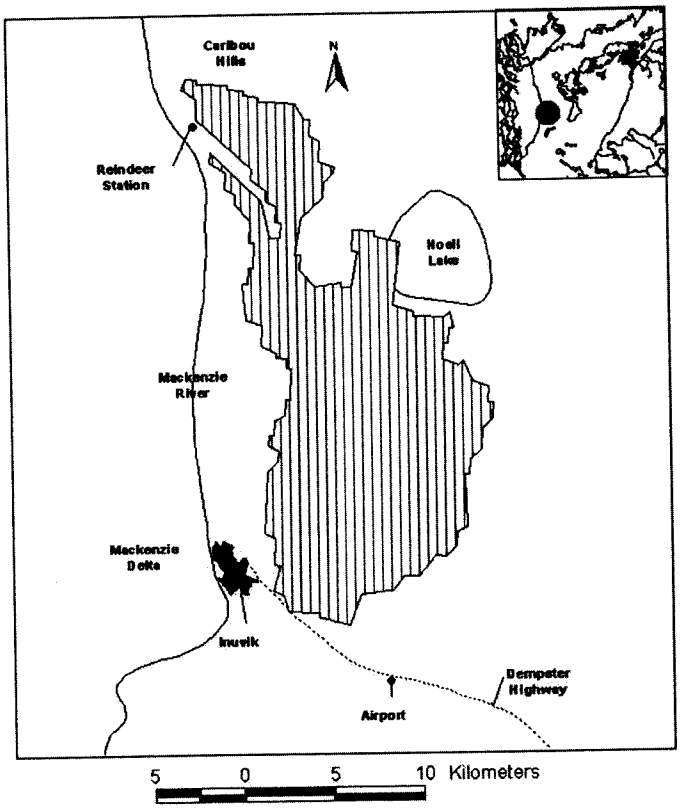
ground; a bulldozer clears cutlines northeast of Inuvik.

16:00 - By this time the fire has spread to 15 km² in size and has reached Navy Road.

Saturday, Aug. 10

Imperial Oil's D-8 Cat and operators are barged from the oil exploration camp on Richard's Island and start to clear firebreaks around Inuvik. Two smaller bulldozers, one owned by Northern Affairs and one owned by Fred Norris, are also used.

11:30 - The fire crosses the fireguard above Gaynor's Lake and moves towards the north



Limit of the 1968 Inuvik Fire

shore of Taylor Lake.

13:00 - The Liquor Store in Inuvik closes and the Mackenzie Hotel is ordered to stop serving "alcohol refreshments" by the Commissioner of the NWT in Yellowknife.

16:00 - The fire has spread to the the hills 1.5 km east of Canadian Forces Base (CFB); wind from the north and northeast pushes the fire towards the base.

20:00 - More fire breaks are constructed to protect warehouses north of town; 80 fire fighters and CFB personnel are on site.

21:00 - The fire crosses Navy Road - there is much smoke. Twenty-five (25) wooden power poles that were weakened by burning fall over and drop high voltage wires which cut communications with CFB. One bulldozer operator is forced to abandon his machine. At CFB steel communications towers fall when their wood pile supports burn. Water is sprayed on and around buildings in town. The RCMP closes the road at the north end of Inuvik. Fire burns over the hills to the southeast of Town. Fire crews concentrate their efforts north of Airport Road between Gaynor's and Taylor Lakes.

23:00 - The fire spreads to three kilometers from the Radio Transmission Towers at Airport Road; wind speed drops.

Sunday, Aug 11

02:00 - Fire fighters from CFB re-

By Saturday evening the fire causes the collapse of a high voltage power line, breaking communication and road access between the Canadian Forces Base and the Town of Inuvik

$160,000 worth of timber (in 1968 dollars) is estimated to have been lost in the 1968 Inuvik Fire.

turn to Inuvik after the power poles blocking the road are cut and removed. There are low wind speeds most of the day. Smoke reduces visibility to 400 metres in town. Inuvik is now completely surrounded by fire breaks. An Otter water bomber arrives from Yellowknife but smoke makes an air survey of the fire difficult.

Monday, Aug 12

The weather in Inuvik is calm, with low wind speeds, a temperature of 20.3°C and a relative humidity that has increased to 43%. The fire is now 2.4 km from Airport Road and north of the Radio Towers. A bulldozer works at making a clearing around the towers. Other fires in the region contribute to the huge amount of smoke in the area.

Tuesday, Aug 13

The entire area of the fires is finally able to be surveyed by Ron Williams, a Game Officer. The fire is found to be 16 by 24 kilometers in size, while the active fire is located 6 kilometers east of Inuvik. 14 firefighters, 3 bulldozers and one Otter water bomber are currently active in fighting the fire.

16:00 - The fire is contained east of Inuvik.

Wednesday, Aug 14

Most firefighting crews return to Inuvik. The force is reduced to 24 firefighters who are kept on standby and to collect equipment from the fire lines. The fire continues to burn from Noel Lake westward towards the East Channel of the Mackenzie River.

Thursday, Aug 15

16:00 - The fire flares up between Gaynor's Lake and Airport Road.

Friday, Aug 16

09:30 - The fire crosses the fireguard to the east of Taylor Lake.

15:00 - The fire crosses the fireguard at the gravel pit.

Saturday, Aug 17

The fire is under control everywhere except alongside the East Channel.

Sunday, Aug 18

11:30 - A light rain begins to fall.

17:00 - 2.2 millimetres of rain have fallen.

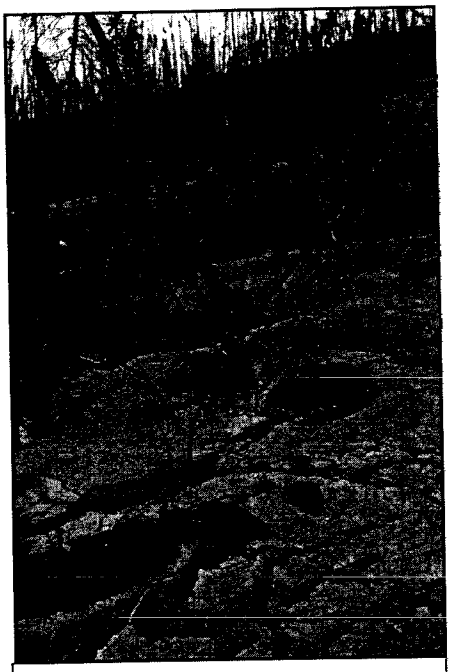
18:00 - The fire boundaries are patrolled for the last time.

Monday, Aug 19

By Monday, 20 millimetres of rain have fallen.

Costs of the fire

In total, 450 persons participated in working on the Inuvik Fire and about 12,000 person-hours were spent directly fighting the fire. The fire covered a total of 350 square kilometers (including 11.5 square kilometers in tundra) and 30 kilometers of fireguard were constructed by bulldozers. About $54,000 (1968 dollars) was spent on labour and equipment rental. The estimated loss of timber was almost $160,000 (1968 dollars).



Post-fire soil flow around Inuvik

After The Fire

Winter 1968-69: The burned area certainly looked like the taiga (a Russian word meaning "the land of little sticks") in the winter of 1968-69. Although unrecorded, the lack of shrubs on the burned hills behind Inuvik probably permitted snow to drift over the tundra-like conditions and into the valleys. Charcoal knocked from trees and burned stems of shrubs mixed with the snow.

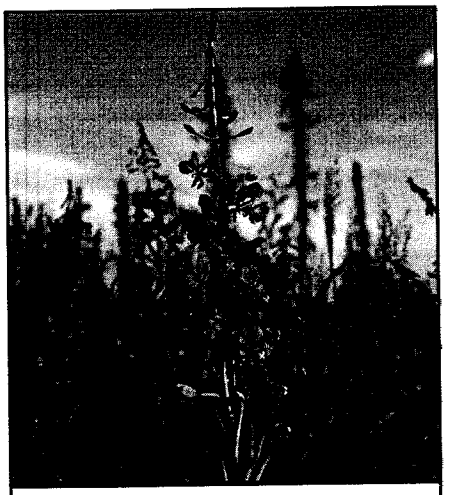
Summer 1969: Snowmelt was probably early because charcoal particles in the snow absorbed the sun's radiation. The June to August precipitation for 1969 was the highest recorded between 1958 and 1992: air temperatures were near

Soil ice melt and soil erosion at the burn site

As the permafrost melted and the soil's active layer deepened, soil flows occurred on steep slopes east of Inuvik.

Fireweed invades quickly after fire and in five years dominates the burned area along with reedgrass. Hillsides of rose coloured flowers and purple seed pods of fireweed could be seen for many kilometers.

minimum for this period as well. Heat penetration into the moist soil was greater than normal because the fire had blackened the soil surface and removed much of the surface insulation of vegetation and organic soil. Permafrost retreated more than normal, ice-rich soil melted, ***soil subsidence*** occurred and water built up in the soil profile. After rains, saturated soils on steep slopes overcame the force of gravity and mudflows were common on the hills east of Inuvik. Even more dramatic erosion occurred on the bulldozed fireguards because of permafrost melting and rapid cutting of new channels. An example of this was located at the north end of Inuvik, where the combined effects of ***ice wedge*** melting in the original stream channel and the erosion caused by greater summer water flow from the burned watershed resulted in a 3 meter deep channel. During the petroleum exploration activities of the 1970s and 1980s, Dick Hill remembers this site being used by environmentalists as a typical example of "catastrophic petroleum industry damage" in the North.



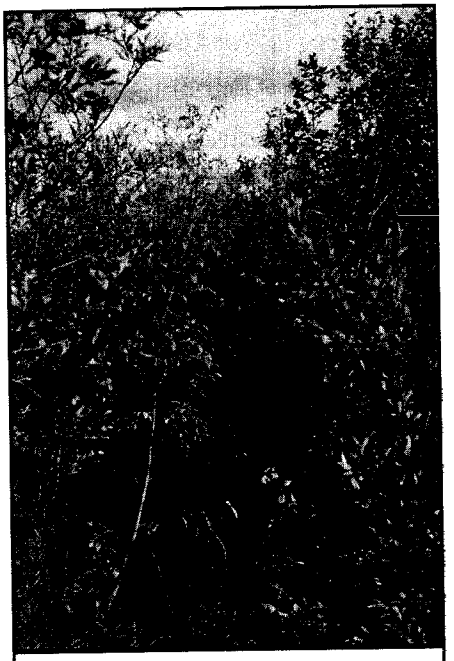
A flowering fireweed plant

The 1970's: Slightly higher than normal summer temperatures and precipitation continued to cause deeper than normal permafrost melt, more slope failures and continued melting and cutting of water channels in fire guards. In the burned area, nutrients became more readily available as the soil warmed. Plants (especially

Cottongrass returns to the burn site.

cottongrass) began to show rapid growth and much flowering.

After Five Years: Permafrost probably did not melt much further than in previous years. Plants



The fire-guard in 1986

such as cottongrass and reedgrass gave moist areas of the landscape a grassland-like appearance. Fireweed flowers on hillsides produced a solid rose-coloured blanket. Labrador tea was blooming everywhere and Blueberries produced much more fruit than in nearby unburned areas. Birch trees that had established in 1970 were about 50 cm in height.

Today: Many people drive between the Airport and the Town of Inuvik without seeing the burned area. Willow, alder and dwarf birch shrubs in the wetland beside the road are 3 m tall. Some of the dead black spruce trees are still standing as evidence of the fire. White and black spruce trees that established after the fire are now knee high. The south-west slopes behind Inuvik are covered by a blanket of 6 meter high paper birch trees. All of the paper birch trees that were killed in the fire have long fallen and most are already well rotted. Along streams, white spruce trees that escaped the fire continue to provide seeds to add more trees to the landscape. Here and there a few balsam poplar trees have found a new foothold in the forest and even on the tundra.

Conclusions/The Future

Many lessons have been learned since the 1968 Inuvik fire and these are now incorporated into emergency and natural resources management practices. The fire fighting capability of forest managers in the Northwest Territories has been strengthened considerably in terms of equipment, trained personnel and procedures. Fires will continue to play out their natural ecological role because there are limited financial resources to man-

Today many people drive between the Town and the Airport of Inuvik without even noticing the burned area they are driving through.

Although the conditions exist for another major fire in the Inuvik area, much has changed in order to make fire less of a threat.

age fire over huge areas of the northern boreal forest. High priority protection is given largely to life and property. Even with these priorities, fire fighting continues to be expensive. In dry years fire fighting costs millions of dollars and towns have been evacuated both for safety and health reasons. Fire managers have encouraged the building of fireguards around towns in the forest regions of the Northwest Territories. These are very different from the fireguards of the South! In order to protect the insulating vegetation, which in turn protects the permafrost from melting, trees in the fire guard are often cut manually during the winter. Existing roads and lakes are incorporated into the fireguards.

In the Inuvik Region much of the vegetation has not burned for many years so there is sufficient fuel to carry a fire following exceptionally dry years as evidenced by the 175,000 hectare fire of 1999 that almost reached the road southeast of Inuvik. Today there is a potential for large fires, but much has changed since 1968. Our knowledge and understanding of how to manage and control fire has been strengthened considerably. The Inuvik Region Fire Base at Shell Lake continues to house personnel and equipment that manages fire in the region. Land ownership has changed due to the Inuvialuit and Gwich'in land settlements, so multi-agency cooperation is more important than ever. The Dempster Highway is an important supply corridor for fighting fires.

Around the Town of Inuvik there have been many changes that relate to fire. The Bypass Road to the east of Inuvik provides rapid transport of fire fighting equipment and personnel to any fires close to town. Fireguards were cut to the north of the town in September of 1995. Never-the-less, a threat of fire remains. The vegetation left within the fireguard and between Inuvik and the Airport probably represents the greatest fire hazard and fuel continues to build on the landscapes around Inuvik. Smoke from fires in the region will always pose a problem for air and surface transport and for people with respiratory health problems.

Tourists will continue to hear about the "Inuvik Fire" and wonder where it was; the elders will remember!

Acknowledgements

The research reported here has received the continuing support of the Aurora Research Institute in terms of laboratory and office space as well as transportation. In alphabetical order, Marty Alexander, Alan Fehr, Mike Gravel and Rick Lanoville kindly contributed to the early drafts of the report. Dick Hill, Manager of the Northern Research Laboratory at the time of the fire, remembers the events vividly and generously supplied details to this report. Our fire research has been supported financially by grants from the Natural Sciences and Engineering Research Council of Canada, Donner Canadian Foundation, North Atlantic Treaty Organization, the University of Alberta Canadian Circumpolar Institute and the Polar Continental Shelf Project.

Glossary of Terms

Boreal forest- the northern forest that covers about one-third of Canada.

Drought Code (DC) - An indicator of long-term moisture conditions deep in soil organic layers. The maximum probable value is around 800.

Erosion - the movement of soil by gravity, wind or water. Often we mean accelerated erosion, which is more than normal and often follows disturbance to the vegetation so that the soil is exposed.

Fine Fuel Moisture Code (FFMC) - A numerical rating (between 0 and 99) of the moisture content of forest floor litter. In a boreal forest a high potential for fire starts to exist once the FFMC reaches 86-89.

Fire frequency - The number of fire events that occur during a specific time span. We often use terms like fire return interval, which is the time period between fires that burn over a specific area.

Fireguards - A break made in the fuel by hand or machinery in order to stop or at least retard the fire.

Fuels - The combustible material is usually grouped into size classes such as lichens, grass, shrubs, and trees because the rates of combustion are different. Fuel types are easily recognized vegetation types such as white spruce, black spruce, dwarf shrubs or sedges.

Ice wedge - A frost crack that fills with ice. Ice wedges develop only in permafrost and may extend downwards for two or more metres.

Ladder fuels - These are tree branches that enable the fire to sweep into the crowns of trees. Tree species with many branches are black and white spruce. Mature jack pine trees have few branches but the bark can lead fire into the crown. Mature paper birch and aspen have few branches on the stems and non-resinous leaves that do not burn readily.

Melt out - This usually refers to the accelerated melting of ice-rich permafrost.

Nutrients - These are minerals that are necessary for plant and animal growth.

Permafrost - Ground that has a temperature of below 0° C for more than two years.

Saturated soil - This refers to soil that is holding

the maximum water possible.

Slope failure - When an area of soil is so heavy that it overcomes the force of gravity and slips down a slope, we indicate that the slope has failed.

Soil Subsidence - Sinking of the earth's surface in response to geological or man-induced causes.

Tundra - Landscape where there is not enough energy during the short summer to enable trees to grow. There are both alpine and arctic tundra landscapes.

Transpiration - The passage of liquid water through a plant from the roots through the vascular system, and then to the atmosphere as water vapour.

Taiga - A Russian word meaning "the land of little sticks" which refers to the slow growth of trees in the northern forest. This is equal to the northern boreal forest.

Glossary of Species Names

Common Name	Scientific Name
Alder	*Alnus crispus*
Paper birch	*Betula papyrifera*
Blueberries	*Vaccinium spp.*
Cottongrass	*Eriophorium vaginatum*
Fireweeed	*Epilobium angustifolium*
Labrador tea	*Ledum palustris*
Reedgrass	*Calamagrostis canadensis*
Black spruce	*Picea mariana*
White spruce	*Picea glauca*

A Bibliography For The Inuvik Fire

The following research papers and reports contain information on the Inuvik fire and changes after the fire. Two papers by W.J. Cody are included because they are from the Inuvik area and predate the Inuvik Fire. Newspaper reports can be found in the *Inuvik Drum*, *News of the North* and *Edmonton Journal*. Most of the reports are available for further study in the Aurora Research Institute Library.

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Inuvik Weather Measurements and Calculated Fire Weather Indices for 1:00 p.m. August 7 to 19, 1968.

Date	Weather Measurements					Fire Weather Indices *							
	Temperature (° C)		Relative Humidity	Wind	Rain								
	Dry Bulb	Wet Bulb	(%)	(Km/hr)	(mm)	FFMC	DMC	DC	ISI	BUI	FWI	DSR	CDSR
7	15	1.6	40	3	0	87.1	130	435	3.3	149	17	4.03	362.22
8	20.6	1.1	27	11	0	91	134	442	8.6	152	33	13.57	375.78
9	23.3	6.3	33	21	0	91.1	137	449	14.4	155	47	24.7	400.49
10	25.6	5.5	27	3	0	92.4	141	456	7	159	30	10.89	411.38
11	22.2	5.8	34	16	0	92.2	144	463	13.2	162	45	22.82	434.19
12	18.3	6.3	45	0	0	90.9	146	470	4.9	165	23	7.01	441.21
13	11.7	6	68	16	0	86.2	147	475	5.6	166	25	8.32	449.52
14	14.4	2.1	43	16	0	87.3	149	480	6.5	168	28	10.19	459.72
15	14.4	3.6	48	13	0	87.4	151	486	5.7	170	26	8.59	468.31
16	16.1	4	44	13	0	87.7	153	492	5.9	172	27	9.16	477.46
17	16.1	5.8	50	24	0	87.8	154	498	10.4	174	39	17.86	495.32
18	13.3	5	57	16	7.9	57.7	73	469	0.8	106	4	0.32	495.64
19	11.1	8.3	83	0	1.3	52.3	74	474	0.2	106	1	0.01	495.65

* FFMC = Fine Fuel Moisture Code

DMC = Duff Moisture Code

DC = Drought Code

ISI = Initial Spread Index

BUI = Build Up Index

FWI = Fire Weather Index

DSR = Daily Severity Rating

CDSR = Cumulative Daily Severity Rating