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# Fuel Model Guide to Alaska Vegetation

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Alaska Wildland Fire Coordinating Group

Fire Modeling and Analysis Committee  
Fuel Model Guide Task Group



Updated from 2008



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*In recognition of his leadership and contributions to the art and science of fire behavior and fuel modeling in Alaska, this guidebook is dedicated to the memory of Brad Cella.*

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## Cover photos

Top: Kanuti National Wildlife Refuge.  
Credit: S. Hillebrand, USFWS.

Middle: Lime Hills Fire, 2013. Credit:  
Alaska Division of Forestry.

Bottom: Post-fire fireweed (*Chamerion  
angustifolium*), Kanuti National Wildlife  
Refuge. Credit: USFWS.

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## Introduction

The Fuel Model Guide to Alaska Vegetation (Cella et al. 2008) was developed by an interagency team of fire practitioners and vegetation mappers/specialists in 2008. It crosswalked vegetation types described in the Alaska Vegetation Classification (Viereck et al. 1992) with the following fuel models/fuel types:

1. 40 Fire Behavior Fuel Models (FBFM40; Scott and Burgan 2005)
2. 13 Fire Behavior Fuel Models (FBFM13; Anderson 1983)
3. Canadian Forest Fire Behavior Prediction System Fuel Types (CANFBP; Taylor et al. 1997)

The original version served as the basis for assigning fuel models to vegetation classifications being developed for LANDFIRE (<https://www.landfire.gov/>). The first LANDFIRE landscape for Alaska was released in 2009 and it has been used in fire behavior models since then, mostly those embedded in the Wildland Fire Decision Support System (WFDSS; [https://wfdss.usgs.gov/wfdss/WFDSS\\_Home.shtml](https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml)).

WFDSS fire behavior analyses typically use Scott and Burgan's FBFM40, which had only been published a couple of years prior to initiation of the 2008 fuel model guide and was relatively new to Alaskan fire personnel. Since then, the LANDFIRE landscape has been periodically updated to reflect disturbance (primarily fire scars) and suggested changes in fuel model assignments. As fire behavior practitioners gained more experience comparing modeled to observed fire behavior under different conditions, they were able to fine tune fuel model assignments. These comparative observations were the primary driver for this review and revision to the 2008 Fuel Model Guide to Alaska Vegetation.

The main updates in this 2018 revision are:

1. Revised Fire Behavior Fuel Model (FBFM40, FBFM13 and CFFDRS) recommendations.
2. Added, combined, and/or removed Alaska Fuel Types.
3. Clarified descriptions and updated photos
4. Included additional photos to represent the diversity of vegetation morphology and characteristics associated with a unique Alaska Fuel Type.
5. Expanded the Fire Behavior Comments section
6. Included alternate fuel model recommendations for differing environmental or site conditions.
7. Revised Vegetation Characteristics sections.
8. Included new tables:
  - a. Table summarizing changes to fuel models between the original Guide and this revision (Appendix 1);
  - b. Classification key for US fuel models and CANFBP fuel types based on vegetation form, composition, and canopy structure (Table 2);
  - c. Table showing rates of spread for each Alaska Fuel Type under different fuel moistures (Appendix 2)

It is recognized that this guide will need to be periodically updated as we learn more about fire behavior modeling and as vegetation classification systems change or are updated; it will therefore be considered a living document with new versions available online.

### Information for Using the Guide:

In an attempt to avoid confusion, we use the term Alaska Fuel Type to describe plant combinations that we can associate with a particular U.S. fire behavior fuel model or Canadian fuel type. In general, the Alaska Fuel Types correspond to Level IV in the Alaska Vegetation Classification (Viereck et al. 1992), sometimes combining several Level IV descriptions into one Alaska Fuel Type. Specific Level IV classes are referenced within the description of each Alaska Fuel Type.

The original Fuel Model Guide and the Alaska Fuel Types in this revision are based on the Alaska Vegetation Classification, as described above. The primary crosswalk between fuel models/CANFBP fuel types and a vegetation classification may change in the future as new classifications are developed or there may be additional crosswalks. For example, the Alaska National Vegetation Classification Standard (NVCS) is currently being developed and may become widely used once completed. LANDFIRE Ecological Systems and Existing Vegetation Types (EVT) were not included in this revision due to uncertainty about classification systems that will be used in the LANDFIRE remap, initiated in 2017. Due

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to potential changes in LANDFIRE, current crosswalks between Alaska Fuel Types, Ecological Systems and EVTs will be available online rather than embedded in this document.

The following bullets provide information about vegetation classification and fuel model selection that may be helpful for people using this guide, particularly if they are unfamiliar with the Alaska Vegetation Classification or fuel models/types in general. They also specify some differences and similarities with LANDFIRE classifications and those found in the guide.

- The Alaska Vegetation Classification groups communities into the following classes based on canopy cover:
  - Woodland: 10 – 24% canopy cover
  - Open: 25 – 59% canopy cover
  - Closed: ≥60% cover for trees, ≥75% cover for shrubs

When working with LANDFIRE data, note that EVT names may not reflect these cover values. For example, LANDFIRE EVT 2602 (Western North American Boreal Spruce – Lichen Woodland) is listed as having a range of cover from 10 – 100% in most LANDFIRE map zones.

In some cases, open and closed communities from the Alaska Vegetation Classification have been combined into a single Alaska Fuel Type that can have canopy cover values ranging from 25 – 100% because the assigned U.S. fuel models and Canadian fuel types did not change between cover classes. Table 2 provides a summary of Alaska Fuel Types, FBFM 13, FBFM 40, and CANFBP fuel types based on vegetation form (forest, shrub, herbaceous) and structure (closed vs. open).

In photo captions, 4-letter/numeral designations refer to the Alaska Vegetation Classification Level IV code. For example, 1A1K refers to Closed Black Spruce Forest and 1A1L refers to Closed Black Spruce – White Spruce Forest.

- Low shrubs/scrub are defined as being 20 cm – 1.5 m (0.6 – 4.9 ft) tall; dwarf shrubs/scrub are less than 20 cm in height (Viereck et al. 1992).
- Plant names follow the naming convention in the USDA Plants Database (<https://plants.usda.gov/>). Common names are provided in the text; scientific names can be found in Appendix 3.
- The CANFBP fuel types (<http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/11038.pdf>) include conifer, mixedwood, deciduous and openland fuel types. Mixedwood (conifer/hardwood mix), deciduous, and openland types are categorized by seasonality as follows:
  - Mixedwood fuel types include a seasonal component for deciduous trees: M-1 for leafless or M-2 for green conditions. They also include a modifier that describes the percentage of conifers in the stand. Two additional mixedwood fuel types describe forests that include dead conifers; M-3 for the leafless state and M-4 for the green state (M-4)
  - The Deciduous fuel type includes a seasonal component: D-1 for leafless, D-2 for green
  - The Openland fuel type includes matted grass (O-1a) and standing grass (O-1b)
- Primary fuel model/CANFBP assignments represent average conditions post-green-up (Scott and Burgan moisture scenario D2L2. Dead fuel moistures: 1hr = 6%; 10hr = 7%; 100hr = 8%. Live herbaceous fuel moisture = 60%; live woody fuel moisture = 90%), which is also the case for the LANDFIRE landscape. Alternative fuel models suggested for milder or more extreme situations may be found in the Fuel Model and Fire Behavior Comment sections. For a comparison of rates of spread (ROS) under different fuel moisture conditions for each Alaska Fuel Type, see Appendix 2.
- The surface ROS is the primary fire behavior variable utilized to assign a fuel model to Alaska Fuel Types. There were two ways the surface ROS was used to assign fuel models: 1) Through direct personal experience or observations of ROS within an Alaska Fuel Type; or 2) Estimating an anticipated or relative ROS without direct experience but based on fire behavior observations with similar fuels. For example, a fire behavior analyst may be familiar with an open shrub class with few graminoids. It would be estimated that a similar configuration of fuels with more grass between the

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shrubs would have a higher ROS than the one without grass, potentially prompting use of a different fuel model/CANFBP fuel type.

- Secondary fuel model parameters/characteristics considered when assigning fuel models, in priority order:
  - Whether fuel models were dynamic – Account for herbaceous vegetation pre-greenup and rapid curing rates in the Alaska fire environment.
  - Dead fuel moisture of extinction values – Account for rapid acceleration and deceleration of fire growth.
  - Fire-carrying fuel type – Commonality between Alaska Fuel Type and the primary carrier of fire (i.e., leaf litter, grass, shrub, etc.)
- Fuel models/types are assigned so that the surface rate of spread would be similar among the three different classification systems. FBFM40 is designed to represent average conditions, but FBFM13 is intended to represent conditions during the severe portion of the fire season. For this guide, FBFM13 assignments were selected to represent average conditions and may therefore exhibit lower fire behavior than what people might be used to. Attention was focused on fire behavior rather than whether a vegetation type fit into grass, shrub, timber, or slash groups.
- FBFM13 and FBFM40 simulate surface fire behavior at the flaming front, assume homogeneity and continuity for the fuelbed, and should not be used for predicting fuel consumption, smoke production, or crown fire. The Fire Behavior Comments section may contain notes about these topics for some Alaska Fuel Types.

Table 1. Crosswalk from Alaska Fuel Types to US fuel models and CANFBP fuel types.<sup>1</sup>

Alaska Fuel Type Number	Alaska Fuel Type Name	FBFM 40	FBFM 13	CANFBP	Alternate Models (See text for usage)
1	Sitka Spruce – Hemlock Forest	TL1	8	C- 5 (closed), C-7 (open)	
2	Closed White Spruce Forest	TU2 upland, TU1 riparian	9	C-3	TU3, FM10
3	Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest	TU3	9 adj <sup>2</sup>	C-2	TU1, SH5
4	Open White Spruce Forest	TU5	10	C-3	TU4, TU1
5	Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest	TU1	8	D-1/D-2 or M-1/M-2 w/ low conifer	TU1, TU3, GR4 , FM9
6	Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest	TU4	9 adj <sup>2</sup>	C-2	TU5, TU3, SH5
7	Black Spruce – Tamarack Forest	TU2	10	C-1	
8	Coastal Woodland Rainforest	TL1	8	M-2 w/low conifer % or D-2	
9	White Spruce Woodland and Mixed Black Spruce – White Spruce Woodland with Shrubs	SH2	10	M-2/25% conifer	GR
10	Black Spruce Woodland with Tussocks	GS2	5	C-1	GS3, O-1a/b
11	Black Spruce and/or White Spruce Woodland with Lichen	TU4	9 adj <sup>2</sup>	C-1	GR2
12	Black Spruce Woodland with <i>Sphagnum</i> Moss	TU2	10	C-1	TU1, SH2, TU4
13	Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forest	TL2	8	D-1/D-2	
14	Closed Paper Birch Forest and Closed Quaking Aspen Forest	TU1	8	D-1/D-2	
15	Open Paper Birch Forest	TU1	8	D-1/D-2	M-1, M-2, TU3
16	Open Quaking Aspen Forest	TU1	8	D-1/D-2	
17	Open Balsam Poplar or Black Cottonwood Forest	TL2	8	D-1/D-2	TU1
18	Woodland Paper Birch and Woodland Balsam Poplar	SH1	8	O-1a/b	GR1, SH2
19	White or Black Spruce with Paper Birch and/or Aspen	TU5	10	M-2/50% conifer	TU5, M-1/2
20	White Spruce with Balsam Poplar and Paper Birch	TU1	8	M-2/25% conifer	M-1



Table 1. Crosswalk from Alaska Fuel Types to US fuel models and CANFBP fuel types.<sup>1</sup>

Alaska Fuel Type Number	Alaska Fuel Type Name	FBFM 40	FBFM 13	CANFBP	Alternate Models (See text for usage)
21	Dwarf Tree Mountain Hemlock Scrub and Dwarf Tree Alpine Spruce Shrub	SH1	8	O-1a	
22	Dwarf Tree Black Spruce Scrub	GS1	9	C-1	C-2, GS2, SH5
23	Closed Tall Alder and Closed Tall Willow	TL2	8	D-1/D-2	TU1,SH2, M-1/2
24	Closed Tall Shrub Birch	SH3	9	M-1/M-2	SH2
25	Tall Shrub Swamp	Removed: Low, patchy occurrence, few examples			
26	Open Tall Alder and/or Willow	TU1	8	D-1/D-2	M-1, GS1
27	Open Tall Shrub Birch and Open Tall Shrub Birch – Willow	SH3	9	M-1/M-2	TU4, GS1
28	Closed Low Shrub Birch and Closed Low Shrub Birch – Willow and Closed Low Ericaceous Shrub	SH2	9	D-1/D-2	TU4
29	Closed Low Willow and Closed Low Alder – Willow	SH2	9	D-1/D-2	TU1, M-1
30	Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog	GR4	1	O-1a/b	GR5, GS3, SH2
31	Open Low Mesic Shrub Birch – Ericaceous Shrub	GR2	5	O-1a/b	SH7
32	Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow	GS2	5	O-1a/b	
33	Open Low Willow and Open Low Sweetgale	SH1	8	O-1a	GR1
34	Open Low Alder and Open Low Alder – Willow	GS1	5	O-1a/b	SH2, FM1
35	Sagebrush – Grass and Grass – Juniper	GR1	8	O-1a/b	FM10
36	Dwarf Shrub Tundra	GS1	5	O-1a/b	FM1
37	<i>Elymus</i>	GS2	5	O-1a/b	
38	Grass – Shrub	GS2	5	O-1a/b	GS1
39	Bluejoint ( <i>Calamagrostis</i> )	GR4	2	O-1a/b	GR7, FM3
40	Bluejoint – Shrub and/Bluejoint – Herb	GR2	6	O-1a/b	GR1
41	Tussock Tundra	GR4	1	O-1a/b	GS3, SH2
42	Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra	GS1	5	O-1a/b	

Table 1. Crosswalk from Alaska Fuel Types to US fuel models and CANFBP fuel types.<sup>1</sup>

Alaska Fuel Type Number	Alaska Fuel Type Name	FBFM 40	FBFM 13	CANFBP	Alternate Models (See text for usage)
43	Sedge – Willow Tundra and Sedge – <i>Dryas</i> Tundra	GR1	5	O-1a/b	FM1
44	Sedge – Birch Tundra	GR2	6	O-1a/b	GR4, GS3
45	Wet Meadow Tundra	GR1	10	O-1a/b	NB6 <sup>3</sup>
46	Wet Sedge – Grass Meadow or Marsh	GR1	5	O-1a/b	NB6, <sup>3</sup> FM1
47	Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog	GR1	9	O-1a/b	NB6, <sup>3</sup> FM2
48	Dry Species – Non Burnable	NB7 <sup>3</sup>	99		
49	Wet Species – Non Burnable	NB7 <sup>3</sup>	99		
50	Mesic Forb Herbaceous	GR1	5	O-1a/b	FM1
51	Foliose and Fruticose Lichen	GR1	2	O-1a/b	GR2, GR3
52	Crustose Lichen	NB9	99		
53	Aquatic Herbaceous	NB8	99		
54	Standing Dead Beetle–Kill Spruce Forest	SB2/SB3	12	M-3	
55	Heavy Stem Breakage/Downed and Jack–Straw Spruce and Aged Post–Mortality Beetle–Kill Forest	SB3	13	C-3	
56	Closed Spruce Forest with Moderate Downed Beetle Kill and Mixed Spruce and Hardwood Forest with Moderate Beetle Kill	TU5	10	M-3	
57	Post–Timber Harvest Areas with Bluejoint Grass and Logging Slash Fuel Beds	GR7	3	O-1a/b	

<sup>1</sup>See Appendix 1 for comparison of fuel model assignments between the 2008 and 2018 guide versions.

<sup>2</sup>The FBFM 13 fuel model “9 ADJ” refers to Norum’s (1982) calibration for Alaska Black Spruce. Rate of spread is 1.2 times that predicted for fuel model 9 (Albini 1976, Anderson 1982), and flame length is that predicted for fuel model 5.

<sup>3</sup>NB6 is a custom fuel model referring to areas covered by hydric vegetation types that do not carry fire; NB7 refers to upland (dry species) vegetation types that do not carry fire.

Table 2. Alaska fuels guide classification key for US fuel models and CANFBP fuel types.<sup>1</sup>

Form	Composition	Canopy/Structure	Alaska Fuel Type	40	13	CANFBP
<b><u>Forest</u></b>	<b><u>Conifer</u></b> (over 75% of tree cover contributed by needle leaf species)	Closed (60%+)	(1) Sitka Spruce – Hemlock Forest (2) Closed White Spruce Forest (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest	TL1 TU2/TU1 TU3	8 9 9 adj	C-5/C-7 C-3 C-2
		Open (25 – 59%)	(1) Sitka Spruce – Hemlock Forest (see above) (4) Open White Spruce Forest (5) Coastal Boreal Transition/Open White – Lutz Spruce (6) Open Black Spruce and Open Mixed Black Spruce – White Spruce Forest (7) Black Spruce – Tamarack Forest	TL1 TU5 TU1 TU4	8 10 8 9 adj	C-5/C-7 C-3 D-1/D-2 C-2
		Woodland (<25%)	(7) Black Spruce – Tamarack Forest (see above) (8) Coastal Woodland Rainforest (9) White Spruce and Mixed Black Spruce – White Spruce Woodland w/ Shrubs (10) Black Spruce Woodland w/ Tussocks (11) Black Spruce and/or White Spruce Woodland w/ Lichen (12) Black Spruce Woodland w/ <i>Sphagnum</i> Moss	TU2 TL1 SH2 GS2 TU4 TU2	10 8 10 5 9 adj 10	C-1 D-1/D-2 M-1/M-2 C-1 C-1 C-1
	<b><u>Deciduous</u></b> (over 75% tree cover contributed by broadleaf species)	Closed (60%+)	(13) Black Cottonwood – Balsam Poplar and Red Alder (14) Paper Birch Forest and Quaking Aspen Forest	TL2 TU1	8	D-1/D-2
		Open (25 – 59%)	(15) Open Paper Birch Forest (16) Open Quaking Aspen Forest (17) Open Balsam Poplar or Black Cottonwood Forest	TU1 TU1 TL2	8	D-1/D-2
		Woodland (<25%)	(18) Woodland Paper Birch and Woodland Balsam Poplar	SH1	8	O-1a/b
	<b><u>Mixed</u></b> (25 – 75% admixtures of conifer and broadleaf)	Closed (60%+)	(19) Spruce – Paper Birch – Aspen (20) White Spruce – Balsam Poplar – Paper Birch	TU5 TU1	10 8	M-1/M-2
		Open (25 – 59%)	(19) White or Black Spruce w/ Paper Birch or Aspen (20) White Spruce w/ Balsam Poplar and Paper Birch	TU5 TU1	10 8	M-1/M-2
		Woodland (<25%)	None really described			
<b><u>Disturbed Lands</u></b>	Beetle-Kill Spruce		(54) Standing Dead Beetle-kill Spruce Forest (55) Heavy Stem Breakage Downed/Jack-Straw Spruce (56) Closed Spruce/Mixed w/ Mod Downed Beetle-kill	SB2/SB3 SB3 TU5	12 13 10	M-3/M-4 C-3 M-3/M-4
	Post-Harvest		(57) Post-Harvest Bluejoint Grass and Logging Slash	GR7	3	O-1a/b
	Wildfire	1 – 2 yrs since burn	Little fine fuel, spread rate negligible to very slow	TL1	8	D-2
		3 – 5 yrs since burn	Live fuels increasing, still inconsistent creeping spread	TU1	8	D-1/D-2
		6+ yrs since burn	Fine fuels increasing, low-moderate spread with wind	SH2	8	O-1a

Table 2, continued. Alaska fuels guide classification key for US fuel models and CANFBP fuel types.<sup>1</sup>

Form	Composition	Canopy/Structure	Alaska Fuel Type	40	13	CANFBP
<b>Scrub</b>	<b>Dwarf Tree Scrub</b> (10%+ dwarf trees cover)	Closed (60%+)	(21) Dwarf Tree Mountain Hemlock and Dwarf Tree Alpine Spruce Scrub	SH1	8	O-1a
		Open (25 – 59%)	(21) Dwarf Tree Mountain Hemlock and Dwarf Tree Alpine Spruce Scrub	SH1	8	O-1a
			(22) Dwarf Tree Black Spruce Scrub	GS2	9	C-2
		Woodland (<25%)	(22) Dwarf Tree Black Spruce Scrub	GS1	9	C-1
	<b>Tall Scrub</b> (shrubs at least 1.5 m or 5 ft tall)	Closed (75%+)	(23) Closed Tall Alder – Willow (24) Closed Tall Birch Shrub	TL2 SH3	8 9	D-1/D-2 M-1/M-2
		Open (25 – 74%)	(26) Open Tall Alder and/or Willow (27) Open Tall Birch/Birch – Willow	TU1 SH3	8 9	D-1/D-2 M-1/M-2
			(28) Closed Low Birch/Birch – Willow/Ericaceous Shrub (29) Closed Low Willow/Alder – Willow	SH2 SH2	9 9	D-1/D-2 D-1/D-2
	<b>Low Scrub</b> (shrubs 20 cm to 1.5m)	Closed (75%+)	(30) Open Low Mixed Shrub – Sedge Tussock Tundra/Bog	GR4	1	O-1a/b
			(31) Open Low Mesic Shrub Birch – Ericaceous Shrub	GR2	5	O-1a/b
		Open (25 – 74%)	(32) Open Low Birch Ericaceous Shrub Bog and Open Low Shrub Birch – Willow Shrub	GS2	5	O-1a/b
			(33) Open Low Willow/Sweetgale	SH1	8	O-1a/b
			(34) Open Low Alder/Alder – Willow	GS1	5	O-1a/b
			(35) Sagebrush – Grass and Grass – Juniper	GR1	8	O-1a/b
	<b>Dwarf Scrub</b>	<i>Dryas</i>	(36) Dwarf Shrub Tundra	GS1	5	O-1a/b
<b>Herbaceous</b>	<b>Graminoid</b>	Dry	(37) <i>Elymus</i> (38) Grass – Shrub	GS2 GS2	5 5	O-1a/b O-1a/b
		Mesic	(39) Bluejoint ( <i>Calamagrostis</i> )	GR4	2	O-1a/b
			(40) Bluejoint – Shrub/Herb	GR2	6	O-1a/b
			(41) Tussock Tundra	GR4	1	O-1a/b
			(42) Mesic Sedge – Grass – Herb Meadow Tundra	GS1	5	O-1a/b
			(43) Sedge – Willow and Sedge – <i>Dryas</i> Tundra	GR1	5	O-1a/b
			(44) Sedge – Birch Tundra	GR2	6	O-1a/b
		Wet	(45) Wet Meadow Tundra	GR1	10	O-1a/b
			(46) Wet Sedge – Grass Meadow Marsh	GR1	5	O-1a/b
			(47) Wet Sedge Meadow – Bog – Shrub	GR1	9	O-1a/b
	<b>Forbs</b>	Mesic	(50) Mesic Forb Herbaceous	GR1	5	O-1a/b
	<b>Bryoid</b>	Lichens	(51) Foliose and Fruticose Lichen (52) Crustose Lichen	GR1 NB9	2 99	O-1a N/A
	<b>Aquatic</b>	Wet	(53) Aquatic Herbaceous	NB8	98	N/A

<sup>1</sup>See Appendix 1 for table displaying fuel model assignments from the 2008 version of the guide.



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## (1) Sitka Spruce – Hemlock Forest



1A1A. Closed Sitka Spruce Forest (Photo Courtesy of M. Fleming, SAIC)



1A1C. Closed Sitka Spruce – Western Hemlock Forest (Photo Courtesy of Alaska Center for Conservation Science)



1A1C. Closed Sitka Spruce Forest – Western Hemlock Forest (Photo Courtesy of J. Koltun, RS)



1A1F. Closed Mountain Hemlock Forest, Chugach State Park (Photo Courtesy of L. Saperstein)



1A2A. Open Sitka Spruce Forest (Photo Courtesy US Forest Service)



1A2A. Young Open Sitka Spruce Forest, Shuyak Island (Photo Courtesy of US Forest Service)



1A2A. Open Sitka Spruce Forest (Photo Courtesy of Lake Clark National Park and Preserve)

### **Fuel Models/Types:**

- FBFM40 – TL1
- FBFM13 – 8
- CANFBP – C-7 in open or C-5 for closed

### **Primary Carrier of Fire:**

- Moss and shrubs
- Litter if alder is present
- Litter and shrub mix in open forest

### **Fire Behavior Comments:**

- Rarely burns except under extreme drought conditions
  - Live fuels seldom contribute to fire behavior
-

### ***Vegetation Characteristics:***

Communities in this fuel type are most commonly found in southeast Alaska, with some occurring in southcentral Alaska, usually in coastal areas. The overstory is generally dominated by Sitka spruce, western hemlock, and/or mountain hemlock, with canopy cover ranging from 25 – 100%. Other species, such as western red cedar, Alaska-cedar, sub-alpine fir, and Pacific silver fir may be present and may dominate the overstory. The shrub layer is often well-developed, ranging in height from 1 – 1.5 m (3 – 5 ft). Shrub cover may be as high as 50%. *Vaccinium* species and rusty menziesia are present at many sites. Some open stands may have taller alders and devil's club, providing more leaf litter. Herbs, ferns, and some grasses may be present with less than 30% cover in closed stands, but cover may reach 80% in open stands. Moss is usually abundant. Hummocks and hollows may be present at some sites.

### ***Viereck et al. (1992) Vegetation Classes:***

- 1A1A Closed Sitka Spruce Forest
- 1A1B Closed Western Hemlock Forest
- 1A1C Closed Sitka Spruce – Western Hemlock Forest
- 1A1D Closed Western Hemlock – Sitka Spruce – (Western Redcedar) Forest
- 1A1E Closed Western Hemlock – Alaska – Cedar
- 1A1F Closed Mountain Hemlock Forest
- 1A1G Closed Western Hemlock – Western Redcedar Forest
- 1A1H Closed Silver Fir – Western Hemlock Forest
- 1A1I Closed Subalpine Fir Forest
- 1A2A Open Sitka Spruce Forest
- 1A2B Open Western Hemlock – Sitka Spruce Forest
- 1A2C Open Mountain Hemlock Forest
- 1A2D Open Mixed Conifer Forest

### ***Similar Looking Alaska Fuel Types:***

- (5) Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest



## (2) Closed White Spruce Forest



1A1J. Closed White Spruce Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1A1J. Closed White Spruce Forest (Photo Courtesy of the National Park Service)



1A1J. Closed White Spruce Forest (Photo Courtesy of Denali National Park and Preserve)



1A1J. Closed White Spruce Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1A1J. Closed White Spruce Forest (Photo Courtesy of Koyukuk National Wildlife Refuge)



1A1J. Closed White Spruce Forest (Photo Courtesy of the National Park Service)

### **Fuel Models/Types:**

- FBFM40 – TU2 upland, TU1 riparian
- FBFM13 – 9
- CANFBP – C-3

### **Primary Carrier of Fire:**

- Feathermoss
- Litter and duff

### **Fire Behavior Comments:**

- In riparian areas fire will tend to smolder, with occasional torching
- Immature stands in both riparian and upland areas will exhibit fire behavior similar to Closed Black Spruce Forest (Alaska Fuel Type #3)
- For FBFM13, use FM10 if significant live fuel curing has occurred
- Relatively high Canopy Base Height results in lower crown fire initiation
- Consider changing to TU3 in uplands for more extreme conditions, depending on observed fire behavior

### **Vegetation Characteristics:**

This Alaska fuel type is found on well drained sites in central Alaska but also along rivers and warm upland sites near treeline in the western and northern portions of the state. Canopy cover ranges from 60 – 100%, generally comprised of white spruce but may also include scattered paper birch or balsam poplar. Hardwoods typically make up less than 5% of the canopy cover. On good sites, trees can grow as tall as 30 m (100 ft), but are more typically 12 – 15 m tall (40 – 50 ft). Tall shrubs exist as a sparsely developed layer of alders and willows with little cover. Low shrubs are more common in forests with more open canopies. Mosses, primarily feathermosses are well-developed. Herbs are sparse but horsetails may comprise significant cover in some sites.

***Viereck et al. (1992) Vegetation Classes:***

- 1A1J Closed White Spruce Forest

***Similar Looking Alaska Fuel Types:***

- (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest
- (4) Open White Spruce Forest
- (5) Coastal Boreal Transition – Open White Spruce – Lutz Spruce Forest



### (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest



1A1K. Closed Black Spruce Forest (Photo Courtesy of Yukon-Charley Rivers National Preserve)



1A1L. Closed Black Spruce – White Spruce Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1A1K. Closed Black Spruce Forest (Photo Courtesy of BLM Alaska Fire Service)



1A1K. Closed Black Spruce Forest, Kenai Peninsula (Photos Courtesy of US Fish and Wildlife Service)



1A1K. Closed Black Spruce Forest, Kenai Peninsula (Photo Courtesy of Alaska Division of Natural Resources)



1A1K. Closed Black Spruce Forest with stringers of hardwood forest (Photo Courtesy of Alaska Center for Conservation Science)

#### **Fuel Models/Types:**

- FBFM40 – TU3
- FBFM13 – 9 (adjusted)
- CANFBP – C-2

#### **Primary Carrier of Fire:**

- Feathermoss

#### **Fire Behavior Comments:**

- In areas without feathermosses, such as riparian areas, consider using TU1
- Consider using SH5 as input in fire behavior models using Finney Crown Fire Method for dry conditions (low 30's RH).
- TU3 has a high moisture of extinction (MOE, 30%). May predict too much active spread on days when spruce fuels are less receptive due to high MOE.
- Canadian FBP system works best for more active fire behavior predictions, Behave Plus is better for less active conditions

***Vegetation Characteristics:***

This Alaska fuel type is found in interior and southcentral Alaska; permafrost is often present. Tree cover is 60% or greater, comprised of black spruce or a mixture of black and white spruce. Paper birch may be present but do not provide significant cover (<25%). Mixed black/white spruce stands tend to have taller trees (up to 24 m [75 ft]) compared to closed black spruce stands (average of 9 m [30 ft] tall). In both types of forest, layering of the lower black spruce branches serves as the primary means of regeneration. Tall shrubs may be found intermixed in the stand, typically alder or willow species. Low shrubs can be common, including prickly rose, Labrador tea, bog blueberry, and lingonberry. Feathermosses are usually present, with mat thickness ranging from 20 – 100 cm (8 – 39 in). *Sphagnum* moss species exist on wetter sites. Lichens may be common depending on stand age and elevation.

***Viereck et al. (1992) Vegetation Classes:***

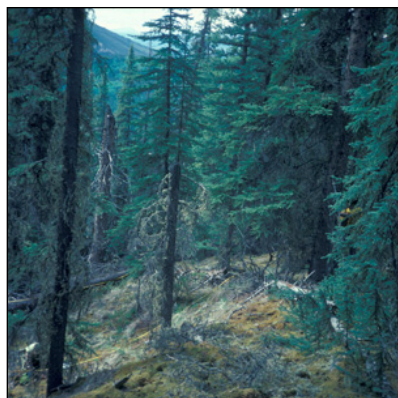
- 1A1K Closed Black Spruce Forest
- 1A1L Closed Black Spruce – White Spruce Forest

***Similar Looking Alaska Fuel Types:***

- (2) Closed White Spruce Forest
- (6) Open Black Spruce Forest and Open Mixed Black – White Spruce Forest



## (4) Open White Spruce Forest



1A2E. Open White Spruce Forest (Photo Courtesy of Yukon-Charley Rivers National Preserve)



1A2E. Open White Spruce Forest (Photo Courtesy of Nowitna National Wildlife Refuge)



1A2E. Open White Spruce Forest (Photo Courtesy of National Park Service)



1A2E. Open White Spruce Forest (Photo Courtesy of M. Fleming)



1A2E. Open White Spruce Forest, northern Cook Inlet (Photo Courtesy of Alaska Center for Conservation Science)

### Fuel Models/Types:

- FBFM40 – TU5
- FBFM13 – 10
- CANFBP – C-3

### Primary Carrier of Fire:

- Shrub and litter
- Feathermoss

### Fire Behavior Comments:

- For sites with more deciduous shrubs (alder, willow, rose) use TU5.
- For sites with feathermosses and ericaceous shrubs, use TU4.
- Use TU1 in riparian areas
- Can have dramatic crown fire behavior

### Vegetation Characteristics:

This Alaska Fuel Type is found in forested portions of the state except for southeast Alaska, most commonly on well drained sites including near treeline. The overstory is dominated by white spruce, ranging in cover from 25–59%. Trees vary in size, with the largest usually about 16 m (50 ft) tall and 30 cm (12 in.) diameter at breast height (DBH). Black spruce, paper birch and aspen may be present with little cover; coniferous trees contribute at least 75% of the total canopy cover. Tall shrubs consist of resin birch, alder, and willows, with increased presence on wetter sites. Low shrubs, notably prickly rose and

buffaloberry, may be present on drier sites. Ground cover is comprised of herbs (twinlineflower, horsetails, bluejoint reedgrass) and a layer of feathermosses that can be nearly continuous.

***Viereck et al. (1992) Vegetation Classes:***

- 1A2E Open White Spruce Forest

***Similar Looking Alaska Fuel Types:***

- (5) Coastal Boreal Transition – Open White Spruce – Lutz Spruce Forest
- (6) Open Black Spruce Forest and Open Mixed Black – White Spruce Forest
- (19) White or Black Spruce with Paper Birch and/or Aspen
- (20) White Spruce with Balsam Poplar and/or Paper Birch



## (5) Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest



Coastal Boreal Transition Forest. *Picea x lutzii*/*Menziesia ferruginea* community on Kenai Peninsula. Viereck et al. (1992) did not describe *P. x lutzii* types. Dominants at this site include: Lutz spruce (60% cover), rusty menziesia (40%), crowberry (10%), and bunchberry (10%). (Photo courtesy of Chugach National Forest Ecology Program.)



Coastal Boreal Transition Forest (Photo Courtesy of Kenai National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – TU1
- FBFM13 – 8
- CANFBP – D-1/D-2 or M1/M2 with low conifer

### Primary Carrier of Fire:

- Grass in more open sites
- Shrub and herb litter with more tree cover

### Fire Behavior Comments:

- Sites with a more herbaceous understory can remain TU1 if fern dominated, but TU3 may be more appropriate if shrub/grass dominated. Both are dynamic fuel models
- Sites with an understory dominated by grass may be classified as GR4; low moisture of extinction and rate of spread does not plateau at high wind
- FBFM13-9 can be used to increase rate of spread and flame length. TU1 has intermediate fire behavior compared to FBFM13-8 and FBFM13-9.

### Vegetation Characteristics:

The Coastal Boreal Transition Forest occurs on the Kenai Peninsula and is transitional between Sitka spruce-hemlock rainforests of the south-coastal region and the white spruce boreal forests of the interior. Common tree species include white spruce, Lutz spruce (hybrids between white and Sitka spruce), paper birch, black cottonwood, quaking aspen, and mountain hemlock. Sitka and black spruce are sometimes present. Canopy cover ranges from 25 – 59%. Species common in the undergrowth are bluejoint reedgrass, rusty menziesia, oval-leaf blueberry, devil's club, Labrador tea, buffaloberry, prickly rose, Sitka mountain ash, salmonberry, wood fern, lowbush cranberry, crowberry, and feathermoss.

### Viereck et al. (1992) Vegetation Classes:

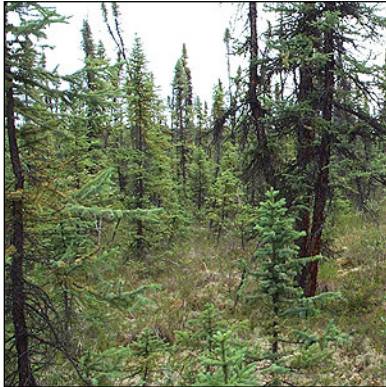
- 1A2A Open Sitka Spruce Forest
- 1A2B Open Western Hemlock – Sitka Spruce Forest
- 1A2C Open Mountain Hemlock Forest
- 1A2D Open Mixed Conifer Forest
- 1A2E Open White Spruce Forest

***Similar Looking Alaska Fuel Types:***

- (1) Sitka Spruce – Hemlock Forest
- (6) Open Black Spruce Forest and Open Mixed Black – White Spruce Forest
- (19) White or Black Spruce with Paper Birch and/or Aspen
- (20) White Spruce with Balsam Poplar and Paper Birch



## (6) Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest



1A2F. Open Black Spruce Forest (*Photo Courtesy of Yukon-Charley Rivers National Preserve*)



1A2F. Open Black Spruce Forest (*Photo Courtesy of Ducks Unlimited*)



1A2G. Open Black Spruce – White Spruce Forest (*Photo Courtesy of Yukon-Charley Rivers National Preserve*)



1A2F. Open Black Spruce Forest (*Photos Courtesy of Kanuti National Wildlife Refuge*)



1A2F. Open Black Spruce Forest (*Photo Courtesy of M. Fleming*)



1A2F. Open Black Spruce Forest (*Photo Courtesy of Koyukuk National Wildlife Refuge*)



1A2F. Open Black Spruce Forest (*Photo Courtesy of Kanuti National Wildlife Refuge*)



1A2F. Open Black Spruce Forest, Tetlin area (*Photo Courtesy of Ducks Unlimited*)

**Fuel Models/Types:**

- FBFM40 – TU4
- FBFM13 – 9 (adjusted)
- CANFBP – C-2

**Primary Carrier of Fire:**

- Feathermoss
- Ericaceous shrubs

**Fire Behavior Comments:**

- Dwarf birch/Labrador tea understory will have higher fire behavior than sites with alder/willow understory.
- If site has a lot of *Sphagnum* moss, it will have lower fire behavior (TU5)
- Consider SH5 for dry conditions (low 30's RH), as input in fire behavior models using Finney crown fire method
- Consider use of TU3 in fire behavior models to produce rates of spread intermediate between TU4 and SH5 when using Finney crown fire method
- TU4 has very low moisture of extinction. When performing fire behavior analyses, may have difficulty producing adequate fire spread rates and crown fire activity. Scott/Reinhardt crown fire model generally required.

**Vegetation Characteristics:**

Open black spruce forest is very common in poorly drained, cold areas in interior and southcentral Alaska, while the mixed spruce communities are more likely to be found at treeline. Permafrost is usually present in both types of forest. Stands are dominated by either black spruce or a mix of black and white spruce as codominants, ranging in cover from 25–59%. Trees are small (DBH 4 – 10 cm [1.5 – 4 in], height 3 – 10 m [18 – 30 ft]). Other tree species that may be present in small amounts are paper birch, tamarack, and quaking aspen. A well-developed low shrub layer is usually present, sometimes with nearly continuous cover. Common species include bog blueberry, lingonberry, Labrador tea, and prickly rose. Red fruit bearberry and crowberry are more commonly found in mixed black spruce-white spruce sites. Tall shrubs (alder, willow, resin birch) may be interspersed throughout the stand. These tall shrubs, especially resin birch, may be especially common in mixed forest near treeline. Common herbs include bluejoint reedgrass, horsetails, cloudberry, tussock cottongrass, and Bigelow's sedge. The ground layer is usually dominated by feathermosses, although *Sphagnum* moss and fruticose and foliose lichens are usually present and are sometimes the primary species.

**Viereck et al. (1992) Vegetation Classes:**

- 1A2F Open Black Spruce Forest
- 1A2G Open Black Spruce – White Spruce Forest

**Similar Looking Alaska Fuel Types:**

- (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest
- (4) Open White Spruce Forest
- (7) Open Black Spruce – Tamarack Forest
- (10) Black Spruce Woodland with Tussocks
- (11) Black Spruce and/or White Spruce Woodland with Lichen
- (12) Black Spruce Woodland with *Sphagnum* Moss
- (19) White or Black Spruce with Paper Birch and/or Aspen
- (22) Dwarf Tree Black Spruce Scrub



## (7) Black Spruce – Tamarack Forest



1A2H. Open Black Spruce – Tamarack Forest (Photo Courtesy of Gates of the Arctic National Park and Preserve)



1A2H. Open Black Spruce – Tamarack Forest (Photo Courtesy of Gates of the Arctic National Park and Preserve)



1A2H. Open Black Spruce – Tamarack Forest (Photo Courtesy of Alaska Center for Conservation Science)

### **Fuel Models/Types:**

- FBFM40 – TU2
- FBFM13 – 10
- CANFBP – C-1

### **Primary Carrier of Fire:**

- Shrub and shrub litter

### **Fire Behavior Comments:**

- Availability for burning depends on drought conditions.
- *Sphagnum* moss generally present; *Sphagnum* has lower fire spread than feathermoss
- Microtopography can dictate whether *Sphagnum* or feathermosses dominate

### **Vegetation Characteristics:**

Small, stunted black spruce and tamarack are codominants with 10 – 59% cover, but more commonly found with lower cover levels. This vegetation type is found on wet lowlands in interior Alaska with a shallow active layer above permafrost, including treed fens (sites with at least 40 cm [15.7 in] of peat). Little information is available about this vegetation type. It has an understory similar to Open Black Spruce Forest (Alaska Fuel Type #6), and can have a nearly continuous understory of low shrubs. These often include dwarf birch, Labrador tea, crowberry, bog blueberry, lingonberry, and leatherleaf. Graminoids include sedges and tussock cottongrass. *Sphagnum* moss is common.

### **Viereck et al. (1992) Vegetation Classes:**

- 1A2H Open Black Spruce – Tamarack Forest

### **Similar Looking Alaska Fuel Types:**

- (6) Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest
- (12) Black Spruce Woodland with *Sphagnum* Moss



## (8) Coastal Woodland Rainforest



1A3B. Sitka Spruce Woodland (Photo courtesy of Chugachmiut)



1A3A. Lodgepole (Shore) Pine Woodland (Photo courtesy of USFS)



1A3A. Lodgepole (Shore) Pine Woodland (Photo courtesy of USFS)



1A3A. Lodgepole (Shore) Pine Woodland (Photo Courtesy of Alaska Center for Conservation Science)

### **Fuel Models/Types:**

- FBFM40 – TL1
- FBFM13 – 8
- CANFBP – M-2 with low conifer % or D-2

### **Primary Carrier of Fire:**

- Litter
- Low shrubs

### **Fire Behavior Comments:**

- Fire is infrequent in this forest type
- Shore pine woodland is different than its counterpart lodgepole pine woodland in drier climates (like Montana), despite being the same species

### **Vegetation Characteristics:**

This Alaska Fuel Type is found in southeast Alaska. The overstory is dominated by shore (lodgepole) pine and, more rarely, Sitka spruce, with cover ranging from 10 – 24%. Mountain hemlock, Alaska cedar and western redcedar may also be present. Trees are often stunted, especially in sites dominated by Sitka spruce. Tall shrubs provide little cover, but low and dwarf shrubs are common with cover generally about 15%. These include bog blueberry, small cranberry, crowberry, Labrador tea, lingonberry, and bog rosemary. Herbs and graminoids include tufted bulrush, deer cabbage, and sedges. Mosses, particularly *Sphagnum* spp., are abundant and may form a continuous carpet.

### **Viereck et al. (1992) Vegetation Classes:**

- 1A3A Lodgepole Pine Woodland
- 1A3B Sitka Spruce Woodland

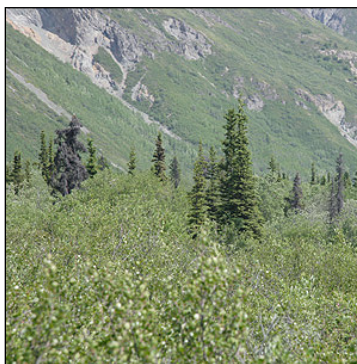
### **Similar Looking Alaska Fuel Types:**

- (1) Sitka Spruce – Hemlock Forest

## (9) White Spruce Woodland and Mixed Black Spruce – White Spruce Woodland with Shrubs



1A3C. White Spruce Woodland, (Photo Courtesy of M. Fleming)



1A3C. White Spruce Woodland (Photo Courtesy of US Fish and Wildlife Service)



1A3C. White Spruce Woodland (Photo Courtesy of Alaska Center for Conservation Science)



1A3C. White Spruce Woodland, Chugach State Park. (Photo Courtesy of L. Saperstein)

### Fuel Models/Types:

- FBFM40 – SH2
- FBFM13 – 10
- CANFBP – M-2, 25% conifer

### Primary Carrier of Fire:

- Feathermoss
- Shrub

### Fire Behavior Comments:

- If grass understory, use a GR model
- Highly variable; fuel model may differ depending on understory
- If lichens dominate the understory, see Alaska Fuel Type #11

### Vegetation Characteristics:

These communities are usually found near latitudinal and elevational treeline. The overstory is dominated by white spruce, or a mix of white and black spruce, generally ranging from 10 – 24% cover. Paper birch and occasionally some aspen may be present with little cover. The white spruce tends to be the larger species when both black and white spruce are present. The understory shrub layer is general open, with resin birch and alder being common tall shrub species. Low shrubs typically consist of Labrador tea, crowberry, bog blueberry, and lingonberry. Feathermosses dominate the surface layer below the shrubs, often in a continuous mat with fruticose and foliose lichens mixed with the moss or occupying openings between shrubs. These stands are most common at tree-line.

### Viereck et al. (1992) Vegetation Classes:

- 1A3C White Spruce Woodland
- 1A3E Black Spruce – White Spruce Woodland

***Similar Looking Alaska Fuel Types:***

- (4) Open White Spruce Forest
- (6) Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub



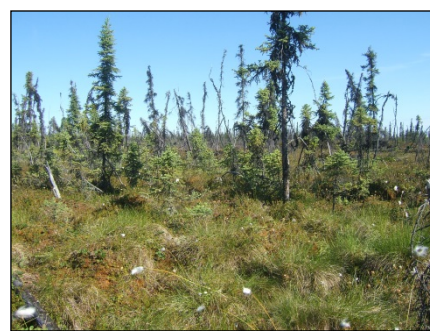
## (10) Black Spruce Woodland with Tussocks



1A3D. Black Spruce Woodland with tussocks (Photo Courtesy of the Steese-White Mountains Recreational Area-BLM)



1A3D. Black Spruce Woodland with tussocks (Photo Courtesy of BLM Alaska Fire Service)



1A3D. Black Spruce Woodland with tussocks (Photo Courtesy of Koyukuk National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – GS2
- FBFM13 – 5
- CANFBP – C-1

### Primary Carrier of Fire:

- Tussocks
- Low shrubs

### Fire Behavior Comments:

- Change to GS3 under drier conditions
- If spruce canopy cover <15% consider O-1 a/b for CFFBPS

### Vegetation Characteristics:

These woodland communities are found on cold, usually poorly drained soils in interior, southcentral, and western Alaska. Stands are dominated by black spruce generally ranging in cover from 10 – 24%, although spruce cover may be slightly higher at some sites. Other trees can include paper birch and tamarack, but these provide little cover. Trees tend to be fairly short (11 m [37 ft]) and only around 15 cm (6 in) in DBH. The small stature of trees can result in high density with relatively low cover. Tall shrubs are scattered with low cover, consisting of resin birch and some willow or alder. Low shrubs are common, composed primarily of *Vaccinium* spp., Labrador tea, and crowberry. Sedges are common, primarily tussock cottongrass or Bigelow's sedge, with some bluejoint reedgrass. Herbs include cloudberry and false toad flax, among others. Feathermoss and lichens are common under the shrubs. *Sphagnum* can be a dominant moss or it may be absent from the site.

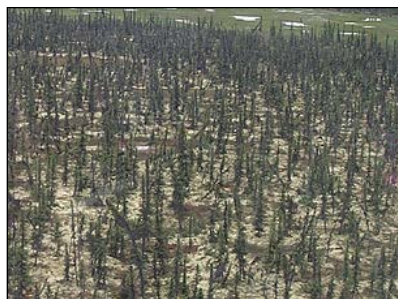
### Viereck et al. (1992) Vegetation Classes:

- 1A3D Black Spruce Woodland

### Similar Looking Alaska Fuel Types:

- (6) Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest
- (11) Black Spruce Woodland with Lichen
- (22) Dwarf Tree Black Spruce Scrub
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub

## (11) Black Spruce and/or White Spruce Woodland with Lichen



1A3D. Black Spruce Woodland with Lichen (Photo Courtesy of Ducks Unlimited)



1A3D. Black Spruce Woodland with Lichen (Photo courtesy of Koyukuk National Wildlife Refuge)



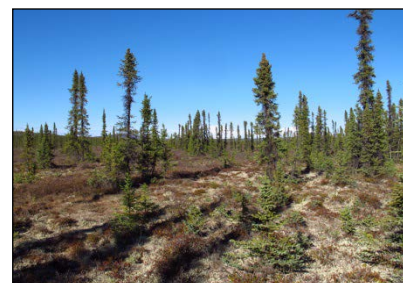
1A3D. Black Spruce Woodland with Lichen (Photo Courtesy of Gates of the Arctic National Park)



1A3C. White Spruce Woodland with Lichen, Kvichak. (Photo Courtesy of Ducks Unlimited)



1A3D. Black Spruce Woodland with Lichen (Photo Courtesy of Kanuti National Wildlife Refuge)



1A3D. Black Spruce Woodland with Lichen (Photo Courtesy of Kanuti National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – TU4
- FBFM13 – 9 (adjusted)
- CANFBP – C-1

### Primary Carrier of Fire:

- Feathermoss
- Lichen

### Fire Behavior Comments:

- Includes lichen and feathermoss types. If *Sphagnum* moss is common, see Alaska Fuel Type #12
- Can switch to GR2 at more open canopy, drier conditions

### Vegetation Characteristics:

Similar to other spruce woodland types mentioned previously, but with an understory dominated by fruticose lichens. Stands are primarily black or white spruce ranging in cover from 10 – 24%. Tall shrubs are not common, but where they occur they consist of scattered clumps of alder, birch, and some willow. Low shrubs are common and comprised primarily of *Vaccinium* species, but are not as high in cover as in the woodland types where lichens do not dominate the understory. Mosses and lichens are nearly continuous, with lichens being the dominant ground cover, resulting in a white to pale green appearance. Mosses are comprised of feathermoss and other species not in the *Sphagnum* genus, although *Sphagnum* may occur in wetter depressions. These stands can be found on old sand dunes, where they are typically dominated by white spruce. When black spruce is the primary tree species, sites are typically drier than those where the understory is dominated by shrubs and mosses.

### Viereck et al. (1992) Vegetation Classes:

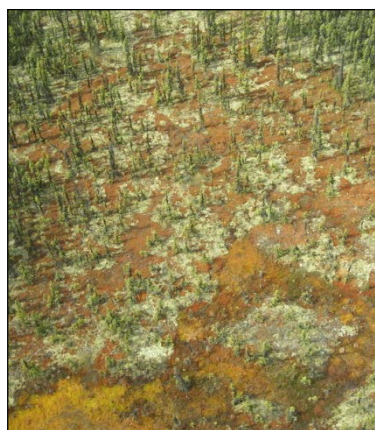
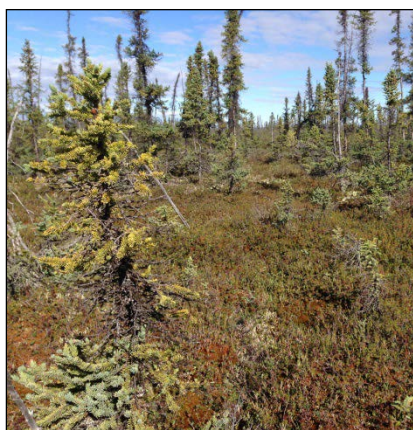
- 1A3C White Spruce Woodland
- 1A3D Black Spruce Woodland
- 1A3E Black Spruce – White Spruce Woodland

### Similar Looking Alaska Fuel Types:

- (6) Open Black Spruce Forest
- (22) Dwarf Tree Black Spruce Scrub
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub



## (12) Black Spruce Woodland with *Sphagnum* Moss



1A3D. Black Spruce Woodland with *Sphagnum* moss (Photos Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – TU2
- FBFM13 – 10
- CANFBP – C-1

### **Primary Carrier of Fire:**

- Shrubs

### **Fire Behavior Comments:**

- Similar to Alaska Fuel Type #11, but *Sphagnum* moss, which retains moisture and mitigates fire behavior, dominates the ground cover rather than lichens and feathermoss
- Fire behavior will be highly dependent on the amount of shrubs in the understory and dryness of *Sphagnum*. Use TU1 or SH2 to slow ROS, TU4 to increase it
- Fire can smolder in dry *Sphagnum* for extended periods

### **Vegetation Characteristics:**

Stands are similar to other black spruce woodland communities in that they contain black spruce ranging in cover from 10 – 24%, but *Sphagnum* moss dominates the ground cover with at least 50% cover and is often nearly continuous under the shrub layer. Tall shrubs consist of scattered clumps of alder, birch, and some willow. Low shrubs are common composed primarily of *Vaccinium* species (blueberry, lowbush cranberry). Herbs range from sparse to dense. Lichens may be present, often occurring in scattered clumps, but do not dominate the site.

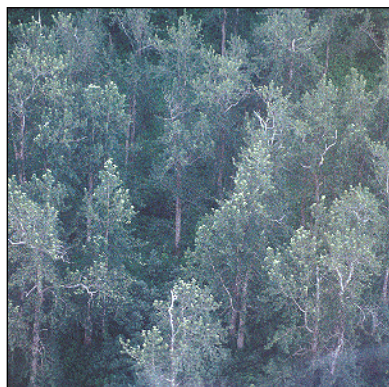
### **Viereck et al. (1992) Vegetation Classes:**

- 1A3D Black Spruce Woodland
- 1A3E Black Spruce – White Spruce Woodland

### **Similar Looking Alaska Fuel Types:**

- (6) Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest
- (22) Dwarf Tree Black Spruce Scrub
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub

## (13) Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forest



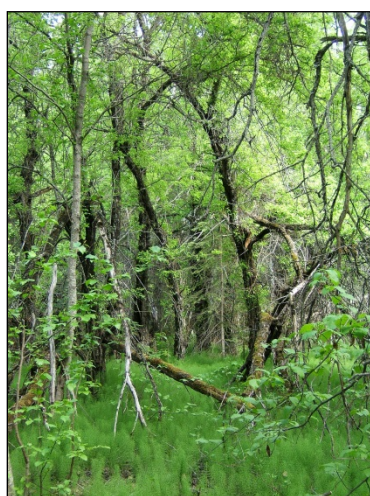
1B1B. Closed Black Cottonwood Forest (Photo Courtesy of M. Fleming, SAIC)



1B1C. Closed Balsam Poplar Forest (Photo Courtesy of Yukon Flats National Wildlife Refuge)



1B1C. Closed Balsam Poplar Forest (Photo Courtesy of Yukon Flats National Wildlife Refuge)



1B1A. Closed Red Alder Forest with Willow. (Photo Courtesy of Nowitna National Wildlife Refuge)



1B1A. Closed Red Alder Forest. (Port Graham, Photo courtesy of Chugachmiut)



1B1A. Closed Red Alder Forest (Photo Courtesy of USDA Forest Service)

### Fuel Models/Types:

- FBFM40 – TL2
- FBFM13 – 8
- CANFBP – D-1/D-2

### Primary Carrier of Fire:

- Leaf litter

### Fire Behavior Comments:

- In floodplains, this type rarely burns due to heavy silt on litter.
- Red alder variety is not common.
- If more fire behavior observed in balsam poplar, see Alaska Fuel Type #14.

### Vegetation Characteristics:

Stands are dominated by black cottonwood, balsam poplar, or red alder with 60% or greater canopy cover and are mostly found in floodplains with moist, well drained soils. In red alder stands, the shrub reaches tree size at 6 – 12 m (20 – 40 ft); these stands are rare and have primarily been described in limited areas of southeast Alaska. In young stands, understory shrubs may be sparse due to the closed canopy but increase as the overstory ages. Balsam poplar stands are described as having the most shrubs in the understory. In all types, shrubs include alder, willow, squashberry (locally called highbush cranberry), willow, and prickly rose. Bluejoint reedgrass and horsetails are common in the herb layer.



Mosses and lichens may be present when flooding is infrequent. More commonly, mosses and lichens are absent due to high leaf litter and frequent flooding.

***Viereck et al. (1992) Vegetation Classes:***

- 1B1B Closed Black Cottonwood Forest
- 1B1C Closed Balsam Poplar Forest
- 1B1A Closed Red Alder Forest

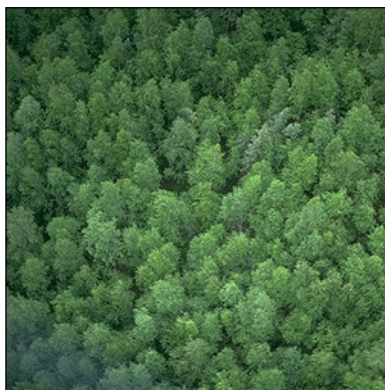
***Similar Looking Alaska Fuel Types:***

- (17) Open Balsam Poplar or Black Cottonwood Forest
- (19) White or Black Spruce w/ Paper Birch and/or Aspen
- (23) Closed Tall Alder and Closed Tall Willow

## (14) Closed Paper Birch Forest and Closed Quaking Aspen Forest



1B1D. Closed Paper Birch Forest (Photo Courtesy of J. Koltun, GRS)



1B1D. Closed Paper Birch Forest (Photo Courtesy of Yukon-Charley Rivers National Preserve)



1B1E. Closed Quaking Aspen Forest (Photo Courtesy of the National Park Service)



1B1D. Closed Paper Birch Forest, foreground (Photo Courtesy of Kanuti National Wildlife Refuge)



1B1D. Closed Paper Birch Forest (Photo Courtesy of Koyukuk National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – TU1
- FBFM13 – 8
- CANFBP – D-1/D-2

### Primary Carrier of Fire:

- Leaf litter
- Sparse grass

### Fire Behavior Comments:

- Use a dynamic fuel model, dependent on green-up
- Leaf litter and some grass in the understory.
- During drought, may get increased fire behavior
- May have some spruce in understory that will increase fire behavior

### Vegetation Characteristics:

This Alaska Fuel Type is common in interior and southcentral Alaska, usually on moderately to well drained soils. A mix of aspen and balsam poplar may be found on floodplains. Paper birch or aspen dominate the overstory with greater than 60% cover. White or black spruce can be found in the understory of both forest types. Tall shrubs include alders, willows, and squashberry (locally called highbush cranberry). Low shrubs include prickly rose, buffaloberry (aspen stands), and willows. Dwarf shrubs such as lingonberry and twinflower may also be found. Bluejoint reedgrass and horsetails are common herbaceous plants, but the herb layer is generally poorly developed in closed aspen stands. Mosses and lichens are not common, possibly due to heavy leaf litter.

***Viereck et al. (1992) Vegetation Classes:***

- 1B1D Closed Paper Birch Forest
- 1B1E Closed Quaking Aspen Forest
- 1B1F Closed Paper Birch – Quaking Aspen Forest
- 1B1G Closed Quaking Aspen – Balsam Poplar Forest

***Similar Looking Alaska Fuel Types:***

- (15) Open Paper Birch Forest
- (16) Open Quaking Aspen Forest
- (17) Open Balsam Poplar or Black Cottonwood Forest
- (23) Closed Tall Alder and Closed Tall Willow
- (26) Open Tall Alder and/or Willow



## (15) Open Paper Birch Forest



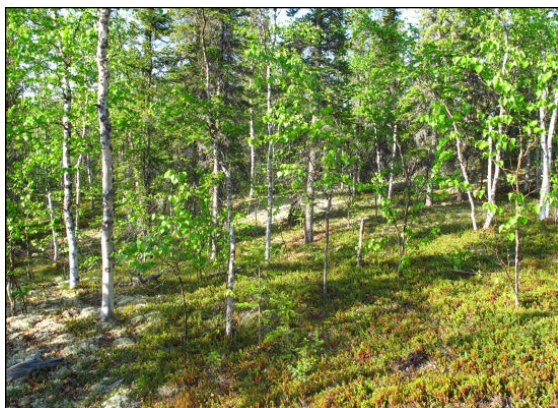
1B2A. Open Paper Birch Forest (Photo Courtesy of Yukon-Charley Rivers National Preserve)



1B2A. Open Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1B2A. Open Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1B2A. Open Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1B2A. Open Paper Birch Forest (Photo Courtesy of M. Fleming)

### **Fuel Models/Types:**

- FBFM40 – TU1
- FBFM13 – 8
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Leaf litter
- Grass

### **Fire Behavior Comments:**

- Use a dynamic fuel model, dependent on green-up
- Leaf litter and some grass in the understory.
- Use M-1, M-2, or TU3 if spruce component in understory nearing 25% or if observing increased fire behavior due to understory characteristics

### **Vegetation Characteristics:**

Found in interior and southcentral Alaska and near the western treeline, these stands are dominated by paper birch with cover ranging from 25 – 59%. Scattered white or black spruce may be present. The type of understory is variable and largely depends on site moisture. Shrubs dominate openings between trees on moist sites. Alder or willow may be the dominant tall shrub, while ericaceous shrubs dominate the low shrub layer. Over-mature open birch forests on slopes in interior and southcentral Alaska usually have prickly rose and squashberry (locally called highbush cranberry) in the understory, along with horsetails and bluejoint reedgrass. These sites may have few to no spruce in the understory. Dry sites can have lichens between the trees.

***Viereck et al. (1992) Vegetation Classes:***

- 1B2A Open Paper Birch Forest

***Similar Looking Alaska Fuel Types:***

- (14) Closed Paper Birch Forest and Closed Quaking Aspen Forest
- (18) Woodland Paper Birch and Woodland Balsam Poplar



## (16) Open Quaking Aspen Forest



1B2B. Open Quaking Aspen Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1B2B. Open Quaking Aspen Forest (Photo Courtesy of Gates of the Arctic National Park and Preserve)



1B2B. Open Quaking Aspen Forest. Silvery hue of aspen is caused by Aspen Leaf Miner (Photo Courtesy of National Park Service)



1B2B. Open Quaking Aspen Forest with shrub understory (Photos Courtesy of Kanuti National Wildlife Refuge)



### **Fuel Models/Types:**

- FBFM40 – TU1
- FBFM13 – 8
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Leaf litter
- Grass
- Shrub

### **Fire Behavior Comments:**

- Slope may be important for significant spread
- During drought, may get increased fire behavior
- May have some spruce in understory that will increase fire behavior

### **Vegetation Characteristics:**

These communities are often found on very dry, steep, south-facing slopes along rivers in interior and southcentral Alaska. They are dominated by small aspen trees ranging from 10 – 59% cover. Diameter at breast height is rarely over 12 cm (5 in) and height generally less than 15 m (50 ft). Prickly rose and buffaloberry can provide low shrub cover, and the dwarf shrub kinnikinnick is often present. If this site occurs on a floodplain, willows may be a component of the understory. A variety of herbs and grasses may be present. Mosses and lichens are present but do not provide significant cover.

***Viereck et al. (1992) Vegetation Classes:***

- 1B2B Open Quaking Aspen Forest

***Similar Looking Alaska Fuel Types:***

- (14) Closed Paper Birch Forest and Closed Quaking Aspen Forest
- (18) Woodland Paper Birch and Woodland Balsam Poplar



## (17) Open Balsam Poplar or Black Cottonwood Forest



1B2C. Open Balsam Poplar Forest, Kincaid Park, Anchorage  
(Photo Courtesy of L. Saperstein)



1B2C. Open Black Cottonwood Forest, Chugach National Forest.  
(Photo Courtesy of USFS)



1B2C. Open Balsam Poplar Forest  
(Photo courtesy of Koyukuk National Wildlife Refuge)



1B2C. Open Black Cottonwood Forest, Chugach Mountains. (Photo Courtesy of USFS)

### **Fuel Models/Types:**

- FBFM40 – TL2
- FBFM13 – 8
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Leaf litter

### **Fire Behavior Comments:**

- Often found on flood plains and occasionally on slopes
- Use TU1 if dynamic fuel model is desired

### **Vegetation Characteristics:**

Balsam poplar or black cottonwood dominate these stands, with balsam poplar stands being more common and found throughout forested areas of the state. Black cottonwood stands are only along the southeastern and southern coasts. Tree cover is between 25 – 59%, and trees can be large, reaching 40 cm (16 in) DBH and 20 – 30 m (65 – 100 ft) in height. Trees may be shorter near treeline, but DBH may be in the same range. Understory shrubs are variable. Tall shrubs tend to be scattered and consist largely of willow and alder. Low shrubs include squashberry (locally called highbush cranberry), prickly rose, and, under balsam poplar, buffaloberry. Herbaceous species include bluejoint reedgrass, fireweed, tall bluebells, and wintergreen. Feathermosses are usually present.

### **Viereck et al. (1992) Vegetation Classes:**

- 1B2C Open Balsam Poplar (Black Cottonwood) Forest

***Similar Looking Alaska Fuel Types:***

- (13) Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forest
- (18) Woodland Paper Birch and Woodland Balsam Poplar

## (18) Woodland Paper Birch and Woodland Balsam Poplar



1B3A. Paper Birch Woodland (Photo Courtesy of Kobuk Valley National Preserve)



1B3A. Paper Birch Woodland (Photo Courtesy of Kanuti National Wildlife Refuge)



1B3A. Paper Birch Woodland (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 –SH1
- FBFM13 – 8
- CANFBP – O-1a

### **Primary Carrier of Fire:**

- Lichen
- Grass
- Leaf litter

### **Fire Behavior Comments:**

- May be found in 10 – 20 year old burns
- Fires may slow when hitting this Alaska Fuel Type, but under high winds and very dry live and dead fuel moistures, fire will readily move through it
- Consider GR1 or SH2 as alternate fuel models, depending on observed fire behavior

### **Vegetation Characteristics:**

These stands are found in the northern interior, northwest Alaska, and to a limited extent in southcentral Alaska. They are composed of open grown paper birch and/or balsam poplar with 10 – 24% cover. Birch is often multi-stemmed and stunted, with heights up to 6 – 10 m (20 – 32 ft) but usually lower. The balsam poplar woodland is limited in distribution, with few locations described. It is similar to open balsam poplar stands (see Alaska Fuel Type #17), but with larger openings between trees. It is possible to have woodland that is a mixture of paper birch and balsam poplar, but this configuration is also rare. The understory differs between birch and poplar woodlands. Paper birch woodlands often have sparse understories with lichen ground cover. They are often found on drier sites such as stabilized sand dunes or alluvial gravel. This type may also be a post-fire seral stage, in which case there may be more shrubs and graminoids in the understory. In balsam poplar woodlands, tall shrubs consist of alder and willow while low shrubs such as prickly rose and squashberry (locally called highbush cranberry) are found in the understory. Herbaceous plants include bluejoint grass, fireweed, tall bluebells, and wintergreen.

### **Viereck et al. (1992) Vegetation Classes:**

- 1B3A Paper Birch Woodland
- 1B3B Balsam Poplar Woodland
- 1B3C Paper Birch – Balsam Poplar Woodland

### **Similar Looking Alaska Fuel Types:**

- (17) Open Balsam Poplar or Black Cottonwood Forest
- (27) Open Tall Shrub Birch and Open Tall Shrub Birch – Willow



## (19) White or Black Spruce with Paper Birch and/or Aspen



1C1D. Closed Quaking Aspen–Spruce Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1C2B. Open Quaking Aspen–Spruce Forest (Photo Courtesy of Denali National Park and Preserve)



1C2B. Open Quaking Aspen–Spruce Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



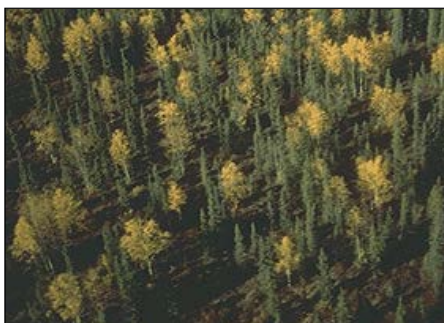
1C1A. Closed Spruce–Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1C1A. Closed Spruce–Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1C1A. Closed Spruce–Paper Birch Forest (Photo Courtesy of Kanuti National Wildlife Refuge)



1C2A. Open Spruce–Paper Birch Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1C1A. Closed Spruce–Paper Birch Forest (Photo Courtesy of Kenai National Wildlife Refuge)



**Fuel Models/Types:**

- FBFM40 – TU5
- FBFM13 – 10
- CANFBP – M-2/50% conifer

**Primary Carrier of Fire:**

- Leaf litter

**Fire Behavior Comments:**

- Amount of spruce in stand increases rate of spread; understory spruce may not be detected from air. Can adjust herbaceous and live woody moistures to account for amount of spruce within TU5
- Use M-1 for leafless period, M-2 during green period
- Occurs on floodplain terraces; slopes; uplands; or warm, dry sites

**Vegetation Characteristics:**

These communities are found in interior and southcentral Alaska, with more limited occurrence in northwest and southwest Alaska. They include open and closed stands (25% cover or greater). These stands are composed of paper birch and/or aspen with white or black spruce or a mixture thereof. Dominance is shared among the different tree species, although spruce tends to become more dominant as the stand ages and shorter-lived deciduous trees become over-mature and drop out. Small quantities of balsam poplar may be present. Stands with white spruce as the dominant conifer tend to be on better drained sites while stands dominated by black spruce tend to be on poorly drained sites. Moderately dense to scattered tall alder or willow may be present. In stands with closed tree canopies, low shrub cover ranges from an intermittent to closed canopy, commonly with the following species: prickly rose, squashberry (locally called highbush cranberry), currant, Beauverd spirea and lingonberry. Closed and open sites with aspen and open sites with paper birch tend to have more ericaceous species such as *Vaccinium* spp., kinnikinnick, and Labrador tea. Common herbaceous plants in all sites include twinflower, horsetail, tall bluebells, bunchberry dogwood, and bluejoint reedgrass. Ferns may be found, depending on dominant stand type. Cover of feathermosses ranges from dominant to patchy. Open spruce/paper birch forests with *Sphagnum* have been reported. Lichens may be present in open stands.

**Viereck et al. (1992) Vegetation Classes:**

- 1C1A Closed Spruce – Paper Birch Forest
- 1C1C Closed Spruce – Paper Birch – Quaking Aspen Forest
- 1C1D Closed Quaking Aspen – Spruce Forest
- 1C2A Open Spruce – Paper Birch Forest
- 1C2B Open Quaking Aspen – Spruce Forest
- 1C3A Spruce – Paper Birch Woodland

**Similar Looking Alaska Fuel Types:**

- (15) Open Paper Birch Forest
- (16) Open Quaking Aspen Forest
- (20) White Spruce with Balsam Poplar and Paper Birch

## (20) White Spruce with Balsam Poplar and Paper Birch



1C1B. Closed White Spruce – Paper Birch – Balsam Poplar Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1C1E. Closed Balsam Poplar – White Spruce Forest (Photo Courtesy of Lake Clark National Park and Preserve)



1C2D. Open Spruce – Balsam Poplar Forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1C2C. Open White Spruce – Paper Birch – Balsam Poplar Forest (Photo Courtesy of Nowitna National Wildlife Refuge)



1C2C. Open White Spruce – Paper Birch – Balsam Poplar Forest (Photo Courtesy of Alaska Center for Conservation Science)

### Fuel Models/Types

- FBFM40 – TU1
- FBFM13 – 8
- CANFBP – M-2/25% conifer

### Primary Carrier of Fire: Fire Behavior Comments:

- Leaf litter
- Herbaceous plants
- Use M-1 during the leafless period
- Consider Alaska Fuel Type #19 if more upland site

### Vegetation Characteristics:

This Alaska Fuel Type occurs on floodplains; creek bottoms; areas with low shrubs at tree line; or high elevation streams in southcentral, interior, southwestern, and northwestern Alaska. These stands are dominated by a mixture of white spruce, balsam poplar or black cottonwood, and paper birch, with tree cover 25% or greater. Proportions of the different tree species may vary, and it is thought that the balsam poplar/black cottonwood is mainly present during earlier seral stages. Tall shrubs include alder and willow, and low/dwarf shrubs are represented by bog blueberry, lingonberry, prickly rose, Beauverd spirea, Labrador tea, and others. Herbaceous plants typically consist of bluejoint reedgrass, horsetails, fireweed, tall bluebells, and possibly ferns. Ferns and mosses may be present.

***Viereck et al. (1992) Vegetation Classes:***

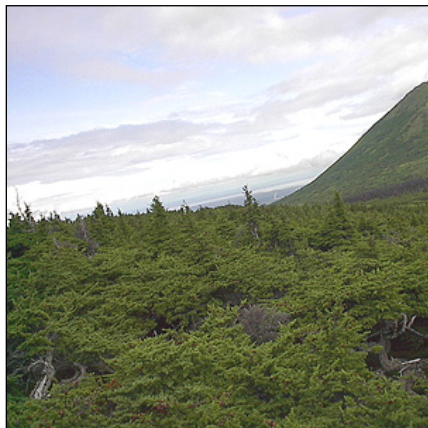
- 1C1B Closed White Spruce – Paper Birch – Balsam Poplar (Black Cottonwood) Forest
- 1C1E Closed Balsam Poplar – White Spruce Forest
- 1C2C Open Paper Birch – Balsam Poplar – Spruce Forest
- 1C2D Open Spruce – Balsam Poplar Forest

***Similar Looking Alaska Fuel Types:***

- (17) Open Balsam Poplar or Black Cottonwood Forest
- (19) White or Black Spruce with Paper Birch and/or Aspen



## (21) Dwarf Tree Mountain Hemlock Scrub and Dwarf Tree Alpine Spruce Scrub



2A1A. Closed Mountain Hemlock Dwarf Tree Scrub  
(Photo Courtesy of J. Koltun, GRS)



2A1A. Closed Mountain Hemlock Dwarf Tree Scrub  
(Photo Courtesy of USFS)



2A1. Closed Dwarf Tree Shrub, spruce is dominant species. (Photo Courtesy of USFS)

### **Fuel Models/Types:**

- BFM40 – SH1
- FBFM13 – 8
- CANFBP – O-1a

### **Primary Carrier of Fire:**

- Sparse moss
- Shrub

### **Fire Behavior Comments:**

- Fire unlikely unless dry.
- High foliar moisture, low rate of spread
- Occurs in areas highly exposed to wind
- Use low curing for O-1a

### **Vegetation Characteristics:**

Generally found at higher elevations in southeast or southcentral Alaska, these stands are dominated by mountain hemlock, spruce, or subalpine fir less than 3 m (10 ft) tall at maturity and with 25% or greater cover. Trees greater than 3 m tall provide less than 10% cover. Dwarf stands may be significantly shorter than 3 m where exposed to severe wind. Low shrub and herbaceous plant cover is sparse in closed (60 – 100% cover) stands, but there may be a well-developed dwarf shrub layer. In open stands (25 – 59% cover), there may be more shrub and herbaceous cover. Shrubs can include Sitka mountain-ash, rusty menziesia, oval leaf blueberry, copperbush, and crowberry. Herbaceous plants include bluejoint reedgrass, bunchberry dogwood, and deercabbage. Feathermosses are common in all situations.

### **Viereck et al. (1992) Vegetation Classes:**

- 2A1A Closed Mountain Hemlock Dwarf Tree Scrub
- 2A1B Closed Subalpine Fir Dwarf Tree Scrub
- 2A2B Open Mountain Hemlock Dwarf Tree Scrub

### **Similar Looking Alaska Fuel Types:**

- (36) Dwarf Shrub Tundra

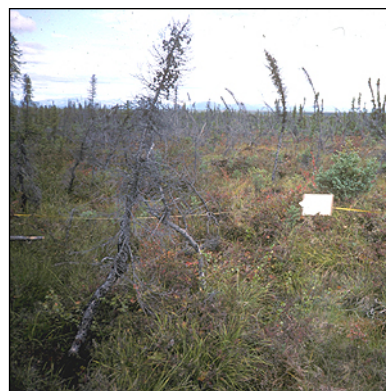
## (22) Dwarf Tree Black Spruce Scrub



2A2A. Open Black Spruce Dwarf Tree Scrub (Photo Courtesy of the Steese-White Mountains Recreational Area-BLM)



2A3A. Black Spruce Dwarf Tree Woodland (Photo Courtesy of Ducks Unlimited)



2A3A. Black Spruce Dwarf Tree Woodland (Photo Courtesy of Kobuk Valley National Preserve)



2A3A. Black Spruce Dwarf Tree Woodland (Photo Courtesy of the Alaska Center for Conservation Science)



2A2A. Open Black Spruce Dwarf Tree Scrub, Dalton Highway (Photo Courtesy of Ducks Unlimited)

### Fuel Models/Types:

- FBFM40 – GS1
- FBFM13 – 9
- CANFBP C-1

### Primary Carrier of Fire:

- Shrub

### Fire Behavior Comments:

- Similar to open and woodland black spruce forests, difference is shorter tree height
- Under average conditions, change to C2/GS2 when canopy cover is in open canopy range (25 – 60%)
- Use SH5 for dry conditions (low 30's RH) and open canopy range (25 – 60%), especially when using Finney Crown Fire Method in fire behavior models

### Vegetation Characteristics:

Common on cold or wet soils in interior, southcentral, and western Alaska, these stands are dominated by black spruce, less than 3 m (10 ft), with cover ranging from 10 – 59% for dwarf trees and less than 10% for trees greater than 3 m. Dwarf tamarack and paper birch may be present, but are less likely to occur in the woodland version of this site (10 – 24% cover). Low shrubs are nearly continuous in cover and include species also found in open black spruce forests (Alaska Fuel Type #6): bog blueberry, lingonberry, Labrador tea, dwarf birch, and prickly rose. Common herbaceous plants include bluejoint reedgrass, horsetails, cloudberry, tussock cottongrass, and Bigelow's sedge. Often underlain by thick peat, the ground layer is dominated by feathermosses, although *Sphagnum* may be prominent in sites with lower cover of dwarf trees. Lichens, both fruticose and foliose, may be present.

***Viereck et al. (1992) Vegetation Classes:***

- 2A2A Open Black Spruce Dwarf Tree Scrub
- 2A3A Black Spruce Dwarf Tree Woodland

***Similar Looking Alaska Fuel Types:***

- (6) Open Black Spruce and Open Mixed Black Spruce – White Spruce Forest
- (11) Black Spruce and/or White Spruce Woodland with Lichen
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog



## (23) Closed Tall Alder and Closed Tall Willow



2B1A. Closed Tall Willow Shrub (Photo Courtesy of Wrangell -St. Elias National Park and Preserve)



2B1A. Closed Tall Willow Shrub (Photo Courtesy of Yukon -Charley Rivers National Preserve)



2B1A. Closed Tall Willow Shrub, Chugach State Park (Photo Courtesy of L. Saperstein)



2B1B. Closed Tall Alder Shrub, along old road (Photo courtesy of Chugachmiut)



2B1B. Closed Tall Alder Shrub, Innoko area (Photo Courtesy of Ducks Unlimited)



2B1B. Closed Tall Alder Shrub (Photo Courtesy of M. Fleming, SAIC)

### **Fuel Models/Types:**

- FBFM40 – TL2
- FBFM13 – 8
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Leaf litter
- Woody debris

### **Fire Behavior Comments:**

- High fuel moisture, most likely to burn in spring
- Use TU1 or M1/M2 to ramp up fire behavior; consider using SH2 for extreme conditions.

### **Vegetation Characteristics:**

Willows and/or alder greater than 1.5 m (5 ft) dominate these stands with greater than 75% cover. Shrubs can be tree-sized, exceeding 6 m (20 ft.) in some areas. Spruce, paper birch, and cottonwood may be present with cover less than 10%. Low shrubs are restricted to openings and may include prickly rose, currants, devil's club, and salmonberry in southeast Alaska. Grasses and horsetails may be present in gaps or in sites at the lower end of the cover range. Mosses can be abundant. This Alaska Fuel Type can be found statewide.

### **Viereck et al. (1992) Vegetation Classes:**

- 2B1A Closed Tall Willow Shrub
- 2B1B Closed Tall Alder Shrub
- 2B1D Closed Tall Alder – Willow Shrub

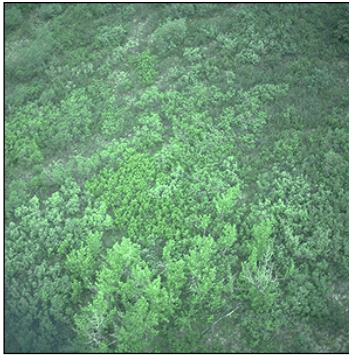
***Similar Looking Alaska Fuel Types:***

- (13) Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forest
- (14) Closed Paper Birch Forest and Closed Quaking Aspen Forest
- (24) Closed Tall Shrub Birch
- (26) Open Tall Alder and/or Willow

## (24) Closed Tall Shrub Birch



2B1C. Closed Tall Shrub Birch Shrub (Photo Courtesy of the US Fish and Wildlife Service)



2B1E. Closed Tall Shrub Birch – Willow Shrub (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



2B1C. Closed Tall Shrub Birch Shrub. (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – SH3
- FBFM13 – 9
- CANFBP – M-1/M-2

### **Primary Carrier of Fire:**

- Shrub litter

### **Fire Behavior Comments:**

- Primary carriers of fire are shrubs, not grasses
- Resin in birch **may** enable shrub birch to burn more readily than willow; birch has higher moisture of extinction.
- SH3 has a high moisture of extinction, consider using SH2 for lower moisture of extinction
- SH2 has faster rate of spread at low fuel moistures compared to SH3, and SH2 has lower moisture of extinction. Use SH3 if this type is burning under moist conditions

### **Vegetation Characteristics:**

These communities can be found in interior and western Alaska, often near treeline. The stands are dominated by tall ( $\geq 1.5$  m [5 ft]) resin birch or resin birch/paper birch hybrids with 75% or greater cover. Tall willows may be present, but the resin birch is the primary species. Occasional alders or trees may occur. Low shrubs are sparse or absent, and herbaceous plants and moss may be present.

### **Viereck et al. (1992) Vegetation Classes:**

- 2B1C Closed Tall Shrub Birch Shrub
- 2B1E Closed Tall Shrub Birch – Willow Shrub

### **Similar Looking Alaska Fuel Types:**

- (23) Closed Tall Alder and Closed Tall Willow
- (26) Open Tall Alder and/or Willow
- (27) Open Tall Shrub Birch and Shrub Birch – Willow
- (29) Closed Low Willow and Low Alder – Willow



## **(25) Tall Shrub Swamp – Deleted**

We have deleted this Alaska Fuel Type due to lack of examples and because we suspect it may burn like other shrub types if dry enough to burn at all. This type is described as being similar to an ericaceous shrub bog, but with a tall shrub component, usually alder or alder – willow.

This may be mapped as Existing Vegetation Type 2777 in LANDFIRE

It is suggested to group this with Alaska Fuel Type #23, Closed Tall Alder and Closed Tall Willow with TL2 – 8 – D-1/D-2 fuel model/type classifications

## (26) Open Tall Alder and/or Willow



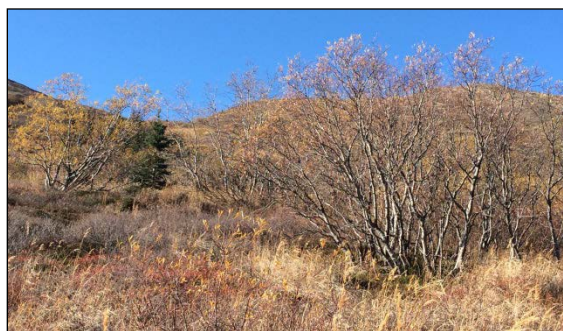
2B2A. Open Tall Willow Shrub (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



2B2B. Open Tall Alder Shrub (Photo Courtesy of Cape Krusenstern National Monument)



2B2B. Open Tall Alder Shrub (Photo Courtesy of Ducks Unlimited)



2B2A. Open Tall Willow Shrub, Chugach State Park (Photo Courtesy of L. Saperstein)

### **Fuel Models/Types:**

- FBFM40 –TU1
- FBFM13 – 8
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Grass
- Shrub litter

### **Fire Behavior Comments:**

- Use M-1 during the shoulder seasons
- Use GS1 if more grass/grass litter to increase fire behavior.
- If shrub canopy more closed, select slower fuel model due to less grass cover

### **Vegetation Characteristics:**

The canopy is dominated by alders and/or willows about 1.5 meters (5 ft) tall or greater with 25 – 74% cover. Scattered white spruce and balsam poplar maybe present with less than 10% cover. Willow stands tend to be found on floodplains, drainages, burns, and sheltered slopes. Stands dominated by alder can be found near altitudinal treeline, in old burns, and on creek and river banks. Low shrubs may be absent or common, consisting of willows, prickly rose, and buffaloberry. Near treeline, resin birch, bog blueberry, and Labrador tea may be found. Herbs and grasses range from sparse to dense, often including fireweed, bluejoint reedgrass, and wooly geraniums. Mosses may be sparse or dense, but lichens are rare. This Alaska Fuel Type can be found in most of the state.

### **Viereck et al. (1992) Vegetation Classes:**

- 2B2A Open Tall Willow Shrub
- 2B2B Open Tall Alder Shrub
- 2B2D Open Tall Alder – Willow Shrub

***Similar Looking Alaska Fuel Types:***

- (23) Closed Tall Alder and Closed Tall Willow
- (27) Open Tall Shrub Birch and Shrub Birch – Willow
- (29) Closed Low Willow and Low Alder – Willow
- (33) Open Low Willow and Open Low Sweetgale



## (27) Open Tall Shrub Birch and Open Tall Shrub Birch – Willow



2B2C. Open Tall Shrub Birch Shrub (Photo Courtesy Wrangell-St. Elias National Park and Preserve)



2B2E. Open Tall Shrub Birch – Willow Shrub (Photo Courtesy of Yukon-Charley Rivers National Preserve)



2B2E. Open Tall Shrub Birch – Willow Shrub (Photo Courtesy of Yukon-Charley Rivers National Preserve)



2B2E. Open Tall Shrub Birch – Willow Shrub (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – SH3
- FBFM13 – 9
- CANFBP – M-1/M-2

### **Primary Carrier of Fire:**

- Shrub and shrub litter

### **Fire Behavior Comments:**

- Use TU4 to increase Rate of Spread (ROS)
- If more graminoids and high ROS observed, use GS1

### **Vegetation Characteristics:**

These communities are characterized by tall (average  $\geq 1.5$  m [5 ft]) resin birch or a combination of resin birch and willow with cover ranging between 25 – 74%. Mixed birch/willow stands are more common than pure birch stands. Tree species like spruce may overtop the shrubs with less than 10% cover, and there may be occasional tall alders. Low shrubs such as willow, Beauverd spirea, Labrador tea, and bog blueberry may be present. Bluejoint reedgrass, Altai fescue, and tall bluebells may be common. Mosses may be extensive in wetter sites while lichens can be plentiful in more open, drier stands. Both types of communities are often, but not always, found on upland slopes or near treeline.

### **Viereck et al. (1992) Vegetation Classes:**

- 2B2C Open Tall Shrub Birch Shrub
- 2B2E Open Tall Shrub Birch – Willow Shrub

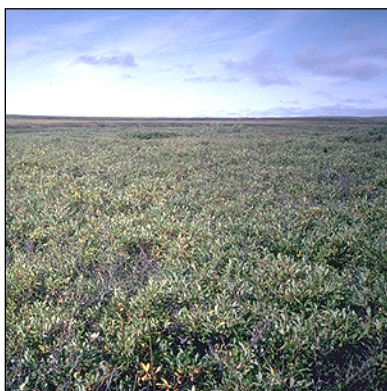
### **Similar Looking Alaska Fuel Types:**

- (24) Closed Tall Shrub Birch
- (26) Open Tall Alder and/or Willow
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow

## (28) Closed Low Shrub Birch and Closed Low Shrub Birch – Willow and Closed Low Ericaceous Shrub



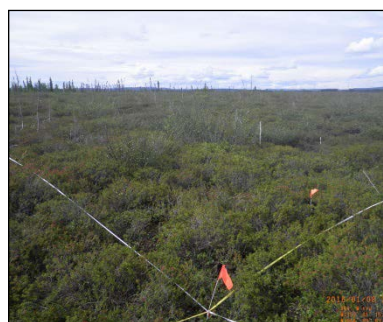
2C1A. Closed Low Shrub Birch Shrub (Courtesy of Bering Land Bridge National Preserve)



2C1C. Closed Low Shrub Birch – Willow Shrub (Courtesy of Bering Land Bridge National Preserve)



2C1C. Closed Low Shrub Birch – Willow Shrub (Courtesy of Bering Land Bridge National Preserve)



2C1D. Closed Low Ericaceous Shrub, 11 years post-fire (Courtesy of Kanuti NWR)

### **Fuel Models/Types:**

- FBFM40 – SH2
- FBFM13 – 9
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Shrub litter and shrubs

### **Fire Behavior Comments:**

- Consider TU4 for Rate of Spread under drought conditions
- Can be wind-driven

### **Vegetation Characteristics:**

Usually found in interior, southcentral, and northwest Alaska, these communities have at least 75% of their cover by shrubs at least 20 cm (8 in) tall but less than 1.5 m (5 ft). They are dominated by shrub birch, willow, or ericaceous shrubs such as Labrador tea, or—rarely—copperbush in southeast Alaska. Trees provide less than 10% cover and shrubs over 1.5 m contribute less than 25% cover. Closed shrub birch communities are dominated by resin or dwarf birch. Some scattered willows may be present in the overstory, with bog blueberry or crowberry sometimes occurring. Feathermosses can be a continuous mat, and lichens may be common. The shrub birch – willow stands are similar, but willows are codominant with birch and lichens are not as common. The closed ericaceous shrub communities are dense enough that there are few other species in the understory.

### **Viereck et al. (1992) Vegetation Classes:**

- 2C1A Closed Low Shrub Birch Shrub
- 2C1C Closed Low Shrub Birch – Willow Shrub
- 2C1D Closed Low Ericaceous Shrub

***Similar Looking Alaska Fuel Types:***

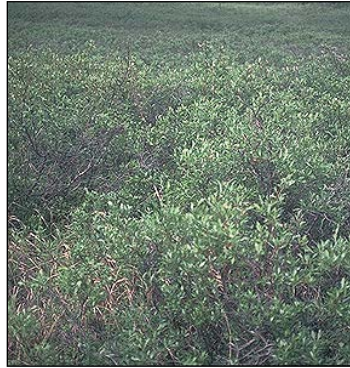
- (24) Closed Tall Shrub Birch
- (29) Closed Low Willow and Closed Low Alder – Willow
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow



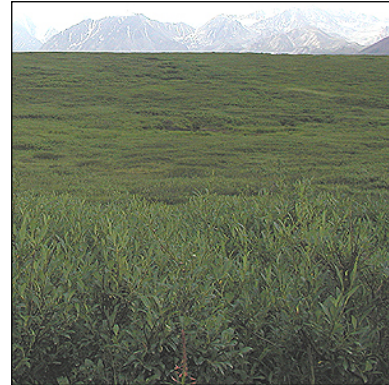
## (29) Closed Low Willow and Closed Low Alder – Willow



2C1E. Closed Low Alder – Willow Shrub, Goodnews Bay (Photo Courtesy of Ducks Unlimited)



2C1B. Closed Low Willow Shrub (Photo Courtesy of Kobuk Valley National Preserve)



2C1B. Closed Low Willow Shrub (Photo Courtesy of Denali National Park and Preserve)

### **Fuel Models/Types:**

- FBFM40 – SH2
- FBFM13 – 9
- CANFBP – D-1/D-2

### **Primary Carrier of Fire:**

- Shrub litter
- Possibly grass in more open canopies

### **Fire Behavior Comments:**

- TU1 could be used to moderate fire spread under extreme dry conditions
- Use M-1 in the shoulder seasons

### **Vegetation Characteristics:**

These communities have at least 75% cover of willow or a mix of alder and willow at least 20 cm (8 in) tall but less than 1.5 m (5 ft). Sweetgale may also be a component of the canopy. Trees provide less than 10% cover and shrubs  $\geq 1.5$  m provide less than 25% cover. Willow sites can contain bluejoint reedgrass, horsetails, and other forbs with feathermosses. Dwarf ericaceous shrubs may be common in the understory of mixed alder – willow stands, including crowberry and lingonberry; mosses other than *Sphagnum* are also common

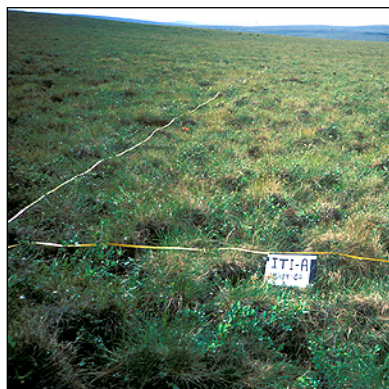
### **Viereck et al. (1992) Vegetation Classes:**

- 2C1B Closed Low Willow Shrub
- 2C1E Closed Low Alder – Willow Shrub

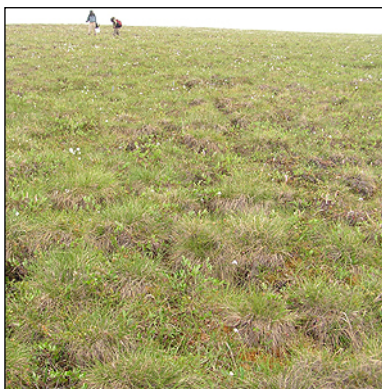
### **Similar Looking Alaska Fuel Types:**

- (23) Closed Tall Alder and Closed Tall Willow
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow
- (34) Open Low Alder and Open Low Alder – Willow

## (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog



2C2A. Open Low Mixed Shrub – Sedge Tussock Tundra  
(Photo Courtesy of the National Park Service)



2C2B. Open Low Mixed Shrub – Sedge Tussock Bog  
(Photo Courtesy of Arctic National Wildlife Refuge)



2C2B. Open Low Mixed Shrub – Sedge Tussock Bog  
(Photo Courtesy of Gates of the Arctic National Park and Preserve)



2C2B. Open Low Mixed Shrub – Sedge Tussock Bog  
(Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR4
- FBFM13 – 1
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Tussocks
- Low shrubs

### **Fire Behavior Comments:**

- Shrub component dampens fire behavior
- Smoke visible from interior of fire indicates difficulty to control; no smoke - can generally be beaten out
- Can be wind-driven
- Backing fire can be very active
- If high fuel moistures and still seeing active fire and/or low moisture of extinction is causing problems, try FBFM40: GR5
- Use GS3 to slow fire behavior, or SH2 for further reduction

### **Vegetation Characteristics:**

This Alaska Fuel Type is found in northern, western, southcentral, and interior Alaska from lowlands to alpine habitat. These communities have at least 25% low shrub cover that is at least 20 cm (8 in) tall but less than 1.5 m (5 ft) and are dominated by tussock-forming sedges (tussock cottongrass or Bigelow's sedge). Trees, if present, are usually stunted black spruce with less than 10% cover. Common low shrubs include resin or dwarf birch, *Vaccinium* spp., crowberry, Labrador tea, and bog rosemary. Scattered alders and willows up to 1 m (3 ft) tall are sometimes present. Herbaceous plants may be present, but are

generally sparse. Mosses, feathermosses and *Sphagnum*, can form a mat in the inter-tussock spaces and lichens may be present.

***Viereck et al. (1992) Vegetation Classes:***

- 2C2A Open Low Mixed Shrub – Sedge Tussock Tundra
- 2C2B Open Low Mixed Shrub – Sedge Tussock Bog

***Similar Looking Alaska Fuel Types:***

- (10) Black Spruce Woodland with Tussocks
- (22) Dwarf Tree Black Spruce Scrub
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub
- (41) Tussock Tundra



## (31) Open Low Mesic Shrub Birch – Ericaceous Shrub



2C2C. Open Low Mesic Shrub Birch – Ericaceous Shrub  
(Photo courtesy of Bering Land Bridge National Preserve)



2C2C. Open Low Mesic Shrub Birch – Ericaceous Shrub (Photo courtesy of Gates of the Arctic National Park and Preserve)



2C2C. Open Low Mesic Shrub Birch – Ericaceous Shrub, Dalton Highway area (Photo courtesy of Ducks Unlimited)

### **Fuel Models/Types:**

- FBFM40 – GR2
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Ericaceous shrub and birch

### **Fire Behavior Comments:**

- Low moisture of extinction.
- Could use SH7 if greater ROS is observed

### **Vegetation Characteristics:**

These communities are found in interior, southcentral, northern and western Alaska, including Alaska Range slopes and alpine sites. They have 25 – 74% low shrub cover dominated by resin or dwarf birch and ericaceous shrubs (e.g., bog blueberry, Labrador tea). The shrubs are between 20 cm (8 in) and 1.5 m (5 ft); taller shrubs provide less than 25% cover. Shorter ericaceous shrubs may be present, such as lingonberry, red fruit or alpine bearberries, and crowberry. Scattered white or black spruce trees provide less than 10% cover. Graminoids include Bigelow's sedge and Altai fescue. Mosses, mostly feathermosses and non-*Sphagnum* species, form a mat under the shrubs. Lichens are common and may be abundant.

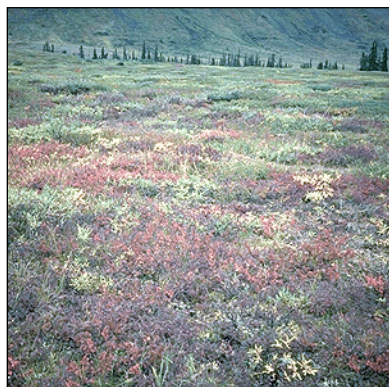
### **Viereck et al. (1992) Vegetation Classes:**

- 2C2C Open Low Mesic Shrub Birch – Ericaceous Shrub

### **Similar Looking Alaska Fuel Types:**

- (22) Dwarf Tree Black Spruce Scrub
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow

## (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow



2C2E. Open Low Ericaceous Shrub Bog (Photo Courtesy of Kobuk Valley National Preserve)



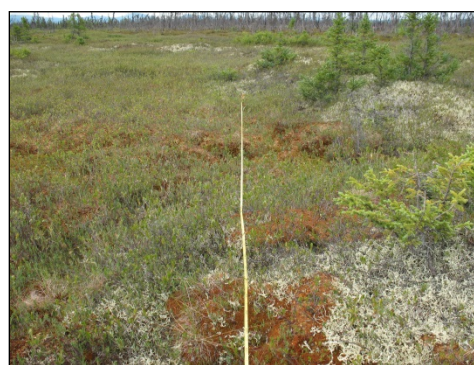
2C2E. Open Low Ericaceous Shrub Bog (Photo Courtesy of Gates of the Arctic National Park and Preserve)



2C2F. Open Low Shrub Birch – Willow Shrub (Photo Courtesy of Gates of the Arctic National Park and Preserve)



2C2D. Open Low Ericaceous Shrub Bog (Photo Courtesy of Kanuti National Wildlife Refuge)



2C2D. Open Low Ericaceous Shrub Bog (Photo Courtesy of Kanuti National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – GS2
- FBFM13 – 5
- CANFBP – O-1a/b

### Primary Carrier of Fire:

- Grass
- Shrub

### Fire Behavior Comments:

- *Sphagnum* and willow dampen fire behavior, even with birch present

### Vegetation Characteristics:

The vegetation classes that comprise this Alaska Fuel Type are found in widely different environments. Shrub Birch – Ericaceous Shrub bogs are common on wet, peaty sites in interior, western, southcentral, and to a lesser extent, northern Alaska. Ericaceous Shrub Bogs occur in maritime areas of southeast Alaska and the gulf coast, also on peaty deposits. Shrub Birch – Willow communities are in interior, southcentral and southwest Alaska on sites with a thin organic layer. Cover of shrubs between 20 cm (8 in) and 1.5 m (5 ft) ranges between 25 – 74%, with taller shrubs contributing less than 25% cover and trees providing less than 10%. For Open Low Shrub Birch – Ericaceous Shrub Bog, dominant shrub species include resin and dwarf birch, *Vaccinium* spp., crowsberry, Labrador tea, and bog rosemary. Willows may be common locally. Stunted scattered black or white spruce trees may be found in this community. In maritime climates, scattered lodgepole pine, Alaska cedar, mountain hemlock, Sitka spruce, and western hemlock may be present with less than 10% cover. A wide variety of sedges and herbs may be present, and lichens may be present on mounds. A similar community is comprised of ericaceous shrubs without the shrub birch. Open Low Shrub Birch – Willow Communities are similar but willows are codominant with the birch shrubs. Mosses in this Alaska Fuel Type tend to be feathermosses on drier and willow-dominated sites and *Sphagnum* mosses at boggy sites. Scattered cottongrass tussocks may be present.

***Viereck et al. (1992) Vegetation Classes:***

- 2C2D Open Low Shrub Birch – Ericaceous Shrub Bog
- 2C2E Open Low Ericaceous Shrub Bog
- 2C2F Open Low Shrub Birch – Willow Shrub

***Similar Looking Alaska Fuel Types:***

- (31) Open Low Birch – Ericaceous Shrub



## (33) Open Low Willow and Open Low Sweetgale



2C2G. Open Low Willow Shrub (Photo Courtesy of Bering Land Bridge National Preserve)



2C2H. Open Low Willow – Sedge Shrub Tundra (Photo Courtesy of Bering Land Bridge National Preserve)



2C2J. Open Low Sweetgale – Graminoid Bog (Photo Courtesy of Lake Clark National Park and Preserve)

### **Fuel Models/Types:**

- FBFM40 – SH1
- FBFM13 – 8
- CANFBP – O-1a

### **Primary Carrier of Fire:**

- Graminoids
- Shrub litter

### **Fire Behavior Comments:**

- Willow will dampen fire behavior
- Graminoids will increase fire behavior-use GR1
- Wet sites dampen fire behavior

### **Vegetation Characteristics:**

These communities have 25 – 74% shrub cover of primarily willows or sweetgale at least 20 cm (8 in) tall but less than 1.5 m (5 ft). The taller shrubs provide less than 25% cover. Trees comprise less than 10% cover and are generally absent. Understory differs based on type and amount of graminoids and species of associated shrubs. Ericaceous shrubs, dwarf shrubs, forbs, and subshrubs are usually present in the understory. Sedges are often present, particularly water sedge, and may dominate the understory in some sites. Mosses, typically non-sphagnaceous, may form patchy to continuous mats, with *Sphagnum* present on wetter sites. Lichens are scarce. This Alaska Fuel Type is found on terraces, bluffs, dune complexes, moist uplands and slopes, terraces, pond margins, stream banks, drained lake basins, wet stream bottoms, and lowland depressions. Sites dominated by sweetgale tend to be very wet, usually with standing water, and have a peat substrate.

### **Viereck et al. (1992) Vegetation Classes:**

- 2C2G Open Low Willow Shrub
- 2C2H Open Low Willow – Sedge Shrub Tundra
- 2C2I Open Low Willow – Graminoid Shrub Bog
- 2C2J Open Low Sweetgale – Graminoid Bog

### **Similar Looking Alaska Fuel Types:**

- (26) Open Tall Alder and/or Willow
- (28) Closed Low Shrub Birch and Closed Low Shrub Birch – Willow and Closed Low Ericaceous Shrub
- (29) Closed Low Willow and Closed Low Alder – Willow
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow
- (34) Open Low Alder and Open Low Alder – Willow

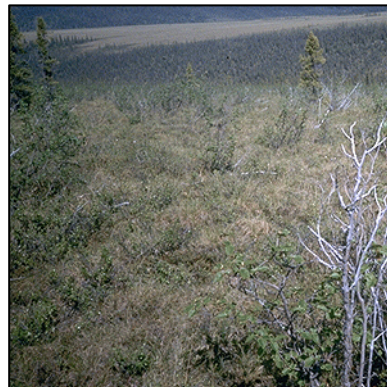
## (34) Open Low Alder and Open Low Alder – Willow



2C2K. Open Low Alder – Willow Shrub (Photo Courtesy of Bering Land Bridge National Preserve)



2C2L. Open Low Alder Shrub (Photo Courtesy of M. Fleming, SAIC)



2C2L. Open Low Alder Shrub (Photo Courtesy of Yukon-Charley Rivers National Preserve)

### **Fuel Models/Types:**

- FBFM40 – GS1
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass
- Low shrubs

### **Fire Behavior Comments:**

- Low shrubs will have more active fire behavior than the tall alder – willow shrubs
- Understory component varies by location in the state (e.g. arctic, interior, southcentral or southeast) or location on landscape (riparian vs upland) and may influence fire behavior
- GS1 designated for this type in tundra shrublands or drier upland sites. Use SH2 for riparian areas or if there is a moist herbaceous understory
- If you want to stop fire growth at higher moisture levels, consider FBFM13-1

### **Vegetation Characteristics:**

These communities have 25 – 75% shrub cover, at least 20 cm (8 in) tall. Shrubs are dominated by alders and/or willows, with mostly ericaceous shrubs in the understory. Tree canopy cover is less than 10% and shrubs greater than 1.5 m (5 ft) provide less than 25% cover. Herbs/sedges are present in the understory, and there may be scattered cottongrass tussocks. A continuous mat of feathermosses and/or *Sphagnum* is often present. Lichens are present locally. This Alaska Fuel Type ranges from steep slopes to river terraces.

### **Viereck et al. (1992) Vegetation Classes:**

- 2C2K Open Low Alder – Willow Shrub
- 2C2L Open Low Alder Shrub

### **Similar Looking Alaska Fuel Types:**

- (26) Open Tall Alder and/or Willow
- (29) Closed Low Willow and Closed Low Alder – Willow
- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Tundra Bog



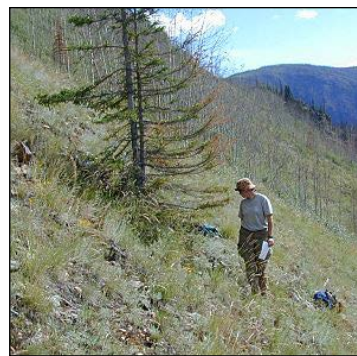
## (35) Sagebrush – Grass and Grass – Juniper



2C2M. Sagebrush – Juniper (Photo courtesy of Koyukuk National Wildlife Refuge)



2C2M. Sagebrush – Juniper (Photo courtesy of Yukon Charley Rivers National Park)



2C2N. Sagebrush – Grass (Photo Courtesy of the Yukon-Charley Rivers National Preserve)



2C2N. Sagebrush – Grass (Photo Courtesy of Gates of the Arctic National Park and Preserve)



2C2N. Sagebrush – Grass (Photo Courtesy of the Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 8
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass
- Shrubs

### **Fire Behavior Comments:**

- Grass will increase rate of spread
- Amount of bare ground or continuity of fuel bed will impact fire behavior
- FBFM13 fuel model 8 will likely under-predict ROS, could use fuel model 10 up to 6 mph mid-flame winds

### **Vegetation Characteristics:**

Sagebrush or juniper taller than 20 cm (8 in) is present with 25 – 75% cover. Sagebrush dominated communities are more common than those dominated by juniper. Tree cover, primarily aspen, is present with less than 10% cover and shrubs taller than 1.5 m (5 ft) contribute less than 25% cover. Grasses and herbs are present. Mosses are scarce and lichens are scattered. Generally found on steep south-facing bluffs in interior Alaska along major rivers.

### **Viereck et al. (1992) Vegetation Classes:**

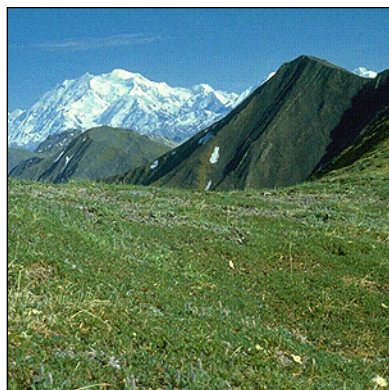
- 2C2N Sagebrush – Grass
- 2C2M Sagebrush – Juniper

### **Similar Looking Alaska Fuel Types:**

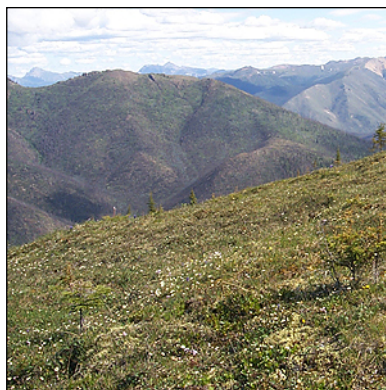
- (38) Grass – Shrub
- (16) Open Quaking Aspen Forest



## (36) Dwarf Shrub Tundra



2D1A. *Dryas* Dwarf Shrub Tundra (Photo Courtesy of Denali National Park and Preserve)



2D1B. *Dryas* - Sedge Dwarf Shrub Tundra



2D3A. Willow Dwarf Shrub Tundra (Photo Courtesy of the Arctic National Wildlife Refuge)



2D1A. Burned *Dryas* Dwarf Shrub Tundra (Photo Courtesy of Kanuti National Wildlife Refuge)



2D3A. Willow Dwarf Shrub Tundra, Alaska Peninsula/Becharof (Photo Courtesy of Ducks Unlimited)



2D1A. *Dryas* Dwarf Shrub Tundra (Photo Courtesy of Ducks Unlimited)

### Fuel Models/Types:

- FBFM40 – GS1
- FBFM13 – 5
- CANFBP – O-1a/b

### Primary Carrier of Fire:

- Herbs
- Low shrubs

### Fire Behavior Comments:

- Low fire behavior
- Fires backing into wind tend to burn faster than headfires
- If you want to stop fire growth at higher moisture levels, consider FBFM13-1

### Vegetation Characteristics:

This Alaska Fuel Type is typically found in alpine areas or in exposed, well drained arctic sites that are usually windswept. It is dominated by dwarf shrubs such as mountain avens, fruticose lichens, bearberry, *Vaccinium* species, black crowberry, mountain heather, and dwarf willows which form mats a few centimeters (1 in) thick. Shrubs taller than 20 cm (8 in) are absent or provide less than 25% cover. Trees are absent or have less than 10% cover. Forbs, mosses, and lichens are usually present. Graminoids often grow 10 – 30 cm (4 – 12 in) above the mat. Depending on the site, graminoid and fruticose lichen cover can range from sparse to being codominant with dwarf shrubs. Mosses are commonly intertwined in the mat of shrubs. Overall plant cover is variable, ranging from sparse to 100%, and patterned ground (steps, stripes, frost boils) may occur. Species composition is variable due to the large number of vegetation classes (see below) included in this Alaska Fuel Type.

***Viereck et al. (1992) Vegetation Classes:***

- 2D1A *Dryas* Dwarf Shrub Tundra
- 2D1B *Dryas* – Sedge Dwarf Shrub Tundra
- 2D1C *Dryas* – Lichen Dwarf Shrub Tundra
- 2D2A Bearberry Dwarf Shrub Tundra
- 2D2B *Vaccinium* Dwarf Shrub Tundra
- 2D2C Crowberry Dwarf Shrub Tundra
- 2D2D Mountain Heath Dwarf Shrub Tundra
- 2D2E *Cassiope* Dwarf Shrub Tundra
- 2D3A Willow Dwarf Shrub Tundra

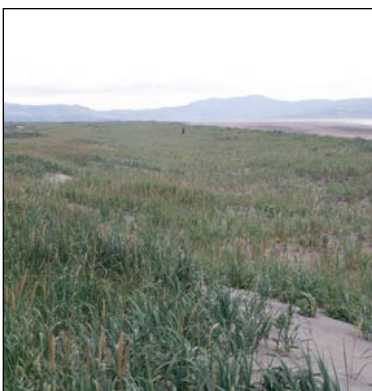
***Similar Looking Alaska Fuel Types:***

- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Tundra Bog
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub

## (37) *Elymus*



3A1A. *Elymus* (Photo Courtesy of M. Fleming, SAIC)



3A1A. *Elymus* (Photo Courtesy of M. Fleming, SAIC)



3A1A. *Elymus* (Photo Courtesy of M. Fleming, SAIC)



3A1A. Burning *Elymus* (Photo Courtesy of Katmai National Park)

### **Fuel Models/Types:**

- FBFM40 – GS2
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass

### **Fire Behavior Comments:**

- Grass only burns pre-green-up or after cured and has a low moisture of extinction
- High fuel load with this type, but doesn't have the rate of spread of a grass model.

### **Vegetation Characteristics:**

This type is dominated by grasses in the genus *Elymus* (wheatgrass), which typically grows in dense pure stands, but can mix with other grasses or forbs. Moss, lichens, and woody plants are scarce, although feathermosses may be present. *Elymus* communities are often found on coastal or near-coastal sand dunes, but one species grows on dry inland sites. The plants range in height from 20 cm (8 in) to over 1 meter (3 ft). Cover ranges from sparse to complete.

### **Viereck et al. (1992) Vegetation Classes:**

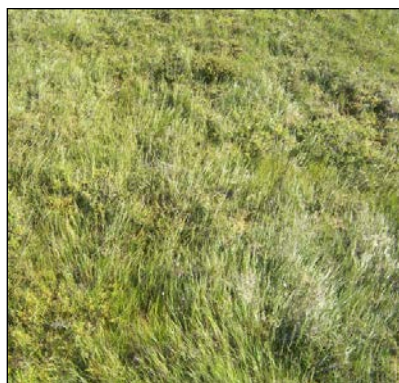
- 3A1A *Elymus*

### **Similar Looking Alaska Fuel Types:**

- (38) Grass – Shrub
- (40) Bluejoint – Shrub and Bluejoint – Herb
- (47) Wet Sedge – Grass Meadow or Marsh



## (38) Grass – Shrub



3A1C. Midgrass – Shrub, Alaska Peninsula /Becharof  
(Photo Courtesy of Ducks Unlimited)



3A1C. Midgrass – Shrub (Photo Courtesy of Yukon-Charley Rivers National Preserve)



3A1C. Midgrass – Shrub (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GS2
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Short grass

### **Fire Behavior Comments:**

- Use GS1 to lower Rate of Spread and flame length

### **Vegetation Characteristics:**

Communities are dominated by fescue grasses, a mixture of medium height grass species (30 – 70 cm; 12 – 28 in tall), or hair-grasses (40 – 80 cm; 16 – 32 in tall). Associated or codominant grasses include bluejoint and purple reedgrasses and largeflower speargrass. Scattered low shrubs may be present with less than 25% cover. Herbs are common but not codominant, while feathermosses and lichens range from absent to common. This Alaska Fuel Type is found throughout the state, but only the hair-grass communities are in southeast Alaska.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A1B Dry Fescue
- 3A1C Midgrass – Shrub
- 3A1E Hair-Grass

### **Similar Looking Alaska Fuel Types:**

- (35) Sagebrush – Grass and Grass – Juniper
- (37) *Elymus*
- (39) Bluejoint (*Calamagrostis*)

## (39) Bluejoint (*Calamagrostis*)



3A2A. Bluejoint Meadow (Photo Courtesy of Bering Land Bridge National Preserve)



3A2A. Bluejoint Meadow (Photo Courtesy of BLM Alaska Fire Service)



3A2A. Bluejoint Meadow (Photo Courtesy of Yukon Flats National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR4
- FBFM13 – 2
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass

### **Fire Behavior Comments:**

- Can use GR7 or FBFM13 fuel model 3 if very heavy fuel loads in southcentral Alaska (excluding Copper River Basin)
- Seasonality and percent curing will have a dramatic effect on rate of spread. Use 30% herbaceous moisture for pre-green-up, transition to 120% at full green-up (May 25 – June 30 depending on location), then back to 30% by late August

### **Vegetation Characteristics:**

These communities are dominated by bluejoint reedgrass, which can reach 0.8 – 1.4 m in height (32 – 55 in). Woody plants are rare or absent, but a mosaic pattern of bluejoint meadow and tall shrubs like alder may be present. Cover is usually complete with very dense vegetation. Other grasses and herbs may be present. Mosses are often absent, but feathermosses may be present in more open stands. Wetter sites may have hummocks. A mat of decaying plant material is usually found on the soil surface. *Calamagrostis* can be found statewide, but species or subspecies may differ in the Aleutians and southeast Alaska.

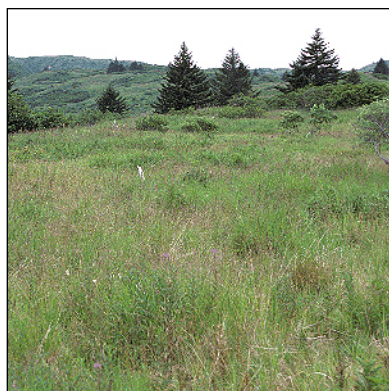
### **Viereck et al. (1992) Vegetation Classes:**

- 3A2A Bluejoint Meadow

### **Similar Looking Alaska Fuel Types:**

- (40) Bluejoint – Shrub and Bluejoint – Herb
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra

## (40) Bluejoint – Shrub and Bluejoint – Herb



3A2B. Bluejoint – Herb (Photo Courtesy of M. Fleming, SAI/C)



3A2B. Bluejoint – Herb (Photo Courtesy of Bering Land Bridge National Preserve)



3A2C. Bluejoint – Shrub (Photo Courtesy of Cape Krusenstern National Monument)



3A2B. Bluejoint – Herb (Photo Courtesy of Kenai National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – GR2
- FBFM13 – 6
- CANFBP – O-1a/b

### Primary Carrier of Fire:

- Grass

### Fire Behavior Comments:

- Fire occurrence will be more common pre-green-up. During peak green-up GR1 may be more representative of fire behavior

### Vegetation Characteristics:

This Alaska Fuel Type is dominated by mixtures of equal amounts of bluejoint reedgrass and herbs or bluejoint and shrubs. The bluejoint – herb type generally includes fireweed, horsetails, and possibly other grass species or sedges. Shrubs in the bluejoint – shrub communities can be tall or short, but do not reach 25% cover. Alder is the primary shrub, and presence of herbs ranges from common to absent. In both communities, bluejoint usually is 0.8 to 1.5 m (32 – 59 in) tall. Feathermosses may be absent or common; *Sphagnum* species are present in small quantities on wetter sites, which may be hummocky. Lichens are rare.

### Viereck et al. (1992) Vegetation Classes:

- 3A2B Bluejoint – Herb
- 3A2C Bluejoint – Shrub

### Similar Looking Alaska Fuel Types:

- (37) *Elymus*
- (39) Bluejoint (*Calamagrostis*)
- (42) Mesic Sedge - Grass Meadow or Tundra and Mesic Sedge - Herb Meadow or Tundra



## (41) Tussock Tundra



3A2D. Tussock Tundra, burned (Photo Courtesy of Noatak National Preserve)



3A2D. Tussock Tundra (Photo Courtesy of Selawik National Wildlife Refuge)



3A2D. Tussock Tundra (Photo Courtesy of Arctic National Wildlife Refuge)



3A2D. Tussock Tundra, June 17 (Photo Courtesy of Kanuti National Wildlife Refuge)



3A2D. Tussock Tundra (Photo Courtesy of M. Fleming)

### **Fuel Models/Types:**

- FBFM40 – GR4
- FBFM13 – 1
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Tussocks

### **Fire Behavior Comments:**

- Fire growth is often associated with backing and flanking fire after the initial head fire event
- There is a relative humidity threshold where fire growth is significantly hampered, around 30%
- Use GS3 to slow fire behavior, or SH2 for further reduction

### **Vegetation Characteristics:**

Mostly found in northern and western Alaska on poorly drained soils, these sites are dominated by tussock-forming sedges (tussock cottongrass or sometimes Bigelow's sedge). Tussocks are commonly 10 – 60 cm (4 – 24 in) tall, spaced 30 – 60 cm (12 – 24 in) apart. Tussock cottongrass retains standing dead leaves; in some cases, up to half of the cottongrass stems on top of the tussock may be dead. Low shrubs, such as dwarf birch, Labrador tea, and *Vaccinium* spp., often grow between tussocks, usually shorter than the sedges, with cover less than 25%. Mosses and lichens are common. *Sphagnum* species may be locally abundant, but are often absent.

***Viereck et al (1992) Vegetation Classes:***

- 3A2D Tussock Tundra

***Similar Looking Alaska Fuel Types:***

- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Tundra Bog
- (31) Open Low Mesic Shrub Birch – Ericaceous Shrub
- (32) Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow



## (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra



3A2G. Mesic Grass – Herb Meadow Tundra (Photo Courtesy of M. Fleming, SAIC)



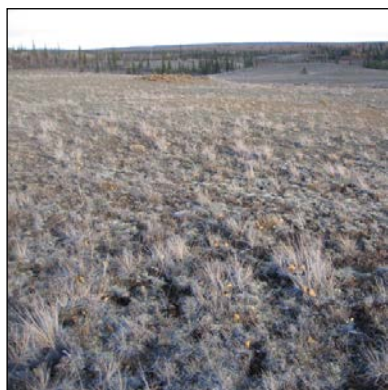
3A2G. Mesic Grass – Herb Meadow Tundra (Photo Courtesy of Cape Krusenstern National Monument)



3A2G. Mesic Grass – Herb Meadow Tundra (Photo Courtesy of Cape Krusenstern National Monument)



3A1D. Midgrass – Herb (Photo Courtesy of Gates of the Arctic National Park and Preserve)



3A1D. Midgrass – Herb (Photo Courtesy of Kanuti National Wildlife Refuge)

### Fuel Models/Types:

- FBFM40 – GS1
- FBFM13 – 5
- CANFBP – O-1a/b

### Primary Carrier of Fire:

- Grass
- Herb

### Fire Behavior Comments:

- N/A

### Vegetation Characteristics:

This Alaska Fuel Type includes communities dominated by a mixture of grasses and sedges that are usually less than 50 cm (20 in) but may reach 1 m (3 ft.) tall. The amount of herbs and shrubs varies widely. In some communities, herbs are codominant with graminoids, but if shrubs are present at all they contribute less than 25% cover. Plant cover is high, usually complete. Lichens and mosses range from being scarce to common. Mosses, if present, are primarily non-sphagnaceous. Species composition of graminoids is variable. Sedges can include smallawned, shortstalk, Bigelow's, and water sedge. Dominant grasses include bluegrasses, wideleaf polargrass, fescues, alpine sweetgrass, and spike trisetum. Bluejoint reedgrass is not typically a component although it may be included in the mesic sedge – herb community. This type occurs on mesic, well-drained sites spanning a variety of topographic positions including alpine and subalpine meadows, slopes, streambanks, and high-center polygons.



***Viereck et al. (1992) Vegetation Classes:***

- 3A1D Midgrass – Herb
- 3A2E Mesic Sedge – Grass Meadow Tundra
- 3A2F Mesic Sedge – Herb Meadow Tundra
- 3A2G Mesic Grass – Herb Meadow Tundra

***Similar Looking Alaska Fuel Types:***

- (40) Bluejoint – Shrub and Bluejoint – Herb
- (43) Sedge – Willow Tundra and Sedge – *Dryas* Tundra

## (43) Sedge – Willow Tundra and Sedge – *Dryas* Tundra



3A2H. Sedge Willow Tundra (Photo Courtesy of Yukon – Charley Rivers National Preserve)



3A2H. Sedge Willow Tundra (Photo Courtesy of Alaska Center for Conservation Science)



3A2J. Sedge *Dryas* Tundra (Photo Courtesy of Cape Krusenstern National Monument)

### **Fuel Models/Types**

- FBFM40 – GR1
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass
- Herbs

### **Fire Behavior Comments:**

- If you want to stop fire growth at higher moisture levels, consider FBFM13-1

### **Vegetation Characteristics:**

This Alaska Fuel Type is dominated by sedges with shrubs contributing less than 25% cover. Despite low cover, willows in the sedge – willow community are conspicuous. Other shrubs besides willow and mountain avens may be present. Mosses are common, although presence of *Sphagnum* varies depending on site. Lichens tend to be scarce. Canopy height is less than 50 cm (20 in), and cover varies from open to complete. Sedge – willow tundra tends to be found on wet and mesic sites ranging from flood plains, benches, drained lakes, and north slopes, mostly in arctic and alpine areas. Sedge – *Dryas* sites are found on mesic alpine slopes and tundra lowlands throughout the state except for the southeast.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A2H Sedge – Willow Tundra
- 3A2J Sedge – *Dryas* Tundra

### **Similar Looking Alaska Fuel Types:**

- (33) Open Low Willow and Open Low Sweetgale
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (45) Wet Meadow Tundra

## (44) Sedge – Birch Tundra



3A2l. Sedge – Birch Tundra (Photo Courtesy of Yukon-Charley Rivers National Preserve)



3A2l. Sedge – Birch Tundra (Photo Courtesy of Yukon-Charley Rivers National Preserve)



3A2l. Sedge – Birch Tundra (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR2
- FBFM13 – 6
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Herbs
- Shrubs

### **Fire Behavior Comments:**

- If more active fire activity is observed could use GR4 or GS3 for higher moisture of extinction (longer burn period)

### **Vegetation Characteristics:**

This community is found in northern Alaska and is dominated by sedges with shrub birch. Typical sedges include water sedge and Bigelow's sedge. Shrub birch comprises less than 25% cover and is often located on hummocks. Mosses, including feathermosses and *Sphagnum* species may be common.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A2l Sedge – Birch Tundra

### **Similar Looking Alaska Fuel Types:**

- (30) Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Tundra Bog
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (45) Wet Meadow Tundra



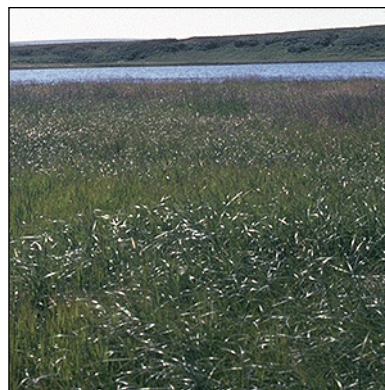
## (45) Wet Meadow Tundra



3A3A. Wet Sedge Meadow Tundra (Photo Courtesy of Bering Land Bridge National Preserve)



3A3A. Wet Sedge Meadow Tundra (Photo Courtesy of Bering Land Bridge National Preserve)



3A3A. Wet Sedge Meadow Tundra (Photo Courtesy of Bering Land Bridge National Preserve)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 10
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass
- Herbs

### **Fire Behavior Comments:**

- Dependent on water table; if submerged, will be NB6

### **Vegetation Characteristics:**

Woody plants are usually absent, but some prostrate willows may be present. This Alaska Fuel Type is dominated by combinations of sedges, grasses, and broad-leaved herbs. Mosses and lichens may be absent to common. Cover ranges from open to complete. This type occurs in arctic lowlands, tundra areas, and near the arctic coast. It usually occupies drained wetlands, depressions, and pond edges.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A3A Wet Sedge Meadow Tundra
- 3A3B Wet Sedge – Grass Meadow Tundra
- 3A3C Wet Sedge – Herb Meadow Tundra

### **Similar Looking Alaska Fuel Types:**

- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (46) Wet Sedge – Grass Meadow or Marsh
- (47) Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog
- (49) Wet Species – Non Burnable

## (46) Wet Sedge – Grass Meadow or Marsh



3A3H. Halophytic Grass Wet Meadow (Photo Courtesy of Bering Land Bridge National Preserve)



3A3D. Fresh Sedge Marsh (Photo Courtesy of M. Fleming, SAIC)



3A3D. Fresh Sedge Marsh (Photo Courtesy of M. Fleming, SAIC)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass

### **Fire Behavior Comments:**

- Dependent on water table; if submerged, will be fuel model NB6
- If you want to stop fire growth at higher moisture levels, consider FBFM13-1

### **Vegetation Characteristics:**

This Alaska Fuel Type includes salt tolerant (halophytic) graminoid communities and those found in freshwater environments. Communities are either dominated by tall emergent sedges, grasses growing in deep water, or halophytic graminoids such as alkaligrass, Lyngbye's sedge, and Ramensk's sedge. Trees and lichens are absent; shrubs may be present, but are likely absent. Halophytic forbs and marine algae may be present in coastal areas and aquatic mosses may be present at freshwater sites. Plant cover ranges from sparse to dense, depending on community. This type occupies a range of locations, including: deep (15 – 200 cm [6 – 79 in]) freshwater ponds, sloughs, and oxbow lakes; edges of coastal marshes; edges of brackish ponds and tidal flats; and ecotones between brackish/tidal sites and freshwater wetlands.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A3D Fresh Sedge Marsh
- 3A3E Fresh Grass Marsh
- 3A3H Halophytic Grass Wet Meadow
- 3A3I Halophytic Sedge Wet Meadow

### **Similar Looking Alaska Fuel Types:**

- (33) Open Low Willow and Open Low Sweetgale
- (45) Wet Meadow Tundra
- (47) Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog
- (49) Wet Species – Non Burnable

## (47) Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog



3A3j. Subarctic Lowland Sedge – Bog Meadow  
(Photo courtesy of Kenai National Wildlife Refuge)



3A3j. Subarctic Lowland Sedge – Bog Meadow (Photo  
Courtesy of Kenai National Wildlife Refuge)



3A3j. Subarctic Lowland Sedge – Bog Meadow  
(Photo Courtesy Alaska Center for Conservation  
Science)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 9
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass

### **Fire Behavior Comments:**

- Dependent on water table; if submerged, will be fuel model NB6
- Use FBFM13 fuel model 2, if wanting to use a grass model

### **Vegetation Characteristics:**

Sedges are the dominant plant in these freshwater wetland communities except in the case of the Subarctic Lowland Sedge – Moss Bog Meadow where they are codominant with moss, primarily *Sphagnum*. Trees are usually absent, although there may be the occasional stunted tree. Low shrubs may be present in some communities but do not exceed 25%, and lichens range from absent to common. The bog meadow communities will have low peat-forming sedges that are smaller and more delicate than those in the wet meadows. Moss species and cover varies. Plant cover is usually complete. The soil surface may have hummocks.

### **Viereck et al. (1992) Vegetation Classes:**

- 3A3F Subarctic Lowland Sedge Wet Meadow
- 3A3G Subarctic Lowland Sedge – Shrub Wet Meadow
- 3A3J Subarctic Lowland Sedge – Bog Meadow
- 3A3K Subarctic Lowland Sedge – Moss Bog Meadow

### **Similar Looking Alaska Fuel Types:**

- (33) Open Low Willow and Open Low Sweetgale
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (45) Wet Meadow Tundra
- (46) Wet Sedge – Grass Meadow or Marsh
- (49) Wet Species – Non Burnable



## (48) Dry Species – Non Burnable



3B1C. Alpine Herbs (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



3B1C. Alpine Herbs (Photo Courtesy of M. Fleming, SAIC)



3C1B. Dry Bryophyte (Moss) (Photo Courtesy of Gates of the Arctic National Park and Preserve)

### **Fuel Models/Types:**

- FBFM40 – NB7
- FBFM13 – 99
- CANFBP – N/A

### **Primary Carrier of Fire:**

- N/A

### **Fire Behavior Comments:**

- NB7 custom fuel model is for non-burnable, dry, and sparse vegetation

### **Vegetation Characteristics:**

Most of the communities in this type are pioneer communities with sparse vegetation that were previously unvegetated; bare ground and rock may be common. Woody and vascular plants range from absent to present and there may be scattered grasses. Lichens range from scarce to common, with crustose lichens particularly common in rocky sites. Herbs can include a wide variety of species. This type may also be composed of bryophytes, including moss mound communities of dead mosses and rock.

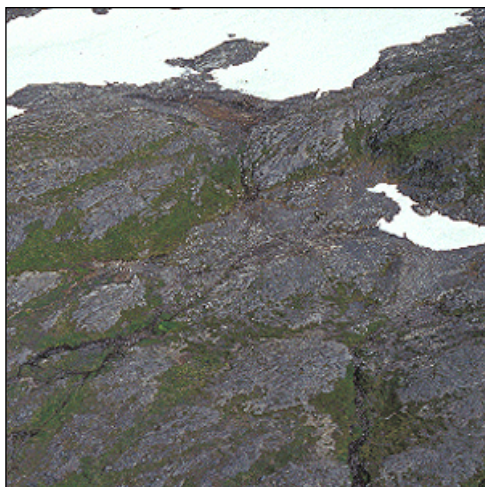
### **Viereck et al. (1992) Vegetation Classes:**

- 3B1A Seral Herbs
- 3B1C Alpine Herbs
- 3C1B Dry Bryophyte (moss)
- 3C2B Foliose and Fruticose Lichen

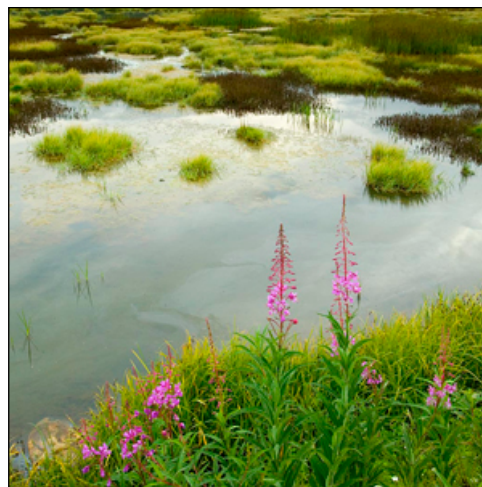
### **Similar Looking Alaska Fuel Types:**

- (37) Dwarf Shrub Tundra
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (49) Wet Species – Non Burnable
- (52) Crustose Lichen

## (49) Wet Species – Non Burnable



3B1B. Alpine Herb – Sedge (Photo Courtesy of M. Fleming, SAIC)



3B3A. Fresh Herb Wet Meadow (Photo Courtesy of Kenai National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – NB6
- FBFM13 – 99
- CANFBP – N/A

### **Primary Carrier of Fire:**

- N/A

### **Fire Behavior Comments:**

- NB6 custom fuel model is for non-burnable, wet vegetation

### **Vegetation Characteristics:**

This Alaska Fuel Type encompasses a variety of wet communities that generally do not support woody plants and are considered unburnable. Plant cover is usually sparse to open, with the exception of bryophyte communities that usually have 100% cover. Snowbed communities are sparsely vegetated and characterized by a wide variety of herbs, mosses, and lichens residing below late-lying snowbanks in mountainous areas. Fresh herb marshes are characterized by emergent herbs in deep water, usually dominated or codominated by water horsetail. Buckbean and purple marshlocks are common and may be codominant. The subarctic herb wet meadow is commonly dominated by horsetails and herbs, with only scattered grasses and sedges. These communities are found in seepage areas, pools, and edges of marshes and ponds. The halophytic herb wet meadow is similar in character, but dominated by species that can tolerate salty environments near the coast. Broad leaved herbs such as buckbean are the primary species in herb bog meadows, with mosses often present, including *Sphagnum*. Graminoids are not present in these sites. Wet bryophyte communities differ from the others in that they are composed of mosses and liverworts. They tend to occur in the southern part of the state and likely do not include *Sphagnum*.

### **Viereck et al. (1992) Vegetation Classes:**

- 3B1B Alpine Herb – Sedge (Snowbed)
- 3B3A Fresh Herb Marsh
- 3B3B Subarctic Lowland Herb Wet Meadow
- 3B3C Subarctic Lowland Herb Bog Meadow
- 3B3D Halophytic Herb Wet Meadow
- 3C1A Wet Bryophyte (moss)

### **Similar Looking Alaska Fuel Types:**

- (45) Wet Meadow Tundra
- (46) Wet Sedge – Grass Meadow or Marsh
- (47) Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog
- (48) Dry Species – Non Burnable

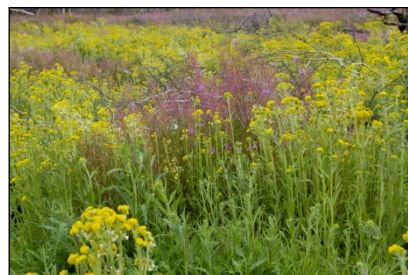
## (50) Mesic Forb Herbaceous



3B2B. Fireweed (Photo Courtesy of Denali National Park and Preserve)



3B2D. Ferns (Photo Courtesy of M. Fleming, SAIC)



3B2A. Mixed Herbs, 2 years post-fire (Photo Courtesy of Yukon Flats National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 5
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Herbs

### **Fire Behavior Comments:**

- If dried out in the fall, fireweed (vegetation class 3B2B) will burn
- Large Umbel community (vegetation class 3B2C) will burn pre-green-up
- If you want to stop fire growth at higher moisture levels, consider FBFM13-1

### **Vegetation Characteristics:**

This Alaska Fuel Type is dominated by herbs. Woody plants range from rare to present, and sedges, grasses, ferns, and mosses (non-sphagnaceous and feathermosses) are common. Lichens may be present. There are several general categories of mesic forb communities. The mixed herb community is found along streambanks, stabilized dunes, old beach ridges, and subalpine slopes. Fireweed communities grow on disturbed sites, particularly recent burns in interior Alaska. Large umbel communities, often dominated by common cowparsnip, tend to be tall (up to 1.5 m [5 ft] or more) and are found on sheltered slopes and streambanks. Fern communities have a lush growth of ferns with almost complete cover. They are found in well drained sites in southeast and southcentral Alaska as well as in the Aleutians.

### **Viereck et al. (1992) Vegetation Classes:**

- 3B2A Mixed Herbs
- 3B2B Fireweed
- 3B2C Large Umbel
- 3B2D Ferns

### **Similar Looking Alaska Fuel Types:**

- (37) *Elymus*
- (40) Bluejoint – Shrub and Bluejoint – Herb



## (51) Foliose and Fruticose Lichen



3C2B. Foliose and Fruticose Lichen (Photo Courtesy of Gates of the Arctic National Park and Preserve)



3C2B. Foliose and Fruticose Lichen (Photo Courtesy of Tetlin National Wildlife Refuge)



3C2B. Foliose and Fruticose Lichen (Photo Courtesy of Kanuti National Wildlife Refuge)

### **Fuel Models/Types:**

- FBFM40 – GR1
- FBFM13 – 2
- CANFBP – O-1a

### **Primary Carrier of Fire:**

- Lichen

### **Fire Behavior Comments:**

- Highly dependent on low moisture for fire behavior
- For more continuous lichen mat consider using GR2 or GR3

### **Vegetation Characteristics:**

This type is dominated by foliose and fruticose lichens of the *Cladonia*, *Cladina*, and *Stereocaulon* genera. Crustose lichens may be present. Vascular plants are absent or nearly so. Mosses are uncommon.

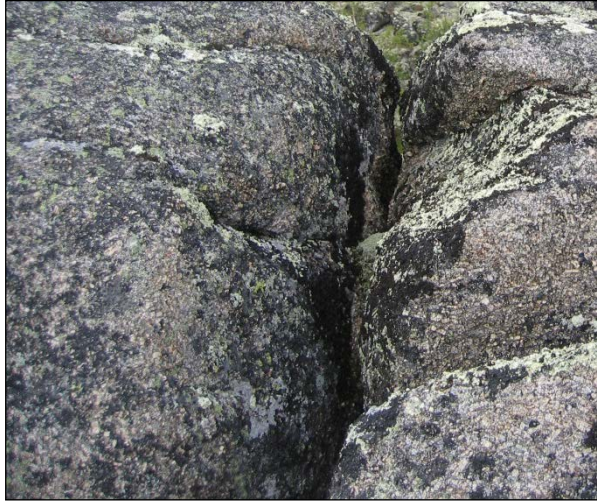
### **Viereck et al. (1992) Vegetation Classes:**

- 3C2B Foliose and Fruticose Lichen

### **Similar Looking Alaska Fuel Types:**

- (36) Dwarf Shrub Tundra
- (42) Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra
- (52) Crustose Lichen

## (52) Crustose Lichen



3C2A. Crustose Lichen (Photos Courtesy of Kanuti National Wildlife Refuge)

**Fuel Models/Types:**

- FBFM40 – NB9
- FBFM13 – 99
- CANFBP – N/A

**Primary Carrier of Fire:**

- N/A

**Fire Behavior Comments:**

- Rock present

**Vegetation Characteristics:**

This community is dominated by crustose lichens such as those in the genera *Rhizocarpon* and *Lecanora*. Rock-inhabiting foliose lichens are common. Fruticose lichens, mosses, and vascular plants are absent to rare, with sparse plant cover.

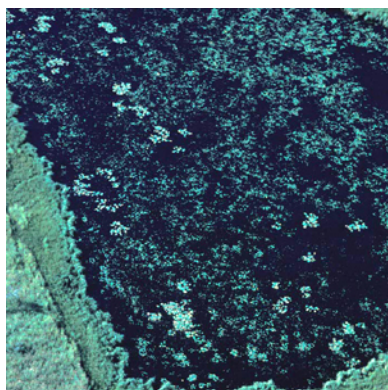
**Viereck et al. (1992) Vegetation Classes:**

- 3C2A Crustose Lichen

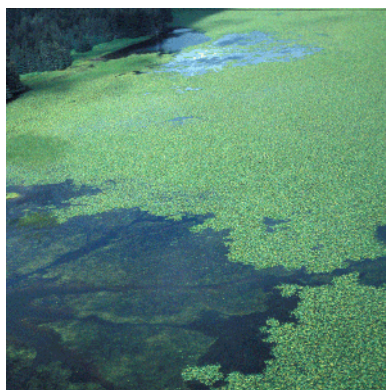
**Similar Looking Fuel Types:**

- (36) Dwarf Shrub Tundra
- (51) Foliose and Fruticose Lichen

## (53) Aquatic Herbaceous



3D1F. Fresh Pondweed (Photo courtesy of Innoko National Wildlife Refuge)



3D1A. Pondlily (Photo Courtesy of M. Fleming, SAIC)



3D1. Freshwater Aquatic Vegetation, Innoko Flats. (Photo Courtesy of Ducks Unlimited)

### **Fuel Models/Types:**

- FBFM40 – NB8
- FBFM13 – 98
- CANFBP – N/A

### **Primary Carrier of Fire:**

- Water present

### **Fire Behavior Comments:**

### **Vegetation Characteristics:**

This Alaska Fuel Type has a number of communities where either fresh or salt water are present at levels to inhibit fire behavior. The freshwater aquatic herbaceous communities include pondlilies, common marestalk, aquatic buttercups, burreed, water milfoil, pondweeds (growing submerged to extending above the surface), and aquatic cryptogams. Communities that reside in brackish water ponds near the sea coast include four-leaf marestalk and other salt-tolerant species. Emergent communities are scattered to absent. Vascular plants may be present.

### **Viereck et al. (1992) Vegetation Classes:**

- 3D1A Pondlily
- 3D1B Common Marestalk
- 3D1C Aquatic Buttercup
- 3D1D Burreed
- 3D1E Water Milfoil
- 3D1F Fresh Pondweed
- 3D1G Water Star-wort
- 3D1H Aquatic Cryptogam
- 3D2A Four-leaf Marestalk
- 3D2B Brackish Pondweed
- 3D3A Eelgrass
- 3D3B Marine Algae

### **Similar Looking Alaska Fuel Types:**

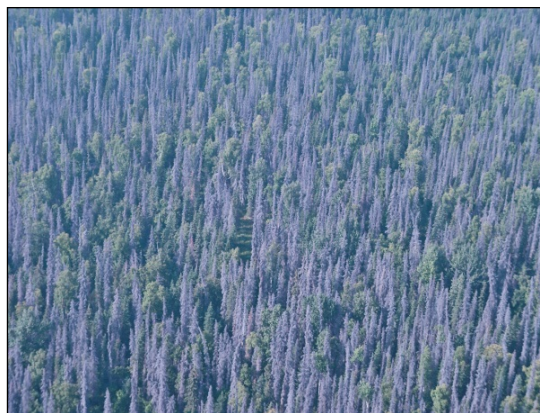
- (45) Wet Meadow Tundra
- (46) Wet Sedge – Grass Meadow or Marsh
- (47) Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog
- (49) Wet Species – Non Burnable



## (54) Standing Dead Beetle-Kill Spruce Forest



1A1J. White Spruce Forest Killed by Bark Beetles (Photo Courtesy of Alaska State Forestry)



1A1J. White Spruce Forest impacted by bark beetle infestation (Photo Courtesy of Kenai Peninsula Borough)



1A1J. Beetle-killed trees can promote torching/crown fire in closed white spruce forest (Photo Courtesy of Wrangell-St. Elias National Park and Preserve)



1A1J. Torching beetle-kill spruce in background with dead Canopy structure in foreground (Photo Courtesy of Alaska State Forestry)



Close-up view of hairy species lichen growing on limbs of Beetle-kill spruce (Photo Courtesy of the Kenai Peninsula Borough)



Close-up view of a fruticose species lichen mixed with foliose lichen on dead spruce (Photo Courtesy of the Kenai Peninsula Borough)

### **Suggested Fuel Models/Types:**

- FBFM40 – SB2/SB3
- FBFM13 – 12
- CANFBP – M-3

### **Primary Carrier of Fire:**

- Grass
- Feathermoss
- Lichen

**Fire Behavior Comments:**

- Surface flames of 0.3 – 0.6 m (1 – 2 ft) will initiate canopy fire involvement
- Active crown fire can occur in moderate wind and fire danger conditions
- Flame length of active crown fire involvement is typically 1 ½ times tree height
- Probability of spot fire ignition is very high in this fuel complex with spot fires of 1.6 km (1 mile) distance common.

**Vegetation Characteristics:**

Spruce forest with tree mortality ranging from 60% to 95% of stand structure as a result of bark beetle (*Dendroctonus rufipennis*) epidemic. Forest composition is predominantly spruce conifer with less than 33% hardwood species; typically closed canopy. Beetle impacted spruce have a “red needle” stage as the last phase before tree mortality. Dead trees retain fine limbs for many years and often serve as host structure to an abundance of lichen species material. Depending on moisture/climatic conditions of beetle infestation area, standing dead spruce forests begin to experience stem decay and breakage within 5 to 10 years after bark beetle infestation. Most stands start to fully unravel by 20 years after beetle attack.

**Viereck et al. (1992) Vegetation Classes:**

- 1A1J Closed White Spruce Forest

**Similar Looking Alaska Fuel Types:**

- (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest
- (4) Open White Spruce Forest
- (5) Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest

**Notes about burn patterns and post-fire vegetative succession:**

- Early and mid-season fires in this fuel complex can generate high intensity canopy fires that are spectacular to observe and which consume almost all above-ground 1hr, 10hr and 100hr fuel loading.
- As contrast, depth of surface/duff layer fuel consumption is often “light” in early to mid-season fires. Later season fires with slow rates of spread and higher duff moisture code values (drought) can generate greater duff consumption patterns.
- Duff layer consumption is a pivotal factor for determining expected post-fire vegetation results.
- Canopy fire intensity in this type of fuel complex typically kills most remnant live spruce not affected by beetles along with many hardwood trees. The end result is far less tree seed production and seed dispersal density when compared to forest fires not influenced by bark beetle mortality.



## (55) Heavy Stem Breakage/Downed and Jack-Straw Spruce and Aged Post-Mortality Beetle-Kill Forest



Spruce Forest 13 years after bark beetle infestation  
(Photo Courtesy of Alaska Division of Forestry)



Spruce Forest along salmon stream 16 years after extensive beetle attack (Photo Courtesy of Alaska Division of Forestry)



Spruce Forest with beetle kill at unmanaged cabin site (Photo Courtesy of Kenai Peninsula Borough)



Spruce forest 11 years after bark beetle epidemic (Photo Courtesy of Alaska Division of Forestry)



Close up view of foliose lichen growing on downed beetle kill spruce (Photo Courtesy of the Kenai Peninsula Borough)



Aerial view of beetle impacted spruce forest 15 years after infestation (Photo Courtesy of Kenai Peninsula Borough)

### **Suggested Fuel Models/Types:**

- FBFM40 – SB3
- FBFM13 – 13
- CANFBP – C-3

### **Primary Carrier of Fire:**

- Grass fine fuels
- Lichen attached tree limb structure
- 10 hour dead tree material

### **Fire Behavior Comments:**

- 10-hour and 100-hour fuel components are normally below expected fuel moisture content levels in early to middle fire season periods.
- Passive to active fire involvement of remnant canopy layers, both dead and green trees, are almost always included in the fire front spread.
- Down-wind fuel beds are highly receptive to spot fire development.
- Crew mobility and rates of travel through this fuel complex are greatly compromised. Well-planned safety zones and locations for safe egress are paramount to crew safety in this Alaska Fuel Type.
- Use of aerial fire retardant is generally not effective because the retardant material does not fully penetrate through the fuel layer.
- Fires that occur after grass (especially bluejoint reedgrass) has reached seasonal “green-up” will diminish rates of fire spread and intensity although prolific spot fire occurrence can still be expected.



### ***Vegetation Characteristics:***

Spruce forests heavily impacted by bark beetle infestation usually begin to experience stem breakage about 8 to 15 years after mortality. More moist climatic areas with greater fungal growth activity cause more rapid stem breakage and timber stand unraveling. Significant windstorms also can accelerate stem breakage patterns.

Closed spruce forests accumulate a heavy fuel layer of downed and jackstraw trees as stem breakage becomes advanced. The forest floor layer of vegetation is commonly composed of bluejoint reedgrass which adds a volume of 3 to 5 tons/acre of fine fuel component during early season fires.

### ***Viereck et al. (1992) Vegetation Classes:***

- 1A1J Closed White Spruce Forest

### ***Similar Looking Alaska Fuel Types:***

- (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest
- (4) Open White Spruce Forest
- (5) Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest

### ***Notes about burn patterns and post-fire vegetative succession:***

- Early and mid-season fires in this fuel complex can generate significant BTU combustion intensity at the surface level. Nevertheless, they commonly yield limited duff consumption because of frozen ground or high duff moisture content soon after snow melt.
- Herbaceous vegetation response after spring/early summer fires exhibits robust growth with warming soils associated with blackened surfaces and increased nutrient mineral availability in fire ash content.
- Fires in remnant forest sites composed with a mix of grass and fireweed tend to accelerate a flush of fireweed growth/dominance after a burn.
- Late summer/fall season fires in this fuel complex have greater probability of occurring with lower duff moisture content/drought conditions. These fires tend to have less initial fire intensity but longer burn residence time. This pattern causes less impact to live trees and typically generates more shrub and forest species sprouting response.

## (56) Closed Spruce Forest with Moderate Downed Beetle Kill/ Mixed Spruce and Hardwood Forest with Moderate Beetle Kill



Spruce forest with about 50% beetle kill mortality and stem breakage (Photo Courtesy of the Kenai Peninsula Borough)



Open mixed birch and spruce forest with most spruce dead (Photo courtesy of the Kenai National Wildlife Refuge)



Open spruce forest about 15 years after beetle infestation (Photo Courtesy of the Alaska Division of Forestry)



Open spruce stand about 12 years after beetle attack after grass seasonal "green-up" (Photo courtesy of Kenai Peninsula Borough)



Downed spruce after grass seasonal "green-up" (Photo Courtesy of the Alaska Division of Forestry)



Example of fire energy release from a single downed spruce tree canopy structure (Photo Courtesy of the Alaska Division of Forestry)



Aerial view of downed beetle kill trees in a mixed spruce and birch timber stand (Photo Courtesy of the Kenai Peninsula Borough)

### **Suggested Fuel Models/Types:**

- FBFM40 – TU5
- FBFM13 – 10
- CANFBP – M-3

### **Primary Carrier of Fire:**

- Grass fine fuels
- Feathermoss, forest litter, duff
- Lichen attached to tree limb structure

***Fire Behavior Comments:***

- 10-hour and 100-hour fuels of downed and jackstraw dead spruce tree material are usually well below fuel moisture content levels expected in early to mid-season periods.
- Fires occurring at lower/mid-level hazard conditions will be fuels driven; expanding at 5 – 20 ch/hr in dead jackstraw fuel pockets with occasional passive torching in neighboring forest canopy.
- Slow moving fires with +/- 0.3 m (1 ft) flames will generate 1.2 – 3 m (4 – 10 ft) flames in a quick time frame after reaching downed beetle-kill spruce.
- Fires occurring at high level/extreme fire conditions will likely involve active crown fire because of ladder fuel loading

***Vegetation Characteristics:***

This type of forest structure is associated with closed or open spruce forests, or mature stands with mixed spruce and deciduous tree composition, that have experienced moderate levels of bark beetle mortality in times past with subsequent dead tree breakage/unraveling. The forest canopy structure will be open with possible larger pockets of decadent jackstraw/downed spruce trees. Open canopy areas/expanses will usually have surface vegetation dominated by bluejoint reedgrass. Portions of remnant healthy forest canopy will have concurrent surface vegetation normal to older dominant stands; principally, moss cover and numerous herbaceous berry species. Intermediate brush layers of rusty menziesia, devils club or Sitka alder are found on some vegetative sites.

***Viereck et al. (1992) Vegetation Classes:***

- 1C1A Closed Spruce – Paper Birch Forest
- 1C1C Closed Spruce – Paper Birch – Quaking Aspen Forest
- 1C2A Open Spruce – Paper Birch Forest

***Similar Looking Alaska Fuel Types:***

- (3) Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest
- (4) Open White Spruce Forest
- (5) Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest



## (57) Post-Timber Harvest Areas with Bluejoint Grass and Logging Slash Fuel Beds



Mixed grass and fireweed fuels about 8 years after salvage timber harvest (Photo Courtesy of the Kenai Peninsula Borough)



Fall season grass fuels about 6 years after salvage logging (Photo Courtesy of the Kenai Peninsula Borough)

### **Suggested Fuel Models/Types**

- FBFM40 – GR7
- FBFM13 – 3
- CANFBP – O-1a/b

### **Primary Carrier of Fire:**

- Grass
- 1-hour and 10-hour logging slash debris

### **Fire Behavior Comments:**

- Logging slash 1-hour and 10-hour fuel loading of 1 – 3 tons/acre is typical volume range in post-timber harvest sites
- Logging slash component adds a longer burn residence time compared to grass fires
- When grass is dead/dormant, logging slash does not add significant change for Rate of Spread outputs but does increase flame length intensity compared to grass fuel models
- Logging slash fuels can generate significant fire intensity well into the grass “green-up” season when high fuel moistures normally diminish fire production
- Logging slash also affects resistance to fire control and mop-up time compared to grass fuel models

### **Vegetation Characteristics:**

Bluejoint reedgrass is a minor vegetative component in most mature upland timber stands. If sites are disturbed and canopy opens because of logging or insect infestation, bluejoint reedgrass often becomes the principal surface vegetation on these sites. Once established, bluejoint reedgrass can dominate site vegetation for 30 years or longer duration. Fires on grass dominated sites do not normally have adverse impact on rhizome layers. To the contrary, ash mineralization actually serves to produce a flourish of new grass production.

### **Viereck et al. (1992) Vegetation Classes:**

- 3a2a Bluejoint meadow grass

### **Similar Looking Alaska Fuel Types:**

- (39) Bluejoint (*Calamagrostis*)
- (40) Bluejoint – Shrub and Bluejoint – Herb

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## Fuel model guide to Alaska vegetation

Appendix 1. Crosswalk from Alaska Fuel Types to US fuel models and Canadian fuel types in the original 2008 fuel model guide (designated as “old”) and this 2018 revision (designated as “new”).

2018 AK Fuel Type #	Alaska Fuel Type Name 2018 (2008 # and/or name if different)	Old 40	Old 13	Old CANFBP	New 40	New 13	New CANFBP	Alternate Models (See text for usage)
1	Sitka Spruce – Hemlock Forest (1. Closed Sitka Spruce-Western Hemlock Forest)	TL1	8	C-6	TL1	8	C-5 (closed) C-7 (open)	
2	Closed White Spruce Forest	TU1	10	C-3	TU2 upland TU1 riparian	9	C-3	TU3, FM10
3	Closed Black Spruce Forest and Closed Mixed Black Spruce – White Spruce Forest (3. Closed Black Spruce Forest)	TU3	9 (adj.)	C-2	TU3/TU4 (test)	9 adj	C-2	TU1, SH5
4	Open White Spruce Forest (5. Open White Spruce Forest)	TU5	10	C-7	TU5	10	C-3	TU4, TU1
5	Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest (Not in 2008 version)	New			TU1	8	D-1/D-2 or M-1/M-2 w/ low conifer	TU1, TU3, GR4 , FM9
6	Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest (6. Open Black Spruce Forest)	TU4	9 (adj.)	C-1	TU4	9 ADJ	C-2	TU5, TU3, SH5
7	Black Spruce – Tamarack Forest (7. Open Black Spruce-Tamarack Forest)	TU5	10	C-1	TU2	10	C-1	
8	Coastal Woodland Rainforest (8. Woodland Sitka Spruce-Pine)	TL1	8	M-2	TL1	8	M-2 w/low conifer % or D-2	
9	White Spruce or Black Spruce – White Spruce Woodland with Shrubs (9. White Spruce Woodland)	TU5	10	C-1	SH2	10	M-2/25% conifer	GR
10	Black Spruce Woodland with Tussocks	GR2	1	O-1	GS2	5	C-1	GS3, O-1a/b
11	Black Spruce Woodland with Lichen (11. Black Spruce Woodland with Lichen-Moss)	TU4	9 (adj)	C-2	TU4	9 adj	C-1	GR2
12	Black Spruce Woodland with <i>Sphagnum</i> Moss (Not in 2008 version)	TU4	9 (adj)	C-2	TU2	10	C-1	TU1, SH2, TU4



# Fuel model guide to Alaska vegetation

Appendix 1, continued. Crosswalk from Alaska Fuel Types to US fuel models and Canadian fuel types in the original 2008 fuel model guide (designated as “old”) and this 2018 revision (designated as “new”).

2018 AK Fuel Type #	Alaska Fuel Type Name 2018 (2008 # and/or name if different)	Old 40	Old 13	Old CANFBP	New 40	New 13	New CANFBP	Alternate Models (See text for usage)
13	Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forests (12. Closed Red Alder Forest and 13. Closed Black Cottonwood-Balsam Poplar Forest)	TL2	8	M-2	TL2	8	D-1/D-2	
14	Closed Paper Birch Forest and Closed Quaking Aspen Forest (14. Closed Paper Birch-Quaking Aspen Forest)	TU1	8	M-2	TU1	8	D-1/D-2	
15	Open Paper Birch Forest	TU1	9	M-2	TU1	8	D-1/D-2	M-1, M-2, TU3
16	Open Quaking Aspen Forest	TL2	8	D-1	TU1	8	D-1/D-2	
17	Open Balsam Poplar (Black Cottonwood) Forest	TL2	8	M-2	TL2	8	D-1/D-2	TU1
18	Woodland Paper Birch and Woodland Balsam Poplar (18. Woodland Paper Birch-Balsam Poplar)	GR1	1	O-1A	SH1	8	O-1a/b	GR1, SH2
19	White or Black Spruce with Paper Birch and/or Aspen (19. Spruce-Paper Birch-Aspen)	TL6	8	M-2	TU5	10	M-2/50% conifer	TU5, M-1/2
20	White Spruce with Balsam Poplar and Paper Birch (20. White Spruce-Paper Birch-Balsam Poplar)	TU1	8	M-2	TU1	8	M-2/25% conifer	M-1
21	Dwarf Tree Mountain Hemlock Scrub and Dwarf Tree Alpine Spruce Shrub (21. Dwarf Tree Mountain Hemlock Scrub)	SH1	10	M-2	SH1	8	O-1a	
22	Dwarf Tree Black Spruce Scrub	TU4	9	C-2	GS1	9	C-1	C2, GS2, SH5
23	Closed Tall Alder and Closed Tall Willow (23. Closed Tall Alder-Willow Shrub)	TU1	5	D-1/D-2	TL2	8	D-1/D-2	TU1, SH2, M-1/2
24	Closed Tall Shrub Birch (24. Closed Tall Birch Shrub)	SH3	6	M-1	SH3	9	M-1/M-2	SH2
25	Tall Shrub Swamp (Removed from 2018 version)	SH1	4	O-1A	SH1 same	8	O-1a/b	

# Fuel model guide to Alaska vegetation

Appendix 1, continued. Crosswalk from Alaska Fuel Types to US fuel models and Canadian fuel types in the original 2008 fuel model guide (designated as “old”) and this 2018 revision (designated as “new”).

2018 AK Fuel Type #	Alaska Fuel Type Name 2018 (2008 # and/or name if different)	Old 40	Old 13	Old CANFBP	New 40	New 13	New CANFBP	Alternate Models (See text for usage)
26	Open Tall Alder and/or Willow (26. <i>Open Tall Alder-Willow Shrub</i> )	TU1	5	M-2	TU1	8	D-1/D-2	M-1, GS1
27	Open Tall Shrub Birch and Open Tall Shrub Birch – Willow (27. <i>Open Tall Birch/Birch-Willow Shrub</i> )	SH3	5	M-1	SH3	9	M-1/M-2	TU4, GS1
28	Closed Low Shrub Birch and Closed Low Shrub Birch – Willow and Closed Low Ericaceous Shrub (28. <i>Closed Low Birch/Birch-Willow/ Ericaceous Shrub</i> )	SH2	5	M-1	SH2	9	D-1/D-2	TU4
29	Closed Low Willow and Closed Low Alder – Willow (29. <i>Closed Low Willow/Alder-Willow Shrub</i> )	TU1	6	M-2	SH2	9	D-1/D-2	TU1, M-1
30	Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog (30. <i>Open Low Mixed Shrub-Sedge Tussock Tundra/Bog</i> )	GR2	1	O-1	GR4	1	O-1a/b	GR5, GS3, SH2
31	Open Low Mesic Shrub Birch – Ericaceous Shrub (31. <i>Open Low Birch-Ericaceous Shrub/Bog</i> )	GR3	1	O-1	GR2	5	O-1a/b	SH7
32	Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow (32. <i>Open Low Birch-Willow/Ericaceous Shrub Bog</i> )	GR2	1	O-1	GS2	5	O-1a/b	
33	Open Low Willow and Open Low Sweetgale (33. <i>Open Low Willow/Sweetgale</i> )	GR1	1	O-1A	SH1	8	O-1a	GR1
34	Open Low Alder and Open Low Alder – Willow (34. <i>Open Low Alder/Alder-Willow Shrub</i> )	GS1	1	O-1	GS1	5	O-1a/b	SH2, FM1
35	<del>Sagebrush – Juniper</del> (Combined with Sagebrush – Grass 2018)	SH2	8	<del>O-1A</del>				
35	Sagebrush – Grass and Grass – Juniper (36. <i>Sagebrush-Grass</i> )	GS1	2	O-1	GR1	8	O-1a/b	FM10

## Fuel model guide to Alaska vegetation

Appendix 1, continued. Crosswalk from Alaska Fuel Types to US fuel models and Canadian fuel types in the original 2008 fuel model guide (designated as “old”) and this 2018 revision (designated as “new”).

2018 AK Fuel Type #	Alaska Fuel Type Name 2018 (2008 # and/or name if different)	Old 40	Old 13	Old CANFBP	New 40	New 13	New CANFBP	Alternate Models (See text for usage)
36	Dwarf Shrub Tundra (37)	GR1	1	O-1A	GS1	5	O-1a/b	FM1
37	<i>Elymus</i> (38)	SH4	8	O-1A	GS2	5	O-1a/b	
38	Grass – Shrub (39)	GR2	1	O-1	GS2	5	O-1a/b	GS1
40	<del>Grass – Herb</del> (Placed in #42 in 2018)	<del>GR1</del>	<del>4</del>	<del>O-1A</del>	<del>GS1</del>	<del>5</del>	<del>O-1</del>	
39	Bluejoint ( <i>Calamagrostis</i> ) (#41. <i>Bluejoint Meadow</i> )	GR4	3	O-1	GR4	2	O-1a/b	GR7, FM3
40	Bluejoint – Shrub and Bluejoint – Herb (42. <i>Bluejoint-Shrub/Herb</i> )	GR2	1	O-1	GR2	6	O-1a/b	GR1
41	Tussock Tundra (43)	GR3	3	O-1	GR4	1	O-1a/b	GS2, SH2
42	Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra (44. <i>Mesic Sedge-Grass-Herb Meadow Tundra</i> )	GR2	1	O-1	GS1	5	O-1a/b	
43	Sedge Willow Tundra and Sedge – <i>Dryas</i> Tundra (45. <i>Sedge Willow Dryas Tundra</i> )	GR1	1	O-1A	GR1	5	O-1a/b	FM1
44	Sedge – Birch Tundra (46)	GR2	1	O-1	GR2	6	O-1a/b	GR4, GS3
45	Wet Meadow Tundra (47)	GR1	1	O-1A	GR1	10	O-1a/b	NB6
46	Wet Sedge – Grass Meadow or Marsh (48. <i>Wet Sedge-Grass Meadow-Marsh</i> )	GR1	1	O-1A	GR1	5	O-1a/b	NB6, FM1
47	Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog (49. <i>Wet Sedge Meadow-Bog-Shrub</i> )	GR1	1	O-1A	GR1	9	O-1a/b	NB6, FM2
48	Dry Species – Non Burnable (50)	NB7*	99		NB7*	99		
49	Wet Species – Non Burnable (51)	NB6**	99		NB6*	99		



## Fuel model guide to Alaska vegetation

Appendix 1, continued. Crosswalk from Alaska Fuel Types to US fuel models and Canadian fuel types in the original 2008 fuel model guide (designated as “old”) and this 2018 revision (designated as “new”).

2018 AK Fuel Type #	Alaska Fuel Type Name 2018 (2008 # and/or name if different)	Old 40	Old 13	Old CANFBP	New 40	New 13	New CANFBP	Alternate Models (See text for usage)
48	Dry Species – Non Burnable (50)	NB7*	99		NB7*	99		
49	Wet Species – Non Burnable (51)	NB6**	99		NB7*	99		
50	Mesic Forb Herbaceous (52)	GR1	1	O-1A	GR1	5	O-1a/b	FM1
51	Foliose and Fruticose Lichen (53)	GR1	1	O-1A	GR1	2	O-1a	GR2, GR3
52	Crustose Lichen (54)	NB9	99		NB9	99		
53	Aquatic Herbaceous (55)	NB8	99		NB8	99		
56	<del>Downed Beetle – killed spruce</del> <i>New types developed in 2018</i>	<del>SB1</del>	<del>11</del>	<del>M4</del>				
54	Standing Dead Beetle Kill Spruce Forest (Not in 2008 version)				SB2/SB3	12	M-3	
55	Heavy Stem Breakage/Downed and Jack-Straw Spruce and Aged Post-Mortality Beetle-Kill Forest (Not in 2008 version)				SB3	13	C-3	
56	Closed Spruce Forest with Moderate Downed Beetle Kill/ Mixed Spruce and Hardwood Forest with Moderate Beetle Kill (Not in 2008 version)				TU5	10	M-3	
57	Post-Timber Harvest Areas with Bluejoint Grass and Logging Slash Fuel Beds (Not in 2008 version)				GR7	3	O-1a/b	

Notes:

- The FMFB 13 fuel model “9 ADJ” refers to Norum’s (1982) calibration for Alaska Black Spruce. Rate of spread is 1.2 times that predicted for fuel model 9 (Albini 1976, Anderson 1982), and flame length is that predicted for fuel model 5.
- NB6 is a custom fuel model referring to areas covered by hydric vegetation types that do not carry fire; NB7 refers to upland (dry species) vegetation types that do not carry fire.

## Fuel model guide to Alaska vegetation

Appendix 2. Rate of Spread (ROS, chains per hour) for each Alaska Fuel Type under different moisture scenarios, and dead fuel extinction moisture (%). ROS based on 15 mph winds and 30 – 50% canopy. When more than one fuel model option provided for an Alaska Fuel Type ROS values and moisture of extinction based on highlighted fuel model.<sup>1</sup>

Alaska Fuel Type #	Alaska Fuel Type Name	FBFM40	FBFM13	CANFBP	Alt. Models (see text for usage)	ROS Above Average Moisture	ROS Average Moisture	ROS Very Low Moisture	Dead Fuel Extinction Moisture
1	Sitka Spruce – Hemlock Forest	TL1	8	C-5 (closed) C-7 (open)		0.31	0.38	0.5	30
2	Closed White Spruce Forest	TU2 upland TU1 riparian	9	C-3	TU3, FM10	0.28	1.17	1.85	20
3	Closed Black Spruce Forest & Closed Mixed Black Spruce – White Spruce Forest	TU3	9 adj	C-2	TU1, SH5	6.48	9.84	16.36	30
4	Open White Spruce Forest	TU5	10	C-3	TU4, TU1	3.13	4.19	6.09	25
5	Coastal Boreal Transition Open White Spruce – Lutz Spruce Forest	TU1	8	D-1/D-2 or M-1/M-2 w/ low conifer	TU1, TU3, GR4, FM9	0.28	1.17	1.85	20
6	Open Black Spruce Forest and Open Mixed Black Spruce – White Spruce Forest	TU4	9 ADJ	C-2	TU5, SH5	2.86	4.23	6.24	12
7	Black Spruce – Tamarack Forest	TU2	10	C-1		3.46	4.45	6.19	30
8	Coastal Woodland Rainforest	TL1	8	M-2 w/low conifer % or D-2		0.31	0.38	0.5	30
9	White Spruce Woodland and Black Spruce – White Spruce Woodland with Shrubs	SH2	10	M-2/25% conifer	GR	0.62	1.18	4.26	15
10	Black Spruce Woodland with Tussocks	GS2	5	C-1	GS3, O-1a/b	1.86	7.89	13.37	15
11	Black Spruce Woodland with Lichen	TU4	9 adj	C-1	GR2	2.86	4.23	6.24	12
12	Black Spruce Woodland with <i>Sphagnum</i> Moss	TU2	10	C-1	TU1, SH2, TU4	3.46	4.45	6.19	30
13	Closed Black Cottonwood or Balsam Poplar Forest and Closed Red Alder Forests	TL2	8	D-1/D-2		0.46	0.56	0.75	25
14	Closed Paper Birch Forest and Closed Quaking Aspen Forest	TU1	8	D-1/D-2		0.28	1.17	1.85	20

## Fuel model guide to Alaska vegetation

Appendix 2. Rate of Spread (ROS, chains per hour) for each Alaska Fuel Type under different moisture scenarios, and dead fuel extinction moisture (%). ROS based on 15 mph winds and 30 – 50% canopy. When more than one fuel model option provided for an Alaska Fuel Type ROS values and moisture of extinction based on highlighted fuel model.<sup>1</sup>

Alaska Fuel Type #	Alaska Fuel Type Name	FBFM40	FBFM13	CANFBP	Alt. Models (see text for usage)	ROS Above Average Moisture	ROS Average Moisture	ROS Very Low Moisture	Dead Fuel Extinction Moisture
15	Open Paper Birch Forest	TU1	8	D-1/D-2	M-1, M-2, TU3	0.28	1.17	1.85	20
16	Open Quaking Aspen Forest	TU1	8	D-1/D-2		0.28	1.17	1.85	20
17	Open Balsam Poplar (Black Cottonwood) Forest	TL2	8	D-1/D-2	TU1	0.46	0.56	0.75	25
18	Woodland Paper Birch and Woodland Balsam Poplar	SH1	8	O-1a/b	GR1, SH2	0.57	0.91	5.55	15
19	White or Black Spruce with Paper Birch and/or Aspen	TU5	10	M-2/50% conifer	TU5, M-1/2	3.13	4.19	6.09	25
20	White Spruce with Balsam Poplar and Paper Birch	TU1	8	M-2/25% conifer	M-1	0.28	1.17	1.85	20
21	Dwarf Tree Mountain Hemlock Scrub and Dwarf Tree Alpine Spruce Shrub	SH1	8	O-1a		0.57	0.91	5.55	15
22	Dwarf Tree Black Spruce Scrub	GS1	9	C-1	C2, GS2, SH5	1.07	5.23	9.65	15
23	Closed Tall Alder and Closed Tall Willow	TL2	8	D-1/D-2	TU1, SH2, M-1/M-2	0.46	0.56	0.75	25
24	Closed Tall Shrub Birch	SH3	9	M-1/M-2	SH2	1.14	1.61	2.5	40
26	Open Tall Alder and/or Willow	TU1	8	D-1/D-2	M-1, GS1	0.28	1.17	1.85	20
27	Open Tall Shrub Birch and Open Tall Shrub Birch – Willow	SH3	9	M-1/M-2	TU4, GS1	1.14	1.61	2.5	40
28	Closed Low Shrub Birch and Closed Low Shrub Birch – Willow and Closed Low Ericaceous Shrub	SH2	9	D-1/D-2	TU4	0.63	1.18	4.26	15
29	Closed Low Willow and Closed Low Alder – Willow	SH2	9	D-1/D-2	TU1, M-1	0.63	1.18	4.26	15
30	Open Low Mixed Shrub – Sedge Tussock Tundra and Open Low Mixed Shrub – Sedge Tussock Bog	GR4	1	O-1a/b	GR5, GS3, SH2	4.75	24.01	44.67	15
31	Open Low Mesic Shrub Birch – Ericaceous Shrub	GR2	5	O-1a/b	SH7	2.23	11.85	22.31	15



## Fuel model guide to Alaska vegetation

Appendix 2. Rate of Spread (ROS, chains per hour) for each Alaska Fuel Type under different moisture scenarios, and dead fuel extinction moisture (%). ROS based on 15 mph winds and 30 – 50% canopy. When more than one fuel model option provided for an Alaska Fuel Type ROS values and moisture of extinction based on highlighted fuel model.<sup>1</sup>

Alaska Fuel Type #	Alaska Fuel Type Name	FBFM40	FBFM13	CANFBP	Alt. Models (see text for usage)	ROS Above Average Moisture	ROS Average Moisture	ROS Very Low Moisture	Dead Fuel Extinction Moisture
32	Open Low Shrub Birch – Ericaceous Shrub Bog and Open Low Shrub Birch – Willow	GS2	5	O-1a/b		1.86	7.89	13.37	15
33	Open Low Willow and Open Low Sweetgale	SH1	8	O-1a	GR1	0.57	0.91	5.55	15
34	Open Low Alder and Open Low Alder – Willow	GS1	5	O-1a/b	SH2, FM1	1.07	5.23	9.65	15
35	Sagebrush – Grass and Grass – Juniper	GR1	8	O-1a/b	FM10	2.42	5.31	9.29	15
36	Dwarf Shrub Tundra	GS1	5	O-1a/b	FM1	1.07	5.23	9.65	15
37	<i>Elymus</i>	GS2	5	O-1a/b		1.86	7.89	13.37	15
38	Grass – Shrub	GS2	5	O-1a/b	GS1	1.86	7.89	13.37	15
39	Bluejoint ( <i>Calamagrostis</i> )	GR4	2	O-1a/b	GR7, FBFM13 3	4.75	24.01	44.67	15
40	Bluejoint – Shrub and Bluejoint – Herb	GR2	6	O-1a/b	GR1	2.23	11.85	22.31	15
41	Tussock Tundra	GR4	1	O-1a/b	GS3, SH2	4.75	24.01	44.67	15
42	Mesic Sedge – Grass Meadow or Tundra and Mesic Sedge – Herb Meadow or Tundra	GS1	5	O-1a/b		1.07	5.23	9.65	15
43	Sedge Willow Tundra and Sedge – Dryas Tundra	GR1	5	O-1a/b	FM1	2.42	5.31	9.29	15
44	Sedge – Birch Tundra	GR2	6	O-1a/b	GR4, GS3	2.23	11.85	22.31	15
45	Wet Meadow Tundra	GR1	10	O-1a/b	NB6	2.42	5.31	9.29	15
46	Wet Sedge – Grass Meadow or Marsh	GR1	5	O-1a/b	NB6, FM1	2.42	5.31	9.29	15
47	Wet Sedge Meadow or Bog and Wet Sedge – Shrub Meadow or Bog	GR1	9	O-1a/b	NB6, FM2	2.42	5.31	9.29	15

## Fuel model guide to Alaska vegetation

Appendix 2. Rate of Spread (ROS, chains per hour) for each Alaska Fuel Type under different moisture scenarios, and dead fuel extinction moisture (%). ROS based on 15 mph winds and 30 – 50% canopy. When more than one fuel model option provided for an Alaska Fuel Type ROS values and moisture of extinction based on highlighted fuel model.<sup>1</sup>

Alaska Fuel Type #	Alaska Fuel Type Name	FBFM40	FBFM13	CANFBP	Alt. Models (See text for usage)	ROS Above Average Moisture	ROS Average Moisture	ROS Very Low Moisture	Dead Fuel Extinction Moisture
48	Dry Species – Non Burnable	NB7*	99			0	0	0	
49	Wet Species – Non Burnable	NB6*	99			0	0	0	
50	Mesic Forb Herbaceous	GR1	5	O-1a/b	FM1	2.42	5.31	9.29	15
51	Foliose and Fruticose Lichen	GR1	2	O-1a/b	GR2, GR3	2.42	5.31	9.29	15
52	Crustose Lichen	NB9	99			0	0	0	
53	Aquatic Herbaceous	NB8	99			0	0	0	
54	Standing Dead Beetle Kill Spruce Forest	SB2/SB3	12	M-3		4.68	5.7	7.67	25
55	Heavy Stem Breakage/Downed and Jack-Straw Spruce and Aged Post-Mortality Beetle-Kill Forest	SB3	13	C-3		8.18	9.97	13.46	25
56	Closed Spruce Forest with Moderate Downed Beetle Kill/ Mixed Spruce and Hardwood Forest with Moderate Beetle Kill	TU5	10	M-3		3.13	4.19	6.09	25
57	Post-Timber Harvest Areas with Bluejoint Grass and Logging Slash Fuel Beds	GR7	3	O-1a/b		7.75	36.4	66.42	15

<sup>1</sup>Fuel moistures are as follows:

Above Average Moisture: 1 hour=9%, 10 hour=10%, 100 hour=11%, live herbaceous=90%, and live woody=120%

Average: 1 hour=6%, 10 hour=7%, 100 hour=8%, live herbaceous=60%, and live woody=90%

Very Low Moisture: 1 hour=3%, 10 hour=4%, 100 hour=5%, live herbaceous=30%, and live woody=60%

## Fuel model guide to Alaska vegetation

Appendix 3. Common and scientific plant names. Naming conventions follow the USDA Plants Database (<https://plants.usda.gov>).

Life Form	Common Name	Scientific Name
Tree	Alaska cedar	<i>Callitropsis nootkatensis</i>
Tree	Balsam poplar/cottonwood	<i>Populus balsamifera</i>
Tree	Black cottonwood	<i>Populus balsamifera</i> ssp. <i>Trichocarpa</i>
Tree	Black spruce	<i>Picea mariana</i>
Tree	Lutz spruce	<i>Picea x lutzii</i>
Tree	Mountain hemlock	<i>Tsuga mertensiana</i>
Tree	Pacific silver fir	<i>Abies amabilis</i>
Tree	Paper birch	<i>Betula neoalaskana</i>
Tree	Quaking aspen	<i>Populus tremuloides</i>
Tree	Shore pine	<i>Pinus contorta</i> var. <i>contorta</i>
Tree	Sitka spruce	<i>Picea sitchensis</i>
Tree	Sub-alpine fir	<i>Abies lasiocarpa</i>
Tree	Tamarack	<i>Larix laricina</i>
Tree	Western hemlock	<i>Tsuga heterophylla</i>
Tree	Western redcedar	<i>Thuja plicata</i>
Tree	White spruce	<i>Picea glauca</i>
Shrub	Alder	<i>Alnus</i> spp.
Shrub	Bearberry	<i>Arctostaphylos alpina</i> , <i>A. rubra</i>
Shrub	Black crowberry	<i>Empetrum nigrum</i>
Shrub	Bog Blueberry	<i>Vaccinium uliginosum</i>
Shrub	Bog Labrador tea	<i>Ledum groenlandicum</i>
Shrub	Bog rosemary	<i>Andromeda polifolia</i>
Shrub	Buffaloberry, Soapberry	<i>Shepherdia canadensis</i>
Shrub	Common juniper	<i>Juniperus communis</i>
Shrub	Copperbush	<i>Elliottia pyroliflorus</i>
Shrub	Crowberry	<i>Empterum nigrum</i>
Shrub	Currant	<i>Ribes</i> spp.
Shrub	Beauverd spirea	<i>Spiraea stenvii</i>
Shrub	Devil's club	<i>Oplopanax horridus</i>
Shrub	Dwarf birch	<i>Betula nana</i>
Shrub	Kinnikinnick	<i>Arctostaphylos uva-ursi</i>
Shrub	Leatherleaf	<i>Chamaedaphne calyculata</i>
Shrub	Lingonberry, lowbush cranberry	<i>Vaccinium vitis-idaea</i>
Shrub	Marsh Labrador tea	<i>Ledum palustre</i> ssp. <i>decumbens</i>
Shrub	Mountain Avens	<i>Dryas</i> spp.
Shrub	Mountain heather	<i>Cassiope</i> spp.
Shrub	Oval-leaf blueberry	<i>Vaccinium ovalifolium</i>
Shrub	Prickly rose	<i>Rosa acicularis</i>
Shrub	Red alder	<i>Alnus rubra</i>
Shrub	Red fruit bearberry	<i>Arctostaphylos rubra</i>
Shrub	Rusty menziesia	<i>Menziesia ferruginea</i>



Appendix 3. Common and scientific plant names. Naming conventions follow the USDA Plants Database (<https://plants.usda.gov>).

Life Form	Common Name	Scientific Name
Shrub	Resin birch/Shrub birch	<i>Betula glandulosa</i>
Shrub	Sagebrush spp.	<i>Artemisia</i> spp.
Shrub	Salmonberry	<i>Rubus spectabilis</i>
Shrub	Sitka alder	<i>Alnus viridis</i> ssp. <i>Sinuata</i>
Shrub	Sitka Mountain Ash	<i>Sorbus sitchensis</i>
Shrub	Small cranberry	<i>Vaccinium oxycoccos</i>
Shrub	Squashberry (locally called highbush cranberry)	<i>Viburnum edule</i>
Shrub	Sweetgale	<i>Myrica gale</i>
Shrub	<i>Vaccinium</i> spp. (includes blueberry, cranberry, lingonberry)	<i>Vaccinium</i> spp.
Shrub	Willow	<i>Salix</i> spp.
Shrub	Wintergreen	<i>Pyrola</i> spp.
Herb	Buckbean	<i>Menyanthes trifoliata</i>
Herb	Bunchberry dogwood	<i>Cornus canadensis</i>
Herb	Burrreed	<i>Sparganium</i> spp.
Herb	Buttercup	<i>Ranunculus</i> spp.
Herb	Cloudberry	<i>Rubus chamaemorus</i>
Herb	Common cowparsnip	<i>Heracleum maximum</i>
Herb	Common mare's tail	<i>Hippuris vulgaris</i>
Herb	Deercabbage	<i>Nephrophyllidium crista-galli</i>
Herb	Eelgrass	<i>Zostera</i> spp.
Herb	False toadflax	<i>Geocaulon lividum</i>
Herb	Fireweed	<i>Chamerion angustifolium</i>
Herb	Four-leaf mare's tail	<i>Hippuris tetraphylla</i>
Herb	Horsetail	<i>Equisetum</i> spp.
Herb	Mare's-tail	<i>Hippuris</i> spp.
Herb	Pond lily	<i>Nuphar lutea</i> ssp. <i>polysepala</i> or <i>Nymphaea tetragona</i>
Herb	Pondweed	<i>Potamogeton</i> spp.
Herb	Purple marshlocks	<i>Comarum palustre</i> ( <i>Potentilla palustris</i> )
Herb	Shortspike water-milfoil	<i>Myriophyllum sibiricum</i>
Herb	Tall bluebells	<i>Mertensia paniculata</i>
Herb	Twinflower	<i>Linnaea borealis</i>
Herb	Water horsetail	<i>Equisetum fluviatile</i>
Herb	Watermilfoil	<i>Myriophyllum</i> spp.
Herb	Wood fern	<i>Dryopteris</i> spp.
Herb	Wooly geranium	<i>Geranium erianthum</i>

Appendix 3. Common and scientific plant names. Naming conventions follow the USDA Plants Database (<https://plants.usda.gov>).

Life Form	Common Name	Scientific Name
Graminoid	Alkaligrass	<i>Puccinellia</i> spp.
Graminoid	Alpine sweetgrass	<i>Anthoxanthum monticola</i> ssp. <i>alpinum</i>
Graminoid	Altai fescue	<i>Festuca altaica</i>
Graminoid	Bigelow's sedge	<i>Carex bigelowii</i>
Graminoid	Bluegrass	<i>Poa</i> spp.
Graminoid	Bluejoint reedgrass	<i>Calamagrostis canadensis</i>
Graminoid	Hair grass	<i>Deschampsia</i> spp.
Graminoid	Largeflower speargrass	<i>Poa eminens</i>
Graminoids	Lyngbye's sedge	<i>Carex lyngbyei</i>
Graminoid	Purple reedgrass	<i>Calamagrostis purpurascens</i>
Graminoid	Ramensk's sedge	<i>Carex ramenskii</i>
Graminoid	Sedge spp.	<i>Carex</i> spp.
Graminoid	Shortstalk sedge	<i>Carex podocarpa</i>
Graminoid	Smallawned sedge	<i>Carex microchaeta</i>
Graminoid	Spike trisetum	<i>Trisetum spicatum</i>
Graminoid	Tufted bulrush	<i>Trichophorum cespitosum</i>
Graminoid	Tussock cottongrass	<i>Eriophorum vaginatum</i>
Graminoid	Water sedge	<i>Carex aquatilis</i>
Graminoid	Wheatgrass	<i>Elymus</i> spp.
Graminoid	Wideleaf polargrass	<i>Arctagrostis latifolia</i>