This volume, **Volume Va: Jack pine in the Lake States (PMS 837, NFES 2669),** is part of a second phase of the natural fuels photo series. This is a supplement to **Volume V: Midwest red and white pine, northern tallgrass prairie, and mixed oak types in the Central and Lake States (PMS 834, NFES 2579).** This volume can be used as a stand-alone document or can be removed and inserted into the back of Volume V.

Stereo Photo Series for Quantifying Natural Fuels

Volume Va: Jack Pine in the Lake States

Roger D. Ottmar, Robert E. Vihnanek, and Clinton S. Wright

ABSTRACT

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A series of single and stereo photographs display a range of natural conditions and fuel loadings in jack pine ecosystems in the Lake States. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuels photo series is designed to help land managers appraise fuel and vegetation conditions in natural settings.

Keywords: Woody material, biomass, fuel loading, natural fuels, jack pine, *Pinus banksiana*.

COOPERATORS

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Contents

WHAT IS THE NATURAL FUELS PHOTO SERIES?

The first phase of the natural fuels photo series was a collection of six volumes, each representing a region of the United States. Volume I included sites in mixed-conifer, western juniper, sagebrush, and grassland ecosystem types in the interior Pacific Northwest. Volume II included sites in black spruce and white spruce ecosystem types in Alaska. Volume III included sites in lodgepole pine, quaking aspen, and gambel oak ecosystem types in the Rocky Mountains. Volume IV included sites in pinyon-juniper, sagebrush, and chaparral ecosystem types in the Southwest. Volume V included sites in red and white pine, northern tallgrass prairie, and mixed-oak ecosystem types in the Midwest. Volume VI included sites in longleaf pine, pocosin, and marsh grass ecosystem types in the Southeast.

Generally, sites include wide-angle and stereo-pair photographs supplemented with information on living and dead fuels and vegetation, and where appropriate, stand structure and composition within the area visible in the photographs (fig. 1). This volume (Volume Va) is a part of a second phase of the natural fuels photo series and includes sites in jack pine ecosystems in the Lake States; this is a supplement to Volume V. The sites in this volume provide a basis for appraising and describing woody material, vegetation, and stand conditions in jack pine ecosystems across the Lake States.

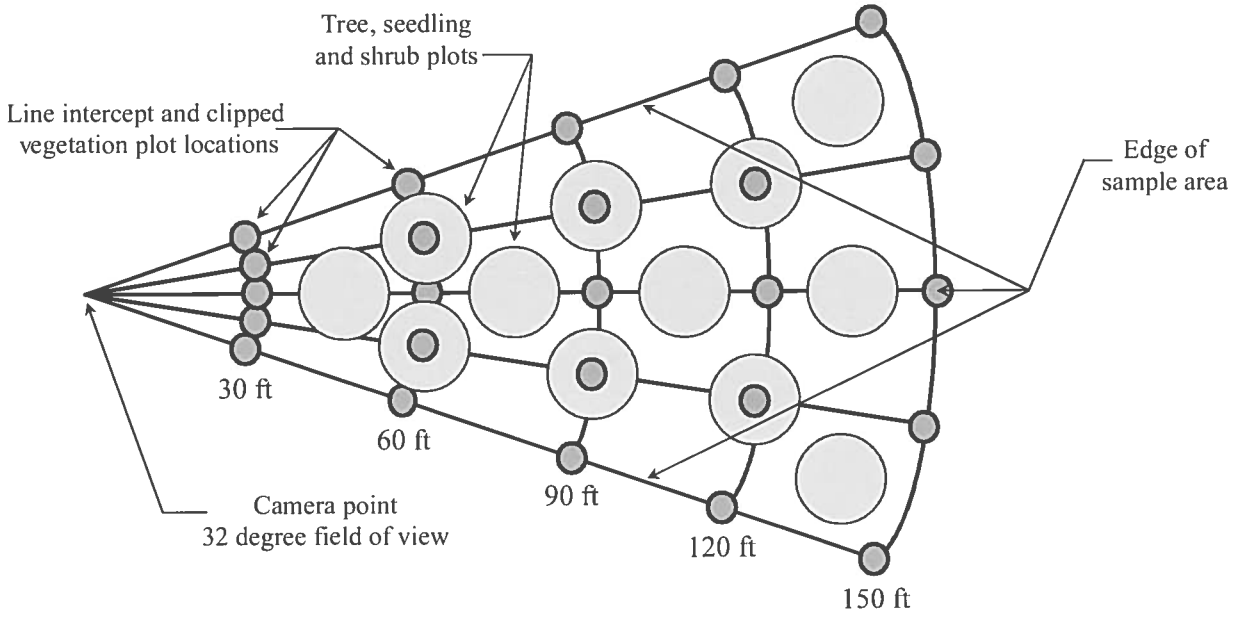

Figure 1--Photo series sample area layout. Forty random azimuth line transects (one at each point on the 30- and 150-foot arcs, and two at each point on the 60-, 90-, and 120-foot arcs) and 12 clipped vegetation plots (two to three per arc) were located within the sample area. Trees, shrubs, and seedlings were inventoried on 12 systematically located sample plots.

Why Is the Photo Series Needed?

These photo series are land management tools that can be used to assess landscapes through appraisal of living and dead woody material and vegetation (i.e., fuels) and stand characteristics. Once an assessment has been completed, stand treatment options, such as prescribed fire or harvesting, can be planned and implemented to better achieve desired effects while minimizing negative impacts on other resources.

The photo series has application in several branches of natural resource science and management. Inventory data such as these can be used as inputs for evaluating animal and insect habitat, nutrient cycling, and microclimate, for example. Fire managers will find these data useful for predicting fuel consumption, smoke production, fire behavior, and fire effects during wildfires and prescribed fires. In addition, the photo series can be used to appraise carbon sequestration, an important factor in predictions of future climate, and to link remotely sensed signatures to live and dead fuels on the ground.

Ground inventory procedures that directly measure site conditions (e.g., fuel loading and arrangement, vegetation structure and composition, etc.) exist for most ecosystem types and are useful when a high degree of accuracy is required. Ground inventory is time-consuming and expensive, however. Photo series can be used to make quick, easy, and inexpensive determinations of fuel quantities and stand conditions when less precise estimates are acceptable.

How Was the Photo Series Developed?

Sites photographed for the series in this volume were selected to show ranges of down and dead woody material loading, understory composition, and overstory development. Photographs were taken and fuel loading, stand structure, and composition data were collected by using the procedures of Maxwell and Ward (1980) as a guide. The sites in this series are ordered from smallest to largest percentages of crown closure.

Photographs

Stereo-pair photographs are included in this guide. The three-dimensional image obtained by viewing the photographs with a stereoscope will improve the ability of the land manager to appraise natural fuel, vegetation, and stand structure conditions. A larger, wide-angle photograph has been included for additional comparisons. The marker in these photographs is a 1-foot square, and the pole is painted in contrasting colors at 1-foot intervals to provide scale. The pole is 30 feet from the camera. The summary data relate to the field of view of the stereo-pair photographs but are based on measurements taken in the sample area only (see fig. 1). No sampling occurs in the foreground between the camera and the sign.

Photograph and Information Arrangement

The photographs and accompanying data summaries are presented as single sites organized into one series. Each site is arranged to occupy two facing pages. The upper page contains the wide-angle (50mm) photograph, and general site, stand, and forest floor information. The lower page includes the

stereo-pair photographs and summaries of overstory structure and composition, understory vegetation structure and composition, and dead and down woody material loading and density by size class.

Site Information

The camera point of each site was located with a global positioning system (GPS) receiver using the WGS-84 datum. Aspect and slope were measured with a compass and clinometer, respectively.

In the jack pine series, potential natural vegetation plant associations from the United States National Vegetation Classification within the terrestrial vegetation of the Midwestern United States region, were designated for each site based on vegetation structure and composition (Faber-Langendoen 1999). In addition, Society of American Foresters (SAF) cover type was assigned for each site based on descriptions in Eyre (1980). Society of American Foresters cover type is defined by current vegetation composition and locality or environmental factors.

Stand Information

Tree and understory species (shrub, forb, and graminoid species) present at a site are listed in order of abundance.[1] The listing of understory species was not meant to be a complete vegetation inventory and may represent only a portion of the actual species richness of the sampled areas. The percentage of dead standing trees (all stems greater than 4.5 feet tall) was determined by sampling within the site (fig. 1). Crown closure was either measured with a forest densitometer at 95 systematically located points in the sample area or, for forests with low tree cover or small stature, was estimated by using line intercept transects (Canfield 1941). Live seedling composition, density, and coverage were estimated by using twelve 0.005-acre circular plots representing 43 percent of the sample area; all trees less than 4.5 feet tall were considered seedlings.

Forest Floor Information

Surface material and duff depth were calculated as the average of measurements taken every five feet between the 30- and 150-foot arcs of the three center transects for a total of 75 measurements (fig. 1). The depth of the different forest floor components was calculated as an average of the depth only where that component was encountered during sampling. Therefore, the depths reported for the different forest floor components are not unit-wide averages and do not necessarily sum to total depth. Loading was calculated from bulk density values derived from field measurements.[2] Constancy is an indicator of how consistently the various forest floor components occur in the sample area and is expressed as a percentage of the total number of measurements. The amount of exposed mineral soil at each site can be estimated by subtracting the constancy of the total forest floor from 100 percent.

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[1] A list of scientific and common species names used in this volume appears on page 7.
[2] Forest floor bulk density values used for each material type appear under "Notes to Users" on page 11.

Saplings and Trees

As with the seedlings, overstory trees and saplings were sampled in twelve 0.005-acre circular plots located systematically throughout the sample area or within the entire sample area for sites with low tree density (fig. 1). Tree measurement data were summarized by diameter at breast height (d.b.h.) size class and by tree status (all, live or dead).[3] Height to crown base was defined as the height of the lowest, continuous live or dead branch material of the tree canopy, and height to live crown was defined as the height of the lowest continuous live branches of the tree canopy. Live crown mass values (i.e., live branches and foliage) were calculated from species- and size-specific allometric equations (Brown 1978, Clark et al. 1985, Crow 1983, Ker 1980, Loomis and Blank 1981, Reiners 1972, Roussopoulos and Loomis 1979, Singh 1981, Stocks 1980, Swank and Schreuder 1974). Crown mass equations for *Acer pensylvanicum*, *Larix laricina*, and *Viburnum* spp. were substituted with *Acer glabrum*, *Larix occidentalis,* and a general hardwood species equation, respectively.

Understory Vegetation

Understory species coverage was estimated by using line intercept transects (Canfield 1941). Where species-specific coverage is not reported, understory vegetation coverage was estimated by lifeform category (shrub, forb, or graminoid) by using the line intercept transects. Understory vegetation heights were measured at 25 points located systematically throughout the sample area. Understory vegetation biomass was determined by sampling 12 square, clipped vegetation plots (2.69 square feet each) also located systematically throughout the sample area (fig. 1). All live and dead vegetation within each square plot was clipped at ground level, separated, and returned to the laboratory for oven drying. Understory vegetation and other collected material were ovendried at a minimum of 158 °F for at least 48 hours before weighing and determination of area loading.

Woody Material

Measurement techniques used for inventorying dead and down woody material were patterned after the planar intersect method outlined by Brown (1974) and described by Maxwell and Ward (1980). Forty transects of random azimuth starting at 25 systematically located points within the sample area were used to determine woody material loading and density (fig. 1). Woody material data are reported by size classes that correspond to timelag fuel classes used in fire behavior modeling (see, for example, Burgan and Rothermel 1984).[4] Woody material in 10-hour, and 100-hour and larger size classes was tallied on transects that were 10 feet and 30 feet long, respectively. Woody material loading in the 1-hour size class (and the 10-hour and 100-hour size classes for several of the sites) was determined by collecting, oven drying, and weighing all pieces in twelve 2.69-square-foot sample plots. The decay class and the actual diameter at the point of intersection was measured for all pieces >3 inches in diameter. All woody material <3 inches in diameter was considered sound. Woody material loading and woody material density were calculated from relationships that use number of pieces intersected and transect length (and wood specific gravity for loading), respectively, developed by Brown (1974) and Safranyik and Linton (1987).

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[3] D.b.h. is measured 4.5 feet above the ground.

[4] 1-, 10-, 100- and 1000-hour timelag fuels are defined as woody material ≤0.25 inch, 0.26-1.0 inch, 1.1-3.0 inches, and >3.0 inches in diameter, respectively.

USING THE PHOTO SERIES

The natural fuels photo series is a tool for quickly and inexpensively evaluating a variety of fuel and vegetation conditions. Because of its ease of use, however, care must be taken when evaluating field sites to compare only with photo series sites that are appropriate matches. It is acceptable, however, to use the data from more than one site from the photo series when evaluating a site in the field (e.g., woody material loading from one site in the photo series and tree density from another site in the photo series to best match the conditions of a given field site).

Make a visual inventory of the site by observing fuel and stand conditions within the field of view and comparing them with the stereo-pair photographs as follows, remembering that the data tables relate to the area behind the sign in the stereo-pair photographs:

- Observe each characteristic for a specific size class of woody material on the ground (e.g., 3.1-9.0-inch woody material loading).
- Select a photo series site (or sites) that nearly matches or brackets the observed characteristics.
- Obtain the quantitative value for the characteristic being estimated from the data summary accompanying the selected photo series site, or interpolate a value between sites.
- Repeat these steps for each size class or stand characteristic of interest.

The total loading or stand condition can then be calculated by summing the estimates. If the site being inventoried has areas with obvious differences in woody material or stand conditions, the user should make separate determinations for each area and then weight and cumulate the loading for the whole site.

Characteristics not distinguishable in the photographs are litter and duff depth, loading and bulk density and proportions of sound and rotten woody material. If values for these characteristics are desired in the inventory, they must be derived from independent sampling or observations.

The 20 National Fire-Danger Rating System (Burgan 1988, Deeming et al. 1977) and the 13 fire behavior (Albini 1976) fuel models are very general in content and broadly applied; consequently, we chose not to assign one of these existing fuel models to individual sites in this photo series. The photo series was designed to provide sufficient fuel and vegetation data from which managers could generate their own customized fuel models.

Species List

Scientific and common species names are from NRCS (2001).

Scientific name	Common name
Trees:	
Abies balsamea (L.) P. Mill.	Balsam fir
Acer pensylvanicum L.	Striped maple
Acer rubrum L.	Red maple
Betula papyrifera Marsh.	Paper birch
Larix laricina (DuRoi) K. Koch	Tamarack
Picea glauca (Moench) Voss	White spruce
Picea mariana (P. Mill.) B.S.P.	Black spruce
Pinus banksiana Lamb.	Jack pine
Pinus resinosa Soland.	Red pine
Pinus strobus L.	Eastern white pine
Populus grandidentata Michx.	Bigtooth aspen
Populus spp.	Poplar
Prunus serotina Ehrh.	Black cherry
Prunus spp.	Cherry
Prunus virginiana L.	Chokecherry
Quercus ellipsoidalis E.J. Hill	Northern pin oak
Quercus rubra L.	Northern red oak
Salix spp.	Willow
Viburnum spp.	Viburnum
Shrubs:	
Amelanchier arborea (Michx. f.) Fern.	Common serviceberry
Amelanchier spp.	Serviceberry
Arctostaphylos uva-ursi (L.) Spreng.	Kinnikinnick
Chimaphila umbellata (L.) W. Bart.	Pipsissewa
Cornus canadensis (L.)	Bunchberry dogwood

Scientific name	Common name
Shrubs:	
Corylus americana Walt.	American hazelnut
Corylus cornuta Marsh.	Beaked hazelnut
Epigaea repens L.	Trailing arbutus
Gaultheria procumbens L.	Eastern teaberry or Wintergreen
Lonicera spp.	Honeysuckle
Ribes spp.	Currant
Rosa spp.	Rose
Rubus spp.	Blackberry
Vaccinium spp.	Blueberry
Forbs:	
Achillea millefolium L.	Common yarrow
Antennaria spp.	Pussytoes
Aster spp.	Aster
Athyrium filix-femina (L.) Roth	Common ladyfern
Comptonia peregrina (L.) Coult.	Sweet fern
Equisetum variegatum Schlieich. ex F. Weber & D.M.H. Mohr	Variegated scouringrush
Fragaria virginiana Duchesne	Virginia strawberry
Galium spp.	Bedstraw
Goodyera spp.	Plantain
Linnaea borealis L.	Twinflower
Lycopodium spp.	Clubmoss
Pteridium aquilinum L. Kuhn	Brackenfern
Taraxacum spp.	Dandelion
Viola spp.	Violet

Metric Conversions

1 inch = 2.54 centimeters
1 foot = 0.3048 meter
1 acre = 4,046.9 square meters
1 acre = 0.4047 hectare
1 square foot = 0.0929 square meter
1 pound = 0.4536 kilogram
1 ton = 907.2 kilograms
1 ton = 0.9072 metric ton
1 ton/acre = 2,241.7023 kilograms/hectare
1 ton/acre = 0.2242 kilogram/square meter
1 pound/acre = 1.1209 kilograms/hectare
1 pound/acre = 1.1209E-04 kilogram/square meter

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JACK PINE
PHOTO SERIES

A SERIES OF 19 SITES
JP 01 THROUGH JP 19

NOTES TO USERS:

1. The sites in this series are ordered from smallest to largest percentages of crown closure.
2. A list of scientific and common species names can be found on page 7.
3. Grass and grass-like plants (graminoids) were not identified by species.
4. Cryptogams include all mosses and lichens.
5. The marker in these photographs is a 1-foot square, and the pole is painted in contrasting colors at 1-foot intervals. The pole is 30 feet from the camera.
6. A distinction is made between rotten and sound woody material for pieces larger than 3 inches in diameter.
7. Bulk density values used for calculating forest floor loading from depth:
   - Cryptogams 2.44 $tons \cdot acre^{-1} \cdot inch^{-1}$
   - Conifer litter 4.05 $tons \cdot acre^{-1} \cdot inch^{-1}$
   - Hardwood litter 3.10 $tons \cdot acre^{-1} \cdot inch^{-1}$
   - Grass 0.30 $tons \cdot acre^{-1} \cdot inch^{-1}$
   - Bark slough 4.05 $tons \cdot acre^{-1} \cdot inch^{-1}$
   - Duff 10.35 $tons \cdot acre^{-1} \cdot inch^{-1}$
8. Woody material and forest floor loading and live crown mass are reported in tons per acre, and understory loading is reported in pounds per acre. Trace coverage of understory species is indicated as (t).
9. Plant association and SAF cover type are based on descriptions in Faber-Langendoen (1999) and Eyre (1980), respectively.
10. Depth values reported for surface material, duff, and total forest floor are not unit-wide averages (null values are not included in average) and, as such, the total forest floor depth is not the sum of surface material and duff depths.

JP 01 JACK PINE

SITE INFORMATION

Site location: N 46° 37' 14.74" W 91° 17' 18.48"
Elev: 1,214 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana - Pinus resinosa / Carex pensylvanica* Wooded Herbaceous Vegetation

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Comptonia peregrina* (1), *Rubus* spp. (1), *Pteridium aquilinum* (1), *Aster* spp. (1), *Vaccinium* spp. (1), *Fragaria virginiana* (t), *Epigaea repens* (t)

Standing dead trees: 0% of stems
Crown closure: 4%

Seedlings (% of stems): *Pinus banksiana* (81), *Prunus* spp. (19)
Density: 36/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.6	0.55	99
Cryptogams	0.8	0.36	24
Conifer litter	1.2	0.07	1
Grass	0.5	0.12	74
Duff	0.8	1.59	17
Total	0.7	2.14	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	--	--	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	29	7	--	--	7
Live	29	7	--	--	7
Dead	0	0	--	--	0
Avg. d.b.h. (in)	1.5	2.7	--	--	2.7
Live	1.5	2.7	--	--	2.7
Dead	--	--	--	--	--
Avg. height (ft)	9.5	12.0	--	--	12.0
Live	9.5	12.0	--	--	12.0
Dead	--	--	--	--	--
Avg. height to crown base (ft)	0.3	0.0	--	--	0.0
Live	0.3	0.0	--	--	0.0
Dead	--	--	--	--	--
Avg. height to live crown (ft)	0.5	0.0	--	--	0.0
Live crown mass (tons/ac)	0.02	0.02	--	--	0.02

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (1)	*Comptonia peregrina* (1)	--
Second most common species (% cover)	*Rubus* spp. (1)	*Pteridium aquilinum* (1)	--
Coverage (percent)	2	4	92
Avg. height (ft)	0.6	0.3	1.5
Biomass (lbs/ac)	295	37	2,299

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.0	0.0	0.0	--	--	--
0.26 - 1.0	0.1	0.0	0.1	--	--	--
1.1 - 3.0	0.0	0.1	0.1	--	--	--
3.1 - 9.0	0.0	0.3	0.3	0	36	36
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	0.1	0.4	0.5	0	36	36

JP 02 JACK PINE

SITE INFORMATION

Site location: N 46° 36' 22.85" W 91° 13' 01.64"
Elev: 1,250 ft Aspect: SSW Slope: 20%

Plant association: *Pinus banksiana - Pinus resinosa / Carex pensylvanica* Wooded Herbaceous Vegetation

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Comptonia peregrina* (25), *Arctostaphylos uva-ursi* (3), *Aster* spp. (t), *Lonicera* spp. (t)

Standing dead trees: 0% of stems
Crown closure: 6%

Seedlings (% of stems): *Pinus banksiana* (100)
Density: 477/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.6	0.28	99
Cryptogams	0.2	0.01	1
Conifer litter	0.4	0.10	5
Grass	0.6	0.17	93
Duff	0.4	1.67	45
Total	0.8	1.95	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	--	--	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	--	--	14	22	36
Live	--	--	14	22	36
Dead	--	--	0	0	0
Avg. d.b.h. (in)	--	--	7.5	10.0	9.0
Live	--	--	7.5	10.0	9.0
Dead	--	--	--	--	--
Avg. height (ft)	--	--	30.0	34.0	32.4
Live	--	--	30.0	34.0	32.4
Dead	--	--	--	--	--
Avg. height to crown base (ft)	--	--	3.0	2.3	2.6
Live	--	--	3.0	2.3	2.6
Dead	--	--	--	--	--
Avg. height to live crown (ft)	--	--	4.5	3.3	3.8
Live crown mass (tons/ac)	--	--	0.33	0.93	1.26

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Comptonia peregrina* (25)	*Aster* spp. (t)	--
Second most common species (% cover)	*Arctostaphylos uva-ursi* (3)	--	--
Coverage (percent)	28	2	92
Avg. height (ft)	1.0	0.3	0.6
Biomass (lbs/ac)	1,072	43	1,867

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.1	0.0	0.1	--	--	--
0.26 - 1.0	<0.1	0.0	<0.1	--	--	--
1.1 - 3.0	0.3	<0.1	0.3	--	--	--
3.1 - 9.0	0.6	0.6	1.2	22	36	58
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	1.0	0.6	1.6	22	36	58

JP 03 JACK PINE

SITE INFORMATION

Site location: N 46° 21' 05.17" W 84° 50' 05.96"
Elev: 918 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Picea mariana / Vaccinium* spp. / Lichen Rocky Woodland

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Vaccinium* spp. (24), *Pteridium aquilinum* (16), *Epigaea repens* (3), *Comptonia peregrina* (1)

Standing dead trees: 34% of stems
Crown closure: 23%

Seedlings (% of stems): *Pinus banksiana* (67), *Prunus* spp. (22), *Acer rubrum* (11)
Density: 65/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.5	3.93	100
Cryptogams	1.8	2.88	67
Conifer litter	0.9	1.04	29
Grass	0.8	0.01	4
Duff	1.2	10.89	91
Total	2.6	14.82	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	28	72	173	21	266
Live	14	43	130	7	180
Dead	14	29	43	14	86
Avg. d.b.h. (in)	1.2	3.2	5.8	9.8	5.4
Live	0.5	3.2	5.7	9.1	5.2
Dead	1.9	3.2	6.0	10.2	5.7
Avg. height (ft)	8.0	14.3	27.8	20.7	23.6
Live	6.0	15.8	28.9	31.0	25.8
Dead	10.0	12.0	24.7	15.5	18.9
Avg. height to crown base (ft)	0.5	0.5	1.6	1.0	1.3
Live	1.0	0.7	1.8	1.0	1.5
Dead	0.0	0.3	1.2	--	0.8
Avg. height to live crown (ft)	2.0	2.2	4.5	1.0	3.8
Live crown mass (tons/ac)	<0.01	0.16	1.71	0.25	2.12

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (24)	*Pteridium aquilinum* (16)	--
Second most common species (% cover)	*Epigaea repens* (3)	*Comptonia peregrina* (1)	--
Coverage (percent)	27	17	11
Avg. height (ft)	0.3	0.3	0.2
Biomass (lbs/ac)	582	231	116

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.1	0.0	0.1	--	--	--
0.26 - 1.0	0.2	0.0	0.2	--	--	--
1.1 - 3.0	0.1	0.0	0.1	--	--	--
3.1 - 9.0	0.3	0.0	0.3	24	0	24
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	0.7	0.0	0.7	24	0	24

JP 04 JACK PINE

SITE INFORMATION

Site location: N 46° 36' 29.92" W 91° 12' 32.68"
Elev: 1,257 ft Aspect: ESE Slope: 10%

Plant association: *Pinus banksiana - Pinus resinosa / Carex pensylvanica* Wooded Herbaceous Vegetation

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (97), *Prunus virginiana* (3)

Understory (% cover): *Vaccinium* spp. (24), *Comptonia peregrina* (16), *Lonicera* spp. (6), *Arctostaphylos uva-ursi* (2), *Pteridium aquilinum* (t), *Aster* spp. (t)

Standing dead trees: 9% of stems
Crown closure: 35%

Seedlings (% of stems): *Pinus banksiana* (94), *Prunus virginiana* (4), *Salix* spp. (1), *Populus* spp. (1)
Density: 758/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.5	1.42	99
Cryptogams	0.3	0.03	4
Conifer litter	0.5	1.36	64
Grass	0.4	0.03	31
Duff	0.4	3.22	69
Total	0.8	4.64	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Prunus virginiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	--	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	7	7	224	--	231
Live	7	7	202	--	209
Dead	0	0	22	--	22
Avg. d.b.h. (in)	0.2	4.0	5.9	--	5.8
Live	0.2	4.0	6.0	--	6.0
Dead	--	--	4.6	--	4.6
Avg. height (ft)	5.0	21.0	27.9	--	27.7
Live	5.0	21.0	28.9	--	28.7
Dead	--	--	18.7	--	18.7
Avg. height to crown base (ft)	1.0	0.0	1.3	--	1.2
Live	1.0	0.0	1.3	--	1.2
Dead	--	--	1.3	--	1.3
Avg. height to live crown (ft)	1.0	11.0	7.6	--	7.7
Live crown mass (tons/ac)	<0.01	0.04	2.95	--	2.99

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (24)	*Comptonia peregrina* (16)	--
Second most common species (% cover)	*Lonicera* spp. (6)	*Pteridium aquilinum* (t)	--
Coverage (percent)	32	17	47
Avg. height (ft)	0.4	0.3	0.2
Biomass (lbs/ac)	1,098	68	378

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.3	0.0	0.3	--	--	--
0.26 - 1.0	0.2	0.0	0.2	--	--	--
1.1 - 3.0	0.1	0.0	0.1	--	--	--
3.1 - 9.0	0.3	0.0	0.3	10	0	10
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	0.9	0.0	0.9	10	0	10

JP 05 JACK PINE

SITE INFORMATION

Site location: N 44° 34' 31.40" W 84° 24' 36.98"
Elev: 1,205 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) - *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (57), *Quercus ellipsoidalis* (41), *Abies balsamea* (2)

Understory (% cover): *Gaultheria procumbens* (15), *Vaccinium* spp. (14), *Arctostaphylos uva-ursi* (7), *Epigaea repens* (1), *Amelanchier arborea* (t), *Comptonia peregrina* (t)

Standing dead trees: 25% of stems
Crown closure: 47%

Seedlings (% of stems): *Quercus ellipsoidalis* (54), *Pinus banksiana* (46)
Density: 369/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.2	3.65	100
Cryptogams	1.4	1.82	55
Conifer litter	1.0	1.04	26
Hardwood litter	1.0	0.79	19
Duff	0.9	9.32	95
Total	2.1	12.97	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Quercus ellipsoidalis* (66)	*Quercus ellipsoidalis* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (83)
Second most common species (percent of stems)	*Pinus banksiana* (34)	--	--	--	*Quercus ellipsoidalis* (13)
Tree density (stems/ac)	487	151	235	17	403
Live	470	101	84	17	202
Dead	17	50	151	0	201
Avg. d.b.h. (in)	1.0	2.9	6.3	9.2	5.2
Live	1.0	2.8	5.9	9.2	4.7
Dead	0.7	3.2	6.5	--	5.7
Avg. height (ft)	9.3	15.9	27.2	42.0	23.6
Live	9.3	17.3	36.8	42.0	27.5
Dead	8.0	13.0	21.9	--	19.7
Avg. height to crown base (ft)	1.6	2.1	21.3	28.0	14.6
Live	1.6	2.5	24.6	28.0	13.8
Dead	0.0	0.0	18.5	--	15.9
Avg. height to live crown (ft)	1.9	3.5	25.6	28.0	14.8
Live crown mass (tons/ac)	0.06	0.24	1.17	0.59	2.00

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Gaultheria procumbens* (15)	*Comptonia peregrina* (t)	--
Second most common species (% cover)	*Vaccinium* spp. (14)	--	--
Coverage (percent)	37	<1	22
Avg. height (ft)	0.6	0.2	0.4
Biomass (lbs/ac)	1,132	101	157

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	1.3	0.0	1.3	--	--	--
0.26 - 1.0	0.5	0.0	0.5	--	--	--
1.1 - 3.0	0.5	0.0	0.5	--	--	--
3.1 - 9.0	3.4	0.5	3.9	170	49	219
9.1 - 20.0	3.8	0.0	3.8	29	0	29
> 20.0	0.0	0.0	0.0	0	0	0
Total	9.5	0.5	10.0	199	49	248

JP 06 JACK PINE

SITE INFORMATION

Site location: N 47° 33' 13.57" W 94° 48' 37.18"
Elev: 1,420 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) - *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (98), *Quercus rubra* (2)

Understory (% cover): *Corylus cornuta* (t), *Achillea millefolium* (t), *Taraxacum* spp. (t), *Rosa* spp. (t), *Galium* spp. (t), *Viola* spp. (t), *Fragaria virginiana* (t)

Standing dead trees: 43% of stems
Crown closure: 47%

Seedlings (% of stems): *Quercus rubra* (84), *Prunus* spp. (16)
Density: 224/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.1	3.15	100
Cryptogams	1.3	2.00	63
Conifer litter	1.0	1.14	31
Grass	0.4	0.01	6
Duff	0.4	2.70	57
Total	1.4	5.85	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Quercus rubra* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	14	36	513	29	578
Live	14	0	303	22	325
Dead	0	36	210	7	253
Avg. d.b.h. (in)	0.5	3.6	6.6	9.4	6.5
Live	0.5	--	6.8	9.5	7.0
Dead	--	3.6	6.1	9.1	5.9
Avg. height (ft)	6.0	15.8	41.6	50.0	40.4
Live	6.0	--	53.9	57.3	54.2
Dead	--	15.8	23.8	28.0	22.8
Avg. height to crown base (ft)	3.0	6.0	25.8	24.3	25.4
Live	3.0	--	28.3	24.3	28.0
Dead	--	6.0	17.8	--	16.9
Avg. height to live crown (ft)	3.0	--	34.1	30.7	33.9
Live crown mass (tons/ac)	0.0	0.0	5.88	0.81	6.69

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Corylus cornuta* (t)	*Achillea millefolium* (t)	--
Second most common species (% cover)	*Rosa* spp. (t)	*Taraxacum* spp. (t)	--
Coverage (percent)	(t)	1	32
Avg. height (ft)	2.0	0.1	0.4
Biomass (lbs/ac)	(t)	2	224

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	1.0	0.0	1.0	--	--	--
0.26 - 1.0	1.6	0.0	1.6	--	--	--
1.1 - 3.0	1.9	0.0	1.9	--	--	--
3.1 - 9.0	10.9	2.1	13.0	584	141	725
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	15.4	2.1	17.5	584	141	725

JP 07 JACK PINE

SITE INFORMATION

Site location: N 46° 22' 09.72" W 84° 44' 01.51"
Elev: 920 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Picea mariana / Vaccinium* spp. / *Pleurozium schreberi* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Acer rubrum* (57), *Pinus banksiana* (30), *Salix* spp. (6), *Prunus* spp. (4), *Quercus rubra* (1), *Populus grandidentata* (1), *Acer pensylvanicum* (1)

Understory (% cover): *Pteridium aquilinum* (23), *Vaccinium* spp. (6), *Gaultheria procumbens* (4), *Epigaea repens* (2), *Comptonia peregrina* (1), *Corylus americana* (t), *Corylus cornuta* (t)

Standing dead trees: 14% of stems
Crown closure: 51%

Seedlings (% of stems): *Acer rubrum* (94), *Prunus* spp. (5), *Abies balsamea* (t), *Populus grandidentata* (t), *Quercus rubra* (t), *Pinus strobus* (t)
Density: 10,214/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.8	2.73	100
Cryptogams	1.2	0.49	17
Conifer litter	0.7	1.96	71
Hardwood litter	0.8	0.28	12
Duff	1.9	19.30	100
Total	2.7	22.03	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Acer rubrum* (80)	*Acer rubrum* (50)	*Pinus banksiana* (95)	*Pinus banksiana* (100)	*Pinus banksiana* (84)
Second most common species (percent of stems)	*Salix* spp. (8)	*Pinus banksiana* (25)	*Acer rubrum* (5)	--	*Acer rubrum* (12)
Tree density (stems/ac)	822	67	336	17	420
Live	788	50	235	0	285
Dead	34	17	101	17	135
Avg. d.b.h. (in)	0.6	2.9	6.6	9.3	6.1
Live	0.6	2.8	7.0	--	6.3
Dead	0.6	3.3	5.6	9.3	5.7
Avg. height (ft)	9.0	29.3	47.3	15.0	43.1
Live	9.2	28.3	53.6	--	49.1
Dead	5.5	32.0	32.5	15.0	30.3
Avg. height to crown base (ft)	3.5	6.8	26.0	9.0	22.6
Live	3.6	6.8	28.4	--	24.6
Dead	0.0	--	17.8	9.0	16.0
Avg. height to live crown (ft)	3.6	6.8	30.5	--	26.3
Live crown mass (tons/ac)	0.16	0.14	4.82	--	4.96

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (6)	*Pteridium aquilinum* (23)	--
Second most common species (% cover)	*Gaultheria procumbens* (4)	*Comptonia peregrina* (1)	--
Coverage (percent)	12	24	1
Avg. height (ft)	0.3	0.2	0.2
Biomass (lbs/ac)	143	501	1

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.2	0.0	0.2	--	--	--
0.26 - 1.0	0.4	0.0	0.4	--	--	--
1.1 - 3.0	0.9	0.0	0.9	--	--	--
3.1 - 9.0	8.4	1.7	10.1	370	136	506
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	9.9	1.7	11.6	370	136	506

JP 08 JACK PINE

SITE INFORMATION

Site location: N 45° 55' 52.67" W 86° 55' 06.94"
Elev: 673 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana* - *Vaccinium* spp. / *Pleurozium schreberi* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (84), *Abies balsamea* (9), *Quercus rubra* (7)

Understory (% cover): *Pteridium aquilinum* (11), *Chimaphila umbellata* (2), *Vaccinium* spp. (1), *Comptonia peregrina* (1), *Arctostaphylos uva-ursi* (1), *Gaultheria procumbens* (t), *Fragaria virginiana* (t)

Standing dead trees: 38% of stems
Crown closure: 52%

Seedlings (% of stems): *Quercus rubra* (34), *Pinus banksiana* (29), *Prunus serotina* (28), *Acer rubrum* (4), *Abies balsamea* (1), *Pinus resinosa* (1), *Viburnum* spp. (1), *Amelanchier arborea* (1), *Picea glauca* (1)
Density: 975/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.7	4.27	99
Cryptogams	1.8	3.62	83
Conifer litter	1.0	0.51	13
Bark slough	1.3	0.14	3
Duff	1.2	12.03	99
Total	2.9	16.30	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Abies balsamea* (33)	*Pinus banksiana* (56)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (94)
Second most common species (percent of stems)	*Pinus banksiana* (33)	*Abies balsamea* (33)	--	--	*Abies balsamea* (5)
Tree density (stems/ac)	87	65	361	36	462
Live	80	36	202	22	260
Dead	7	29	159	14	202
Avg. d.b.h. (in)	0.8	3.2	6.4	10.8	6.3
Live	0.8	2.8	6.6	10.5	6.4
Dead	1.0	3.7	6.1	11.3	6.1
Avg. height (ft)	8.1	22.3	37.5	50.8	36.4
Live	8.3	17.8	47.0	56.0	43.7
Dead	6.0	28.0	25.4	43.0	27.0
Avg. height to crown base (ft)	2.1	9.3	23.3	5.4	19.7
Live	2.0	4.0	24.6	5.3	20.1
Dead	3.0	22.5	20.3	5.5	18.8
Avg. height to live crown (ft)	2.1	4.0	32.5	34.0	28.7
Live crown mass (tons/ac)	0.04	0.14	3.59	1.03	4.76

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Chimaphila umbellata* (2)	*Pteridium aquilinum* (11)	--
Second most common species (% cover)	*Vaccinium* spp. (1)	*Comptonia peregrina* (1)	--
Coverage (percent)	4	12	23
Avg. height (ft)	0.6	0.5	0.3
Biomass (lbs/ac)	102	266	192

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.7	0.0	0.7	--	--	--
0.26 - 1.0	1.2	0.0	1.2	--	--	--
1.1 - 3.0	1.8	0.0	1.8	--	--	--
3.1 - 9.0	6.0	0.1	6.1	311	10	321
9.1 - 20.0	0.4	0.0	0.4	5	0	5
> 20.0	0.0	0.0	0.0	0	0	0
Total	10.1	0.1	10.2	316	10	326

JP 09 JACK PINE

SITE INFORMATION

Site location: N 45° 56' 06.35" W 86° 55' 01.86"
Elev: 660 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana* - *Vaccinium* spp. / *Pleurozium schreberi* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (78), *Pinus resinosa* (10), *Abies balsamea* (8), *Larix laricina* (2), *Prunus* spp. (2)

Understory (% cover): *Pteridium aquilinum* (18), *Gaultheria procumbens* (13), *Lycopodium* spp. (5), *Arctostaphylos uva-ursi* (4), *Vaccinium* spp. (3), *Comptonia peregrina* (1), *Epigaea repens* (t)

Standing dead trees: 30% of stems
Crown closure: 52%

Seedlings (% of stems): *Prunus* spp. (64), *Pinus banksiana* (19), *Abies balsamea* (7), *Pinus strobus* (3), *Acer rubrum* (3), *Salix* spp. (2), *Picea glauca* (2)
Density: 425/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.4	3.60	100
Cryptogams	1.5	2.85	77
Conifer litter	0.8	0.75	23
Duff	1.0	9.96	97
Total	2.3	13.56	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (38)	*Pinus banksiana* (75)	*Pinus banksiana* (100)	*Pinus banksiana* (86)	*Pinus banksiana* (92)
Second most common species (percent of stems)	*Abies balsamea* (31)	*Pinus resinosa* (25)	--	*Pinus resinosa* (14)	*Pinus resinosa* (8)
Tree density (stems/ac)	94	58	159	50	267
Live	65	15	137	36	188
Dead	29	43	22	14	79
Avg. d.b.h. (in)	1.0	3.1	6.5	10.4	6.5
Live	0.9	3.0	6.9	10.8	7.3
Dead	1.3	3.2	4.4	9.4	4.7
Avg. height (ft)	8.8	15.4	41.5	51.3	37.7
Live	8.2	19.5	44.4	54.8	44.5
Dead	10.0	14.0	23.0	42.5	21.6
Avg. height to crown base (ft)	3.8	9.0	21.4	13.7	17.6
Live	2.4	6.5	22.1	11.8	18.9
Dead	16.0	10.3	15.0	18.5	13.5
Avg. height to live crown (ft)	2.9	8.0	25.9	23.2	24.0
Live crown mass (tons/ac)	0.04	0.04	2.65	1.80	4.49

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Gaultheria procumbens* (13)	*Pteridium aquilinum* (18)	--
Second most common species (% cover)	*Arctostaphylos uva-ursi* (4)	*Comptonia peregrina* (1)	--
Coverage (percent)	20	19	17
Avg. height (ft)	0.9	0.5	0.5
Biomass (lbs/ac)	96	599	126

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.4	0.0	0.4	--	--	--
0.26 - 1.0	0.8	0.0	0.8	--	--	--
1.1 - 3.0	1.4	0.0	1.4	--	--	--
3.1 - 9.0	3.8	0.4	4.2	132	29	161
9.1 - 20.0	2.4	0.0	2.4	24	0	24
> 20.0	0.0	0.0	0.0	0	0	0
Total	8.8	0.4	9.2	156	29	185

JP 10 JACK PINE

SITE INFORMATION

Site location: N 47° 14' 42.99" W 94° 58' 21.02"
Elev: 1,411 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana* - *Vaccinium* spp. / *Pleurozium schreberi* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (97), *Pinus resinosa* (3)

Understory (% cover): *Vaccinium* spp. (18), *Arctostaphylos uva-ursi* (8), *Antennaria* spp. (1), *Aster* spp. (1), *Gaultheria procumbens* (t), *Corylus cornuta* (t), *Fragaria virginiana* (t), *Rubus* spp. (t), *Equisetum variegatum* (t), *Ribes* spp. (t), *Achillea millefolium* (t)

Standing dead trees: 22% of stems
Crown closure: 52%

Seedlings (% of stems): *Prunus serotina* (41), *Pinus banksiana* (40), *Quercus rubra* (14), *Pinus resinosa* (5)
Density: 527/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.0	2.81	99
Cryptogams	1.2	1.68	62
Conifer litter	0.7	1.13	37
Duff	0.8	4.27	51
Total	1.4	7.08	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (92)	*Pinus banksiana* (95)	*Pinus banksiana* (100)	*Pinus banksiana* (95)
Second most common species (percent of stems)	--	*Pinus resinosa* (8)	*Pinus resinosa* (5)	--	*Pinus resinosa* (5)
Tree density (stems/ac)	108	87	145	79	311
Live	72	80	94	79	253
Dead	36	7	51	0	58
Avg. d.b.h. (in)	1.7	3.0	6.5	11.5	6.8
Live	1.8	2.9	7.0	11.5	7.1
Dead	1.4	3.9	5.6	--	5.4
Avg. height (ft)	14.4	22.5	39.1	62.2	40.4
Live	15.0	21.8	48.5	62.2	44.4
Dead	13.2	30.0	21.7	--	22.8
Avg. height to crown base (ft)	6.1	7.1	14.4	14.2	11.9
Live	6.4	6.6	14.5	14.2	11.9
Dead	5.6	13.0	13.0	--	13.0
Avg. height to live crown (ft)	8.1	9.0	18.6	22.5	16.8
Live crown mass (tons/ac)	0.07	0.24	1.87	4.73	6.84

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (18)	*Antennaria* spp. (1)	--
Second most common species (% cover)	*Arctostaphylos uva-ursi* (8)	*Aster* spp. (1)	--
Coverage (percent)	28	2	41
Avg. height (ft)	0.4	0.2	0.4
Biomass (lbs/ac)	580	47	482

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.5	0.0	0.5	--	--	--
0.26 - 1.0	0.5	0.0	0.5	--	--	--
1.1 - 3.0	0.5	0.0	0.5	--	--	--
3.1 - 9.0	4.9	0.6	5.5	204	58	262
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	6.4	0.6	7.0	204	58	262

JP 11 JACK PINE

SITE INFORMATION

Site location: N 44° 33' 36.65" W 84° 24' 20.62"
Elev: 1,195 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) – *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Vaccinium* spp. (9), *Arctostaphylos uva-ursi* (5), *Comptonia peregrina* (4)

Standing dead trees: 0% of stems
Crown closure: 55%

Seedlings (% of stems): None
Density: 0/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.8	2.88	99
Cryptogams	1.4	0.45	13
Conifer litter	0.8	2.42	82
Grass	0.7	0.01	4
Duff	0.4	2.15	52
Total	1.0	5.03	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	--	--	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	788	721	--	--	721
Live	788	721	--	--	721
Dead	0	0	--	--	0
Avg. d.b.h. (in)	1.7	2.5	--	--	2.5
Live	1.7	2.5	--	--	2.5
Dead	--	--	--	--	--
Avg. height (ft)	9.8	11.3	--	--	11.3
Live	9.8	11.3	--	--	11.3
Dead	--	--	--	--	--
Avg. height to crown base (ft)	0.2	0.4	--	--	0.4
Live	0.2	0.4	--	--	0.4
Dead	--	--	--	--	--
Avg. height to live crown (ft)	3.8	4.1	--	--	4.1
Live crown mass (tons/ac)	0.78	1.56	--	--	1.56

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (9)	*Comptonia peregrina* (4)	--
Second most common species (% cover)	*Arctostaphylos uva-ursi* (5)	--	--
Coverage (percent)	14	4	47
Avg. height (ft)	0.5	--	0.4
Biomass (lbs/ac)	709	1	287

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.1	0.0	0.1	--	--	--
0.26 - 1.0	<0.1	0.0	<0.1	--	--	--
1.1 - 3.0	0.1	0.1	0.2	--	--	--
3.1 - 9.0	0.0	0.0	0.0	0	0	0
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	0.2	0.1	0.3	0	0	0

JP 12 JACK PINE

SITE INFORMATION

Site location: N 45° 53' 11.10" W 86° 55' 57.28"
Elev: 667 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Arctostaphylos uva-ursi* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Comptonia peregrina* (10), *Lycopodium* spp. (4), *Arctostaphylos uva-ursi* (t)

Standing dead trees: 5% of stems
Crown closure: 61%

Seedlings (% of stems): *Pinus banksiana* (100)
Density: 50/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.1	3.76	100
Cryptogams	1.1	0.59	23
Conifer litter	1.2	2.76	56
Grass	0.9	0.41	21
Duff	0.5	3.63	68
Total	1.5	7.39	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	--	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	1,728	637	118	--	755
Live	1,694	637	101	--	738
Dead	34	0	17	--	17
Avg. d.b.h. (in)	1.3	2.4	6.7	--	3.1
Live	1.3	2.4	7.0	--	2.5
Dead	0.5	--	6.6	--	6.6
Avg. height (ft)	11.4	14.7	17.6	--	15.2
Live	11.5	14.7	10.0	--	14.6
Dead	6.5	--	18.8	--	18.8
Avg. height to crown base (ft)	1.0	1.0	0.0	--	0.9
Live	1.0	1.0	0.0	--	0.9
Dead	1.0	--	--	--	--
Avg. height to live crown (ft)	2.9	2.1	0.0	--	2.0
Live crown mass (tons/ac)	0.98	1.29	0.33	--	1.62

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Arctostaphylos uva-ursi* (t)	*Comptonia peregrina* (10)	--
Second most common species (% cover)	--	--	--
Coverage (percent)	<1	10	21
Avg. height (ft)	--	0.7	0.3
Biomass (lbs/ac)	(t)	227	196

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.2	0.0	0.2	--	--	--
0.26 - 1.0	1.4	0.0	1.4	--	--	--
1.1 - 3.0	4.3	0.0	4.3	--	--	--
3.1 - 9.0	30.8	1.6	32.4	1,844	136	1,980
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	36.7	1.6	38.3	1,844	136	1,980

JP 13 JACK PINE

SITE INFORMATION

Site location: N 44° 35' 03.30" W 84° 05' 16.17"
Elev: 1,215 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) - *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (93), *Quercus ellipsoidalis* (7)

Understory (% cover): *Vaccinium* spp. (46), *Pteridium aquilinum* (4), *Comptonia peregrina* (4), *Amelanchier* spp. (3), *Gaultheria procumbens* (1), *Epigaea repens* (1), *Arctostaphylos uva-ursi* (t)

Standing dead trees: 8% of stems
Crown closure: 63%

Seedlings (% of stems): *Pinus banksiana* (73), *Quercus ellipsoidalis* (27)
Density: 184/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.2	4.58	97
Cryptogams	1.3	0.26	8
Conifer litter	1.2	4.12	84
Hardwood litter	1.5	0.20	5
Duff	0.9	9.99	97
Total	2.1	14.57	97

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (93)	*Pinus banksiana* (94)	--	--	*Pinus banksiana* (94)
Second most common species (percent of stems)	*Quercus ellipsoidalis* (7)	*Quercus ellipsoidalis* (6)	--	--	*Quercus ellipsoidalis* (6)
Tree density (stems/ac)	3,036	1,090	--	--	1,090
Live	2,717	1,090	--	--	1,090
Dead	319	0	--	--	0
Avg. d.b.h. (in)	1.1	2.6	--	--	2.6
Live	1.2	2.6	--	--	2.6
Dead	0.5	--	--	--	--
Avg. height (ft)	11.6	15.4	--	--	15.4
Live	12.1	15.4	--	--	15.4
Dead	7.1	--	--	--	--
Avg. height to crown base (ft)	1.3	1.9	--	--	1.9
Live	1.4	1.9	--	--	1.9
Dead	1.1	--	--	--	--
Avg. height to live crown (ft)	6.4	7.5	--	--	7.5
Live crown mass (tons/ac)	1.43	2.47	--	--	2.47

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (46)	*Pteridium aquilinum* (4)	--
Second most common species (% cover)	*Amelanchier arborea* (3)	*Comptonia peregrina* (4)	--
Coverage (percent)	51	8	12
Avg. height (ft)	0.6	0.4	0.3
Biomass (lbs/ac)	1,318	48	116

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.2	0.0	0.2	--	--	--
0.26 - 1.0	0.2	0.0	0.2	--	--	--
1.1 - 3.0	1.3	0.0	1.3	--	--	--
3.1 - 9.0	0.5	2.8	3.3	34	287	321
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	2.2	2.8	5.0	34	287	321

JP 14 JACK PINE

SITE INFORMATION

Site location: N 44° 35' 37.72" W 84° 02' 56.78"
Elev: 1,225 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) - *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (58), *Quercus ellipsoidalis* (42)

Understory (% cover): *Vaccinium* spp. (29), *Pteridium aquilinum* (6), *Arctostaphylos uva-ursi* (2), *Comptonia peregrina* (1), *Amelanchier arborea* (1)

Standing dead trees: 7% of stems
Crown closure: 65%

Seedlings (% of stems): *Quercus ellipsoidalis* (89), *Pinus banksiana* (9), *Pinus resinosa* (2)
Density: 939/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.7	5.09	100
Cryptogams	2.1	2.75	54
Conifer litter	1.2	2.34	46
Duff	1.1	8.47	74
Total	2.5	13.56	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Quercus ellipsoidalis* (91)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	--	*Pinus banksiana* (100)
Second most common species (percent of stems)	*Pinus banksiana* (9)	--	--	--	--
Tree density (stems/ac)	386	168	285	--	453
Live	352	168	285	--	453
Dead	34	0	0	--	0
Avg. d.b.h. (in)	0.5	3.4	5.7	--	4.8
Live	0.5	3.4	5.7	--	4.8
Dead	0.8	--	--	--	--
Avg. height (ft)	7.9	21.6	24.9	--	23.7
Live	7.9	21.6	24.9	--	23.7
Dead	8.0	--	--	--	--
Avg. height to crown base (ft)	1.7	3.2	2.2	--	2.6
Live	1.6	3.2	2.2	--	2.6
Dead	2.0	--	--	--	--
Avg. height to live crown (ft)	2.0	9.1	6.6	--	7.6
Live crown mass (tons/ac)	0.01	0.72	3.64	--	4.36

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (29)	*Pteridium aquilinum* (6)	--
Second most common species (% cover)	*Arctostaphylos uva-ursi* (2)	*Comptonia peregrina* (1)	--
Coverage (percent)	31	7	19
Avg. height (ft)	0.5	0.4	0.3
Biomass (lbs/ac)	1,089	61	101

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.1	0.0	0.1	--	--	--
0.26 - 1.0	0.1	0.0	0.1	--	--	--
1.1 - 3.0	0.1	0.0	0.1	--	--	--
3.1 - 9.0	0.3	0.5	0.8	15	34	49
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	0.6	0.5	1.1	15	34	49

JP 15 JACK PINE

SITE INFORMATION

Site location: N 44° 36' 00.55" W 84° 25' 14.15"
Elev: 1,193 ft Aspect: -- Slope: <5%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) - *Quercus ellipsoidalis* / *Carex pensylvanica* Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (100)

Understory (% cover): *Vaccinium* spp. (1), *Comptonia peregrina* (1), *Amelanchier arborea* (1)

Standing dead trees: 6% of stems
Crown closure: 66%

Seedlings (% of stems): *Pinus banksiana* (40), *Quercus ellipsoidalis* (38), *Prunus serotina* (13), *Pinus resinosa* (8), *Abies balsamea* (1)
Density: 1,326/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.5	4.18	100
Cryptogams	1.9	3.05	66
Conifer litter	0.8	1.13	34
Duff	0.6	5.35	93
Total	2.0	9.53	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (100)
Second most common species (percent of stems)	--	--	--	--	--
Tree density (stems/ac)	218	67	252	34	353
Live	201	50	252	34	336
Dead	17	17	0	0	17
Avg. d.b.h. (in)	0.6	2.9	6.0	9.2	5.7
Live	0.6	2.7	6.0	9.2	5.9
Dead	0.2	3.4	--	--	3.4
Avg. height (ft)	7.2	19.8	35.3	44.5	33.2
Live	7.4	18.3	35.3	44.5	33.7
Dead	5.0	24.0	--	--	24.0
Avg. height to crown base (ft)	1.2	4.8	11.7	8.0	10.0
Live	1.3	6.0	11.7	8.0	10.5
Dead	1.0	1.0	--	--	1.0
Avg. height to live crown (ft)	1.9	7.3	20.5	27.0	19.2
Live crown mass (tons/ac)	0.03	0.13	3.78	1.19	5.10

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Vaccinium* spp. (1)	*Comptonia peregrina* (1)	--
Second most common species (% cover)	*Amelanchier arborea* (1)	--	--
Coverage (percent)	2	1	41
Avg. height (ft)	0.6	--	0.3
Biomass (lbs/ac)	87	(t)	199

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.6	0.0	0.6	--	--	--
0.26 - 1.0	0.6	0.0	0.6	--	--	--
1.1 - 3.0	0.7	0.0	0.7	--	--	--
3.1 - 9.0	0.8	0.7	1.5	44	44	88
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	2.7	0.7	3.4	44	44	88

JP 16 JACK PINE

SITE INFORMATION

Site location: N 47° 44' 45.05" W 93° 08' 17.33"
Elev: 1,409 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana* - (*Pinus resinosa*) / *Corylus cornuta* Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (44), *Betula papyrifera* (20), *Acer rubrum* (15), *Abies balsamea* (11), *Pinus resinosa* (5), *Picea mariana* (4), *Pinus strobus* (1)

Understory (% cover): *Corylus cornuta* (31), *Lycopodium* spp. (10), *Pteridium aquilinum* (4), *Lonicera* spp. (2), *Epigaea repens* (t), *Vaccinium* spp. (t), *Gaultheria procumbens* (t), *Cornus canadensis* (t)

Standing dead trees: 26% of stems
Crown closure: 66%

Seedlings (% of stems): *Abies balsamea* (85), *Acer rubrum* (11), *Pinus strobus* (3), *Prunus* spp. (1)
Density: 2,449/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.0	3.99	100
Cryptogams	0.7	0.31	17
Conifer litter	0.9	1.58	43
Hardwood litter	1.2	2.10	40
Duff	1.7	18.32	100
Total	2.7	22.31	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Acer rubrum* (40)	*Acer rubrum* (44)	*Betula papyrifera* (42)	*Pinus banksiana* (93)	*Pinus banksiana* (54)
Second most common species (percent of stems)	*Abies balsamea* (40)	*Betula papyrifera* (31)	*Pinus banksiana* (33)	*Pinus strobus* (3)	*Betula papyrifera* (22)
Tree density (stems/ac)	108	116	173	210	499
Live	94	87	108	159	354
Dead	14	29	65	51	145
Avg. d.b.h. (in)	0.7	3.1	6.5	11.8	7.9
Live	0.6	3.0	6.4	11.9	8.0
Dead	1.4	3.3	6.8	11.2	7.7
Avg. height (ft)	10.2	26.2	41.6	68.5	49.3
Live	10.6	32.4	49.0	77.8	57.9
Dead	7.5	7.5	29.2	39.4	28.5
Avg. height to crown base (ft)	4.2	12.9	22.0	42.3	28.8
Live	4.2	13.8	21.9	42.2	29.0
Dead	--	2.0	22.5	43.0	26.6
Avg. height to live crown (ft)	4.4	15.3	21.9	49.4	32.6
Live crown mass (tons/ac)	0.02	0.20	2.21	10.72	13.13

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Corylus cornuta* (31)	*Pteridium aquilinum* (4)	--
Second most common species (% cover)	*Lonicera* spp. (2)	--	--
Coverage (percent)	36	4	4
Avg. height (ft)	2.4	0.2	0.2
Biomass (lbs/ac)	1,268	84	26

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.4	0.0	0.4	--	--	--
0.26 - 1.0	0.7	0.0	0.7	--	--	--
1.1 - 3.0	0.9	0.0	0.9	--	--	--
3.1 - 9.0	5.2	3.9	9.1	175	170	345
9.1 - 20.0	1.6	1.6	3.2	20	24	44
> 20.0	0.0	0.0	0.0	0	0	0
Total	8.8	5.5	14.3	195	194	389

JP 17 JACK PINE

SITE INFORMATION

Site location: N 46° 05' 55.52" W 86° 23' 56.78"
Elev: 660 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Abies balsamea* / Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Pinus banksiana* (74), *Picea mariana* (16), *Pinus strobus* (5), *Abies balsamea* (5)

Understory (% cover): *Pteridium aquilinum* (34), *Gaultheria procumbens* (15), *Vaccinium* spp. (7), *Comptonia peregrina* (4), *Epigaea repens* (1), *Lycopodium* spp. (t)

Standing dead trees: 13% of stems
Crown closure: 68%

Seedlings (% of stems): *Pinus strobus* (67), *Picea mariana* (33)
Density: 43/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.8	3.04	99
Cryptogams	1.0	0.20	7
Conifer litter	0.8	2.84	92
Duff	1.5	15.69	97
Total	2.3	18.73	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Picea mariana* (63)	*Picea mariana* (50)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (93)
Second most common species (percent of stems)	*Abies balsamea* (25)	*Pinus strobus* (50)	--	--	*Picea mariana* (3)
Tree density (stems/ac)	58	14	109	94	217
Live	58	14	87	80	181
Dead	0	0	22	14	36
Avg. d.b.h. (in)	0.9	3.0	7.5	10.1	8.3
Live	0.9	3.0	8.2	10.2	8.6
Dead	--	--	4.8	9.6	6.7
Avg. height (ft)	8.4	21.5	56.7	64.4	57.7
Live	8.4	21.5	59.1	64.7	58.6
Dead	--	--	47.0	62.5	53.2
Avg. height to crown base (ft)	0.4	0.0	30.2	33.0	29.4
Live	0.4	0.0	29.3	32.7	28.5
Dead	--	--	33.7	34.5	34.0
Avg. height to live crown (ft)	0.4	1.0	35.4	33.4	31.8
Live crown mass (tons/ac)	0.04	0.07	2.39	3.52	5.98

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Gaultheria procumbens* (15)	*Pteridium aquilinum* (34)	--
Second most common species (% cover)	*Vaccinium* spp. (7)	*Comptonia peregrina* (4)	--
Coverage (percent)	22	37	10
Avg. height (ft)	0.5	0.3	0.3
Biomass (lbs/ac)	167	1,384	43

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.3	0.0	0.3	--	--	--
0.26 - 1.0	0.3	0.0	0.3	--	--	--
1.1 - 3.0	0.1	0.0	0.1	--	--	--
3.1 - 9.0	0.4	0.1	0.5	24	10	34
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	1.1	0.1	1.2	39	10	49

JP 18 JACK PINE

SITE INFORMATION

Site location: N 47° 44' 07.71" W 93° 05' 36.31"
Elev: 1,449 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Abies balsamea* / Forest

SAF cover type: Jack pine - feather moss

STAND INFORMATION

Trees (% of stems): *Abies balsamea* (85), *Pinus banksiana* (14), *Acer rubrum* (t), *Prunus* spp. (t)

Understory (% cover): *Pteridium aquilinum* (6), *Corylus cornuta* (1), *Gaultheria procumbens* (t), *Amelanchier arborea* (t), *Goodyera* spp. (t), *Vaccinium* spp. (t), *Linnaea borealis* (t), *Fragaria virginiana* (t)

Standing dead trees: 2% of stems
Crown closure: 68%

Seedlings (% of stems): *Abies balsamea* (90), *Acer rubrum* (5), *Pinus strobus* (3), *Prunus* spp. (1), *Picea glauca* (1)
Density: 3,103/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	1.4	3.86	99
Cryptogams	1.7	2.24	54
Conifer litter	0.9	1.62	45
Duff	0.8	6.58	72
Total	1.9	10.44	99

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Abies balsamea* (99)	*Abies balsamea* (75)	*Pinus banksiana* (100)	*Pinus banksiana* (100)	*Pinus banksiana* (92)
Second most common species (percent of stems)	*Acer rubrum* (t)	*Pinus banksiana* (25)	--	--	*Abies balsamea* (8)
Tree density (stems/ac)	3,590	67	570	17	654
Live	3,573	50	503	17	570
Dead	17	17	67	0	84
Avg. d.b.h. (in)	0.8	2.7	6.9	10.1	6.6
Live	0.9	2.3	7.1	10.1	6.8
Dead	0.1	3.7	5.5	--	5.1
Avg. height (ft)	9.4	20.3	60.7	69.0	56.8
Live	9.5	21.0	64.5	69.0	60.8
Dead	5.0	18.0	32.5	--	29.6
Avg. height to crown base (ft)	0.8	0.7	34.5	33.0	31.5
Live	0.8	0.7	34.8	33.0	31.7
Dead	1.0	--	25.0	--	25.0
Avg. height to live crown (ft)	2.6	4.3	45.2	43.0	41.5
Live crown mass (tons/ac)	2.45	0.17	10.49	0.72	11.38

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	*Corylus cornuta* (1)	*Pteridium aquilinum* (6)	--
Second most common species (% cover)	*Gaultheria procumbens* (t)	*Linnaea borealis* (t)	--
Coverage (percent)	1	6	1
Avg. height (ft)	6.0	0.6	0.3
Biomass (lbs/ac)	426	42	4

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.5	0.0	0.5	--	--	--
0.26 - 1.0	0.4	0.0	0.4	--	--	--
1.1 - 3.0	1.1	0.0	1.1	--	--	--
3.1 - 9.0	2.2	2.2	4.4	166	243	409
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	4.2	2.2	6.4	166	243	409

JP 19 JACK PINE

SITE INFORMATION

Site location: N 46° 16' 31.69" W 85° 00' 29.78"
Elev: 889 ft Aspect: -- Slope: 0%

Plant association: *Pinus banksiana - Abies balsamea* / Forest

SAF cover type: Jack pine - balsam fir - black spruce

STAND INFORMATION

Trees (% of stems): *Acer rubrum* (56), *Abies balsamea* (30), *Pinus banksiana* (11), *Betula papyrifera* (2), *Viburnum* spp. (1)

Understory (% cover): *Athyrium filix-femina* (1), *Pteridium aquilinum* (t)

Standing dead trees: 15% of stems
Crown closure: 91%

Seedlings (% of stems): *Abies balsamea* (95), *Acer rubrum* (5)
Density: 1,023/ac

FOREST FLOOR INFORMATION

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	0.6	2.47	100
Cryptogams	0.4	0.04	4
Conifer litter	0.6	1.26	51
Hardwood litter	0.6	1.16	45
Duff	1.6	16.88	100
Total	2.2	19.35	100

Saplings and Trees

	Size class (diameter at breast height)				
	Saplings (≤ 2")	2 - 4"	4 - 9"	> 9"	> 2"
Most common species (percent of stems)	*Acer rubrum* (74)	*Abies balsamea* (55)	*Pinus banksiana* (50)	*Pinus banksiana* (100)	*Abies balsamea* (43)
Second most common species (percent of stems)	*Abies balsamea* (25)	*Acer rubrum* (33)	*Abies balsamea* (44)	--	*Pinus banksiana* (33)
Tree density (stems/ac)	2,164	554	302	168	1,024
Live	1,761	537	235	168	940
Dead	403	17	67	0	84
Avg. d.b.h. (in)	0.9	2.8	5.8	10.1	4.9
Live	1.0	2.8	5.9	10.1	4.9
Dead	0.5	2.1	5.5	--	4.8
Avg. height (ft)	15.9	27.9	39.3	67.3	37.7
Live	17.4	28.6	43.9	67.3	39.3
Dead	9.3	6.0	23.0	--	19.6
Avg. height to crown base (ft)	6.3	6.5	14.6	28.5	12.5
Live	6.5	6.5	13.6	28.5	12.2
Dead	3.7	--	29.0	--	29.0
Avg. height to live crown (ft)	7.7	10.3	19.9	37.2	17.5
Live crown mass (tons/ac)	0.90	1.96	3.68	7.25	12.89

Understory Vegetation

	Lifeform		
	Shrub	Forb	Graminoid
Most common species (% cover)	--	*Athyrium filix-femina* (1)	--
Second most common species (% cover)	--	*Pteridium aquilinum* (t)	--
Coverage (percent)	0	1	0
Avg. height (ft)	--	<0.1	--
Biomass (lbs/ac)	0	24	0

Woody Material

	Loading (tons/ac)			Density (pieces/ac)		
Diameter (in)	Sound	Rotten	Total	Sound	Rotten	Total
≤ 0.25	0.4	0.0	0.4	--	--	--
0.26 - 1.0	0.4	0.0	0.4	--	--	--
1.1 - 3.0	0.4	0.0	0.4	--	--	--
3.1 - 9.0	1.2	1.0	2.2	54	73	127
9.1 - 20.0	0.0	0.0	0.0	0	0	0
> 20.0	0.0	0.0	0.0	0	0	0
Total	2.4	1.0	3.4	54	73	127

Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S. 2002. Stereo photo series for quantifying natural fuels. Volume Va: Jack pine in the Lake States. PMS 837. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 49 p.

A series of single and stereo photographs display a range of natural conditions and fuel loadings in jack pine ecosystems in the Lake States. Each group of photos includes inventory information summarizing vegetation composition, structure, and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuels photo series is designed to help land managers appraise fuel and vegetation conditions in natural settings.

Keywords: Woody material, biomass, fuel loading, natural fuels, jack pine, *Pinus banksiana*.