Aspen regen.
under burned
aspen overstory

Pingree Park
@ ½ m. due n of
Mess Hall

late Aug '95
(Fire was 3 July '94)

Ichneumon Wasp
(Rhyssa lineolata)

Parasitoid of
horntail wood wasps
acting as wood borers
in fire-killed spruce
& lodgepole pine
Pingree Park
late August '95
D. Leathermon

Pingree Park 2001 Management Team

The 2001 Pingree Park staff is dedicated to providing courteous and efficient service to all campus visitors. Seasonal staff are selected annually and most are Colorado State University students. The management team includes:

Bill Bertschy – Director. Ph.D. in College Student Personnel Administration from the University of Northern Colorado; M.Ed. and B.S. from Colorado State. He currently serves on the Fort Collins City Council, the Poudre Fire Authority, and the Larimer Land Trust Board. Bill has avid interests in local history, world travel, photography, and hiking.

Patrick Rastall – Associate Director. Ph.D. in Education/ Human Resources from Colorado State University. Pat and Jan have two duaghters, Ellie, 12, and Addie, 9. The Rastalls enjoy mountain climbing, trail running, and other outdoor pursuits. Pat led his fifth successful expedition to Aconcagua (22,834 ft.) this past January. Jan works for Experience Plus Bicycle and Walking Tours.

Deborah Cowan – Elderhostel and Conference Coordinator. B.F.A. in Commercial Art from the University of Denver. Deborah owned a graphic design business in Durango, Colorado for 10 years. She coordinated Elderhostel and other educational conferences for 5 years and joined the Pingree Park staff in 1996. She and her husband, Tony, live in Fort Collins. Avocation: dancing.

Pat Daly – Food Service Coordinator. Pat has spent many seasons at Pingree Park, and this is his second as coordinator. Pat enjoys hiking, golf, and fishing. He majored in philosophy at Colorado State. Pat and the entire food service staff hope you enjoy their food and hospitality.

2001 Pingree Park Conference Schedule

May
CSU – Food Services Retreat
College of Applied Sciences
Bill Reed Middle School
CSU – Faculty Staff Weekend
Elderhostel Chamber Music, Gilbert & Sullivan
Mosquito Snow Pool

June
CSU Preview Orientation
Elderhostel Orchestra, Chorus
NATO Research Workshop
CSU – NR 220-Field Session I
Freshman Seminar
Planetary Protection
Elderhostel Intergenerational Rocky Mountain Adventure
FFA Colt Camp & Maps
NEH I Summer Institute

July
Elderhostel Adventure Program
CSU – F230
High Country Botany
Stormy Peaks Girls Adventure Camp
Elderhostel Handbells in the Rockies
NEH II & III
ITESM
Youth in Natural Resources
UNC Cosmos
CSU – Apartment Life Staff Retreat, SAHE, Senior Staff
Elderhostel Astronomy in the Rockies
Elderhostel Birds of the Forest & Mountains
CSU – NR 220-Field Session II
New Belgium Brewery
Elderhostel Llama Trekking
CIRA
Rocky Mountain Collegian
North Lake College

August
Kathy's Quilters
Women's Conference
Camp Isaiah
NSF
CSU Resident Assistance Training
CSU – ASAP / A/PASS / ASCSU
CSU Bio-Chemistry
Front Range Forum
Timber Framing Guild
Probation Department
DU Residence Life
CSU International Forestry

September
Timber Framing Workshops
Elderhostel Watercolor and Photography
Eco-Week Environmental Science Program
CSU College of Business
Elderhostel Oil Painting
Lazy D Ranch
NR Forestry Reunion
SOGLB

October
Neenan Company Retreat
NASPA
CSU Rocky Mountain Leadership
Eco-Week Environmental Science Program

Visit the Pingree Park Store

If you've got a hankerin' for a snack or souvenir, discover the **Pingree Park Store,** right behind the Recreation Hall.

T-shirts, postcards, posters, candy, popcorn, and last-minute items are available.

Open most evenings, 7:15 to 10:30 p.m. and some evenings, 7:15 to 9:00 p.m.

Visitor's Guide

Pingree Park Campus – 2001

Welcome to Pingree Park

On behalf of Colorado State University and the entire Pingree Park staff, we hope your stay at our remote mountain campus will be educational, productive, and enjoyable. We encourage you to experience the relaxing spirit of the campus during your stay. If at any time we can assist you, please feel free to ask any of the campus staff.

One way to help us make your stay a good one is for you to be aware of the campus regulations. These are described in this *Visitor's Guide* and are the result of many years of experience. Please help us keep Pingree Park beautiful.

Your comments and suggestions are welcome in our efforts to improve the campus facilities.

Please Follow All Fire Safety Regulations

An ever-present hazard in the forests surrounding Pingree Park is a high fire danger. The intense solar radiation at this altitude produces high ground temperatures, which causes rapid evaporation and near-zero humidity. The obvious consequence is very dry soil and vegetative ground cover.

While summer rain showers help lower the fire danger, the results are only temporary. Lightning is a further concern in July and August. Guests should observe the following campus regulations:

1. Smoking materials should be extinguished completely in ash trays or garbage cans, **not on the ground.**
2. Campfires will be permitted only at the designated campfire area, north of the Conference Center parking lot. Permission must be obtained from the Main Office several days ahead of the planned campfire.

In the event of a campus fire, a siren will sound continuously. All persons should report to the Dining Hall for fire duty. Campus fire hoses and extinguishers should not be used for any other purpose. Cars should be parked in parking lots and should not block emergency drives. If any fires are discovered or if a smoke detector is sounding, the campus management/ Main Office should be notified immediately. **Be sure to know the locations of building exits and fire escapes.**

Help Us Preserve and Protect the Pingree Park Environment

The Pingree Park staff is committed to a use philosophy compatible with the area's fragile environment. Visitors are reminded of the ecological differences the 9,000-foot (2,750 m) elevation causes in plant and animal life. The subalpine lifezone is best compared to the type of terrain found in Canada; consequently, our growing season is very short, running from early June to mid-August.

In addition, a number of rare plant species are located in the campus area. These and all wildflowers, animals, minerals, etc., are protected. Therefore, we remind visitors that **no collection of specimens of any kind, living or dead, is allowed.**

Guests are also asked to put all litter in trash receptacles. Remind others not to litter, and help us keep the area clean by picking up after the carelessness of others. Please deposit all aluminum and glass at one of the recycling receptacles on the campus.

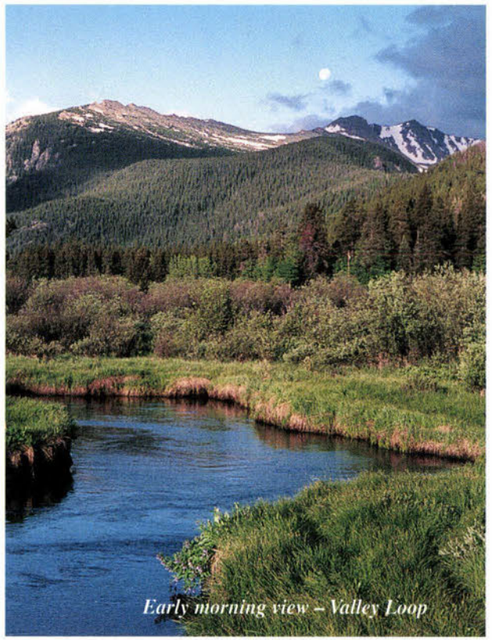
Please use the roads and paths while walking about the valley.

The following brochures are available in the Pingree Park Office:
Mountain Safety Guide, Minimum Human Impact, Hourglass Fire 1994, new Trail Map and Hiking Guide, Ropes Course, and Pingree Park Nature Trail.

Printed on Recycled Paper

Colorado State University
Knowledge to Go Places

Hiking at Pingree Park



Early morning view – Valley Loop

Cirque Meadows

Mountain hiking opportunities at Pingree Park abound. Trails leading into the Comanche Peak Wilderness and the Northern Region of Rocky Mountain National Park are readily accessible by foot. Examples of short hikes are the Boardwalk, Valley Loop, or Denny's Point. Longer day hikes could take you to Mummy Pass or Lake Emmaline. The *Trail Map and Hiking Guide* is available in the Main Office. Remember to be kind to the land and animals. Be safe by always knowing and respecting your limits.

Hourglass Fire Quick Facts:

Date:
July 1, 1994

Cause:
Lightning

Size:
1,275 Acres

Suppression Costs:
$1.5 Million

People Evacuated:
170

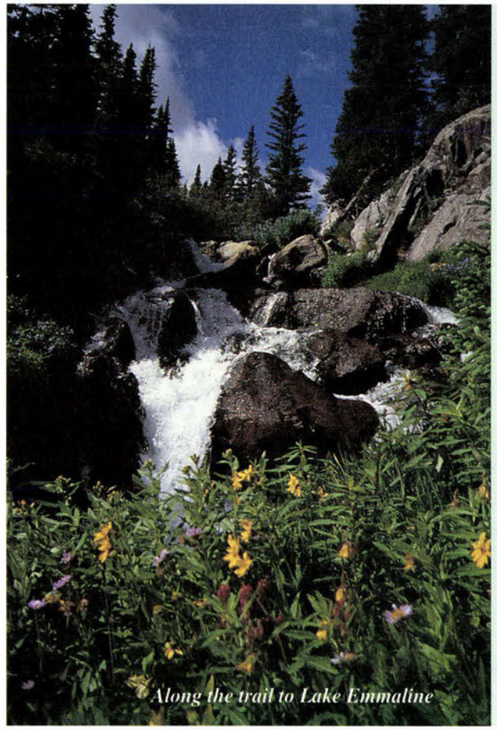
Buildings Destroyed:
13

Damaged Buildings:
2

Cost of Damage:
$2.3 Million

Number of Firefighters:
600

Date Fire Contained:
July 5, 1994



Along the trail to Lake Emmaline

Ten Essentials for All Hikers

- *Extra food and water*
- *Map of the area and compass*
- *First-aid kit*
- *Rain protection*
- *Sunglasses*
- *Fire starter*
- *Flashlight*
- *Whistle*
- *Pocket knife*
- *Layered clothing*

Minimum Impact Hiking Techniques

- *Plan ahead and be prepared*
- *Pack it in – pack it out*
- *Don't cut switchbacks*
- *Properly dispose of human waste*
- *Minimize use and impact of fires*
- *Move off the trail when taking breaks*

(Minimum Human Impact Brochure available at the Main Office)

Pingree Park is Summer Home for Natural Resources Students

Since the summer of 1916, Pingree Park has been a field-session site for Colorado State Natural Resources students. In the early years, students slept and ate in what is now the "old" classroom next to the Dining Hall. Summer sessions lasted 10 weeks. Students studied at night using candles or lights powered by the camp's electric generator.

Today the program is four weeks long and very demanding. It allows students many hands-on outdoor opportunities. Most majors in the College of Natural Resources take part in the program. One of the program's objectives is for students to learn about other viewpoints. Wildlife students are challenged to critically analyze natural-resource issues in recreation, range management, or forestry-like professions.

Days begin early and often involve taking field notes even during afternoon rain storms. Yet, students look back on the experience as one of the most meaningful in their university careers. Living at Pingree Park allows students to get to know the faculty in a way not possible on the main campus. Colorado State is one of the few universities in the nation to offer a field program in a setting like Pingree Park.

Second NR-220 session in August, 2000.

There will be two NR-220 sessions this summer. The first session runs from June 11 - July 6 and the second session from July 16 - August 10. F-230 will be offered July 7 to July 14.

Dr. Wayne Leininger is the director of the summer natural resource management sessions. Dr. Roger Hoffer directs the F-230 class.

Other faculty participating include: Rocky Coleman, Lisa Dale, Shanna Gillette, Bob Shaw, Freeman Smith, John Stednick, John Titre, and Ken Wilson.

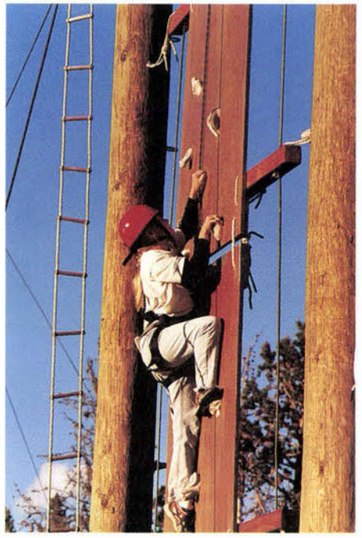
Pingree Park Smoking and Alcohol Policies

In order to comply with state law, conference guests, students, and visitors are **prohibited from smoking in all state buildings.** Smoking is permitted outdoors. Please put all smoking materials in a waste container.

Guests residing at Pingree Park are expected to comply with all state laws regarding the sale and consumption of alcoholic beverages. **The legal drinking age for all forms of alcoholic beverages is 21 years of age.**

Alcohol may be consumed in the residents' and guests' rooms or cabins or in designated areas at sanctioned events. For conference groups, alcohol may be consumed in the Conference Center Lodge or in the housing units. Students may consume alcohol in the student cabins. In accordance with state laws, **no open containers may be carried between buildings.** Above all, respect and consideration for others is paramount. Thank you for your cooperation.

Challenge Ropes Course Builds Teamwork and Self-Confidence



Sarah Cooper ascends climbing wall.

"Nothing Ventured, Nothing Gained"

According to Ropes Course Coordinator Patrick Rastall, stepping outside your "comfort zone" within a supportive environment is one of the benefits of the ropes-course experience. "Everyone who goes through our ropes course sets their own goals. We believe in the challenge-by-choice concept."

Although the high elements are the most anxiety producing, teambuilding and group dynamics are the core of the program. Initiative problems are presented to the group. These emphasize the need for cooperation, trust, and communication. Success is determined by both the completion of the task and the process the group went through to get there.

Pay Phones Offer Convenience

Three pay phones have made calling from Pingree Park easier. One phone is located on the north side of Hotchkiss Lodge. The other two are on the Recreation Hall/Store porch. All are in service 24 hours a day.

LONG DISTANCE CALLING CARDS *can be purchased at the Main Office during the day and the store during the evening.*

The Pingree of Pingree Park

by Bill Bertschy

Where did Pingree Park get its name? Was there more than one scout and tie hack named Pingree? These are questions shared by visitors to Pingree Park and other local history researchers alike. Over the years several articles have appeared in magazines and books describing the life of George W. Pingree, the person now generally accepted as the founder of Pingree Park.

Considerable research has been conducted by Dr. Evadene Swanson, author of *Fort Collins Yesterdays,* who has granted permission for the use of her material in this article on George Pingree. According to Army pension records, George W. Pingree was born in Orono, Maine, on November 16, 1832. Details of Pingree's life prior to coming to Colorado are sketchy, but he evidently went to sea for a few years before he gave it up due to the confinements of ship life. He also cut railroad ties for a time in Missouri in 1856 (*Denver Post* interview dated March 4, 1911).

Pingree followed the gold rush west after trapping for a couple of years in Minnesota and became a miner in Central City, Colorado. In August 1861, Pingree enlisted at Central City as a private in Company H, First Regiment of the Colorado Cavalry Volunteers. Pingree was discharged in 1864 but re-enlisted immediately in the same Cavalry Volunteer Regiment.

Pingree was assigned to Fort Lyons, Colorado, near Denver. During his army career, he was wounded with an arrow in the right side of his face. Years later he showed the scar to interviewers from the *Denver Post*.

Pingree followed his fortune into northern Colorado and in the late 1860s settled in the Rustic region of the Cache la Poudre River. It is at this point in history that the possibility of a second person named Pingree occurs. It seems that in an interview by R.E. Ford in *The Colorado Forester,* Charles E. Pennock recalled a man named John W. Pingree having a tie camp on the Little South Poudre River. As Pennock was in his 80s, it is possible that the person was in fact George Pingree. Both Larimer County historian Ansel Watrous and Norman Walter Fry in *Cache la Poudre, The River* place one George W. Pingree in the Cache la Poudre Valley. Watrous recalls that Pingree, in the late 1860s, built a cabin near present day Rustic and cut a trail north three miles up what today is still called "Pingree Hill."

George Pingree (back row, third from left) and family, Thanksgiving Day, 1901.

In the fall of 1867, the Union Pacific Railroad reached Cheyenne, Wyoming. The general contractors, named Coe and Carter, had up to this point used eastern hardwood ties in construction. As the distance from the source of supply became greater, it became economically advantageous to search for local ties when construction resumed in the spring of 1868. Word probably spread fast of the need for ties, and loggers, including George Pingree and Charles Pennock, contracted with the railroad.

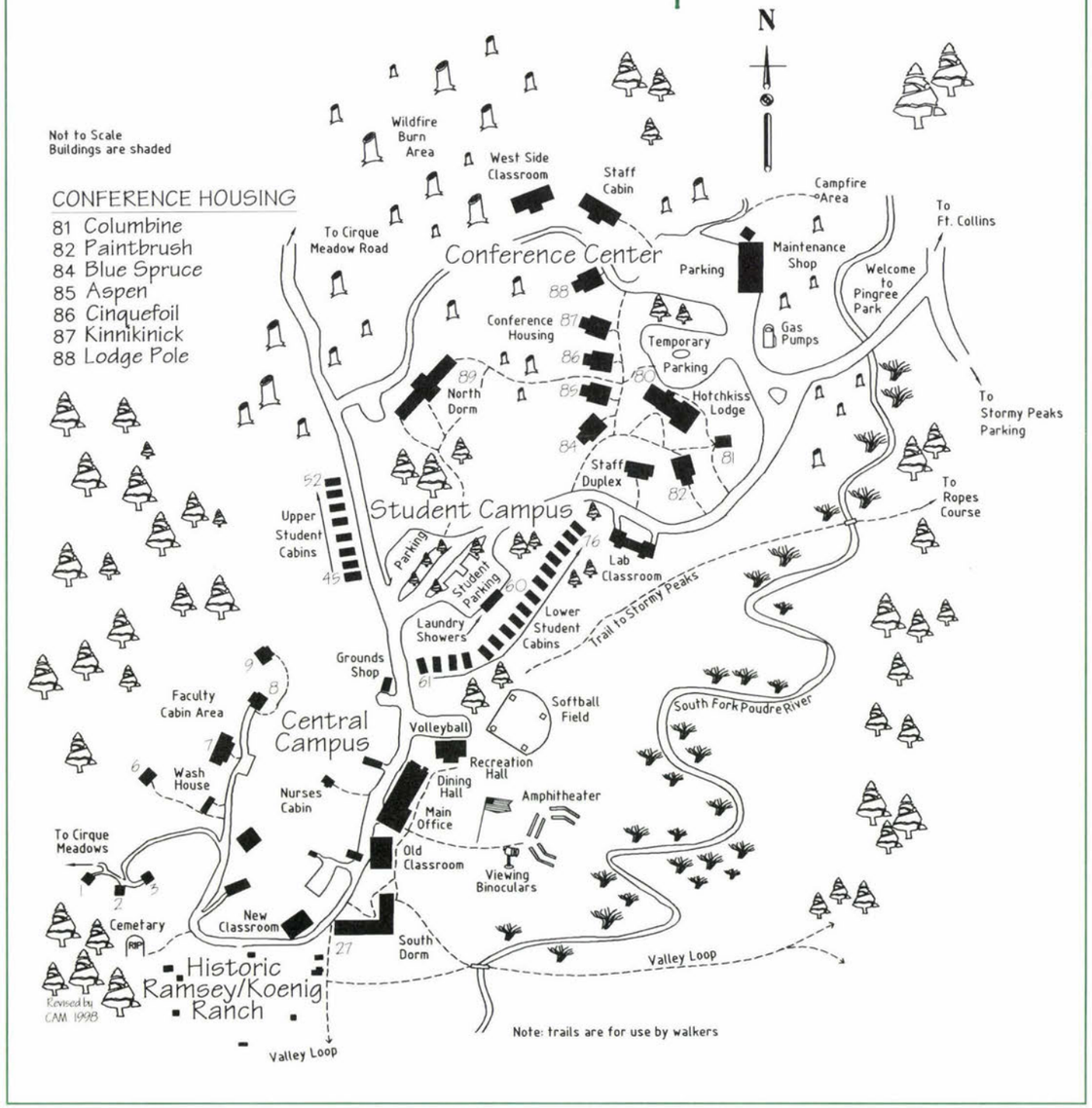
According to R.E. Ford, Pingree established his first tie camp in the Pingree area early in 1868. Thirty to forty tie hacks worked that summer and winter cutting and piling ties along the banks of the Little South Poudre River. In the spring of 1869, during the runoff flooding, the ties were floated down river to a point near LaPorte, Colorado, where they were hauled by oxen-pulled wagons to Tie Siding, Wyoming. The name "Tie Siding" is indicative of the town's role in the construction of the railroad. It is said that teamsters charged 50 cents per tie for the round trip from LaPorte, which took seven to ten days.

The tie camp at Pingree Park, a name given to the valley the first winter, was occupied during three seasons. Naturally, all provisions were packed by man and mule over hard trails from the colony of LaPorte. The tie hacks were paid 10 cents per tie, and an average day's work was from 30 to 40 ties. It was rumored that Pingree himself could whip any man who worked for him, from fighting to working, and once cut a hundred ties in a day.

By fall of 1870, the local demand for railroad ties had been filled, and the tie camps closed. Once again Pingree sought his fortune elsewhere, but records are vague as to his roamings. It is known that in 1875 he married one Susan Morley, who died in Boulder, Colorado, in 1882. In 1892, Pingree married Elizabeth Stewart Adams in Laramie City, where he lived for 20 years, according to pension records. Elizabeth died before or during 1915. During that year, Pingree moved to Platteville, Colorado, and stated that it was the best spot on earth according to a later *Denver Post* interview. He literally pitched his tent, living in it for 16 years as recorded in Geff's *History of Weld County*.

He passed away August 30, 1921, at the age of 89 and is buried in the Platteville cemetery. No one can deny that George Pingree led an exciting life during the late 1800s.

Pingree Park Mountain Campus Area Map



Life at the Koenig Homestead

Historic Koenig Ranch

Just past South Dorm, through the gate, is the historic Koenig-Ramsey Homestead. Frank and Hazel Koenig built the present structures in the mid-1920s and made a life in the sometimes hostile valley. Crops were meager; cattle grazed where they could. The family survived fires, long winters, and the death of two children (buried in the cemetery on the hill). By the late '40s, the Koenigs were renting cabins to summer tourists and fishermen, which they continued to do until 1974 when the property was sold to Colorado State University. The family still owns a cabin and property on the east side of the valley.

A restoration project funded by a grant from the Colorado Historical Society will be completed this summer. The Koenig Homestead is being transformed into a museum.

Diverse Wildlife Call Pingree Park Home

The wildlife of Pingree Park is characteristic of high mountain meadows in the Lodgepole Canadian lifezone. There are 100 species of birds and 45 species of mammals in the Pingree Park area. With an observant eye and a certain amount of stealth, the visitor might see any of the following:

BIRDLIFE – Mallard, Goshawk, Redtailed Hawk, Blue Grouse, Common Snipe, Great Horned Owl, Broad-tailed Hummingbird, Common Flicker, Yellow-bellied Sapsucker, Gray Jay, Steller's Jay, Raven, Clark's Nutcracker, Mountain Chickadee, American Robin, Hermit Thrush, Mountain Bluebird, Townsend's Solitaire, Ruby-crowned Kinglet, Yellow-rumped and Wilson's Warblers, Pine Grosbeak, Dark-eyed Junco, and White-crowned Sparrow.

MAMMALS – Vagrant Shrew, Black Bear, Longtail Weasel, Coyote, Richardson Ground Squirrel, Golden-mantled Ground Squirrel, Colorado Chipmunk, Elk, Pine Squirrel, Northern Pocket Gopher, Beaver, Deer Mouse, Vole – 2 varieties, Porcupine, Snowshoe Hare, Mule Deer, Pine Marten, and Moose.

AMPHIBIANS – Mountain Toad and Boreal Chorus Frog.

REPTILES – Western Garter Snake.

FISH – Brook Trout, Greenback Trout, Cutthroat Trout (rare), and Brown Trout.

Pingree Park Weather Trends

Weather data has been collected at Pingree Park for many years. On-site measurements indicate a mean annual temperature of 35°F. Temperature extremes have ranged from a low of -45°F to a high of 83°F. Average minimum, mean, and maximum temperatures for the summer/visitor months are given in the following table.

Mean annual precipitation is about 21 inches (54 cm) with approximately 60 percent of the annual precipitation occurring from October through May, primarily in the form of snow. This amounts to an average annual snowfall of about 200 inches (500 cm), but annual snowfall can easily vary from one-half to twice that amount. Summer precipitation from June to September is usually in the form of thunderstorms of short duration, high intensity, and small-area coverage. Most thunderstorms occur in the afternoon due to solar heating beginning at sunrise.

Average Month	Average Minimum °F (°C)	Mean °F (°C)	Average Maximum °F (°C)
May	26 (-3)	41 (5)	55 (13)
June	36 (2)	49 (9)	63 (17)
July	38 (3)	56 (13)	72 (22)
August	39 (4)	53 (11)	70 (21)
September	30 (-1)	45 (7)	60 (16)
October	28 (-2)	34 (1)	47 (8)

Moose on the Loose!

In recent years, bulls, cows, and calves have taken up residence in the Pingree Park, Comanche Reservoir area. These moose are majestic to view but be aware of the danger. Keep a safe distance away and try not to startle them. Remember that the park is their home too.

Elderhostel: Adventures in Lifelong Learning

by Deborah Cowan, Elderhostel Coordinator

Friendship, learning and fun are synonymous with the Elderhostel name. For a week, participants reside in the spectacular mountain setting of Pingree Park, attend exciting courses and meet people from across the country. Elderhostelers join the staff and other conferences for an adventure in living close to nature, surrounded by the breath-taking beauty of the Rocky Mountains. All components add up to an exciting educational experience.

We have grown! In 1983, approximately 30 spirited adult learners attended the first Elderhostel program at Pingree Park. It is a tribute to our success that we mark 2001 as the 19th year of Elderhostel, offering 15 courses on the Pingree Campus and 35 courses at other locations. The staff feels that providing educational opportunities for adults 55 years and older is a fulfilling endeavor and an important component of Pingree Park. This year we will welcome hundreds of enthusiastic Elderhostel participants to our campus in the mountains. Please feel welcome to give our office a call at (970) 491-7377 for more specific information about our programs.

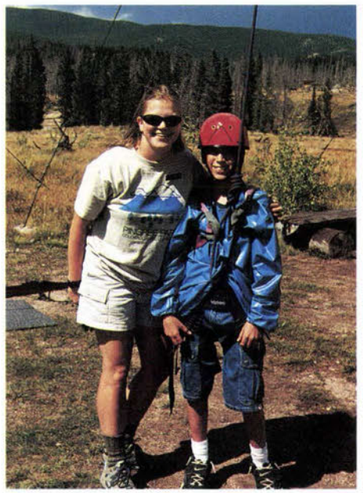
Adventure Elderhostelers on summit of Stormy Peaks (12,148 ft., 3,702 m).

"Eco-Week" Combines Environmental Awareness and Personal Growth

"Eco-Week" is a unique opportunity for elementary school students to experience nature in a remote mountain setting. This year Bauder, Eyestone, Harris Bilingual, Irish, Johnson, Kruse, Liberty Common, Lopez, Moore, Putnam, Riffenburg, St. Joseph, and Werner schools in Fort Collins, have chosen to come to Pingree Park.

During their three-day/two-night stay, 6th grade students study tree identification, fire ecology, map and compass use, geology, lifezones, ecosystem interaction, and some schools do the Challenge Ropes course. A hike to the alpine is a highlight on day two.

For many, this is the first time away from home in a peer group. Campfires, square dances, skits, and songs are enjoyed by all. Teachers are seen in a new role. One student wrote in her diary, "We went to Denny's Point, and it was so beautiful." Another said, "I had the most fun I ever had. I will never forget these three days. It was sad when we left, but I can always dream about all the fun I had." Finally, one student wrote, "I really liked hiking up Mummy Pass Trail. I also liked seeing the deer. I didn't think I was going to make it at first, my legs were aching, but when I got up there I knew that I had made it. It was beautiful and worth it."



Eco-Week instructor Leslie Shaner (left) and student, at the Ropes course.

Mountain Safety Tips

- *Get an early "alpine" start to avoid afternoon lightning*
- *Let someone in the Main Office know your intentions*
- *Don't hike alone*
- *Stay on trails whenever possible*
- *Stay hydrated; drink lots of fluids*
- *Take precautions against blisters, hypothermia, giardia*
- *Be conservative; use good judgment.*

(Mountain Safety Brochure available at the Main Office)

Respect Private Property – Please Do Not:

- *Cross fences*
- *Fish on private ponds*
- *Disturb historic property*
- *Hike through private property*

(If in doubt, ask in the Main Office)

Pingree Park Nurse and Medical Clinic

- Nurse's Clinic next to Main Office in the Dining Hall
- Regular hours during meal times
- On call 24 hours/day
- After hours call 316 on the intercom phone

Pingree Park Staff 1994

The 1994 Pingree Park staff is dedicated to providing courteous and efficient service to all campus visitors. Seasonal staff are selected annually and most are Colorado State University students. The management team includes:

Bill Bertschy - Director. Ph.D. in College Student Personnel Administration from the University of Northern Colorado; M.Ed. and B.S. from Colorado State. Bill enjoys mountain biking, fishing, and hiking. An avid world traveler, Bill spent this past January in Tanzania and Mali.

Pat Rastall - Associate Director. Ph.D. in progress at Colorado State University. Pat enjoys running, rock climbing, and playing with his daughters (Ellen and Addie). He led a Colorado State climbing expedition to Mt. McKinley in May.

Jan Rastall - Elderhostel Coordinator. M.Ed. in Adult Education from Colorado State University. Born in Missouri, Jan has lived most of her life in Colorado. She is a past Outward Bound instructor, marathoner, and world traveler. Currently, Jan enjoys parenting, quilting, running, hiking, and reading.

Alissa Reardon - Conference Coordinator. M.F.A. in Poetry and B.S. in Human Development from Colorado State. Alissa is a native of Colorado who enjoys writing, skiing, papermaking, and camping. She is working on publishing her first book of poetry and plans to teach Creative Writing at the university level in the future.

Wayne Hall - Food Service Coordinator. B.S. in Finance from Mankato State University. Wayne likes hiking, mountain biking, and is pursuing his master's degree. He and the entire food-service staff hope you enjoy their food and hospitality.

1994 PINGREE PARK CONFERENCE SCHEDULE

May 14-15	New Belgium Brewing Company
May 15-20	Wilderness First Responder
May 16-20	Grant Writing Workshop
May 17-18	Fishery and Wildlife Biology
May 22-28	Elderhostel (Poudre River, Land Management, Literature)
May 28-30	Colorado State Faculty/Staff Weekend
May 30-June 3	MB562 Field Ecology of Disease Vectors
June 2-10	Elderhostel (Chamber Music and Madrigal Music)
June 2-10	Elderhostel (Orchestra and Chorus)
June 12-13	Bridge Talent Search
June 13-July 8	NR-220 Natural Resources #1
June 17-19	Wilderness Box Training
June 22-24	CIRA
June 23-25	Applewood-Ward Youth Conference
June 26-July 2	Elderhostel (Intergenerational)
June 27-28	Upward Bound Day Trips
July 3-9	Elderhostel (Wildlife, Geology, Plants)
July 3-9	Elderhostel (Hiking, Orienteering, Natural History)
July 8-10	High Country Botany
July 9-13	Prentice Hall Printing
July 10-15	Project Adventure
July 11-Aug 5	NR-220 Natural Resources #2
July 12-14	Youth in Natural Resources
July 15-16	Greeley Stake - LDS
July 15-17	Missouri Western College
July 17	International Wildland Program
July 17-23	Elderhostel (History, Bird Ecology, Native Plants)
July 17-23	Elderhostel (Poudre River)
July 19-21	Youth in Natural Resources
July 22-24	High Country Botany
July 24-30	North Lake College
July 30-31	Colorado State Apartment Life Retreat
July 30-Aug 3	American Occupational Therapy Foundation
July 30-Aug 8	East Central Missouri College
July 30-Aug 7	Elderhostel (Centennial)
Aug 1-4	Ute Shoshone Group
Aug 3-5	Colorado State University Residence Life (Senior Staff/SAHE)
Aug 5-6	Larimer County Partners
Aug 6-11	Amorphous Insulators
Aug 7-13	Elderhostel (Mysteries)
Aug 8-Sept 30	Fall Forest Management Session
Aug 10-12	Northwest Community College
Aug 12-14	Colorado State University Student Assistants
Aug 15-17	CIRA
Aug 18	Leadership Fort Collins
Aug 18-19	Colorado State University Biochemistry Department
Aug 18-21	ASCSU/Programs Board Retreat
Aug 19-20	Larimer County Partners
Aug 21-26	Field Techniques
Aug 21-26	Elderhostel (Oil Painting)
Aug 21-Sept 6	Log Building Class
Aug 26-27	Colorado State University Honors Seminar
Aug 28-Sept 3	Elderhostel (Beginning Watercolor)
Aug 28-Sept 3	Elderhostel (Geology, Economics, National Parks)
Aug 27-29	DU Residence Life
Aug 28-Sept	Elderhostel (Beginning Photography)
Sept 2-3	Colorado State University Honors Seminar
Sept 4-10	Elderhostel (Advanced Watercolor)
Sept 4-10	Elderhostel (Photography)
Sept 4-10	Elderhostel (Handbells)
Sept 9-11	Wildlife Weekend
Sept 10-11	President's Leadership Program Retreat
Sept 10-11	Denver Partners
Sept 14-Oct 21	ECO Weeks
Sept 16-18	Colorado State University Microbiology Retreat
Sept 16-18	Colorado State University Career Forestry Students
Sept 18-23	Trails Construction
Sept 23-25	Residence Hall Association (RHA)
Sept 24-25	Campus Activities - FCGLBA
Sept 26-30	Bridge Construction
Sept 30-Oct 2	Guild of Rocky Mountain Population Biologists
Oct 7-9	Rocky Mountain Leadership
Oct 11-17	Nature Conservancy

VISITOR'S GUIDE

PINGREE PARK CAMPUS – 1994

Help Us Preserve and Protect the Pingree Park Environment

The Pingree Park staff is committed to a use philosophy compatible with the area's fragile environment. Visitors are reminded of the ecological differences the 9,000-foot (2,750 m) elevation causes in plant and animal life. The subalpine lifezone is best compared to the type of terrain found in Canada; consequently, our growing season is very short, running from early June to mid-August.

In addition, a number of rare plant species are located in the campus area. These and all wildflowers, animals, minerals, etc., are protected. Therefore, we remind visitors that **no collection of specimens of any kind, living or dead, is allowed.**

Guests are also asked to put all litter in trash receptacles. Remind others not to litter, and help us keep the area clean by picking up after the carelessness of others. Please deposit all aluminum and glass at one of the recycling recepticles on the campus.

Please use the roads and paths while walking about the valley. Several areas are currently under restoration.

Thank you for your support. By observing these guidelines, the beauty of Pingree Park will be the same tomorrow as it is today. Brochures about minimum-impact hiking and camping and mountain safety are available in the main office.

Welcome to Pingree Park!

On behalf of Colorado State University and the entire Pingree Park staff, we hope your stay at our remote mountain campus will be educational, productive, and enjoyable. We encourage you to experience the relaxing spirit of the campus during your stay. If at any time we can assist you, please feel free to ask any of the campus staff.

One way to help us make your stay a good one is for you to be aware of the campus regulations. These are described in this *Visitor's Guide* and are the result of many years of experience. Please help us keep Pingree Park beautiful.

Your comments and suggestions are welcome in our efforts to improve the campus facilities.

Please Follow All Fire Safety Regulations

An ever-present hazard in the forests surrounding Pingree Park is a high fire danger. The intense solar radiation at this altitude produces high ground temperatures, which causes rapid evaporation and near-zero humidity. The obvious consequence is very dry soil and vegetative ground cover.

While summer rain showers help lower the fire danger, the results are only temporary. Lightning is a further concern in July and August. Guests should observe the following campus regulations:

1. Smoking materials should be extinguished completely in ash trays or garbage cans, **not on the ground.**

2. Campfires will be permitted only at the designated campfire area, north of the conference center parking lot. Permission must be obtained from the main office several days ahead of the planned campfire.

In the event of a campus fire, a siren will sound continuously. All persons should report to the dining hall for fire duty. Campus fire hoses and extinguishers should not be used for any other purpose. Cars should be parked in parking lots and should not block emergency drives. If any fires are discovered or if a smoke detector is sounding, the campus management/main office should be notified immediately. **Be sure to know the locations of building exits and fire escapes.**

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Colorado State University

Life at the Koenig Homestead

Historic Koenig Homestead

Just past South Dorm, through the gate, is the historic Koenig-Ramsey Homestead. Frank and Hazel Koenig built the present structures in the mid-1920s and made a life in the sometimes hostile valley. Crops were meager; cattle grazed where they could. The family survived fires, long winters, and the death of two children (buried in the cemetery on the hill). By the late '40s, the Koenigs were renting cabins to summer tourists and fishermen, which they continued to do until 1974 when the property was sold to Colorado State University. The family still owns a cabin and property on the east side of the valley.

Pingree Park Weather Trends

Weather data has been collected at Pingree Park for many years. On-site measurements indicate a mean annual temperature of 35°F. Temperature extremes have ranged from a low of -45°F to a high of 83°F. Average minimum, mean, and maximum temperatures for the summer/visitor months are given in the following table.

Mean annual precipitation is about 21 inches (54 cm) with approximately 60 percent of the annual precipitation occurring from October through May, primarily in the form of snow. This amounts to an average annual snowfall of about 200 inches (500 cm), but annual snowfall can easily vary from one-half to twice that amount. Summer precipitation from June to September is usually in the form of thunderstorms of short duration, high intensity, and small-area coverage. Most thunderstorms occur in the afternoon due to solar heating beginning at sunrise.

Average Month	Average Minimum °F (°C)	Average Mean °F (°C)	Maximum °F (°C)
May	26 (-3)	41 (5)	55 (13)
June	36 (2)	49 (9)	63 (17)
July	38 (3)	56 (13)	72 (22)
August	39 (4)	53 (11)	70 (21)
September	30 (-1)	45 (7)	60 (16)
October	28 (-2)	34 (1)	47 (8)

Elements and Times Formed Today's Park

The term "park" in Pingree Park refers to the natural phenomenon of the area rather than the more familiar term of a recreational area. The geology of the area is similar to that found in many mountain valleys in Northern Colorado. Pingree Park lies in a glaciated valley at an elevation of 9,000 feet (2,750 m) above sea level. It rests at the foot of the Mummy Range, one of several ranges of mountains that make up the main Front Range of the Colorado Rocky Mountains.

The campus occupies two-thirds of the open area of the valley with meadows and slopes along either side of the Little South Fork of the Cache la Poudre River. Two or possibly three glacial periods occurred in the valley during the Pleistocene Epoch, the earliest of which began some two million years ago.

As the glaciers retreated, they left lateral moraine deposits (ridges) along the valley, north and south of the campus. The meadow itself is thought to be a filled-in glacial lake. The lake was created by morainal deposits that dammed the valley and trapped water from the retreating glacier. Over many hundreds of thousands of years, the lake diminished in size and depths as the morainal dam eroded away, and sediment washed from the surrounding mountains to fill in the lake bed.

Binoculars Return to Pingree Park

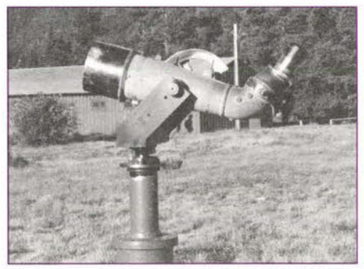
A Pingree Park landmark returns this summer after a five-season absence. The large, high-powered binoculars mounted on the deck near the flagpole have been extensively refurbished and are available for use by visitors. (Please replace nylon cover when done.)

Manufactured in Japan, these precision binoculars were donated to Pingree Park shortly after World War II. Ken Ashley, one of the donors and the actual finder of the binoculars, related their discovery. He was a Marine lieutenant who participated in the invasion of the island of Palau in the South Pacific. During the occupation of the island, Ken was walking down a beach and saw a large wooden box, half buried in the sand. Stored inside were the binoculars on display today.

After nearly 50 years of use at Pingree Park, the binoculars were in dire need of restoration. Only a very specialized person could tackle the job. That person was Gary Emerson, who lives near Coal Creek Canyon, Colorado. He specializes in the design and construction of specialty optics. His work is found everywhere from the South Pole to shuttles in outer space.

For two years, Gary painstakingly disassembled, repaired, replaced some optics, and reassembled the binoculars. During the restoration, he discovered that the binoculars were manufactured in 1918 (the prism is dated). According to dates found on the brass fittings, it is evident the binoculars were sent back to Japan in the 1930s for repair. They were probably sent from Japan in the wooden box Ken found. They likely fell overboard from a ship or the ship sunk, and they washed up on the beach. (Sea water was still inside the casing!)

The binoculars were rededicated in 1993, the 50th anniversary of Ken Ashley's and Merle Tigerman's graduation from Colorado State. These two men generously donated the new pedestal upon which the binoculars are now mounted.



The Pingree of Pingree Park

by Bill Bertschy

Where did Pingree Park get its name? Was there more than one scout and tie hack named Pingree? These are questions shared by visitors to Pingree Park and other local history researchers alike. Over the years several articles have appeared in magazines and books describing the life of George W. Pingree, the person now generally accepted as the founder of Pingree Park.

Considerable research has been conducted by Dr. Evadene Swanson, author of *Fort Collins Yesterdays,* who has granted permission for the use of her material in this article on George Pingree. According to Army pension records, George W. Pingree was born in Orono, Maine, on November 16, 1832. Details of Pingree's life prior to coming to Colorado are sketchy, but he evidently went to sea for a few years before he gave it up due to the confinements of ship life. He also cut railroad ties for a time in Missouri in 1856 (*Denver Post* interview dated March 4, 1911).

Pingree followed the gold rush west after trapping for a couple of years in Minnesota and became a miner in Central City, Colorado. In August 1861, Pingree enlisted at Central City as a private in Company H, First Regiment of the Colorado Cavalry Volunteers. Pingree was discharged in 1864 but re-enlisted immediately in the same Cavalry Volunteer Regiment.

Pingree was assigned to Fort Lyons, Colorado, near Denver. During his army career, he was wounded with an arrow in the right side of his face. Years later he showed the scar to interviewers from the *Denver Post*.

Pingree followed his fortune into northern Colorado and in the late 1860s settled in the Rustic region of the Cache la Poudre River. It is at this point in history that the possibility of a second person named Pingree occurs. It seems that in an interview by R.E. Ford in *The Colorado Forester,* Charles E. Pennock recalled a man named John W. Pingree having a tie camp on the Little South Poudre River. As Pennock was in his 80s, it is possible that the person was in fact George Pingree. Both Larimer County historian Ansel Watrous and Norman Walter Fry in *Cache la Poudre, The River* place one George W. Pingree in the Cache la Poudre Valley. Watrous recalls that Pingree, in the late 1860s, built a cabin near present day Rustic and cut a trail north three miles up what today is still called "Pingree Hill."

George Pingree (back row, third from left) and family, Thanksgiving Day, 1901.

In the fall of 1867, the Union Pacific Railroad reached Cheyenne, Wyoming. The general contractors, named Coe and Carter, had up to this point used eastern hardwood ties in construction. As the distance from the source of supply became greater, it became economically advantageous to search for local ties when construction resumed in the spring of 1868. Word probably spread fast of the need for ties, and loggers, including George Pingree and Charles Pennock, contracted with the railroad.

According to R.E. Ford, Pingree established his first tie camp in the Pingree area early in 1868. Thirty to forty tie hacks worked that summer and winter cutting and piling ties along the banks of the Little South Poudre River. In the spring of 1869, during the runoff flooding, the ties were floated down river to a point near LaPorte, Colorado, where they were hauled by oxen-pulled wagons to Tie Siding, Wyoming. The name "Tie Siding" is indicative of the town's role in the construction of the railroad. It is said that teamsters charged 50 cents per tie for the round trip from LaPorte, which took seven to ten days.

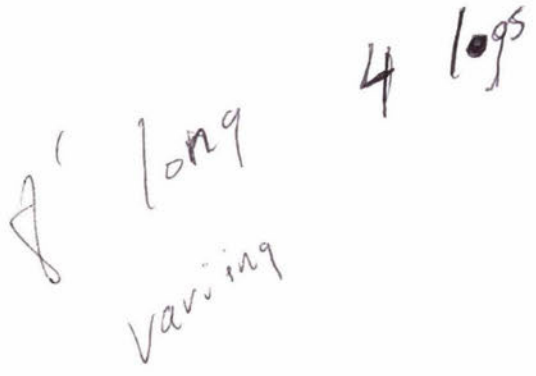
The tie camp at Pingree Park, a name given to the valley the first winter, was occupied during three seasons. Naturally, all provisions were packed by man and mule over hard trails from the colony of LaPorte. The tie hacks were paid 10 cents per tie, and an average day's work was from 30 to 40 ties. It was rumored that Pingree himself could whip any man who worked for him, from fighting to working, and once cut a hundred ties in a day.

By fall of 1870, the local demand for railroad ties had been filled, and the tie camps closed. Once again Pingree sought his fortune elsewhere, but records are vague as to his roamings. It is known that in 1875 he married one Susan Morley, who died in Boulder, Colorado, in 1882. In 1892, Pingree married Elizabeth Stewart Adams in Laramie City, where he lived for 20 years, according to pension records. Elizabeth died before or during 1915. During that year, Pingree moved to Platteville, Colorado, and stated that it was the best spot on earth according to a later *Denver Post* interview. He literally pitched his tent, living in it for 16 years as recorded in Geff's *History of Weld County*.

He passed away August 30, 1921, at the age of 89 and is buried in the Platteville cemetery. No one can deny that George Pingree led an exciting life during the late 1800s.

Presentations given:

Date	Topic	Group
September 29, 1994	Forestry/Fire Ecology	PLT Workshop
September 16,	Forest Fires & Forestry in Colorado	Colorado Biology Teachers Association
July 1995	Tour of Hourglass Fire/Fire Ecology	PR-1 School Teachers
November 9, 1995	Wildfire Mitigation	Estes Valley Improvement Association
August 27, 1996	Wildfire Mitigation Proposal	Stove Prairie Public Meeting
September 3, 1996	Wildfire Mitigation Proposal	Glacier View Public Meeting
September 19, 1996	Wildfire Mitigation Proposal	Estes Park Public Meeting
September 24, 1996	Wildfire Mitigation Proposal	Crystal Lakes Public Meeting
October 1, 1996	Wildfire Mitigation Proposal	Fort Collins Public Meeting
October 2, 1996	Wildfire Mitigation Proposal	Larimer Fire Council



Wildfire Hazard	
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Presentations given by Dave Farmer

July 1995 to Present

Group	Topic	# of people	Date Given
Larimer County Tree Farmers Picnic	Ecology/Management	55	7/12/97
Cherokee Meadows Homeowner's Assoc	Wildfire Mitigation	30	6/28/97
Loveland Fire Department - Prevention	Wildfire Mitigation	10	3/26/97
Larimer County Commissioners	Wildfire Mitigation	20	1/23/97
Glacier View Roads & Recreations Assoc.	Mitigation/Forest Mgt	20	11/16/96
F424 Fire Management (CSU)	Wildfire Mitigation	30	10/16/96
Colorado State Forest Service	Hourglass Fire	50	10/15/96
SAF Walk in the Woods (Pingree Park)	Mitigation/Ecology	91	10/12/96
Larimer Fire Council	Wildfire Mitigation	12	10/2/96
Fort Collins area public meeting	Wildfire Mitigation	6	10/1/96
Wildland Fire Conference	LARCO Mitigation	15	9/29/96
Wildland Fire Conference	Wildfire Hazards ID	15	9/28/96
CSFS Nursery Open House	Defensible Space	50	9/27/96
Front Range Forum	Fire Ecology/Mitigation	20	9/25/96
Crystal Lakes area public meeting	Wildfire Mitigation	3	9/24/96
Estes Park area public meeting	Wildfire Mitigation	23	9/19/96
International Foresters	Fire Suppression	20	9/17/96
International Foresters	Fire Ecology/Mitigation	20	9/16/96
Bauder Elementary (6th grade classes)	Fire Ecology	100	9/9/96
Glacier View area public meeting	Wildfire Mitigation	20	9/3/96
Rist Canyon area public meeting	Wildfire Mitigation	20	8/27/96
Elderhostel (at Pingree Park)	Fire Ecology/Mitigation	18	7/31 - 8/1/96
Crystal Lakes Homeowner's Assoc.	Wildfire Mitigation	50	7/17/96

Youth at Risk	Fire Ecology/Mitigation	20	7/16/96
Redstone Canyon	Wildfire Mitigation	8	7/13/96
Buckskin Heights	Wildfire Mitigation	30	7/12/96
Davis Ranch Road Homeowner's Assoc.	Wildfire Mitigation	40	6/15/96
Crystal Lakes Homeowner's Assoc.	Wildfire Mitigation	200+	6/8/96
Bonner Peaks' Homeowner's Assoc.	Wildfire Mitigation	50	5/18/96
Larimer Fire Council	Wildfire Mitigation	35	5/4/96
Larimer County Tree Farmer's Assoc.	Fuels Management	30	4/25/96
Small Acreage Landowners (Extension Serv)	Wildfire	35	4/20/96
Larimer County Board of Commissioners	Wildfire Mitigation	20	4/9/96
Upper Poudre Canyon Citizen's Assoc.	Wildfire Mitigation	29	1/8/96
Estes Valley Improvement Assoc.	Wildfire Mitigation	19	11/9/95
Volunteer Forest Rangers	Wildfire Mitigation/ Tree Biology	22	10/28/95
Colorado Biology Teachers Assoc.	Fire Ecology/Wildfire Mitigation	17	9/16/95
Poudre R-1 Teachers	Fire Ecology/Wildfire Mitigation	20	7/18/95
TOTALS:	34 programs	1158+	

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1997 Larimer County Tree Farm Picnic
Handout #2

The Hourglass Fire at Pingree Park

Fire Facts

Cause.....Lightning
Size.....1275 Acres

Date Fire .....Friday July 1, 1994
Date Fire Contained.....Tuesday July 5, 1994

Suppression Costs.....$1.5 Million
Cost of New Buildings.....$2.5 Million
Lost Revenue.....$300,000

Buildings Destroyed.....13
Buildings Damaged.....2
People Evacuated.....170

Firefighters.....602
Air Tankers.....9
Helicopters.....4
Fire Engines.....15

Pingree Park Forest Management (1995 to 1997)

Table 1. Salvage Sales at Pingree Park (1995-1997)

Sale #	PP94-SLV-1	PP94-SLV-1	ST-Pingree (SLV)96-1	ST-Pingree (SLV)96-1	TOTAL
Block	1A	1B	A	B	4 blocks
Acres	19.5	4	5.4	2.7	31.6
Volume	435 cords	82 cords	107 cords	54 cords	678 cords
Total Revenue	$3412.50	$700.00	$943.25	$472.50	$5528.25
Avg. DBH	6.5"	6.6"	6.9"	6.9	6.5"
Avg. Height	42'	38'	42'	42'	40'
Starting Date	2/17/96	2/17/96	12/16/96	3/6/97	--
Completion Date	5/2/96	5/2/96	3/6/97	In progress	--

Other Forest Management/Public Education Activities:

1. Two acres thinned around student cabins by Pingree staff (1995).
2. One acre thinned north of student parking lot by Oklahoma State University students (1995).
3. *The Hourglass Fire at Pingree Park, July 1, 1994* brochure.
4. Forest management/fire ecology/wildfire mitigation tours/workshops:
   - Poudre R-1 Teachers (7/18/95 - 20 teachers)
   - Colorado Biology Teacher Assoc. (9/16/95 - 17 teachers)
   - Youth at Risk (7/16/96 - 20 students)
   - Elderhostel (7/31-8/1/96 - 18 people)
   - Front Range Forum (9/25/96 - 20 people)
   - SAF Walk in the Woods (10/12/96 - 91 people)

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Lodgepole Pine Fire Ecology

Wildfire is a natural and often necessary element of a healthy forest ecosystem. Lodgepole pine, the dominant tree species in the Pingree Park area, is considered a fire-dependent species.

Lodgepole pine have both closed (serotinous) and open (nonserotinous) cones. The closed cones need a fire's intense heat to melt resins and open the cones to release seeds. During prolonged periods without fire, seed for regeneration comes from open-coned trees. The forest will eventually become dominated by "nonserotinous" trees if wildfires do not occur. Fire also burns the forest floor to prepare the seed bed needed for lodgepole seedlings to become established.

The fire that burned through Pingree Park was a high intensity fire. This type of fire destroys all trees in the area and therefore is referred to as a stand replacement fire. Aspen are thriving in many of the burned areas. In the future, lodgepole pine will once again become the dominant tree species.

Colorado State Forest Service

This brochure received major funding from the Colorado State Forest Service.

Printed on recycled paper.

Printed and Produced by Publications and Printing

Fire Facts

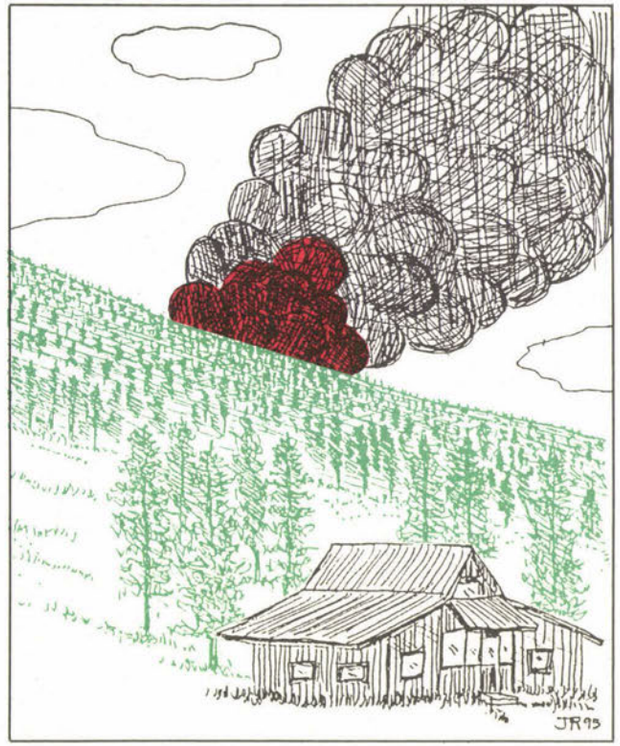
Cause ..... **Lightning**
Size ..... **1,275 Acres**
Suppression Costs ..... **$1.5 Million**
People Evacuated **170**

Buildings Destroyed **13**
Damaged Buildings **2**
Estimated $ Building Loss ..... **$2.2 Million**

Firefighters **602**
Air Tankers Involved **9**
Helicopters **4**
Fire Engines **15**

Date Fire Started ..... **July 1, 1994 (Friday)**
Date Fire Contained .. **July 5, 1994 (Tuesday)**

The Hourglass Fire at Pingree Park July 1, 1994



Nature, People, and Wildfire: A Delicate Balance

Pingree Park Campus

Colorado State University

July 1, 1994

On Friday morning, July 1, 1994, smoke was detected in the sky over Pingree Park. Authorities were notified of a wildfire in the Arapaho-Roosevelt National Forest southwest of the Pingree Park campus. Before the day was over, 170 people were evacuated from the campus, the fire destroyed 13 buildings, and consumed hundreds of acres of lodgepole pine forest.

Cause of the Fire

A dry lightning storm passed through the Pingree Park area at approximately 1:45 a.m. Friday. Several Pingree Park staff members remembered being awakened at that time by thunder. Fire danger was high in the Northern Colorado mountains. Storms of that nature can occur in early July. However, there had been little rain and the forests were dry. Governor Romer had implemented an unpopular statewide ban on open fires for the upcoming fourth of July weekend.

How the Fire Got Its Name

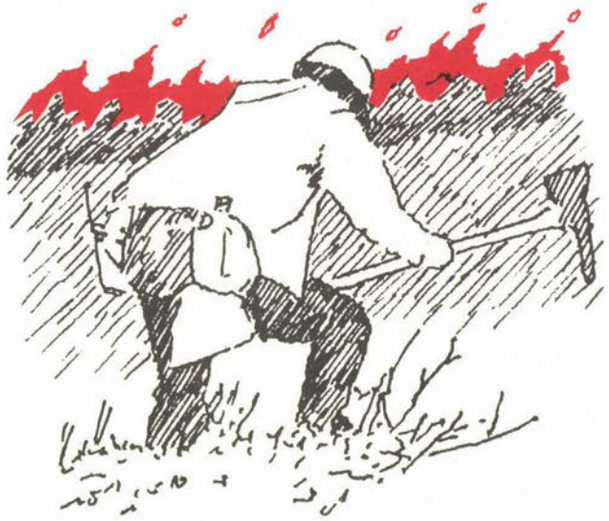
Whenever wildfires are reported they are given an official name that reflects some local geological or topographic feature. In this case the fire was named after the Hourglass Reservoir north of the fire's origin. Unofficially, many refer to the fire as the "Pingree Park Fire," due to the damage to buildings on the Pingree Park campus.

Summary of the Fire

The fire was started by a lightning strike in a remote area west of Pingree Park. The fire was reported to the Larimer County Sheriff's Department at 10:27 a.m. Initial fire crews from the Arapaho-Roosevelt National Forest were quickly dispatched. Due to heavy fuel loading (dry, down timber) and gusting winds, the fire escaped initial attack efforts and grew to 25 acres by 1:00 p.m. Strong westerly winds pushed the fire toward Pingree Park. Evacuation of the campus began shortly after 1:30 p.m.

By mid-afternoon, the wind-driven fire was raging, with flame lengths over 100 feet burning through the crowns of the trees. Fate had put the Pingree Park campus directly in the line of the fire. Wind gusts were estimated in the fifty mph range when the fire swept through the campus destroying three faculty cabins, the North Dormitory, a newly built staff housing facility, six conference center residence buildings, and a staff duplex cabin located near the conference center.

The conference center lodge was partially burned as was the maintenance shop/water treatment plant. Firefighters on the scene worked hard to restrain the fire. It was fortunate that no one was injured and most of the older/historic parts of the campus were untouched.



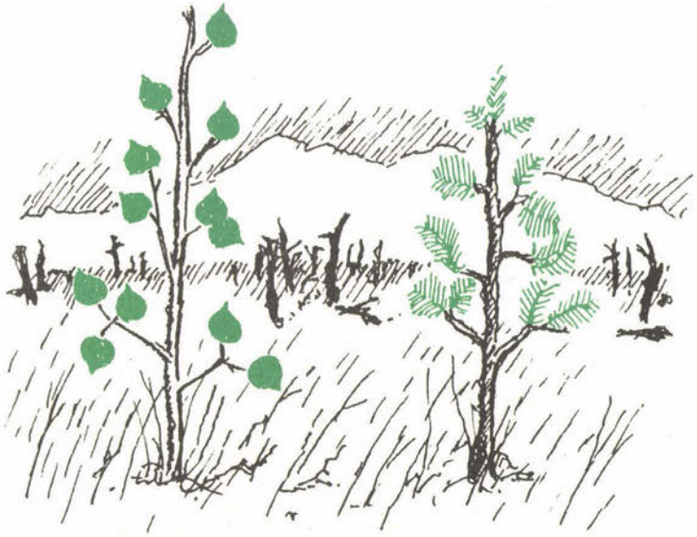
By evening the fire had grown to 800 acres and was threatening the Poudre Springs subdivision. Firefighting efforts, in particular machine and hand-dug fire lines, kept the fire away from the summer cabins. The fire remained active through Saturday July 2, threatening Poudre Springs and burning another 475 acres.

The fire was declared contained on Tuesday July 5th, having burned an estimated 1,275 total acres.

Historic Note: Fourteen firefighters were tragically killed in a wildfire above Glenwood Springs, Colorado, several days after the Hourglass Fire.

Suppression Costs

Approximately $1.5 million was spent on the Hourglass Fire. Firefighters and equipment from volunteer fire departments, Larimer County Sheriff's Department, Colorado State Forest Service, Arapaho-Roosevelt National Forest, and several out-of-state agencies assisted in the suppression efforts.



The Future

Scheduled rebuilding of the conference center and other destroyed buildings began in the summer of 1995. Efforts to salvage the burned timber on University land will continue for years to come.

In an effort to minimize future fire hazard, forests in the unburned areas of the campus are being thinned. Grass seeding and tree planting will continue to help minimize erosion. Willows from upstream have been transplanted to stabilize burned slopes adjacent to the South Fork of the Poudre River. A management plan was developed by the Colorado State Forest Service to address future wildfire hazards, forest health, and other issues prevalent when people live in fire-dependent ecosystems.

Colorado State FOREST SERVICE

MEMORANDUM

DATE: 1 Dec '95

TO: Dave Farmer

FROM: Dave Leatherman

SUBJECT:

I was looking over your Pingree Park Veg mgmt Plan outline today. I thought perhaps the attached lists might meet the needs of your I&D appendix.

Let me know if you want help with the wildlife species list.

FIELD TRIP INSECT LIST
(some animals causing tree damage listed also)

Forest Insects Found in the Buckhorn Canyon and Pingree Park Region

Host	Insect	Scientific Name
Ponderosa pine (Pinus ponderosa)	Mountain pine beetle	Dendroctonus ponderosae
	Red turpentine beetle	D. valens
	Engraver beetles	Ips spp. (including knausi)
	Twig beetles	Pityophthorus sp. and Pityogenes sp.
	Pine butterfly	Neophasia menapia
	Pine budworm (or sugar pine tortrix)	Choristoneura lambertiana
	Tiger moth	Halisidota ingen
	Pine sawflies	Neodiprion autumnalis et al
	Ponderosa needleminer	Coleotechnites ponderosae
	Giant conifer aphids	Cinara ponderosae
	Pine needle scale	Chionaspis pinifoliae
	Spotted pine sawyer	Monochamus maculosus
	Western conifer seedbug	Leptoglossus occidentalis
Lodgepole pine (Pinus contorta)	Mountain pine beetle	Dendroctonus ponderosae
	Engraver beetles	Ips spp.
	Twig beetles	Pityophthorus sp. and Pityogenes sp.
	Tiger moth	Halisidota ingens
	Porcupine	Erethzidon dorsatum
Limber pine (Pinus flexilis)	Mountain pine beetle	Dendroctonus ponderosae
	Twig beetles	Pityophthorus sp. and Pityogenes sp.
Engelmann spruce (Picea engelmanii)	Spruce beetle	Dendroctonus rufipennis
	Western spruce budworm	Choristoneura occidentalis
	Whitespotted sawyer	Monochamus scutellatus
	White pine weevil	Pissodes strobi
	Cooley gall adelgid	Adelges cooleyi
	Spruce spider mite	Oligonychus ununguis
Cedar (J. scopulorum)	Giant conifer aphid	Cinara sabinae
	Cedar bark beetle	Phloeosinus sp.
	Juniper spittlebug	Clastoptera juniperina
	Longhorned wood borer	Callidium sp.
Chokecherry (Prunus virginiana	Fall webworm	Hyphantria cunea
	Chokecherry lacebug	Corythuca sp.
	Cherry curculio	Tachypterellus consors
Alder (Alnus tenufolia)	Leafmining sawfly	Fenusa dohrnii
	Spittlebug	Clastoptera obtusa
	Flea beetle	Altica ambiens

Aspen	Western tent caterpillar	*Malacosoma californicum*
	Large aspen tortrix	*Choristoneura conflictana*
	Aspen leafminer	*Phyllocnistis populiella*
	Weidemeyer's admiral	*Limenitis weidemeyerii*
	Poplar twiggall fly	*Melanagromyza schineri*
	Oystershell scale	*Lepidosaphes ulmi*
	Leafhoppers	*Idiocerus* spp.
	Ambrosia beetle	*Trypodendron retusum*
	Poplar borer	*Saperda calcarata*
	Flatheaded wood borer	*Dicerca* sp.
	Flatheaded wood borers	*Agrilus* spp.
	Nipplegall mite	*Phyllocoptes didelphis*
	Sapsuckers (woodpeckers)	*Sphyrapicus varius* et al
	Wapiti (elk)	*Cervus canadensis*
	Beaver	*Castor canadensis*
Douglas-fir (*Pseudotsuga menziesii*)	Western spruce budworm	*Choristoneura occidentalis*
	Douglas-fir beetle	*Dendroctonus pseudotsugae*
	Douglas-fir pole beetle	*Pseudohylesinus nebulosus*
	Cooley gall adelgid	*Adelges cooleyi*
	Tiger moth	*Halisidota ingens*
	Douglas-fir cone moth	*Barbara colfaxiana*
Subalpine Fir (*Abies lasiocarpa*)	Fir engraver	*Scolytus ventralis*
	Balsam bark beetle	*Dryocoetes confusus*
	Bowlegged fir aphid	*Cinara curvipes*
Willows (*Salix* spp.)	Sawfly galls	*Euura* sp.
	Pinecone gall midge	*Rhabdophaga strobiloides*
	Willow and poplar borer	*Cryptorhychus lapathi*
	Leaffolding sawfly	*Phyllocolpa* sp.
Mixed Hosts	Putnam's cicada	*Platypedia putnami*

FIELD TRIP DISEASE LIST

Plant Diseases Found in the Buckhorn Canyon and Pingree Park Region

Host	Disease	Causal Agent
Ponderosa pine (*Pinus ponderosa*)	Dwarf mistletoe	*Arceuthobium vaginatum*
		A. americanum
	Western gall rust (Pine to Pine)	*Endocronartium harknessii*
	Root rot	*Armillaria mellea*
	Mt. Pine beetle-Ceratocystis complex	
	Comandra rust	*Cronartium comandrae*
	Limb rust	*Peridermium filamentosum*
	Decay	*Phellinus pini*
		Polyporus anceps
	Needle casts	*Elytroderma deformans*
		Davisomycella ponderosae
		Davisomycella medusae
Lodgepole pine (*Pinus contorta*)	Dwarf mistletoe	*Arceuthobium americanum*
		A. vaginatum
	Western gall rust	*Endocronartium harknessii*
	Stalactiform rust	*Peridermium stalactiforme*
	Mistletoe rust	*Peridermium bethelii*
	Comandra rust	*Cronartium comandrae*
	Needle cast	*Lophodermella montivaga*
		Lophodermella concolor
	Root rots and decay	*Armillaria mellea*
		Phellinus pini
		Polyporus circinatus
		Coniophora puteana
	Snowmold	*Neopeckia coulteri*
Limber pine (*Pinus flexilis*)	Mistletoe	*Arceuthobium cyanocarpum*
	Needle casts	*Lophodermium arcuata*
		Bifusella linearis
		Bifusella saccata
Engelmann spruce (*Picea engelmannii*)	Branch gall	Hail ??
	Genetic brooms	
	Rust brooms	*Chrysomyxa arctostaphyli*
	Decay	*Phellinus pini*
		P. nigrolimitatus
Many conifers	Porcupine damage (Injury)	
Cedar (*Juniperus scopalorum*)	Broom rust	*Gymnosporangium nidus-avis*
	Gall rust	*Gymnosporangium nelsonii*

Host	Disease	Causal Agent
Cherry	Black knot	*Apiosporina morbosum*
Rose	Rust	?
Alder (*Alnius* sp.)	Canker	?
Aspen	Sooty bark canker	*Encoelia pruinosa*
	Ceratocystis canker	*Ceratocystis fimbriata*
	Cytospora canker	*Cytospora chrysosperma*
	Cryptosphaeria canker	*Cryptosphaeria populina*
	Rough Bark	*Diplodia tumefaciens*
	Ink spot (leaf spot)	*Ciborinia whetzelii*
	Leaf rust	*Melampsora medusae*
	Leaf spot	*Marssonina populi*
		Phellinus tremulae
	Shoot blight	*Venturia macularis (pollacia radiosa)*
	Decay	*Peniophora polygonia*
	Decay	*Ganoderma applanatum*
	Rough bark	*Macrophoma*
Douglas Fir (*Pseudotsuga menziesii*)	Defoliation	Western Spruce Budworm (*Choristoneura occidentalis*)
	Needle cast	*Rhabdocline pseudotsugae*
	Needle cast	*Rhabdocline weirii*
	Decay	*Phellinus pini*
Subalpine Fir	Broom rust	*Melampsorella caryophyllacearum*
	Needle cast	*Lirula abietis-concoloris*
		Grovesiella abieticola
	Complex Disease	*Ceratocystis-Dryocetes* complex
	Root rot	*Armillaria mellea*
	Brown Felt Blight	*Herpotrichia juniperi*
Willows (*Salix* sp.)	Leaf rust	*Melampsora epitea*
Cottonwoods	Leaf rust	*Melampsora medusae*
		Melampsora occidentalis

Use of the Compass

J. A. Bailey

The compass is an important tool of the outdoorsman, be he afield for fun or on the job. With a compass, a map, and a knowledge of pacing distances, you can locate yourself on a map, travel cross-country to desired locations, find section corners and property boundaries and make simple maps. You can also establish sample plots in a random system or on a mechanically-spaced grid -- for timber cruising, vegetation sampling, wildlife surveys, etc. Frequent practice - with compass and maps during summer camp will develop your skill.

Azimuth and Bearing are two common methods for reading compass directions. Azimuth readings range from 0 to 360 degrees, reading the compass clockwise. Due east is 90^0; south is 180^0; west is 270^0; north is 0^0 or 360^0. Bearings range from 0 to 90 degrees and are always given as east or west deviations from either north or south. Thus an azimuth of 45^0 would be a bearing of N45E; an azimuth of 190^0 would be a bearing of S10W; an azimuth of 310^0 would be a bearing of N50W. A bearing of S25E would be an azimuth of 155^0. Be prepared to convert from azimuth to bearing and vice versa.

Declination. In most places, the compass needle does not point toward true north (the north pole). Rather, the needle points toward the earth's magnetic pole. We call this direction magnetic north and the difference between true and magnetic north is magnetic declination. Along a line from northeast Wisconsin to southeast Georgia, the true and magnetic poles are lined up so that there is no magnetic declination. East of this line, the compass needle points west of true north; the declination is west. West of this line, as in Colorado, the needle points east of north; the declination is east (Fig. 1). Find the local declination on your Pingree Park quadrangle. It is 17E.

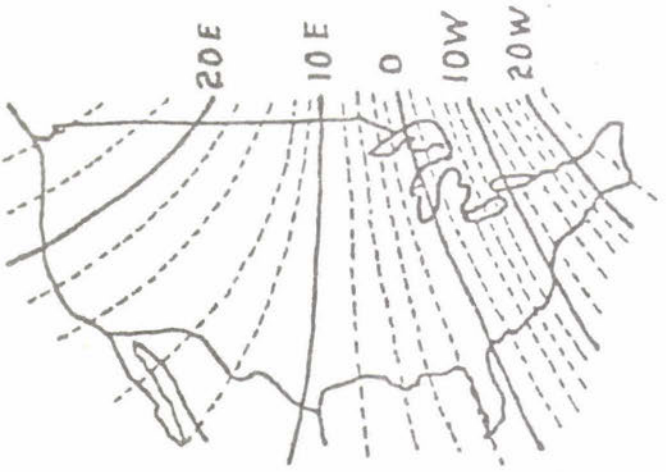


Fig. 1. Magnetic declination in the United States.

Converting magnetic azimuths (or bearings) to true azimuths and converting true azimuths to magnetic azimuths is necessary in compass work. Your compass instructions may give rules for conversions. However, the rules are easily forgotten or misused. A logical method for converting is to draw the true and magnetic compasses on two concentric circles (Fig. 2). The inner, magnetic compass is offset by the angle of declination from the outer, true compass. Conversion is simply a matter of adding or subtracting the declination and the appropriate conversion is easily seen on Fig. 2. Complete the right-hand portion of Fig. 2 by filling in the indicated bearings on the outer, true compass. For practice complete the following statements.

A true azimuth of 45° would be a magnetic azimuth of 59°.

A magnetic azimuth of 210° is a true azimuth of 196°.

A true bearing of N5E is a magnetic bearing of N19E°.

A magnetic bearing of S25E is a true bearing of S.

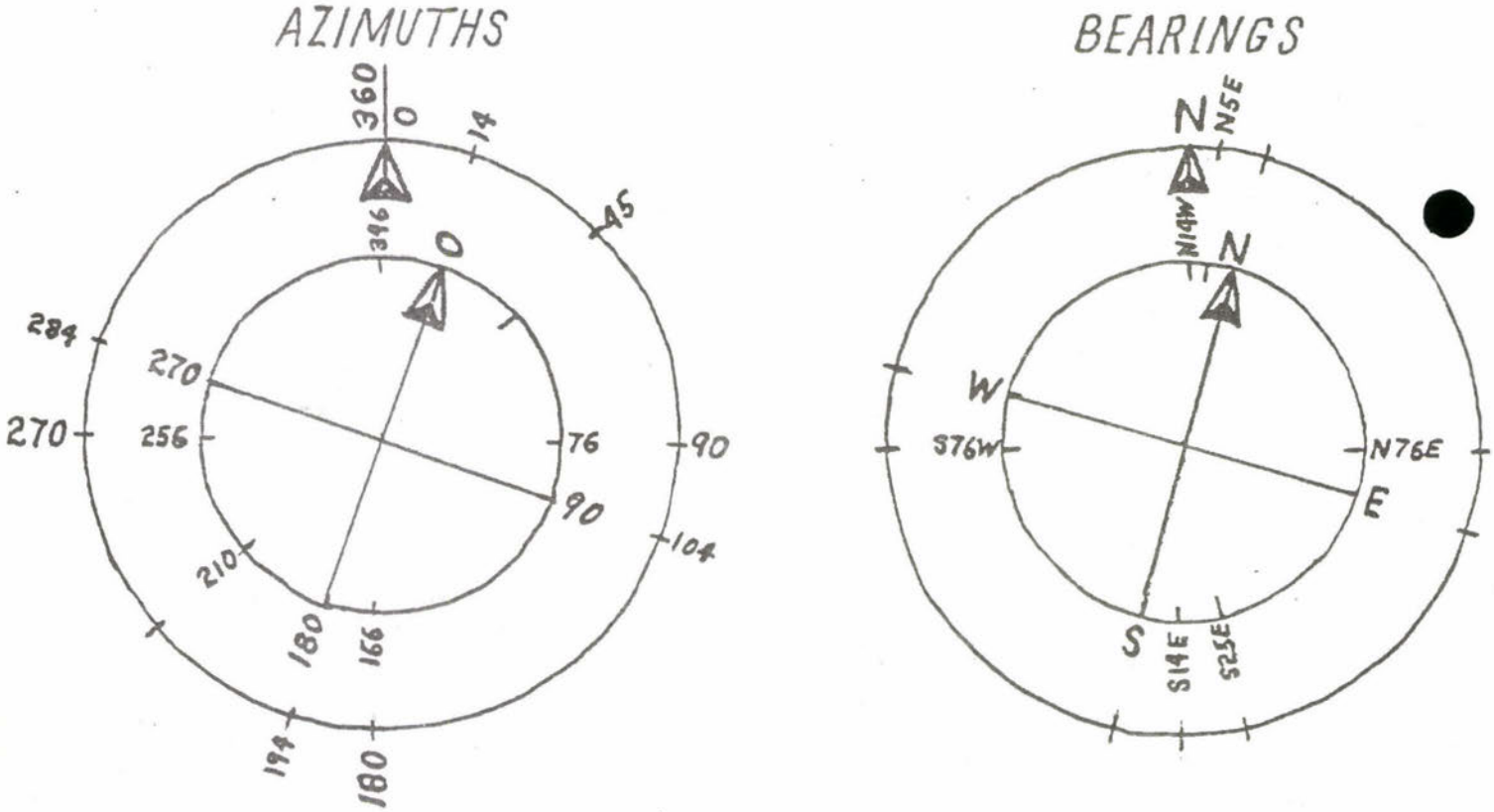


Fig. 2. Relation between magnetic compass (inner circles) and true compass (outer circles) at Pingree Park where the magnetic declination is approximately 14°E. Azimuths are given at left; bearings at right. Complete the figure by filling in bearings on the right hand, true compass.

Local Attraction can cause deviation of the compass needle. Local magnetic fields may be due to electric currents or to objects containing iron. Be watchful for local attraction when under a power line, next to a fence or in areas where ore bodies are common. Personal items may also lead your compass and you astray. Don't use your compass close to a steel chain over your shoulder, a lighter in your shirt pocket, a camera hung from your neck, etc.

Orienting your Compass. The dial on your Silva compass turns with respect to its plastic base. When the compass needle points toward north on the dial, the dial shows azimuths on the magnetic compass. Turn the dial so the arrow on the base lines up with 346° on the dial. Now orient the compass so the needle points to north on the dial. The arrow on the compass base now points true north (14° west of magnetic north).

Orienting a Map is easy with your Silva compass. Set the compass dial to compensate for declination, as above. The long side of the compass base will now be oriented toward true north. Place this side of the compass base along the true north arrow on the map. Turn the map and compass until the needle is oriented toward north on the dial. The compass and map are now oriented with respect to true north.

Backsighting is simply correcting a bearing or azimuth by 180°. Thus, if a prominent mountain peak is due north (0°) of you, you are obviously due south (180°) of the mountain. If a tall grain elevator is N25W of you, the back-bearing from the elevator to you is _____.

Finding Your Location on a Map. You may want to locate your position quite precisely on a map. This can be done by orienting your map and backsighting at least two prominent objects, such as mountain peaks, that can be found on the map. First orient your map toward true north. Sight one of the prominent objects and obtain its magnetic azimuth by turning the compass dial while sighting. Lay your Silva compass on the map with the needle toward north on the dial and the long side of the base through the object on the map. Draw this line through the object. It is the backbearing from the object to you. Repeat for the second prominent object. The intersection of these two lines is your location.

Following a Bearing is easiest with a compass having a sighting mechanism. However, a reasonably good job can be done with many simpler models. Adjust the compass dial so the magnetic azimuth you wish to follow is lined up with the arrow on the compass base. In the western United States, where the declination is east, subtract the east declination from the true azimuth you wish to follow. Orient the compass so the needle points to north on the dial. The arrow on the compass base (or the sight on a more complicated compass) now points in the desired direction.

Note a prominent object in the direction you wish to travel and walk toward it. Ideally, the object should be far from you, yet visible all along the way, allowing for a long walk before having to check the compass again. Greater accuracy results from fewer long sightings than from many short sightings. If an impassible object, such as a pond should intersect your line of travel, offset by traveling a given distance at right angles to the line of travel. Resume the desired direction again until you are past the object, then correct for your offset by moving the same distance at right angles in the opposite direction from your offset.

PACED TRANSECT EXERCISE

Dale Hein

INTRODUCTION

Paced distances are always recorded in standard units of measurement for horizontal distance regardless of slope of the terrain. You can learn to pace distance within 1% accuracy by measuring and maintaining the length of your individual pace and by becoming proficient in correcting for slope.

OBJECTIVE

Learn to accurarely pace a given traverse with aid of compass and map.

EQUIPMENT

(1) hand compass (2) topographic map (3) pencil & paper

PROCEDURE

1) Calibrate your pace along a designated 10-chain (660 ft = 201 m) transect.

   1 chain (20.1 m) = _____ of your double (2-step) paces Your double (2-step) pace = _____ ft (_____ m)

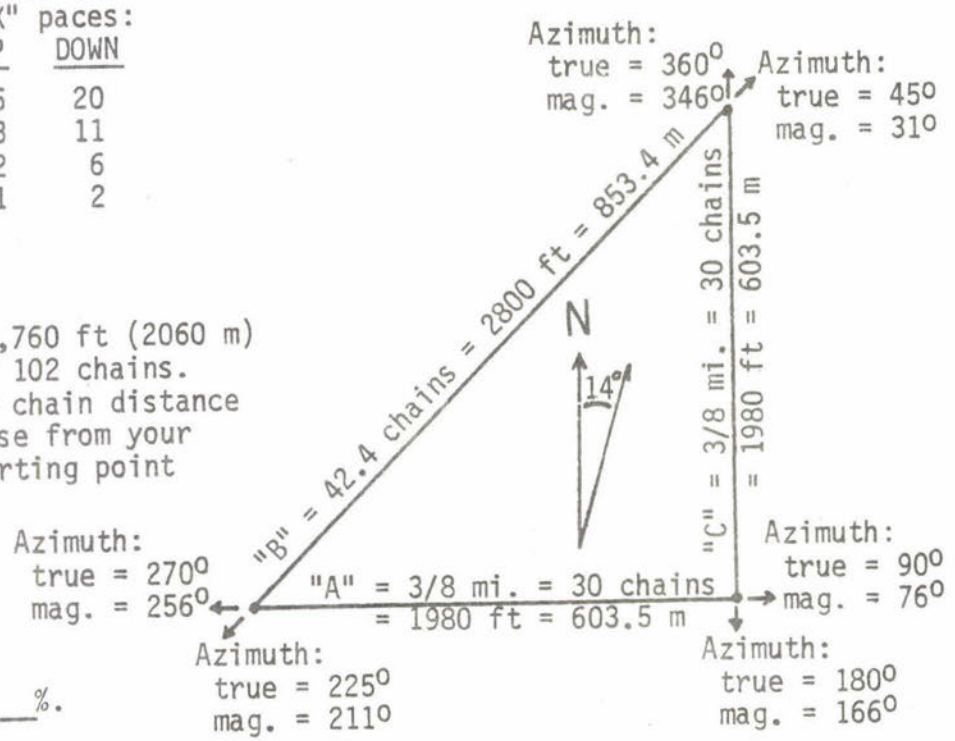
2) Pace a closed traverse along a designated right-triangle route from a designated starting point. Note the following comments:
   (a) Plan your correction for slope (see table below) by looking ahead to estimate percent slope for next chain (66 ft = 20 m) distance.
   (b) To calculate magnetic azimuth for a desired true azimuth, subtract the east magnetic declination (add west magnetic declination) from the true azimuth of the line.
   (c) To travel a desired line, rotate dial of Sylva compass until magnetic azimuth of line and indicator line (index pointer) are aligned. Then rotate entire compass to align needle with "N". Follow direction of index pointer.

CORRECTION FOR SLOPE IN PACING

skip 1 pace for every "X" paces:

Percent slope		UP	DOWN
10	X =	6	20
20	X =	3	11
30	X =	2	6
40	X =	1	2

DIAGRAM OF PACED TRAVERSE



RESULTS

Traverse is 6,760 ft (2060 m) or approximately 102 chains. Therefore, every chain distance necessary to close from your end point to starting point is 1% error.

Your error = _____%.

PUBLIC LAND SURVEY

Dale Hein

Thomas Jefferson proposed the basic provisions of the rectilinear form of land survey enacted into law by Congress in 1796. Except for Texas, virtually all of the United States west of the Mississippi River, north of the Ohio River, plus Alabama, Florida and Mississippi, have been surveyed. In the colonial states, early boundaries were given in more-or-less narrative form under the system of Rural Land Description. This was followed by a system of Metes & Bounds, which gave lengths and directions of boundaries. The present day system of Public Land Survey was essentially completed early in this century. The system continues to serve us well.

The survey started with establishment of control points, whose longitude and latitude were determined by astronomical observations. There are 35 of these initial points. Principal (north-south) meridians were then established through each point. An east-west baseline was extended through each point on a true parallel of latitude. Township corners were established every 6 miles and permanent section and quarter section corners were alternately established each half mile along both baselines and principal meridians. Colorado's western border is a principal meridian, and a baseline crosses northern Colorado as a westward extension of the Kansas-Nebraska boundary.

The next provision of the Public Land Survey Law was to establish standard parallels at each 24-mile interval north and south of the baselines. Likewise, guide meridians were surveyed at 24-mile intervals east and west of the principal meridians. Then, each 24-mile quadrangle was divided into 16 townships, each 6 miles square, by surveying range lines north at intervals of 6 miles along each standard parallel. The township corners, located every 6 miles along the north-south range lines, guide meridians and principal meridians, were then joined by east-west township lines. Thus, north-south columns of townships called ranges, and east-west rows of townships called tiers, were established. Because of the conversion of meridians towards the North Pole, all townships contain less than 36 square miles

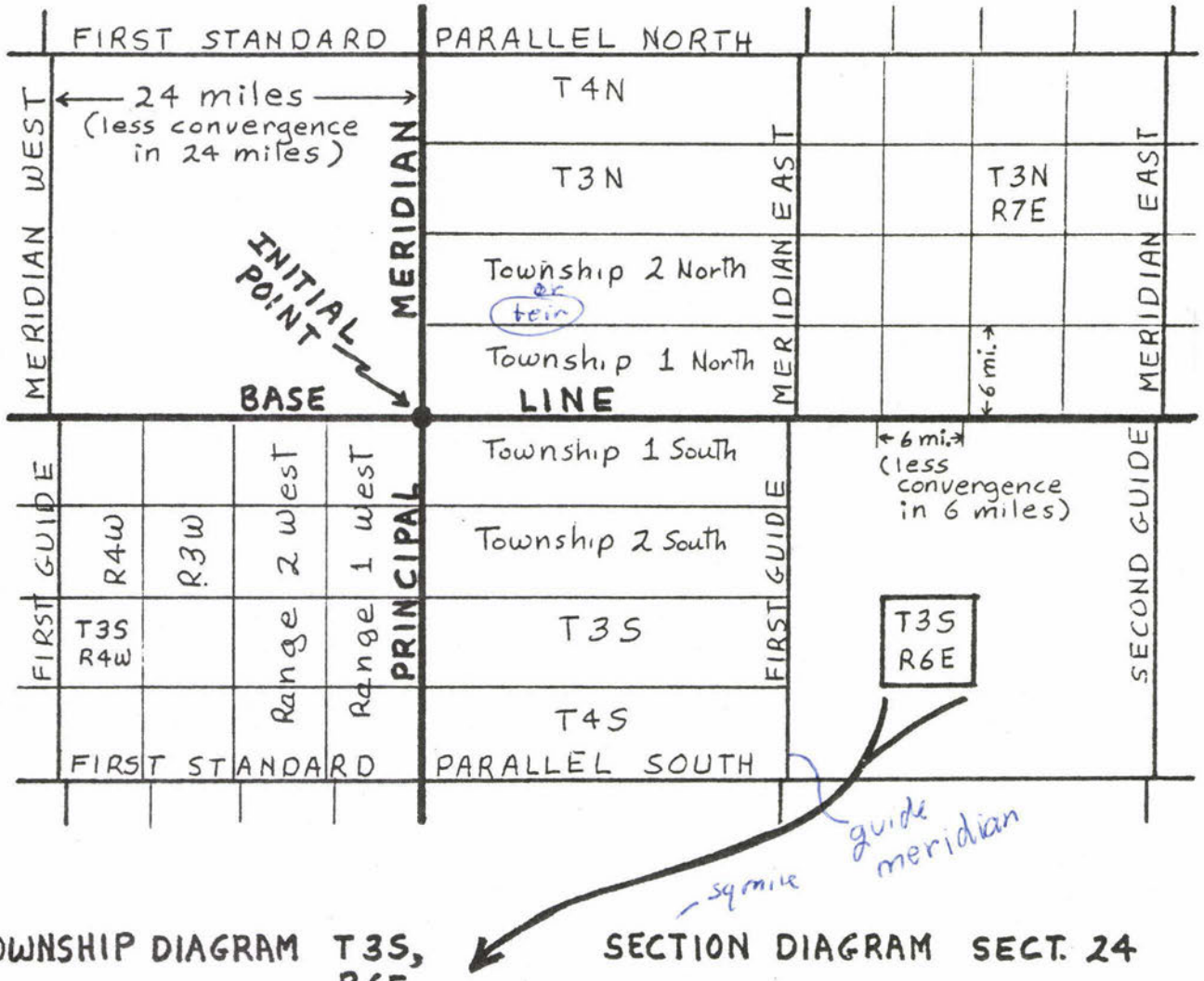
Subdivision of townships into sections was the next step. This was done by surveying section lines parallel to the east boundary of the township at successive 1-mile intervals along the south boundary. This tended to concentrate any errors in the survey into the north and west rows and columns of sections in each township, although each section supposedly should be approximately 1 mile square and contain 640 acres. Sections were numbered west and east in successive rows starting in the northeast corner of each township.

Subdivision of sections into quarter sections was the final step by the U.S. Surveyor. Further subdivision of 160-acre quarter sections into tracts is done by local surveyors.

Legal description of a piece of land is easy and logical under the Public Land Survey. Description starts by naming the smallest subdivision location within the next largest subdivision. For example, to describe a 10-acre tract, give the quarter of the 40-acre tract first, followed by the quarter of the quarter section, then the quarter section, section, township, range, and principal meridian. With the aid of a topographic quadrangle map, can you precisely describe the legal location of the 5-acre tract in which you are located at this moment?

U.S. PUBLIC LAND SURVEY

Dale Hein



TOWNSHIP DIAGRAM T3S, R6E

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	Sect. 24
30	29	28	27	26	25
31	32	33	34	35	36

SECTION DIAGRAM SECT. 24

Half Section
N ½
320 Acres

Sect. 24

640 Acres

Quarter Section
SW ¼
160 Acres

Half Quarter Section
N½ SE¼ 80 Acres

Quarter Quarter Section
SW¼ SE¼
40 Acres

SMALL TRACTS
5 acres each

NOTE: *Small tracts are often numbered lots.*

BIRDS OF PINGREE PARK

Dale Hein

Approximately 100 species of birds occur in the Pingree Park area. However, most are present only during certain seasons, and some are rare or occur only in restricted habitats. You should attempt to identify about 40 species during your summer at Pingree Park.

Identification of birds in the field requires a good guidebook or the company of an experienced "birder." Binoculars are a valuable aid. Birds are identified by size, colors, song or calls, behavior, and by their habitat. Fortunately, the American Ornithologists' Union Check-list is generally accepted as the authority for standard common names of North American birds. Thus, learning scientific names is not so important for birds as it is for many other organisms. You should strive to be more than a "biological name dropper." Therefore, learn to observe a bird's habitat and activities with particular care, for ecological knowledge of birds is most important.

"Free as a bird" is not a very accurate phrase, for although birds are highly mobile, most are restricted to particular habitats. Even within a specific forest type, some birds may be ground-dwelling, others may live in definite strata of the overstory, and others may spend most of their time in aerial feeding above the forest. But the great mobility of most birds has advantages in escaping from predators, being able to forage over large areas, or perhaps to migrate when conditions are adverse. Good examples of the restriction of certain avian species to their particular habitats may be found near Pingree Park. Gray-headed Juncos and Green-tailed Towhees spend most of their time on or near the ground; Hairy Woodpeckers, White-breasted Nuthatches, and Brown Creepers feed by searching tree trunks for insects and seeds; several species of warblers may be found almost exclusively in the outer foliage of the trees; and overhead, Tree Swallows and Common Nighthawks spend many hours feeding on aerial insects.

Most birds of Pingree Park are migratory. Not surprisingly, those species that remain during winter are browsers on buds and leaves, seed eaters, carnivores, or able to find immature insects beneath the bark of trees. A few species that nest farther north are winter residents in the Pingree Park area. Blue Grouse and White-tailed Ptarmigan are species that make altitudinal migrations but remain in the general area all year.

Much can be discovered about a bird's ecology, especially its feeding habits, by examining the feet and bill. Examples of these ecological adaptions are the webbed feet of the Mallard, talons of a Great Horned Owl, and a woodpecker's sharp toenails for clinging to a tree trunk. Likewise, morphological adaptions of bills include the short, heavy bill of a grosbeak adapted for cracking seeds; the hooked, sharp bill of a flesh-eating hawk; the chisel-like bill of a woodpecker; and the probing bill of a Spotted Sandpiper. Other morphological adaptions are the large,

forward-directed eyes of raptors; the hovering ability of hummingbirds; the change in plumage color of ptarmigan; and the ability of a Dipper to walk underwater. Each bird is specially equipped to function and perhaps to survive, in a specific ecological role and in a particular habitat. Look for these characteristics.

Reproduction is a main activity of birds in summer. In the Pingree Park area much of this activity may be compressed into a short season, especially at the highest elevations where summer is brief. Most birds are more or less monogamous for a single season. Only in a few species, in which birds are usually long-lived, does the pair bond exceed one year. Golden Eagles and Ospreys might be examples. In a few species, such as Blue Grouse, one male may mate with several females.

Courtship is often spectacular. Displays and breeding calls are highly varied but specific for each species; they fulfill the function of advertising breeding readiness and locating mates. The defense of a "territory" may also involve noisy and aggressive behavior. Usually it involves males of the same species, and seldom do the antagonists do more harm than a few plucked feathers in the brief "combat" which is often ritualized.

Nests range from the intricately constructed Robin's nest to simply laying four eggs on the ground as a Kildeer does. Clutch sizes range from two for a Broad-tailed hummingbird to a dozen for the Mallard. Many birds are persistent renesters if a nest is destroyed before the young are fledged, and many species are multibrooded, raising up to three families each year. Most species have altricial young--remaining in the nest for a period of weeks after hatching; a few such as the ptarmigan are precocial and leave the nest within a day after hatching. When you are fortunate enough to find an active bird nest, a photograph is an excellent record of your observation, especially if you keep a field diary with supplemental notes.

The majority of birds in the Pingree Park area have high rates of population turnover. Certainly, a typical bird when fledged has a life espectancy of less than a year. However, a very few, such as the large raptors, may often live for a decade or more. Birds have high metabolic rates and require relatively constant supplies of suitable foods. Nestlings may consume their own weight in food each day. Even short food crises can weaken birds or cause them to expose themselves to mortality agents such as predators, diseases or accidents.

Birds are the most easily observed class of vertebrates. Because they are so abundant and visible, they are especially useful in describing or recognizing biotic communities. You will visit and study representative communities in at least four life zones near Pingree Park. Avian species which are most restricted in their ecologic distribution are the best indicators of community types; usually there are a few of these in each community. More numerous are the species which are typical of a particular biotic community but frequently occur in adjacent habitats. A few species are truly ubiquitous--widespread over several life zones. The most

ubiquitous of the common Pingree Park species are Mallard, Goshawk, Red-tailed Hawk, Blue Grouse, Killdeer, Spotted Sandpiper, Great Horned Owl, Common Nighthawk, Red-shafted Flicker, Hairy Woodpecker, Common Raven, House Wren, American Robin, Mountain Bluebird, Pine Siskin, and Gray-headed Junco--all occur in at least three life zones.

The Tundra Community occurs in the Alpine Life Zone above timberline. The Horned Lark is common in the Tundra Community and also abundant on the shortgrass prairies below 2000 m; the rarer Prairie Falcon is another species with this type of distribution. The Water Pipit and Brown-capped Rosy Finch are restricted to the tundra, and the White-tailed Ptarmigan is most commonly found above tree line. The White-crowned Sparrow is also common on the tundra. In late summer especially, individuals of many species that nest below timberline may wander into the tundra.

The Spruce-Fir Community occupies much of the Hudsonian Life Zone, which is a narrow irregular belt below the Alpine Life Zone. The most typical avian species are Clark's Nutcracker, Brown Creeper, Pine Grosbeak, and Ruby-crowned Kinglet. Gray-headed Juncos are often abundant, and in late summer, Blue Grouse may congregate in this community to feed on berries of Vaccinium spp.

The Lodgepole Pine Community comprises much of the Canadian Life Zone. The boundaries of this life zone are vague; it extends from approximately 2500 to 3000 m. Typical species of birds for the Lodgepole Pine Community include Gray Jay, Hermit Thrush, Yellow-rumped (Audubon's) Warbler, and chickadees. Many species from adjacent communities and most of the ubiquitous species are found in this community. The open parks, streamsides, and aspen groves especially, are likely to contain abundant and varied avifauna in summer.

The Ponderosa Pine Community probably has the most varied bird life of any community in the Pingree Park area. This major community of the Transition Life Zone is typified by Western Wood Peewee, Steller's Jay, Western Tanager, and Pygmy Nuthatch. Also common are several species of woodpeckers, flycatchers, nuthatches, chickadees, swallows, and wrens.

You will probably visit the Mountain Shrub Community in the Lower Transition Life Zone. You may expect to see the Black-billed Magpie, Green-tailed Towhee, and several sparrows. Some more ubiquitous species especially common here are Red-tailed Hawk, American Kestrel, Cliff Swallow and Mourning Dove.

Riparian and meadow habitat along streams intersects all montane forest types. These moist, often brushy habitats attract certain birds which thereby occur within several life zones. Among these species are Common Snipe, Lincoln's Sparrow (above 2400 m), Song Sparrow (below 2500 m), Yellow Warbler (below 2700 m), and Wilson's Warbler. Betted Kingfisher, Dipper, and Green-winged Teal are examples of species which are even more closely associated with stream environments extending through several life zones.

PRELIMINARY CHECKLIST OF SUMMER BIRDS OF PINGREE PARK AREA, COLORADO, ABOVE 2500 M

A = abundant; C = common; O = occasional; R = rare. Species listed without prefix symbol are theoretically present but unreported in recent years.

O Mallard ✓
O Green-winged Teal
R Turkey Vulture
O Goshawk
Sharp-shinned Hawk
Cooper's Hawk
O Red-tailed Hawk
Swainson's Hawk
R Golden Eagle
Bald Eagle
R Marsh Hawk
R Osprey
R Prairie Falcon
Peregrine Falcon
American Kestrel
O Blue Grouse
C White-tailed Ptarmigan
R Kildeer
C Spotted Sandpiper
C Common Snipe
O Band-tailed Pigeon
O Mourning Dove
Great Horned Owl
Screech Owl
Pygmy Owl
Saw-whet owl
C Common Nighthawk
A Broad-tailed Hummingbird ✓
O Rufous Hummingbird
O Belted Kingfisher
O Common (Red-shafted) Flicker
O Yellow-bellied Sapsucker
O Williamson's Sapsucker
O Downy Woodpecker
C Hairy Woodpecker
Northern Three-toed Woodpecker
C Empidonax spp. flycatchers
O Western Wood Peewee
O Olive-sided Flycatcher
O Horned Lark
C Violet-green Swallow
C Tree Swallow
Cliff Swallow
C Gray Jay ✓
C Steller's Jay ✓
Black-billed Magpie
C Common Raven ✓
C Clark's Nutcracker

C Black-capped Chicadee
C Mountain Chickadee
R White-breasted Nuthatch
Red-breasted Nuthatch
O Pygmy Nuthatch
O Brown Creeper
O Dipper
R House Wren
Canon Wren
R Rock Wren
A American Robin ✓
C Hermit Thrush
Swainson's Thrush
Western Bluebird
C Mountain Bluebird
C Townsend's Solitaire
A Ruby-crowned Kinglet
R Golden-crowned Kinglet
C Water Pipit
O Solitary Vireo
Warbling Vireo
C Yellow Warbler
A Yellow-rumped (Audubon's) Warbler ✓
R MacGillivray's Warbler
Yellowthroat
A Wilson's Warbler ✓
O Red-winged Blackbird
R Bullock's Oriole
R Brewer's Blackbird
O Western Tanager
Black-headed Grosbeak
R Evening Grosbeak
O Cassin's Finch
C Pine Grosbeak
C Brown-capped Rosy Finch
A Pine Siskin
American Goldfinch
R Red Crossbill
O Green-tailed Towhee
R Lark Bunting
Savannah Sparrow
O Vesper Sparrow
A Gray-headed Junco
O Chipping Sparrow
C White-crowned Sparrow
C Lincoln's Sparrow
O Song Sparrow

REPRESENTATIVE VEGETATION OF THE MOUNTAIN SHRUB COMMUNITY (TRANSITION LIFE ZONE)

TREES	
*Alnus tenuifolia	x thinleaf alder
*Juniperus scopulorum	x Rocky Mountain juniper
*Pinus ponderosa	x ponderosa pine
*Populus angustifolia	x narrowleaf cottonwood
*Prunus virginiana	x choke cherry
SHRUBS	
Amelanchier alnifolia	serviceberry
*Artemesia tridentata	x big sagebrush
*Cercocarpus montanus	mountain mahogany
Chrysothamnus sp.	rabbitbrush
Leptodactylon pungens	prickly gilia
Mamillaria vivipara	pincushion cactus
Opuntia sp.	pricklypear
Physocarpus monogynus	ninebark
*Purshia tridentata	x bitterbrush
*Rhus trilobata	skunkbush
*Ribes cereum	x squaw currant
*Rosa sp.	rose
*Rubus deliciosus	flowering raspberry
*Symphoricarpos sp.	snowberry
FORBS	
*Achillea lanulosa	yarrow
*Allium sp.	onion
*Artemisia frigida	x fringed sage
Asclepias sp.	milkweed
*Astragalus sp.	milk vetch
*Cryptantha virgata	miner's candle
*Erigeron sp.	daisy
*Eriogonum umbellatum	sulphur-flower
*Gaillardia aristata	gaillardia
*Geranium sp.	geranium
Grindelia squarrosa	curlycup gumweed
*Heterotheca (chrysopsis) villosa	hairy goldenaster
*Helianthus pumilus	dwarf sunflower
Lepidium sp.	pepper-grass
*Penstemon sp.	penstemon
Phacelia heterophylla	scopion-weed
*Potentilla sp.	herbaceous cinquefoil
Pseudocymopterus montanus	mountain parsley
*Sedum stenopetalum	stonecrop
Selaginella sp.	little club moss
*Senecio sp.	senecio
Sphaeralcea coccinea	scarlet globe mallow
*Taraxacum offincinale	x common dandelion

MOUNTAIN SHRUB COMMUNITY continued

GRASSES AND GRASSLIKE	
Agropyron griffithsii	Griffith's wheatgrass
*Agropyron smithii	western wheatgrass
Agropyron trachycaulum	slender wheatgrass
*Bouteloua gracilis	blue grama
*Bromus tectorum	cheatgrass brome
*Carex sp.	sedge
Elymus ambiguus	Colorado wildrye
Festuca ovina	sheep fescue
*Koeleria cristata	junegrass
Muhlenbergia filiculmis	slimstem muhly
*Muhlenbergia montana	mountain muhly
*Stipa comata	needleandthread
Stipa robusta	sleepy grass
Stipa viridula	green needlegrass

REPRESENTATIVE VERTEBRATES OF THE MOUNTAIN SHRUB COMMUNITY
(R= restricted; T=typical; U=ubiquitous)

REPTILLIA
- Prairie rattlesnake (Crotalus viridis) - T
- Bull snake (Pituophis melanoleucus savi) - T
- Western Garter Snake (Thamnophis elegans) - U

AVES (few distinctive species)
- Black-billed Magpie (Pica pica) - T
- Say's Phoebe (Sayornis saya) - T
- Green-tailed Towhee (Chlorura chlorura) - T
- Brewer's Sparrow (Spizella breweri) - T
- Red-tailed Hawk (Buteo borealis) - U
- Kestrel (Falco sparverius) - U
- Mourning Dove (Zenaidura macroura) - U
- Nighthawk (Chordeiles minor) - U
- Cliff Swallow (Petrochelidon pyrrhonota) - U
- Chipping Sparrow (Spizella passerina) - U

MAMMALIA (few distinctive)
- Blacktailed jackrabbit (Lepus californicus) - T
- Bushy-tailed woodrat (Neotoma cinerea) - T
- Mountain cottontail (Sylvilagus nuttalli) - U
- Voles (Microtus spp.) - U
- Deer mouse (Peromyscus maniculatus) - U
- Coyote (Canis latrans) - U
- Longtailed weasel (Mustela frenata) - U
- Spotted skunk (Spilogale putorius) - U
- Badger (Taxidea taxus) - U
- Raccoon (Pyocyon lotor) - U
- Mule deer (Odocoileus hemionus) - U
- Bobcat (Lynx rufus) - U

REPRESENTATIVE VEGETATION OF THE PONDEROSA PINE COMMUNITY
(TRANSITION LIFE ZONE)

TREES	
*Betula occidentalis	water birch
*Picea pungens	blue spruce
*Pinus ponderosa	ponderosa pine
*Populus tremuloides	quaking aspen
*Pseudotsuga menziesii	Douglas-fir
SHRUBS	
*Arceuthobium sp.	dwarf mistletoe
*Arctostaphylos uva-ursi	kinnikinnik
Ceanothus velutinus	buckbrush
*Juniperus communis	common juniper
*Potentilla fruiticosa	shrubby cinquefoil
*Purshia tridentata	bitterbrush
*Ribes cereum	squaw currant
*Rosa sp.	Rose
FORBS	
*Achillea lanulosa	yarrow
*Allium sp.	onion
*Antennaria rosea	rose pussytoes
*Arenaria fendleri	Fendler sandwort
*Artemisia frigida	fringed sage
*Astragalus sp.	milk vetch
Campanula sp.	harebell
*Castilleja sp.	paintbrush
*Draba sp.	draba
*Erigeron sp.	daisy
*Eriogonum umbellatum	sulphur-flower
Fragaria sp.	strawberry
*Gaillardia aristata	gaillardia
*Geranium sp.	geranium
Harbouria trachypleura	whiskbroom parsley
*Lupinus sp.	lupine
*Oxytropis sp.	locoweed
*Penstemon sp.	penstemon
Phacelia sp.	scorpion weed
*Pontentilla sp.	herbaceous cinquefoil
Pseudocymopterus montanus	yellow mountain parsley
Pulsatilla patens	pasqueflower
*Sedum stenopetalum	yellow stonecrop
*Senecio sp.	senecio
*Thermopsis divaricarpa	golden banner
GRASSES AND GRASSLIKE	
Agropyron griffithsii	Griffith's wheatgrass
*Agropyron smithii	western wheatgrass
Bromus anomalus	nodding brome
*Calamagrostis purpurascens	purple reedgrass
*Carex sp.	sedge

GRASSES AND GRASSLIKE continued

*Danthonia paryi	Parry oatgrass
*Festuca sp.	fescue
*Hesperochloa kingii	King fescue
*Koeleria cristata	junegrass
*Muhlenbergia filiculmis	slimstem muhly
*Muhlenbergia montana	mountain muhly
*Phleum pratensis	timothy
*Poa pratensis	Kentucky bluegrass
*Poa sp.	bluegrass
*Sitanion hystrix	bottlebrush squirreltail
Stipa columbiana	subalpine needlegrass
*Stipa comata	needleandthread

REPRESENTATIVE VERTEBRATES OF THE PONDEROSA PINE COMMUNITY - TRANSITION ZONE
(R=restricted; T=typical; U=ubiquitous)

PISCES
- Rainbow trout (Salmo Gairdneri) - U
- Brown trout (Salmo trutta) - U

AMPHIBIA
- Mountain toad (Bufo boreas) - U

REPTILLIA
- Western garter snake (Thamnophis elegans) - U

AVES
- ✓Steller's Jay (Cyanocitta stelleri) - R
- Western Tanager (Piranga ludoviciana) - R
- Pygmy Nuthatch (Sitta pygmaea) - R
- ✓Yellow-bellied Sapsucker (Sphyrapicus varius) - T
- Violet-green Swallow (Tachycineta thalassina lepida) - T
- ✓Black-capped Chickadee (Penthestes atricapillus) - T
- ✓White-breasted Nuthatch (Sitta carolinensis) - T
- House Wren (Troglodytes aedon parkmani) - T
- ✓Mountain Bluebird (Sialia currocoides) - T
- Red-tailed Hawk (Buteo jamaicensis) - U
- Great Horned Owl (Bubo virginianus) - U
- ✓Red-shafted Flicker (Colaptes cafer) - U
- ✓Downy Woodpecker (Dryobates pubescens) - U

MAMMALIA
- Tassel-eared squirrel (Sciurus aberti) - R
- Mountain cottontail (Sylvilagus nuttalli) - T
- Little brown bats (Myotis spp.) - U
- Colorado Chipmunk (Eutamias quadrivittatus) - U
- Golden-mantled ground squirrel (Citellus lateralis) - U
- Deer mouse (Peromyscus maniculatus) - U
- Voles (Microtus spp.) - U
- Porcupine (Erethizon dorsatum) - U
- Red fox (Vulpes fulva) - U
- Black bear (ursus americana) - U
- Badger (Taxidea taxus) - U
- Mountain lion (Felis concolor) - U
- Bobcat (Lynx rufus) - U
- Mule deer (Odocoileus hemionus) - U

REPRESENTATIVE VEGETATION OF THE LODGEPOLE PINE COMMUNITY - MATURE AND DISTURBED (CANADIAN LIFE ZONE)

TREES	
*Abies lasiocarpa	subalpine fir
*Picea engelmannii	Engelmann spruce
*Pinus contorta	lodgepole pine
*Pinus flexilis	limber pine
*Populus tremuloides	quaking aspen
*Pseudotsuga menziesii	Douglas-fir
SHRUBS	
*Arctostaphylos uva-ursi	kinnikinnik
*Jamesia americana	cliffbush
*Juniperus communis	common juniper
*Mahonia repens	Oregon-grape
Prunus pensylvanica	pin cherry
*Ribes cereum	squaw currant
*Rosa sp.	Rose
*Rubus strigosus	red raspberry
*Salix sp.	willow
*Sambucus racemosa	red-berried elder
*Shepherdia canadensis	Canada buffaloberry
*Vaccinium sp.	vaccinium
FORBS	
*Achillea lanulosa	yarrow
Androsace septentrionalis	rock-primrose
*Antennaria rosea	rose pussytoes
Arenaria fendleri	Fendler sandwort
*Arnica cordifolia	heartleaf arnica
*Astragalus sp.	milk vetch
*Castilleja sp.	paintbrush
*Draba sp.	draba
*Epilobium angustifolium	firewood
*Erigeron sp.	daisy
*Erysimum asperum	western wallflower
Fragaria sp.	strawberry
*Geranium sp.	geranium
Harbouria trachypleura	whiskbroom parsley
Heterotheca villosa	hairy goldenaster
*Penstemon sp.	penstemon
*Potentilla sp.	herbaceous cinquefoil
Pseudocymopterus montanus	yellow mountain parsley
*Pyrola sp.	pyrola
*Sedum stenoptalum	yellow stonecrop
*Senecio sp.	senecio
*Thermopsis divaricarpa	golden banner
GRASSES AND GRASSLIKE	
*Calamagrostis purpurascens	purple reedgrass
*Carex sp.	sedge

GRASSES AND GRASSLIKE continued

*Hesperochloa kingii	King fescue
Juncus sp.	rush
*Poa pratensis	Kentucky bluegrass
*Trisetum spicatum	spike trisetum

REPRESENTATIVE VERTEBRATES OF THE LODGEPOLE PINE COMMUNITY (TYPICAL AND MEADOW) - CANADIAN ZONE (R-Restricted; T-typical; U-ubiquitous)

PISCES
- Rainbow trout (Salmo gairdneri) - U
- Brook trout (Salvelinus fontinalis) - T

AMPHIBIA
- Mountain toad (Bufo boreas) - T
- Chorus frog (Pseudacris triseriata) - T

REPTILIA
- Western garter snake (Thamnophis elegans) - T

AVES
- Hermit Thrush (Hylocichla guttata) - R
- Gray Jay (Perisoreus canadensis) - R/T
- Mountain chickadee (Parus gambeli) - T/R
- Goshawk (Astur atricapillus) - T
- Ruby-crowned Kinglet (Corthylio calendula) - T
- Yellow-rumped (Audubon's) Warbler (Dendroica auduboni) - T
- Townsend's Solitaire (Myadestes townsendi) - T
- Broad-tailed Hummingbird (Selasphorus plastycercus) - T
- Pine Siskin (Spinus pinus) - T
- Wilson's Warbler (Wilsonia pusilla) - T
- Hairy Woodpecker (Dendrocopos villosus) - T
- Gray-headed Junco (Junco caniceps) - U
- American Robin (Turdus migratorius) - U

MAMMALIA
- squirrel (Tamiasciurus hudsonicus) - T/R
- Vagrant shrew (Sorex vagrans) - T
- Boreal redback vole (Clethrionomys gapperi) - T
- Richardson's ground squirrel (Spermophilus richardsoni) - T
- Beaver (Castor canadensis) - T
- Mountain vole (Microtus montanus) - U
- Deer mouse (Peromyscus maniculatus) - U
- Golden-mantled ground squirrel (Spermophilus lateralis) - U
- Colorado chipmunk (Eutamias quadrivittatus) - U
- Northern pocket gopher (Thomomys talpoides) - U
- Porcupine (Erethizon dorsatum) - U
- Black bear (Ursus americana) - U
- Mink (Mustela vison) - U
- Wapiti or Elk (Cervus canadensis) - U

REPRESENTATIVE VEGETATION OF THE SPRUCE-FIR COMMUNITY - MATURE & DISTURBED (HUDSONIAN/CANADIAN LIFE ZONE)

TREES	
*Abies lasiocarpa	subalpine fir
*Picea engelmannii	Engelmann spruce
*Pinus contorta	lodgepole pine
*Pinus flexilis	limber pine
*Populus tremuloides	quaking aspen
SHRUBS	
*Acer glabrum	Rocky Mountain maple
*Arctostaphylos uva-ursi	kinnikinnik
*Betula glandulosa	mountain bog birch
Gaultheria humifusa	true wintergreen
*Jamesia americana	cliffbush
*Juniperus communis	common juniper
Kalmia polifolia	dwarf laurel
Linnaea borealis	twinflower
*Lonicera involucrata	honeysuckle
*Rosa sp.	Rose
*Rubus strigosus	red raspberry
*Salix sp.	willow
*Sambucus racemosa	red-berried elder
*Shepherdia canadensis	Canada buffaloberry
*Vaccinium sp.	vaccinium
FORBS	
Anaphalis subalpina	pearly everlasting
Anemone globosa	windflower
Arabis sp.	rockcress
*Arnica cordifolia	heartleaf arnica
*Caltha leptosepala	marsh-marigold
*Epilobium angustifolium	fireweed
*Geranium sp.	geranium
*Mertensia sp.	blue bells
Pedicularis bracteosa	tall lousewort
Primula parryi	Parry's primrose
*Pyrola sp.	pyrola
*Smilacina racemosa	Solomon's plume
*Streptopus amplexifolius	twisted-stalk
*Trollius laxus	globeflower
GRASSES AND GRASSLIKE	
Agropyron subsecundum	bearded wheatgrass
Calamogrostis canadensis	bluejoint reedgrass
*Calamogrostis purpurascens	purple reedgrass
*Carex sp.	sedge
*Deschampsia caespitosa	tufted hairgrass
Festuca thurberi	Thurber fescue
Stipa columbiana	subalpine needlegrass
*Trisetum spicatum	spike trisetum

REPRESENTATIVE VERTEBRATES OF THE SPRUCE-FIR COMMUNITY - HUDSONIAN ZONE
(R-restricted; T=typical; U=ubiquitous)

PISCES
- Cutthroat trout (*Salmo clarkii*) - T

AMPHIBIA
- Mountain toad (*Bufo boreas*) - T

AVES
- Clark's Nutcracker (*Nucifraga columbiana*) - T/R
- Pine Grosbeak (*Pinicola enucleator*) - T/R
- Blue Grouse (*Dendrogapus obscurus*) - T
- Ruby-crowned Kinglet (*Regulus calendula*) - T
- Wilson's Warbler (*Wilsonia pusilla*) - T
- Lincoln's Sparrow (*Melospiza lincolni*) - T
- Gray-headed Junco (*Junco caniceps*) - U

MAMMALIA
- Varying hare (*Lepus americanus*) - T/R
- Red-backed vole (*Clethrionomys gapperi*) - T/R
- Shrews (*Microsorex* and *Sorex* spp.) - T
- Marten (*Martes americana*) - T
- Deer mouse (*Peromyscus maniculatus*) - U
- Colorado chipmunk (*Eutamias quadrivittatus*) - U
- Wapiti or Elk (*Cervus canadensis*) - U
- Mule deer (*Odocoileus hemionus*) - U

REPRESENTATIVE VEGETATION OF THE ALPINE TUNDRA COMMUNITY
(ALPINE LIFE ZONE)

TREES	
*Abies lasiocarpa	subalpine fir
*Picea engelmannii	Englemann spruce
*Pinus contorta	lodgepole pine
*Pinus flexilis	limber pine
SHRUBS	
*Betula glandulosa	mountain bog birch
*Dryas octopetela	mountain dryad
*Juniperus communis	common juniper
Kalmia polifolia	dwarf laurel
*Potentilla fruticosa	shrubby cinquefoil
*Salix sp.	willow
*Vaccinium sp.	vaccinium
FORBS	
*Achillea lanulosa	yarrow
Androsace chamaejasme	rock-jasmine
Anemone globosa	windflower
*Antennaria rosea	rose pussytoes
Arabis sp.	rockcress
*Arenaria obtusiloba	Arctic sandwort
*Caltha leptosepala	marsh-marigold
*Castilleja sp.	paintbrush
*Draba sp.	draba
*Erigeron sp.	daisy
*Eritrichium elongatum	alpine forget-me-not
Frasera speciosa	monument plant
*Geum rossii	alpine avens
Lewisia pygmaea	least lewisia
*Lupinus sp.	lupine
*Mertensia sp.	blue bells
*Oxytropis sp.	locoweed
*Pedicularis groenlandica	little pink elephant
*Pedicularis parryi	Parry lousewort
*Penstemon sp.	penstemon
Polemonium delicatum	Jacob's ladder
Polemonium viscosum	sky pilot
*Polygonum bistortoides	American bistort
*Potentilla sp.	herbaceous cinquefoil
Primula parryi	Parry primrose
*Ranunculus adoneus	snow buttercup
*Saxifraga rhomboidea	snowball saxifrage
Sedum rhodanthum	rose crown
Sedum rosea	king's crown
*Sedum stenopetalum	yellow stonecrop
*Sibbaldia procumbens	false strawberry
*Silene acaulis	moss pink, moss campion
Thlaspi alpestre	candytuft
*Trifolium spp.	clovers
*Trollius laxus	globeflower

TUNDRA COMMUNITY continued

GRASSES AND GRASSLIKE

*Agropyron scribneri	Scribner wheatgrass
*Calamagrotis purpurascens	purple reedgrass
*Carex sp.	sedge
*Deschampsia caespitosa	tufted hairgrass
*Festuca ovina	sheep fescue
*Phleum alpinum	alpine timothy
*Poa sp.	bluegrass
*Trisetum spicatum	spike trisetum

REPRESENTATIVE VERTEBRATES OF THE TUNDRA COMMUNITY - ALPINE ZONE
(R=restricted; T-typical; U-ubiquitous)

AVES

- White-tailed Ptarmigan (Lagopus leucurus) - R
- Water Pipit (Anthus spinoletta) - R
- Brown-capped Rosy Finch (Leucosticte australis) - R
- Prairie Falcon (Falco mexicanus) - T
- Horned Lark (Otocoris alpestris) - T
- White-Crowned Sparrow (Zonotrichis leucophyrs) - T
- Golden Eagle (Aguila chrysaetos) - U
- Common Raven (Corvus corvax) - U

MAMMALIA

- Pika (Ochotona princeps) - R
- Bighorn sheep (Ovis canadensis) - R/T
- Heather vole (Phaenacomys intermedius) - T
- White-tailed jackrabbit (Lepus townsendii) - T
- Least chipmunk (Eutamias minimus) - U
- Yellow-bellied marmot (Marmota flaviventris) - U
- Coyote (Canis latrans) - U
- Red fox (Vulpes fulva) - U
- Longtailed weasel (Mustela frenata) - U
- Wapiti or Elk (Cervus canadensis) - U

TREE DISEASES OF THE PINGREE PARK AREA

NAGAYOSHI OSHIMA

Forest trees are affected by many diseases, which cause not only tree mortality but also reduction in annual increment, and wood and landscaping quality. Diseases also predispose trees to insect attack, winter injury and windthrow. Damages caused by disease are often not as spectacular as those caused by insects or fire, but it is more of a persistent nature. Annual growth losses in trees 5.0 inches in diameter and over in the U.S. are (in billion cubic feet): disease, 4.3; insect, 0.8; fire 1.5; weather, 0.1.

Disease can be defined as "persistent deviation from normal function and structure of an organism." Some diseases are caused by living organisms (pathogens), such as bacteria, fungi, (virus), nenatodes and parasitic higher plants, (infectious diseases or parasitic diseases). Factors involved here are - excessively high or low air and soil temperatures, soil moistures, nutrient deficiency and excess, soil aeration, and air and water pollution.

Pathogens are parasitic organisms which obtain nutrients from other organisms (hosts) at their expense. Some of them such as rusts and dwarf mistletoe must obtain nutrients from living tissues (obligate parasite), but many others can obtain nutrients also from dead organi matter (saprophytes).

Diseases are recognized by symptoms or signs. "Symptoms" are evidences of disease produced by hosts such as browning of needles, leaf spots, witches' broom, chlorosis or dwarfing, etc; whereas "signs" are evidences produced by pathogens, such as sporophous (conks) or white mycelial mats.

Symptoms can be divided into three types. (1) necrotic, (2) hypoplastic and (3) hyperplastic; necrotic symptoms are the ones in which tissues are degenerating or dying, such as browning, blight, canker, chlorosis and decay. Hypoplastic symptoms are the ones in which multiplication and enlargement of cells are reduced, such as dwarfing. In hyperplastic symptoms, cell division and enlargement are accelerated, resulting in malformations such as galls, witches broom, and burls.

In the western United States dwarf mistletoes cause the greatest damage to conifers followed by wood-decaying fungi.

I. Non-parasitic diseases

1. Winter drying and red belt
   Conifer needles turn brown often in late spring. Browning is usually more severe in older needles. This is caused by "winter drying", which took place in late winter and early spring. Rise in air temperature during the period increases the transpiration in the daytime. But since the ground is still frozen, it is impossible for the tree to replace the moisture, resulting in browning and death of the needles.

In the western U.S., winter drying caused by chinook winds appears at certain elevations of the mountain slope, and is called "red belt".

2. Freezing injury and frost crack
Freezing injury is more severe if low temperature occurs when trees are not dormant, as in late and early frost injury. It is also more severe in a depressed area where cold air can move in and accumulate.

Frost crack is a straight crack which appears on the trunk. This develops when the air temperature suddenly falls. The outside of the trunk cools down rapidly, whereas it takes longer for the inside to cool. The stress due to this difference causes the wood to crack. Callus tissues can heal the cracks, but this often predisposes trees to the attack of heart rot fungi.

3. Soil compaction
Trees located close to trails, picnic and camp grounds often show decline in vigor. This may be the direct result from mechanical injury of above-ground parts, but it is also due to soil compaction caused by heavy traffic. Compaction causes oxygen starvation of feeder roots, and results in sparse and chlorotic crowns and eventual die-back.

4. Flood injury

During floods tree roots are covered by water. Conifers are very sensitive and trees may die even if their roots were immersed only for a few days.

Oxygen starvation is generally considered to be the cause of the death, but some claim that death is caused by toxins which accumulate in the flood water.

Trees such as willows, poplars, alders and some species of birch are relatively tolerant of flood.

5. Terminal injury and die-back
Terminal injury includes broken tops or the aborted development of buds resulting in double or multiple leaders. These can be caused by freezing, dessication by hot wind, animals, birds or insects. Die-back is a necrotic symptom in which tree branches die from the top down. Causes of die-back are often of environmental nature, but stem diseases like canker may cause die-back.

6. Sunscald
Sunscal is the injury of the bark caused by the intense heat of sunlight. It appears often on the southwest side of the tree, and discoloration, necrosis and death of the bark may result. It is most severe with species having thin and smooth barks such as aspen or birch and when the stand is thinned and open. Incidence of sunscald increases when the stand is thinned and open.

Sunscald often develops during late winter and early spring when the bark is heated by the sun in the daytime, and then is frozen at night (winter sunscald).

Sunscalds often predispose trees to canker diseases.

II. Parasitic Diseases

1. Root Diseases

Tree roots are often invaded by various fungi. Some of them are beneficial to the trees (mycorrhizae), helping them in the absorption of nutrients, and protecting them from infection by strong pathogens. Most forest tress have mycorrizae. Fungal hyphae grow on the surface and in the intercellular spaces of roots (Ectomycorrhizae).

Many fungi which penetrate into tree roots, however, are pathogens. They can survive in the soil as resting spores or in plant residues as mycelia for many years, and as the root grows by they become active and infect the root. Some of the root rot fungi like Armillaria can grow through the soil by shoe-string like strands of mycelia (Rhizomorph). Some can move from tree to tree through root contact or root fusion.

Root rot fungi such as Pythium, Phytophthora, Fusarium and Rhizoctonia can cause a rapid killing of young seedlings (Damping-off) and affect the regeneration of stands of trees.

Other fungi destroy feeder-roots, cortex, and cambial tissues or even cause decay of woody tissues and weaken the mechanical strength of the roots.

Trees affected by root rots show a gradual general decline, such as sparse crown, chlorotic leaves, and reduction in height and diametal growth.

Root rot infections often predispose trees to windthrow and insect attack, such as the infestation of ponderosa pine by mountain pine bark-beetle following an attack by Armillaria.

Important root diseases of the area are:

A. Shoestring root rot of conifers and hardwoods, caused by Armillaria mellea. This is common on lodgepole and ponderosa pines, especially in overstocked stands or on saplings. Characteristic symptoms are abundant resin flow at the trunk-base, white mycelial-fan under bark, yellow sap-rot and black, shoestring like rhizomorph on roots.

B. White-mottled root rot of aspen and poplars, caused by Fomes applanatus is common on quaking aspen. It is characterized by crumbly white rot of roots and butts and, a shelf-like dark brown fruiting body which appears on the trunk near the base. Almost all the wind-thrown aspen in Colorado show some degree of white-mottled root rot.

2. Foliage diseases
Foliage diseases of conifers and hardwoods are caused by fungi, which penetrate the leaves, and cause spotting, browning, malformation and eventual death. These fungi usually survive in infected dead leaves and twigs, and at the beginning of the growing season discharge spores which germinate on the leaves and cause infection. Water is essential for spore germination and these diseases are more prevalent and severe in humid areas in the United States.

Important diseases of the area are:

a. Needle casts of conifers listed below are caused by fungi in the Ascomycetes, and infection is localized in the needles. An exception is Elytroderma which grow systemically in the twigs and cause witches' broom. Characteristic symptoms of needle casts are the presence of dark-colored ellipsoid fruiting bodies on the needle, and general browning of the crown.

Elytroderma deformans on ponderosa pine

Hypoderma saccatum on lumber pine

Hypodermella concolor on Lodgepole pine

Hypodermella montivaga on Lodgepole pine

Hypodermella medusa on ponderosa pine

Lopodermium ponderosa on ponderosa pine

Rhabdocline pseudotsugae on douglas fir

b. Leaf spots, leaf blisters, leaf rusts and powdery mildews of hardwoods, listed below, cause only minor damage:

Inky spots of aspen, caused by Ciborinia confundens, is characterized by small, round black spots.

Leaf spots and blight of aspen, caused by Marssonina populi, is characterized by irregular spots and necrosis of leaves and twigs. Some aspen clones are showing resistance.

Powdery mildew of aspen, caused by Unvinula salicis, is an obligate parasite, and characterized by superficial white mycelium on the leaf surface.

Leaf rusts of aspen and cottonwoods, caused by Melampsora spp., is characterized by yellow-orange pustules, which turn black at the end of the season.

Leaf blister of wild plum caused by Taphrina communis, is characterized by malformed and swollen leaves and fruits.

c. Brown felt blight (Snow mold)

Felt blight on subalpine firs and Engelmann spruces, caused by Herpotrichia Nigra

Felt blight on lodgepole pine, caused by Neopeckia coulteri are characterized by messy dark brown mycelial mats which cover the branches of hosts growing at high elevation(9 to 10 thousand feet). The fungi can only grow under the snow. They may cause extensive seedling mortality.

3. Stem diseases - cankers

Cankers are necrotic diseases of the bark. Symptoms include discolored and sunken tissues, formation of callus around the lesion, and die-back. Some cankers are annual, bur most are perennial and subsist for many years. When expansion of canker is slow, the host can form callus tissues to stop it. But the causal organism can invade the callus during the dormant season and eventually the canker will show a target shape. When the canker enlarges rapidly, no callus is formed and the tree will be girdled in a few years. When a branch is girdled it will turn brown and show "flagging".

Fungi belonging to the class Ascomycetes are the main cause of cankers. They enter the bark through wounds of various kinds. Sunscars and injury caused by man, animal and insects are important points of entry.

Quaking aspen is extremely susceptible to canker diseases due not only to its delicate thin bark but also due to the presence of sugars produced through photosynthesis in the bark.

When trees are in high vigor and the turgidity of bark cells is high, they are less susceptible to canker diseases. Incidences of canker diseases are also low when the healing process of bark wounds is rapid.

Important canker diseases are:

a. Cytospora canker of Douglas fir, Engelmann and blue spruces, caused by Cytospora Kunzei is characterized by flagging of branches and an abundant resin production at their base. Unfavorable environment can predispose the hosts to this disease.

b. Abietiscola, a common cause of flagging and die-back of seedlings.

c. Pitch canker of Engelmann spruce, (cause unknown) is characterized by stem swelling and abundant resin production.

d. Cytospora canker of aspen and cottonwoods, caused by Cytospora chrysosperma is prevalent on weakened trees. Orange sporehorns appear on the bark after a rain.

e. Ceratocystis canker of aspen, caused by Ceratocystis fimbriata, is characterized by ridged concentric cankers. This is a slow-growing canker but still reduces the quality of wood.

f. Sooty bark canker of aspen, caused by Cenamgium singulare, is characterized by discolored bark with zonate lines and is sooty under bark tissue. This is a rapid-growing and destructive canker and can kill a 60 year old aspen in three years.

4. Stem diseases - Rusts

Rusts are a group of fungi in the class Basidiomycetes, which cause many destructive plant diseases. They are obligate parasites, and very host specific, and have many spore stages. Many of them require two hosts to complete their life cycle, (Heteroecious rusts), but some are known to require only one host (Autoecious rusts).

Rust fungi cause stem cankers, (often accompanied by abundant resin production) malformation stems such as galls, swellings and witches' broom and limb killing.

Spread of rusts is by airborne spores, and initial infection usually takes place on young shoots. After penetration fungal hyphae invade branches, limbs and main trunk following through vascular tissues (systemic infection).

Since stem rust infection is systemic it is difficult to control the disease by chemical or surgical means. Alternate hosts are usually abundant and their eradication in forest stands is usually not feasible.

Important stem rusts are:

a. Comandra rust of lodgepole and ponderosa pines caused by Cronartium comandraecharacterized by trunk cankers accompanied by abundant resin flow. Alternate host is Comandra which is a parasitic plant on a sage brush.

b. Stalactiform stem rust of lodgepole pine, caused by Peridermium stalactiforme, is characterized by elongated trunk cankers (a ratio of width and length is 1:5). Alternate host is paint brush.

c. Limb rusts of ponderosa pine, caused by Peridermium filamentosum and characterized by systemic infection of limbs and eventual limb-killing. No cankers are formed. Alternate host is again paint brush.

d. Western gall rust of lodgepole and ponderosa pines, caused by Peridermium harknessii is one of the most common tree rusts of the area. Small spherical galls are found on twigs and if the gall is located near the trunk, swollen hip cankers will be formed reducing the value of the tree. This rust can spread from pine to pine and no alternate host is required (autocecious rust).

e. Yellow broom rusts of spruces or firs caused by Chysomyxa arctostaphyli or Melampsorella cerastii, are characterized by yellowish witches' broom formations. Alternate host of the former is Kinnikinnik and

that of the latter is chickweed, (Stellaria and Cerastium). Loss caused by broom rusts is relatively minor.

f. Gall and broom rusts of Rocky Mountain junipers, caused by Gymnosporangium nelsoni and juverescens. Alternate host is serviceberry (Amelanchier alnifolia and Amelanchier utahensis). In May and June, the rusts form jelly-like sporemasses on Juniper.

g. Spindle-gall rust of common juniper, caused by Gymnosporanigium claviforme also infects serviceberry.

Rusts belonging Peridermium, Cronartium and Chrysomyxa produce blisters (aecia) in July and numerous airborne orange spores will be produced.

5. Stem diseases - Decay

Decay of trees is caused by fungi belonging to the class Basidiomycetes. Not only does it reduce the annual increment and commercial value of the trees but also it causes breakage of trunks, which becomes a hazard especially in recreation areas.

Decay may be classified into sap or heart rots, brown or white rots and butt or trunk rots. Some species of wood decaying fungi can attack only living trees or only dead wood whereas some species can attack both. Sapwood is usually too high in moisture content for the decaying fungi to grow and saprot takes place only in the dead tissues.

Decay of fallen trees and slash in the forest is actually beneficial since it cleans up the forest, enriches the soil and also reduces fire hazard.

Fungi causing decay of living trees enter the host through branch stubs, dead branches, fire scars and other trunk wounds. White rot is caused by fungi which utilized both cellulose and lignin, whereas brown rots fungi utilize cellulose only and leave lignin intact.

Decay is most prevalent in overmature trees and beyond certain tree ages annual loss due to decay will exceed annual increment. Therefore it is wise to harvest the tree, and rotate the stand (pathological rotation). With Colorado aspen this is at about 60-70 years of age, which is longer than in Minnesota (50 years) but shorter than that in Utah (90 - 100 years).

After consuming the wood, the fungi produce fruiting bodies on the trunk (conk, basidio carp). One basidio carp can produce billions of airborne basidiospores which can spread the decay. The number of fruiting bodies sometimes may be used as an indicator of the amount of decay.

a. Heartrots

Red Ring rot of conifers, caused by Fomes pini is one of the most widely distributed decayers of the living conifers. The initial stage is pink to purple discoloration and the final tage is an extensive white pocket rot. The fungus produces a perennial yellow conk, but it is rare in this area.

Brown cubical rot of conifers, caused by Fomes pinicola is also common. The fungus can attack both living and dead trees. Shelf-like perennial conks with red margin are frequently found.

Red heartrot of conifers, caused by Stereum sanquinolentum is fairly common and in the final stage the wood turns red-brown and disintegrates. Crust like fruiting bodies of the fungus may be formed on the bark.

White heart rot of aspen caused by Fomes igniarius var populinus is the most serious disease of aspen. Heart wood will turn spongy and weak. At the final stage, hoof-shaped conks will appear from branch stubs.

b. Saprots and decay of slash

Brown cubical rot of conifers, caused by Fomes pinicola or Lenzites saepiarea are important as destroyers of slash. The fruiting body of Lenzites (slash conk) is small, dark-brown, shelf-like and thin.

Pitted saprot of conifers, caused by Polyporus abietinus is common on dead sapwood or slash. Decayed wood shows numerous pits. This is also important as a clean-up fungus.

Decay of aspen logs is caused by numerous species of Polyporus such as Polyporus adustus, Polyporus hirsutus and Polyporus paragamenus and is white-rot type. These fungi, however, cannot invade a living tree.

Control measures for decay that should be followed are: (1) avoid wounding trees, especially during logging operations, (2) if trees are wounded, try to harvest these trees early, (3) study the development of decay in a particular tree species of the area, and establish pathological rotation.

6. Dwarf Mistletoe

Dwarf mistletoes are parasitic higher plants belonging to family Vascaceae, and are one of the most destructive pests of western conifers. They are dioecious, and female plants produce explosive fruits which at maturity discharge the seed with great force, (at 60 MPH and at 45^{o} angle). These seeds can reach as far as 20 to 30 feet, and since the seed surface is viscous, they can stick to the needles without difficulty. Radicles from germinated seed, then, penetrate the vascular tissues of the host. The parasite develops sinkers (in xlem) and other absorbing organs in the host, and obtains water and nutrients.

Infected trees will show swelling of stem and branches, witches' brooms will develop in many cases and tree-tops will eventually die.

Mistletoes not only reduce the height and diametal growth of the host, but also reduce the quality of wood and seed production. They reduce the vigor of the hosts and predispose them to root rots and insect attacks.

It takes about 4 years after infection before the aerial shoots appear, and an additional two years for the production of mature seeds. In average conditions the spread of mistletoe in the forest is 2 to 3 feet a year.

Mistletoe shoots on the branches may be pruned off if the infection is light and not too close to the main trunk. Since it takes a long time for the shoots to appear, pruning should be repeated at two to three year intervals.

In forest stands clear-cutting, and subsequent regeneration is recommended. It is also important to have a clean stand surrounding the clear cut area.

Biological control using fungal parasites is promising but not yet feasible for practical use. Herbicide trials using 2.4.D and related compounds failed to give an effective control.

Important dwarf mistletoes of the area are:

a. Lodgepole pine dwarf mistletoe, Arceuthobium americanus, is small and short, green or yellow, with slender shoots about 2 to 4 inches long.

b. Ponderosa pine dwarf mistletoe, Arceuthobium vaginatum cryptopodum is orang to purple with thick shoots from 3 to 6 inches long.

c. Limber pine dwarf mistletoe, Arceuthobium cyanocarpum is the smallest of the three.

HOST INDEX OF INFECTIOUS DISEASES IN PINGREE PARK AREA

Douglas-Fir (Pseudotzuga Menziesii)	
Root rots	Armillaria Mellea
Dwarf Mistletoes	(Arceuthobium douglasii) (not yet found)
Cankers	Cytospora Kunzie (Valsa Kunzei)
Bacterial galls	Bacterium pseudotsugae
Heart rots	(Stereum sanguinolentum)
	Fomes pini
	Fomes pinicola
Sap rots	Fomes pinicola
(Slash rots)	Lenzites saepiarea
	Polyporus abietinus
	Polyporus volvatus
Needle casts	Rhabdocline pseudotsugae
Engelmann spruce	(Piceae engelmanni)
Blue spruce	(Piceae pungens)
Root rots	Armillaria mellea
	Polyporus tomontosus
Broom rust	Chysomyxa arctostaphyli
Cankers	Cytospora Kunzei (Valsa Kunzei)
Heart rots	Fomes pini
	Fomes pinicola
	Stereum sanguinolentum
Sap rots	Fomes pinicola
(Slash rots)	Polyporus abietinus
Brown Felt Blight	Herpotrichia nigra
Cone rust	Chrysomyxa pirolata
Subalpine fir	(Abies lasiocarpa)
Root rot	Armillaria mellea
Canker	Scleroderris abietis
Heart rots	Fonus pini
	Fonus pinicola
	Stereumi sanguinolentum
Sap rot	Fomes pinicola
(Slash rots)	Polyporus abietinus
	Polyporus volvatus
Broom rust	Melampsorella cerastii
Needle rust	Pucciniastrum goepperianum
Brown felt blight	Herpotrichia nigra
Lodgepole pine	(Pinus contorta)
Root & butt rot	Armillaria mellea
Dwarf mistletoe	Arceuthobium americanum
Stem rusts	Cronartium comandrae
	Peridermium harknessii
	Peridermium stalactiforme
Cankers	Periderium harknesii (diamond and hip cankers)
Heartrots	Fomes pini
	Fomes pinicola
Sap rot	Polyparus volvatus (Poluparus abietimus and Lenzites)
(Slash rots)	Saepiarea
Needle casts	Hypodermella concolar
	Hypodermella montivaga
Brown felt blight	Neopeckia coulteri

Ponderosa Pine	Pines ponderosa	
Root rot	Armillaria mellea	
Dwarf mistletoe	Arceuthobium viginatum cryptopodum	
Limb rust	Peridermium filamentosum	
Stem rust	Cronartium comandrae	
	Peridermium harknessii	
Canker	Peridermium harknessii (diamond & hip cankers)	
Heartrot	Fomes pini	
	Fomes pinicola	
Sap rots	Fomes pinicola	
	Polyporus anceps	
	Polyporus abietius	
	Polyporus volvatus	
Needle cast	Elytroderma deformans	
	Hypodermella medusa	
	Lophodermium ponderosae	
Brown felt blight	Neopeckia coulteri	
Limber pine	(Pinus flexilis)	
Blister rust	Cronartium ribicola	
	(Alternate host-Ribes)	Not present here
Dwarf mistletoe	Arceuthobium cyanocarpum	but it has been found
Needle cast	Hypoderma saccatum	in Wyoming
Junipers		
Rocky Mountain Juniper	(Juniperus scopulorum)	
Gall rust	Gymnosporangium nelsoni	
Broom rust	Gymnosporangium juvenescens	
Common juniper	(Juniper communis)	
Spindle-gall rust	Gymnosporangium clavariiforme	
Aspen	(Populus tremuloides)	
Root & butt rot	Fomes applanatus	
Heart rots	Fomes igniarius var populinus	
Sap rots	Polyporus hirsutus	
(Slash rots)	Polyporus versicolor	
	Polyporus adustus	
Cankers	Cenangium singulare	
	Ceratocystis fimbriata	
	Cytospore chrysosperma	
Foliage diseases		
Inky spots	Ciborinia confundens	
Leaf spots & blight	Marssonia populi	
Leaf rust	Melampsora spp	

Colorado State FOREST SERVICE

Fax Transmittal Sheet

Colorado State Forest Service
Colorado State University
Foothills Campus
Fort Collins, CO 80523
Fax number: (303) 491-8645

Date sent: 2-16-95 Time: 7:50A Fax telephone number: 491-7427

To: BILL BERTSCHY Telephone number:

From: DAVE FARMER Telephone number:

Subject: Pingree Management Plans

Number of Pages: 3 (including this page)

Message:

Bill,

Here is a copy of the DRAFT OUTLINE for the Pingree Management Plans.

Dave

Please contact this office immediately if you do not receive pages indicated or if any information is unreadable.

Pingree Park Vegetative Management Plan

Draft Outline

- Executive Summary
- Management Goals
- Purpose of Plan
- Planning Process
- Evaluation Criteria
- Pingree Park - General Description
  - Geology
  - Soils
  - Climate
  - Wildlife
  - Vegetation
  - Water
  - Wildfire
    - Hazards
    - History
    - Fire Patterns and Fire Behavior
    - Fire Effects/Fire Ecology
    - The Fire Season
- Pingree Park - Brief History
- Major Issues and Concerns
- Silvicultural Prescriptions
  - Uneven-aged Management
  - Even-aged Management
- Silviculture and Visual Management
- Silviculture and Wildlife
- Silviculture and Water
- Silviculture and Wildfire Hazards
- Prescribed Fire
- Explanation of Prescriptions
  - Individual Tree Selection
  - Group Selection
  - Clearcutting
  - Shelterwood
  - Seed Tree
  - Salvage and Sanitation
  - Thinning
- Using Silvicultural Prescriptions
- Pingree Park - Management Unit Descriptions
- Silvicultural Prescriptions by Management Unit
- Work Schedule for Implementation
- Appendices:
  - Wildlife Species List
  - Vegetation Species List
  - Insects and Disease
  - Pre-attack Plan
    - Fire Management Organization & Responsibilities
    - Access - Ingress/Egress
    - Water Supply
    - Utilities

- Wildfire Response Plan
  - Goals/Objectives
  - Anticipated Problems
    - Firefighter Safety
    - Evacuations
    - Expected Fire Behavior
  - Fire Modes & Responsibilities
  - Communications Plan
  - Structure Defense
  - Locations for Incident Command Posts, Staging Areas, Safety Zones, Helispots, etc.
- Glossary
- Bibliography

FAX 491-7427

added Re fax

Bill Bertschy

Pingree Park Vegetative Management Plan

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- Locations for Incident Command Posts, Staging Areas, Safety Zones, Helispots, etc.

Glossary

Bibliography

THE HOURGLASS (PINGREE PARK) FIRE

July 1, 1994

On Friday morning July 1, 1994 smoke was detected in the sky over Pingree Park. Authorities were notified of a wildfire in the Arapaho-Roosevelt National forest southwest of the Pingree Park Campus. Before the day was over, 170 people would be evacuated from the campus, 13 buildings would be destroyed, and the fire would consume hundreds of acres of lodgepole pine forest.

CAUSE OF THE FIRE

A dry lightning storm passed through the Pingree Park area at approximately 1:45 am Friday. Fire danger was high in the Northern Colorado mountains. Several Pingree Staff members remembered being awakened at that time by thunder. Storms of that nature are not uncommon in early July. However, there had been little rain and the forests were dry. Governor Romer had implemented an unpopular state-wide ban on open fires for the upcoming fourth of July weekend.

HOW THE FIRE GOT ITS NAME

Whenever wildfires are reported they are given an official name, which reflects some local geological or topographic feature. In this case the fire was named after the Hourglass Reservoir north of the fire's origin. Unofficially, many refer to the fire as the "Pingree Park" fire, due to the damage to buildings on the Pingree Park Campus.

SUMMARY OF THE FIRE

The fire was started by a lightning strike in a remote trailess area. Pingree Park Staff reported the fire to the Larimer County Sheriff's Department at 10:27 am. Initial fire crews from the Arapaho-Roosevelt National Forest were quickly dispatched. Due to heavy fuel loading and gusting winds, the fire escaped initial attack efforts and grew to 25 acres by 1:00 pm. Strong westerly winds pushed the fire toward Pingree Park. Evacuation of the campus began shortly after 1:30 pm.

By mid-afternoon, the wind-driven fire was raging, with flame lengths over 100 feet burning through the crowns of the trees. Fate had put the Pingree Park campus directly in the line of the fire. Wind gusts were estimated in the fifty mph range when the fire swept through the campus destroying three faculty cabins, the North Dormitory, a newly built staff housing facility, six conference center residence buildings, and a staff duplex cabin located near the conference center. The "Hotchkiss" lodge was partially burned as was the maintenance shop/water treatment plant. Firefighters on the scene worked hard to restrain the fire. It was fortunate that no one was injured and most of the older/historic parts of the campus was untouched.

Historic Note: 14 firefighters were tragically killed in a wildfire above Glenwood Springs, less then two weeks after the Hourglass Fire.

By evening, the fire had grown to 800 acres and was threatening the Poudre Springs subdivision. Firefighting efforts, in particular large fire prevention lines, kept the fire away from the summer cabins. The fire remained active through Saturday July 2, threatening Poudre Springs and burning another 475 acres. The fire was declared contained on Tuesday July 5th, having burned an estimated 1,275 total acres.

SUPPRESSION COSTS

Approximately $1.5 million was spent on the Hourglass Fire. Firefighters and equipment from volunteer fire departments, Larimer County Sheriff's Department, Colorado State Forest Service, Arapaho-Roosevelt National Forest, and several out-of-state agencies assisted in the suppression efforts.

THE FUTURE

Scheduled rebuilding of the conference center and other destroyed buildings, began in the summer of 1995. Efforts to salvage the burned timber on university land will continue for years to come. In an effort to minimize future fire hazard, forests in the unburned areas of the campus are being thinned. Grass seeding and tree planting will continue to help minimize erosion. Willows from upstream have been transplanted to stabilize burned slopes adjacent to the South Fork of the Poudre River. A management plan was developed by the Colorado State Forest Service to address future wildfire hazards, forest health and other issues prevalent when people live in fire dependent eco-systems.

LODGEPOLE PINE FIRE ECOLOGY — [Add More!]

Fire is a natural part of a healthy forest eco-system. Lodgepole Pine, the dominant tree species in the Pingree Park area, is considered a fire dependent species. The closed cones of lodgepole need a fire's intense heat to melt resins and open the cones to release seeds. Fire also burns the forest floor to prepare the seed bed needed for lodgepole seedlings to become established. Aspen are growing in many of the burned areas however, in the future, lodgepole pine will once again become the dominant tree species in the burned areas.

FIRE FACTS

Cause.....Lightning
Size.....1275 Acres
Suppression Costs.....$1.5 Million
People Evacuated.....170
Buildings Destroyed.....13
Damaged Buildings.....2
Estimated $ Building Loss...$2 Million
Firefighters.....602
Air tankers involved.....9
Helicopters.....4
Fire Engines.....15
Date Fire Started.....July 1, 1995 (Friday)
Date Fire Contained.....July 5, 1995 (Tuesday)

This bruchure was funded in large part by the Colorado State Forest Service.

Guidelines for Managing Vegetation to Create Defensible Space in the Main Campus of Pingree Park

This management unit is primarily an even-aged, single story stand with a low to moderate windfall risk.

1. The initial cut should be limited to thinning from below to remove about 30% to 50% of the current basal area, depending on the stand's susceptibility to windthrow. A general guideline for spacing between trees is diameter of the tree + 5 feet. For example, if a tree is 7" in diameter, spacing between it and other trees should be 12 feet (i.e. 7+5). Current basal area ranges from 180 to 200+. The general canopy height should be maintained.

   The second entry should occur in about five to ten years or when stand becomes windfirm. This entry should also remove about 30% of the original basal area. Ultimately, a basal area of 80 is desired.

2. Remove as many trees infected with comandra blister rust and/or dwarf mistletoe as possible without removing more than the recommended basal area or creating large openings in the canopy. Openings of one tree height or less should be considered within the defensible space area.

3. Remove lodgepole pine in Tree Vigor Classes "C" and "D". All dead trees should be removed from the defensible space area.

4. Retain engelmann spruce and subalpine fir in areas where ladder fuels are not a significant threat. The area around these trees should be more open than if ladder fuels were not present.

5. Remove most trees between cabins, trees leaning towards cabins, and trees within five to ten feet of cabins.

6. Minimize tall grasses and other vegetation within ten feet of structures. Areas with continual grass cover should be mowed to a height of 2" or less after the grass has cured out.

7. Remove all ladder fuels within 50 feet of structures. Remove any tree limbs within 15 feet of a chimney. Lower branches should be pruned off to a height of about 8 to 10 feet.

8. Eliminate firewood pile stacked against student cabins. Designate areas for firewood storage. These areas should be at least 30 feet away from any structures and uphill or on the contour from buildings.

9. Remove conifers from clumps of aspen to increase aspen regeneration.

10. Attempt to obtain a separation between crowns of at least 10 feet.

11. Slash should be piled and burned or chipped.

c:\wp6docs\pingree\defspace.gdl

Pingree Park Management Presentation

October 25, 1995
for CSU Pest Discussion Group

Fire Facts:

Started on July 1, 1994
Contained on July 5, 1994

Cause.....Lightning
Size.....1275 Acres
Suppression Costs.....$1.5 Million ($1176 per acre!)
People Evacuated.....170

Buildings Destroyed.....13
Damaged Buildings..... 2
Estimated $ Value of Buildings Lost.....$2.2 Million

Firefighters.....602
Air Tankers 9
Helicopters.....4
Fire Engines.....15

Salvage Sale:

2 blocks, 24 acres total (clearcut) 500 cords at about $7/cord

Defensible Space Work:

1 acre around student cabins
1 acre thinned by OSU students north of student parking lot

Management Plan:

Objectives:

* To minimize the potential for a damaging wildfire to occur in the future.
* To improve and maintain forest health through insect and disease control, soil and water protection, and fire hazard reduction.
* To maintain the natural beauty of the property.
* To maintain or improve wildlife habitat.

Colorado State Forest Service
Fort Collins District

Memorandum

June 27, 1995

TO: Ray Mehaffey
FROM: Dave Farmer Dave

RE: Pingree Park Update #3

The following list is provided as an update on the Pingree Park project:

1. The "Hourglass Fire" brochure has been completed and is being distributed to guests at Pingree Park. A copy is enclosed for your review.

2. Timber Sale #PP94-SLV-1 is about one-half complete. Alvin Crabtree has been doing a good job. My only complaint is that he has moved around in the sale area more than I would like, but this is to harvest specific products as the market dictates. Nearly $3100 in stumpage fees has been collected for Pingree Park.

3. Work on thinning to develop a defensible space around the student cabins northeast of the dinning hall has begun. Cutting is being done by Pingree's work crew.

4. I am working with faculty from Oklahoma State University on a thinning project in the main campus. Approximately one acre will be thinned between the burn perimeter and the main campus area.

5. Stand mapping and inventory has begun on Pingree Park. My goal is to have the management plan completed by July 31.

cc Jim Hubbard
Bill Wilcox
Ron Gosnell
Greg Sundstrom
Bob Sturtevant
Tom Ostermann
Mike Hughes

COLORADO STATE FOREST SERVICE
Fort Collins District

Memorandum

Date: February 21, 1995

To: Ray Mehaffey
From: Dave Farmer

RE: Pingree Park Update #2

The following list is provided as an update on the Pingree Park project:

1. Timber Sale #PP94-SLV-1 was sold to Alvin Crabtree of Bellvue for $175 per acre (about $7.90 per cord). Total sale value is $4112.50. The first payment is being held in 1-93740 until Housing & Food Services is able to set up a "revolving" account. They plan to use sale revenue for landscaping and defensible space work.
2. Pingree Park is reviewing the service agreement for signature.
3. The USFS inventory does not adequately cover Pingree Park, so I will be using data from student management plants. I have made arrangements to pick up these plans on February 24th.
4. I have discussed planting willows along portions of the South Fork of the Poudre River. Cuttings will be made from native willows in Pingree Park and planted in highly erodible areas. Everyone is agreeable to this. Randy Moench has agreed to assist.
5. I have requested hourly wages be transferred to operating in the Larimer County Mitigation account. If the request is granted, this money will be used to develop a series of brochures on fire ecology. Each brochure will discuss fire ecology of a specific tree species and address mitigation techniques for that species. A brochure summarizing the Pingree Park Fire is also planned. This brochure will highlight costs and "suggest" mitigation is cheaper in the long run.
6. There is still much work to be done in developing the Pingree Park Management Plan. I expect to concentrate on the Pingree Plan and Larimer County's Mitigation Plan in March. Hopefully, other activities can be put off until latter this spring or early summer.

cc Jim Hubbard
Ron Gosnell

COLORADO STATE FOREST SERVICE
Fort Collins District

Pingree Park Update

Date: December 14, 1994 **Reply Requested:** FYI only.

To: Ray Mehaffey
From: Dave Farmer Dave

RE: Pingree Park Update #1

Management activities at Pingree Park are moving along well. The following briefly summarizes activities to date:

1. **A Timber Sale Announcement** for salvaging 25 acres of the burned area will be in the mail by December 16, 1994. A copy is attached for your review. Time table is:
   * Show-me Tour on December 28, 1994
   * Bid deadline at 10:00 January 6, 1995
   * Contract signing is planned for January 12, 1995
   * Sale completion by May 31, 1995

2. Bill Bertschy, Pat Rastall, and Rex Kramer (Pingree Staff) are supportive and have reviewed the sale announcement and the sale area.

3. I have given the sale information to Denny Lynch for review. He has passed it along to other faculty members. I have not received any comments at this time. I plan to schedule time to meet with faculty as soon as possible to review harvesting plans and management plan development.

4. I attended one meeting of the "Pingree Committee". Discussion regarding insurance and reconstruction. No faculty members were present.

5. I have drafted the attached outline for the Pingree management plan.

6. I have collected stand data from the USFS for the Pingree area. I should be able to use this and student management plans to develop a Pingree Park Management Plan.

7. I have agreed to write an article on lodgepole pine fire ecology and salvage activities for Pingree's "Visitor Guide".

8. I have also agreed to develop a brochure discussing salvage operations/fire ecology/mitigation to help answer questions for guests at Pingree.

9. Pingree staff has begun developing "defensible space" around existing buildings. I will continue to work with them as an advisor on this and other mitigation activities.

10. I have scheduled a meeting with Chuck Dennis, Paul Summerfelt, and Bernie Post in Golden on January 5th. We will discuss what I have done to date and review the management plan out line mentioned above.

11. I am working on a Service Agreement between CSFS-Fort Collins District and Pingree Park Campus. Bill Bertschy has agreed this is a good idea. (I should have done this earlier, but have been spending my time in the field). I introduced the subject of "fees" or "reimbursement" to cover some costs involved with my work. Bill Bertschy agreed in principle, but feels Jim Hubbard has committed us to assist Pingree without reimbursement. He basically feels this must be worked out between Jim and Grant Sherwood. I had suggested 10% of sale proceeds (which is a bargain for Pingree), but would feel more comfortable with a per acre amount. I will visit again with Jim Hubbard about this.

12. I will be contacting Poudre Springs, Sky Ranch and other private landowners in the Pingree area after the first of the year to attempt to include them in the plans. I will also visit with USFS personnel and involve them in the Pingree process.

13. I spoke with Phil Omi in November about Pingree. I will be contacting him soon to discuss the salvage activities. I believe 2 of his photo plots are in the salvage area.

14. I have completed a literature search through RMF&RES on lodgepole pine fire ecology, fire behavior, mitigation, etc. This information will help support prescriptions in the management plan

Overall, as mentioned above, I feel work at Pingree is progressing well. The Pingree staff is supportive to this point and have been easy to work with. I'm looking forward to completing the salvage sales and to continue to implement forest management and wildfire mitigation activities on Pingree Park.

Colorado State FOREST SERVICE

Foothills Campus
Colorado State University
Fort Collins, Colorado 80523
(303) 491-8660
FAX: (303) 491-8645

TIMBER SALE ANNOUNCEMENT
PINGREE PARK SALVAGE SALE (PP94-SLV-1)

Timber Description: Dead, burned, standing lodgepole pine, primarily post and pole size.

Sale Area Description: The sale is located on Colorado State University's Pingree Park Campus in sections 16 and 17, T7N, R73W, 6th Principal Meridian (See attached map).

Volume: Bidders are responsible for determining their own volume estimate. Total sale volume has been estimated at 193.5 MBF or 521 cords. The COLORADO STATE FOREST SERVICE DOES NOT GUARANTEE VOLUME.

Sale Statistics: Block	Acres	MBF	Avg DBH	Avg HGT
1A	21	164.5	6.5"	42'
1B	4	29.1	6.6"	38'

Contract Period: The contractor will have until May 31, 1995 to complete this sale. It is important that harvesting be completed as soon as possible due to reconstruction schedule. Extensions may be granted due to weather or other circumstances.

Roads: Pingree Park is located about 50 miles from Fort Collins (the final 16 miles are on county maintained gravel roads. The sale will be accessed from the Pingree Park Road (County Roads 63E and 44H). No new roads will be constructed in the sale area.

Bidding: The timber will be sold on a lump-sum basis with a minimum bid of $275 per acre. Send sealed bids **on the enclosed "Bid On Timber Sale" form** to COLORADO STATE FOREST SERVICE, Foothill Campus, Bldg. 1052, Fort Collins, CO 80523, by **10:00 a.m. on January 6, 1995.** A $250.00 bid guarantee will be collected from the successful bidder. The bid guarantee is non-refundable but will be used towards the final sale payment.

Payment Schedule: Contract signing, performance bond, bid guarantee and the first payment will be due by noon on January 12, 1995. Payment for the first 25% of the total sale value will be made at the contract signing. Payment for the second 25% of the total sale value will be made upon completion of the first 25% of the area is harvested. Payment for the third 25% of the total sale value will be made when 50% of the area is harvested. Payment for the final 25% of the total sale value will be made when 75% of the area is harvested. An unexplained non-payment will constitute a breech of contract and timber harvesting operations will cease.

Performance Bond: A performance bond equalling 25% of the total sale value will be collected at contract signing. The performance bond will be in the form of a certified check or money order.

Cutting Requirements: All trees in the salvage units except those identified by orange DBH and butt marks will be cut.

Slash and Stumps: Slash will be lopped and scattered. Stump height will be 4" or lower on the uphill side.

Known Hazards: An above-ground water line and power lines run through the sale. Some debris, sewer lines, etc. are in the vicinity of burned buildings.

Other Contract Requirements:

1. Contractor/Purchaser will remove all wood larger than 8' long and 3" in diameter at the small end.

2. The Contractor/Purchaser will be responsible for any erosion problems that are the result of sale operations. These problems are to be corrected immediately upon discovery.

3. Due to conference schedules, there will occasionally be days when no log hauling is allowed.

4. Contractor/Purchaser will be required to provide a lock a the main gate.

5. The Contractor/Purchaser shall assume all responsibility for any claim of damages that may arise as a result of logging or transporting forest products, and shall indemnify Colorado State University and the Colorado State Forest Service against any and all such claims.

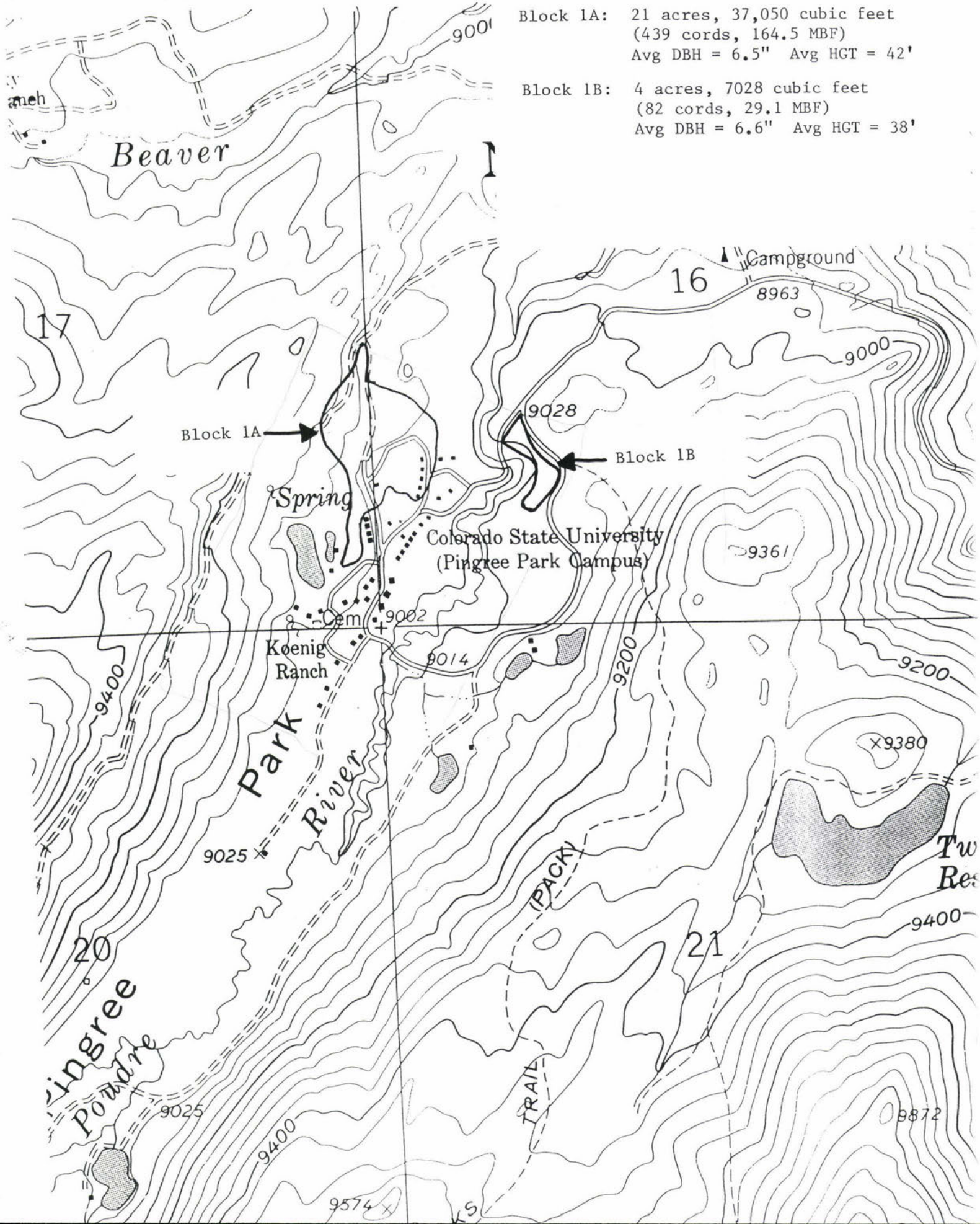
Show-me Tour: A tour of the sale area is scheduled for December 28, 1995 at 10:00 a.m. Meet at the main gate to the Pingree Park Campus. **Contact Dave Farmer by December 27 at 491-8660 to confirm your attendance at the Show-me Tour.**

Administration: The sale will be administered by Dave Farmer, Colorado State Forest Service, 303-491-8660.

Sale # PP94-SLV-I Blocks 1A and 1B

Block 1A: 21 acres, 37,050 cubic feet
(439 cords, 164.5 MBF)
Avg DBH = 6.5" Avg HGT = 42'

Block 1B: 4 acres, 7028 cubic feet
(82 cords, 29.1 MBF)
Avg DBH = 6.6" Avg HGT = 38'



Colorado State
FOREST
SERVICE

Foothills Campus
Colorado State University
Fort Collins, Colorado 80523
(303) 491-8660
FAX: (303) 491-8645

BID ON TIMBER SALE

I hereby submit my bid on the Pingree Park Salvage Sale (PP94-SLV-1).

My bid is $_____ per acre for a total value of $_____.

A description of the bidder's equipment and/or vehicles which will be involved in the harvesting activities is as follows:

_____

_____

_____

If awarded this sale, you, the purchaser, will work:

_____Weekdays _____Weekends _____Both

Signed _____ Date_____

Company _____ Phone_____

Address _____

_____

_____

Bids will be opened at 12:00 noon at the Colorado State Forest Service office, 3843 W. LaPorte Avenue in Fort Collins, on January 6, 1995.

If more than one qualifying bid is received, the sale will be awarded based upon the greatest advantage to the seller. All bids may be rejected at the option of the seller.

Minimum acceptable bid is $275.00 per acre.

Mail to: Colorado State Forest Service
Bldg. 1052, Foothills Campus
Colorado State University
Fort Collins, CO 80523
ATTN Dave Farmer

Please mark "BID" on outside of your envelope!!

Forest Resource Inventory Form
CSFS - Fort Collins District

Landowner _____ Date _____ Forester _____

Stand/Unit _____ Slope _____% Aspect _____

Plot location _____ Ground cover _____

Structure stage _____ Crown closure _____% BA _____

Regeneration _____stems/acre Windfall Risk _____

Ladder fuels L M H Fuel Loading _____tons/acre

Wildlife _____ BAF used _____

Recommendations/comments _____

TREE IDENTIFICATION				TREE MEASUREMENTS					TREE CLASSIFICATION				OTHER				
POINT NUMBER	TREE NUMBER	[redacted]	TREE HISTORY	SPECIES	DBH	TOTAL HEIGHT	[redacted]	TERMINAL HEIGHT GROWTH	10-YR. RADIAL	TREE AGE—DBH	[redacted]	TOTAL DEFECT	CROWN RATIO	CROWN CLASS	DAMAGE—DEATH	TREE POSITION	MISTLETOE	CONE SEROTINY	SITE TREE CLASS	REMARKS
XXX	XX		XX	XXX	XXX	XXX		XXX	XX	XXX		X	X	X	XX	X	X	X	X	
14-16	17-18		24-25	26-28	29-31	32-34		37-39	40-41	42-44		48	49	50	51-52	55	56	57	58	PUNCH (14-59

Guidelines for Managing Vegetation to Create Defensible Space in the Main Campus of Pingree Park

This management unit is primarily an even-aged, single story stand with a low to moderate windfall risk.

1. The initial cut should be limited to thinning from below to remove about 30% to 50% of the current basal area, depending on the stand's susceptibility to windthrow. A general guideline for spacing between trees is diameter of the tree + 5 feet. For example, if a tree is 7" in diameter, spacing between it and other trees should be 12 feet (i.e. 7+5). Current basal area ranges from 180 to 200+. The general canopy height should be maintained.

   The second entry should occur in about five to ten years or when stand becomes windfirm. This entry should also remove about 30% of the original basal area. Ultimately, a basal area of 80 is desired.

2. Remove as many trees infected with comandra blister rust and/or dwarf mistletoe as possible without removing more than the recommended basal area or creating large openings in the canopy. Openings of one tree height or less should be considered within the defensible space area.

3. Remove lodgepole pine in Tree Vigor Classes "C" and "D". All dead trees should be removed from the defensible space area.

4. Retain engelmann spruce and subalpine fir in areas where ladder fuels are not a significant threat. The area around these trees should be more open than if ladder fuels were not present.

5. Remove most trees between cabins, trees leaning towards cabins, and trees within five to ten feet of cabins.

6. Minimize tall grasses and other vegetation within ten feet of structures. Areas with continual grass cover should be mowed to a height of 2" or less after the grass has cured out.

7. Remove all ladder fuels within 50 feet of structures. Remove any tree limbs within 15 feet of a chimney. Lower branches should be pruned off to a height of about 8 to 10 feet.

8. Eliminate firewood pile stacked against student cabins. Designate areas for firewood storage. These areas should be at least 30 feet away from any structures and uphill or on the contour from buildings.

9. Remove conifers from clumps of aspen to increase aspen regeneration.

10. Attempt to obtain a separation between crowns of at least 10 feet.

11. Slash should be piled and burned or chipped.

c:\wp6docs\pingree\defspace.gdl

To: Dave Farmer
From: Chuck D.

JUL 10 1995

Guidelines for Managing Vegetation to Create Defensible Space in the Main Campus of Pingree Park

This management unit is primarily an even-aged, single story stand with a low to moderate windfall risk.

1. The initial cut should be limited to thinning from below to remove no more than about 30% of the current basal area. Current basal area ranges from 180 to 200+. The general canopy height should be maintained. Could probably go to D+S spacing no matter what BA is. Initial entry can be heavier.

2. Remove as many trees infected with comandra blister rust and/or dwarf mistletoe as possible without removing more than the recommended basal area or creating large openings in the canopy. Openings of 1 tree height or less should be OK.

3. Remove lodgepole pine in Tree Vigor Classes "C" and "D". All dead trees should be removed from the defensible space area. — using distance guides in the S.I.A. sheet?

4. Retain engelmann spruce and subalpine fir in areas where ladder fuels are not a significant threat. — open up around them more.

5. Remove most trees between cabins, trees leaning towards cabins, and trees within five feet of cabins. Crown spacing guides?

6. Minimize tall grasses and other vegetation within ten feet of structures.

7. Remove all ladder fuels within 50 feet of structures. Remove any tree limbs within 15 feet of a chimney.

8. Eliminate firewood pile stacked against student cabins. Designate areas for firewood storage. These areas should be at least 15 feet away from any structures — up hill or on contour.

9. Remove conifers from clumps of aspen to increase aspen regeneration. Good.

10. Attempt to obtain a separation between crowns of at least 10 feet. OH - see #5!

11. Slash should be piled and burned or chipped.

12. Second entry should occur in about five to ten years or when stand becomes windfirm. This entry should also remove about 30% of the original basal area. Ultimately, a basal area of 80 is desired. (outside immediate defensible space)

Re-entry period?

OH² - see #1

Colorado State Forest Service
Fort Collins District

Memorandum

June 27, 1995

TO: Ray Mehaffey
FROM: Dave Farmer Dave

RE: Pingree Park Update #3

The following list is provided as an update on the Pingree Park project:

1. The "Hourglass Fire" brochure has been completed and is being distributed to guests at Pingree Park. A copy is enclosed for your review.

2. Timber Sale #PP94-SLV-1 is about one-half complete. Alvin Crabtree has been doing a good job. My only complaint is that he has moved around in the sale area more than I would like, but this is to harvest specific products as the market dictates. Nearly $3100 in stumpage fees has been collected for Pingree Park.

3. Work on thinning to develop a defensible space around the student cabins northeast of the dinning hall has begun. Cutting is being done by Pingree's work crew.

4. I am working with faculty from Oklahoma State University on a thinning project in the main campus. Approximately one acre will be thinned between the burn perimeter and the main campus area.

5. Stand mapping and inventory has begun on Pingree Park. My goal is to have the management plan completed by July 31.

TOO BAD TAL FORESTRY PROGRAM IS SHOT! WE COULD DO SOME GOOD.

cc Jim Hubbard
Bill Wilcox
Ron Gosnell
Greg Sundstrom
Bob Sturtevant
Tom Ostermann
Mike Hughes

David A. Farmer
Assistant District Forester
Fort Collins District

Colorado State FOREST SERVICE

Serving Larimer and Weld Counties

Foothills Campus, Building 1052
Colorado State University
Fort Collins, Colorado 80523
(303) 491-8660

COLORADO STATE FOREST SERVICE
Memorandum

Date: August 24, 1992

To: Phil Omi
From: Dave Farmer Dave

RE: Pingree Park Fire Management Plan

The following is provided as a starting point to discuss the potential for developing a fire management plan for Pingree Park. I'm looking forward to meeting with you Wednesday!

Problem: The potential for wildfire in the Pingree Park area is significant. Evacuation of students, faculty, employees, etc. and the need for structure protection intensifies the problem.

Purpose: The Pingree Park Fire Management Plan will be designed to 1)identify and prioritize hazards, 2) provide recommendations to reduce hazards, and 3) establish "pre-attack" and "response" plans.

Suggestion for items to be covered by the plan:

- Description of the Pingree Park Campus (vegetation, soils, water, wildlife, geology, recreation, facilities, etc.)
- Fire History
- Fire Patterns and Fire Behavior
- Fire Effects and Fuels
- The Fire Season
- Pingree Park Fire Management Objectives
- Fire Management Units - Breakdown and Description
- Wildfire Hazard Maps
- Fire Management Units - Recommendations
- Implementation Schedule
- Pre-Attack Plan
  - Fire Management Organization and Responsibilities
  - Access - Ingress/Egress
  - Topography
  - Water Supply
  - Utilities
- Wildfire Response Plan
  - Goals/Objectives (strategic and tactical)
  - Anticipated problems
    - Firefighter Safety
    - Evacuations (procedure, travel routes, etc.)
    - Expected Fire Behavior (BEHAVE Program)
  - Fire Modes and Responsibilities
  - Communications plan
  - Structure Defense
  - Locations for Incident Command Posts, Staging Areas, Safety Zones, Helispots.

COLORADO STATE FOREST SERVICE
Fort Collins District

Memorandum

Date: October 31, 1994 **Reply Requested:**

To: Dave Farmer

From: Ray Mehaffey Ray

RE: Pingree Park Management Plan

I met today with Jim Hubbard, Tom Osterman, and Bill Wilcox to discuss the development of vegetation management and defensible space plans, timetables, manpower, and plan implementation for the Pingree Park lands and campus. What may have precipitated the upgraded priority of this project is the attached fax memo from Bill Bertschy. Bill wants to start selling "burnt timber" and utilize the revenues for future landscaping of the facility.

Jim's direction to proceed immediately comes from several factors.

- His second meeting with Grant Sherwood which re-affirmed
→ that CSFS IS responsible for vegetation management on the Pingree Park CSU owned property.

-Bill Bertschy, as indicated by his fax, is "opening up" to the idea of vegetation management and defensible space.

-The need to have defensible space implementation completed prior to conference activity next Spring.

-The meeting with Pingree faculty held on October 24, 1994. (Copy of meeting summary attached.)

-Previous agreements that we are responsible for vegetation management at Pingree and the need to market fire-killed trees prior to their decline in value.

Discussion led to the determination that there would be a plan developed in two stages. Defensible space around existing and rebuilt improvements will be the first stage. This should also address landscaping issues. The second is the remaining area of Pingree and will involve salvage logging, road building, snag falling along roads/trails, research activities, thinning present and future stands for wildfire hazard reduction, fuelbreak systems, stream and soils protection, and other facets of any good vegetation management plan.

Furthermore, it is directed that the implementation of the defensible space plan is completed no later than May 1, 1995. This means that there must be sales activity yet this winter. Marking and cutting should be completed by January 1, 1995.

The entire Pingree Plan is to be in place by May 15, 1995. The defensibility objective has the highest priority. It should be based on what makes sense to reach that objective. Education and research may very well be included. Sherwood and Al Dyer will be given a chance to review the plan. However, CSFS will make the final determination of what is in the plan.

Direction for both Federal land and the immediate private lands, including Sky Ranch, should be included in the plan.

A written summary of our approach and what we plan to do must be completed by mid-November. It will be general in nature. Jim will use it in future discussions with Grant Sherwood and the faculty if necessary.

add Bob Hurtevant

This strategy may be developed at a meeting of a "Strike Team" or earlier as necessary. The Team will be composed of you as leader of the project, Chuck Dennis, Paul Summerfelt, Bernie Post and Fred Winkler. You may wish to involve Larimer County Emergency Services but that will be up to you after you and I discuss it.

Jim made it very clear that Bertschy and the forestry faculty (through Dale Hein) are NOT in charge. We are. Jim says, "the State Board of Agriculture gave us authority years ago, but we don't want to be pushy".

Tasks assigned at this meeting.
-Tom to develop a memorandum of understanding for Grant Sherwood and Jim's signatures spelling out authority. To be done by 11/7.
-Tom to check with CSU purchasing regarding how the sale of products will be handled, CSU Purchasing or CSFS standard procedure.
-Tom to contact Strike Team members for Jim and thank them that they "volunteered" for this project (does not include Winkler contact that will be your responsibility).
-Ray will contact Larimer County to check on how far up the Pingree Road is kept open in winter.
-Ray to contact Mark Morgan to encourage his participation in the bidding on the defensible space implementation this winter.
-Ray to provide advice and encouragement to you in all phases of the project. I will re-arrange District workloads to free up your time for this project. Our Annual Work Plan will need adjustment for both CY 1994 and CY 1995.
-You will set up meeting of "Strike Team" as soon as possible.
-Strike Team under your direction to develop the aforementioned written summary of your approach to complete the plan.

You have my complete confidence and assistance in this opportunity.

To: James E Hubbard jhubbard@vines.colostate.edu
Cc:
Bcc:
From: Bill Bertschy 491-7377 <BERTSCHY@sacc.colostate.edu>
Subject: Timber Sale
Date: Thursday, October 27, 1994 at 2:53:00 pm
Attach: Headers.822
Certify: N
Forwarded by:

Hi Jim,

We would like to put out an RFP for sale of some of the burnt timber. The area I wish to propose is the area immediately surrounding the destroyed buildings and extending out to the gate. This is a very accessible area. We have done an estimate of 400-500 trees per acre with a dbh of at least 12". There is maybe 120 acres of timber. We would want the cut to be 6" stumps and restoration of any skid paths which wouldn't take much obviously. Hopefully the logging could occur next season. We also want feathering into the unburned stands.

Hopefully there would be revenue which we could then use for landscaping, paths, fences, signs both lost and necessary as a result of the fire. We are receiving no recovery dollars from insurance for this loss.

What do you think? I have talked to Roger Marshall in purchasing about this, they have a bid package ready to go, I did inquire about bidders and a list from the USFS and received it.

The USFS plans no salvage at this time on their portion of the burn. I figure the remainder of the forest not being logged under this proposal is within CSFS jurisdiction. I know that the College of Natural Resources has interest also in what happens for research purposes.

I would if nothing else by this RFP, sample potential interest and would like to go ahead with it.

Thanks, Bill

31st PM
ON 1
11
21

Jim
Roy will be on the SO
at 1:15 PM on Monday 31ST.
Ellen

COLORADO STATE FOREST SERVICE
Fort Collins District

Memorandum

Date: October 31, 1994 **Reply Requested:**

To: Jim Hubbard

From: Ray Mehaffey

RE: 10/24/94 Meeting with Pingree Faculty

I requested a meeting, through Dr. Dennis Lynch, with all interested Pingree faculty members to discuss management possibilities of the facility following the wildfire of July 1st. Denny sent copies of the attached September 28th notice to all faculty members who had been instructors with the Pingree summer program. This was approximately 12 to 14 professors.

Denny, Rick Laven, Craig Shuler, Wayne Leininger, and I were present at the meeting. I started discussion by handing out a map of the fire with Pingree boundaries defined. I mentioned that both Bill Bertschy and I have received offers of assistance from volunteer groups up to 100 people in size. The Fort Collins District plans to inventory for salvage and other purposes, including defensible space, were brought forward.

Denny commented that he has student management plans for all the area outside of the camp with potentially useful data. He felt most of the merchantable volume for salvage is around the section corner between sections 17, 18, 19, & 20. Area east of camp might also be a possibility. He recommended short log trucks be utilized for hauling. Denny thought that Dale Hein has a fledgling bird study started.

Rick and Wayne were interested in a lodgepole pine recovery study since there has been nothing new since the Fred Clements study of 1910. Both did not want any attempts made at artificial regeneration. Rick felt the opportunity of working in an area where there is a 100 year-old burn, a 3-year old burn, and the "fresh" burn is unique and useful for research. He felt that roads into the area would have little value since you can walk into most areas from the Camp. Rick felt that most of the area should be used for research and education. Wayne would like to see some portion of area left as is. There is a current study being conducted by Julie and Larry (???). Dale Hein has a map.

Craig was concerned about the liability of blowdown trees close to trails, the camp, etc. He felt that leaners and tall trees close to travel zones should be removed. He asked about water and soil concerns of John Fusaro (SCS) made immediately after the fire.

My interpretation of the comments made at this meeting were as follows:

- -Salvage of merchantable products is okay if the process does not interfere with research and education.
- -Defensible space around the Camp is a high priority.
- -Safety in and around human use zones is a high priority issue.
- -Access can be obtained to the potential salvage area by going through Sky Ranch, crossing the stream above Beaver Falls, and going through the saddle where the fire started.
- -At least one study has already started.
- -Natural reproduction should occur in large numbers but growth and survival will be influenced by local high winds.
- -Soil and water concerns should be identified and action taken.

I recommend we should work with Denny Lynch as the contact person for the Pingree faculty in the development of the vegetation management plan. We should also look at the defensible space inventory of the Camp done by Phil Omi with help of his students in developing and mitigating future wildfire hazards.

Colorado State
FOREST
SERVICE

Foothills Campus
Colorado State University
Fort Collins, Colorado 80523
(303) 491-8660
FAX: (303) 491-8645

2310

September 28, 1994

Dr. Dennis L. Lynch
125 Forestry
Colorado State University
Fort Collins, CO 80523

Dear Denny,

The wildfire at Pingree Park this July created both problems and opportunities. I would like to get together with all that have an interest in the future of Pingree to discuss management possibilities within the wildfire area.

I am most interested in such opportunities/needs as salvage harvest, forest regeneration, soil protection measures, riparian management, access, and designating areas for forestry related studies. I'm sure the faculty has others.

Interest in several of these opportunities has already been expressed by persons and groups both inside and outside the University.

Those interested should plan to meet on:
Monday, October 24th at
4:00 PM in the
Colorado State Foresters Conference Room
Second Floor, Forestry Building.

Please pass this information on to all who might be interested.
Thanks much.

Sincerely,

Ray Mehaffey

Ray Mehaffey
District Forester

Pingree Park Vegetative Management Plan

Outline 11-2-94 DRAFT

- Executive Summary
- Management Goals
- Purpose of Plan
- Planning Process
- Evaluation Criteria
- Pingree Park - General Description
  - Geology
  - Soils
  - Climate
  - Wildlife
  - Vegetation
  - Water
  - Wildfire
    - Hazards
    - History
    - Fire Patterns and Fire Behavior
    - Fire Effects/Fire Ecology
    - The Fire Season
- Pingree Park - Brief History
- Major Issues and Concerns
- Silvicultural Prescriptions
  - Uneven-aged Management
  - Even-aged Management
- Silviculture and Visual Management
- Silviculture and Wildlife
- Silviculture and Water
- Silviculture and Wildfire Hazards
- Explanation of Prescriptions
  - Individual Tree Selection
  - Group Selection
  - Clearcutting
  - Shelterwood
  - Seed Tree
  - Salvage and Sanitation
  - Thinning
- Using Silvicultural Prescriptions
- Pingree Park - Management Unit Descriptions
- Silvicultural Prescriptions by Management Unit
- Work Schedule for Implementation
- Appendices:
  - Wildlife Species List
  - Vegetation Species List
  - Insects and Disease
  - Pre-attack Plan
    - Fire Management Organization & Responsibilities
    - Access - Ingress/Egress
    - Water Supply
    - Utilities

Wildfire Response Plan
- Goals/Objectives
- Anticipated Problems
  - Firefighter Safety
  - Evacuations
  - Expected Fire Behavior
- Fire Modes & Responsibilities
- Communications Plan
- Structure Defense
- Locations for Incident Command Posts, Staging Areas, Safety Zones, Helispots, etc.

Glossary

Bibliography

landowners who in the past thirty (30) days requested management assistance with forest & related resource. This list will be provided to any consultant that requests it from the district. CSFS will maintain a directory of forest, forest product, and other natural resource consultants. This directory will be distributed to all cooperators upon request or to those whom CSFS personnel feel will benefit from the services of a consultant.

M.19.3.6 CSU-related Forest Lands

Policy: CSFS will assist CSU in administering, managing, and protecting all CSU related forest lands. CSFS will recover costs through sales of products or by mutual agreement with other units of the university. Revenue beyond those associated with administration and operating costs will be deposited in appropriate accounts as prescribed by the University. CSFS will plan and implement forest practices on these lands to enhance the teaching, research, and public service programs of the University and its associated agencies. CSFS activities related to this policy will be coordinated by the Forest Management Division.

M.19.3.7 Rural Development

Policy: CSFS will manage it's programs in a manner that will contribute to the enhancement of rural communities and economies.

- CSFS will encourage forest industries to provide services to accomplish planned management activities, and utilize the products and by-products of that management activity.
- CSFS will maintain a directory of forest industries, provide training opportunities, and assist the industry in ways that are considered mutually beneficial.
- Forest industry representatives will be encouraged to participate as partners in the Forest Stewardship Program.
- CSFS will cooperate with Resource Conservation & Development (RC&D) councils to provide forestry technical assistance and coordinate forestry activities which enhance the conservation and use for forest related resources in the RC&D areas.

CSU

Office of the President

RECEIVED
JUN 2 0 1978
CSFS-SO

Colorado State University
Fort Collins, Colorado
80523

M E M O R A N D U M

June 12, 1978

TO: Tom Borden, Director
Colorado State Forest Service

FROM: A. R. Chamberlain

SUBJECT: CSU Related Forest Lands

This memo concerns your recent proposal to the CSU Land Use Committee requesting concurrence in designating the Colorado State Forest Service the administrative responsibility for managing and protecting the forest lands at Pingree Park and other locations on Board owned or controlled lands. It is my understanding the CSFS would plan and implement forest practices on these lands to enhance the teaching, research and public service programs of the University and its associated agencies.

I hereby designate CSFS to administer, manage and protect all University related forest lands in cooperation with other CSU agencies and the Land Use Committee. For purposes of recovering costs, it is expected that CSFS will do so through sale of products or by mutual agreement with other units of the University. Revenues beyond those associated with administrative and operating costs will be deposited in appropriate accounts as prescribed by the President or the Vice President for Planning and Budgets.

cc: M.A. Binkley
J.R. Hehn
D. McClintock

Copy to C.W. Hotchkiss
Rex Kellums
R.H. Burnham
L.T. Suber

6-14-78

PALACE CONSTRUCTION CO., INC.
90 GALAPAGO STREET • PHONE (303) 777-7999 • FAX # (303) 777-5256 • DENVER, COLORADO 80223

October 28, 1994

Fred A. Frederick, CPCU
AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.
6130 Stoneridge Mall Road, Suite 390
Pleasanton, California 94588

Re: Fort Collins, Colorado, Colorado State University (CSU)
Pingree Park Fire Loss Estimate
Changes to original estimate

Dear Fred,

As per our meeting of September 19, 1994 and the Fay Engineering letter of October 5, 1994, please find attached revised pricing for the referenced project.

The attachment includes cost reductions discussed during our meeting. These changes were made and faxed to you on September 20, 1994. The current cost reductions include:

- Reduction of the cost of masonry from $15.00 per square foot to the agreed $6.00 per square foot.
- Removal of any taxes.
- Removal of the doubled cost for the baseboard heat.
- New electrical pricing based on information from the meeting.
- The base hourly rates for labor was reduced.

In addition, there are cost changes made per the Fay Engineering letter. All cost changes are indicated with an asterisk within the estimate.

Should you require any further information, or have any questions regarding the attachment, please do not hesitate to call.

Sincerely,

PALACE CONSTRUCTION COMPANY, INC.

Richard H. Kagiyama
Project Manager

xc: Carl Mangone, Fay Engineering

PALACE CONSTRUCTION COMPANY, INC.
90 Galapago Street
Denver, Colorado 80223
(303) 777–7999
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ESTIMATE SUMMARY BY BUILDING

BUILDING	NUMBER	COST	SQUARE FOOTAGE	$ / SF
1 STAFF DUPLEX CABIN NO. 7	3007	$60,025	1,364.6	$43.99
2 FACULTY CABIN NO. 8 (3008)	3008	$37,162	494.9	$75.10
3 FACULTY CABIN NO. 9 (3009)	3009	$37,162	494.9	$75.10
4 NORTH DOMITORY (3053)	3053	$224,750	3,331.2	$67.47
5 PAINTBRUSH (3082) Type B	3082	$80,370	1,436.7	$55.94
6 STAFF DUPLEX C (3083)	3083	$64,114	1,364.6	$46.98
7 BLUE SPRUCE 3084–TYPE A	3084	$138,496	2,553.8	$54.23
8 ASPEN (3085) – TYPE A	3085	$138,496	2,553.8	$54.23
9 CINQUEFOIL (3086) TYPE B	3086	$80,370	1,436.7	$55.94
10 KINNIKINNIK (3087) TYPE B	3087	$80,370	1,436.7	$55.94
11 LODGE POLE (3088) TYPE A	3088	$139,426	2,553.8	$54.60
12 NEW STAFF CABIN (3089)	3089	$162,452	2,659.9	$61.07
13 OUTHOUSE ALLOWANCE	3054	$2,291	70.0	$32.73
14 GENERAL CONDITIONS		$238,553	14.88%	
15 OVERHEAD AND FEE	8.00%	$118,723		
	TOTAL FIRE LOSS	$1,602,763	21,751.6 SF	$73.68
16 SEWAGE TREATMENT PLANT	3095	$111,114		
17 HOTCHKISS LODGE	3080	$51,332		
18 CISTERN / WATER TANK		$7,533		
	TOTAL PROJECT	$1,772,742		

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AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.

PINGREE PARK FIRE RECONSTRUCTION
AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost--------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	Superintendent (21.25)	8	MOS	4,788				38,306	0	0	0	38,306
	Carpenter Foreman (17.95)	8	MOS	4,045				32,357	0	0	0	32,357
	Daily Cleanup	768	HRS	17.81				13,675	0	0	0	13,675
	Mileage	4	MOS	990				3,960	0	0	0	3,960
	Office Trailers	8	MOS				375	0	0	0	3000	3,000
	Housing Trailers	16	MOS	31.25	312.50	75	850	500	5000	1200	13600	20,300
	Meals and per diem	88	MOS				330	0	0	0	29040	29,040
	Storage Trailers	8	MOS				50	0	0	0	400	400
	Temporary Toilets	48	MOS				135	0	0	0	6480	6,480
	Drinking Water	16	MOS				110	0	0	0	1760	1,760
	Mob/Demob	1	LS	1140	1050	350	2400	1,140	1050	350	2400	4,940
	Barricades & Fencing	1	Allow				3500	0	0	0	3500	3,500
	Survey-Baseline/Layout	1	LS		250	1200	4500	0	250	1200	4500	5,950
	Safety	8	MOS	150	75			1,200	600	0	0	1,800
	Telephone	8	MOS			125		0	0	1000	0	1,000
	Fax Machine	8	MOS			45		0	0	360	0	360
	Office supplies	8	MOS			50		0	0	400	0	400
	Final Clean-up	192	HRS	17.81				3,419	0	0	0	3,419
	Dumpster	16	PULLS			420		0	0	6720	0	6,720
	Pick-up	16	MOS	50	250	550		800	4000	8800	0	13,600
	Flatbed	8	MOS	25	175	750		200	1400	6000	0	7,600
	Skid/Bobcat	6	MOS		75		1752.03	0	450	0	10512	10,962
	Loader / Backhoe	6	MOS		100		2304.43	0	600	0	13827	14,427
	Testing	BY OWNER						0	0	0	0	0
	Fire Extinguishers	10	EA			65		0	0	650	0	650
	Radios	1	LS		6,500			0	6500	0	0	6,500
	Close out	1	Allow	500				500	0	0	0	500
	Small Tools	1	LS		6,948			0	6948	0	0	6,948
	TOTAL DIVISION 1											238,553

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AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Unit Cost: Materials	Unit Cost: Equip	Unit Cost: Subs	Total Cost: Labor	Total Cost: Materials	Total Cost: Equip	Total Cost: Subs	Total Dollars
	BLUE SPRUCE 3084-TYPE A	2553.8	SF									
	DEMOLITION	BY OTHERS										
	Excavation / Clean out	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	6	HRS	19.30	W/ GC'S			116	0	0	0	116
	TOTAL DIVISION 2											270
	Concrete Footing	8.27	CYS	25	65		95.00	207	538	0	786	1,530
	Rebar	0.08	TNS				850	0	0	0	68	68
	Concrete Pads	1.68	CYS	25	65		1.40	42	109	0	2	154
	TOTAL DIVISION 3											1,752
04200	Masonry	811	SF				6.00	0	0	0	4866	4,866
	Masonry Rebar	0.06	TNS				850	0	0	0	51	51
	TOTAL DIVISION 4											4,917
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		3332.26			0	3332	0	0	3,332
	1st Wall Package	1	LS		2521.83			0	2522	0	0	2,522
	2nd Subfloor Package	1	LS		1709.46			0	1709	0	0	1,709
	2nd Wall Package	1	LS		2308.76			0	2309	0	0	2,309
	Roof Package	1	LS		2399.47			0	2399	0	0	2,399
	Backout Package	1	LS		609.03			0	609	0	0	609
	Exterior Trim	1	LS		3016.79			0	3017	0	0	3,017
	Deck Package	1	LS		303.46			0	303	0	0	303
	Stairs	1	LS		500			0	500	0	0	500
*	Porch Addition	1	LS	997.70	605			998	605	0	0	1,603
*	Hallway Closet Addition	1	LS	332.57	75			333	75	0	0	408
	Trusses	1	LS		1296			0	1296	0	0	1,296
	Fasteners	1	LS		750			0	750	0	0	750
	TOTAL DIVISION 6											27,883
	Insulation (Ceiling & Floor)	2,809	SF		0.45		0.1	0	1264	0	281	1,545
	Insulation (Walls)	2,257	SF		0.40		0.1	0	903	0	226	1,129
*	Class A Composition	18.3	Sq				145.36	0	0	0	2660	2,660
	TOTAL DIVISION 7											5,333
08114	Front Door Allowance	1	EA	42	275			42	275	0	0	317
	2-6 x 6-8 6 Panel Pine	21	EA	42	131			873	2751	0	0	3,624
*	Closet Door Addition	1	EA	42	131			42	131	0	0	173
08210	4-0 x 6-8 Bifold	1	EA	31	130			31	130	0	0	161
	2-4 x 2-0 DH Wind	14	EA	42	153			582	2142	0	0	2,724
	2-4 x 2-0 DH Wind Mulled	2	EA	42	326			83	652	0	0	735
	2-4 x 1-6 DH Wind	4	EA	42	135			166	540	0	0	706
08700	Hardware	22	EA	42	95			915	2090	0	0	3,005
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											11,711
09260	Gypsum Board Systems - 8'	778.1	LF				28.50	0	0	0	22176	22,176
09650	VCT Flooring	56	SYS	7	0.25		15.95	389	14	0	886	1,289
	Rubber Base	1,556.2	LF				1.40	0	0	0	2179	2,179
09680	Carpet	227	SYS				12.95	0	0	0	2941	2,941
09900	Painting	2,553.8	SF				2.50	0	0	0	6385	6,385
	TOTAL DIVISION 9											34,969

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AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.

PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost----------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				28700	0	0	0	28700	28,700
	TOTAL DIVISION 15											28,700
16	Electrical	1	LS				22,612	0	0	0	22612	22,612
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											22,962
	SUBTOTAL							12,263	31,065	0	95,168	138,496
	0.00% Tax (On Material)											0
	SUBTOTAL BLUE SPRUCE 3084-TYPE A											138,496

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Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	ASPEN (3085) - TYPE A	2553.8	SF									
	DEMOLITION	BY OTHERS										
	Excavation / Clean out	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	6	HRS	19.30	W/ GC'S			116	0	0	0	116
	TOTAL DIVISION 2											270
	Concrete Footing	8.27	CYS	25	65		95.00	207	538	0	786	1,530
	Rebar	0.08	TNS				850	0	0	0	68	68
	Concrete Pads	1.68	CYS	25	65		1.40	42	109	0	2	154
	TOTAL DIVISION 3											1,752
04200	Masonry	811	SF				6.00	0	0	0	4866	4,866
	Masonry Rebar	0.06	TNS				850	0	0	0	51	51
	TOTAL DIVISION 4											4,917
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		3332.26			0	3332	0	0	3,332
	1st Wall Package	1	LS		2521.83			0	2522	0	0	2,522
	2nd Subfloor Package	1	LS		1709.46			0	1709	0	0	1,709
	2nd Wall Package	1	LS		2308.76			0	2309	0	0	2,309
	Roof Package	1	LS		2399.47			0	2399	0	0	2,399
	Backout Package	1	LS		609.03			0	609	0	0	609
	Exterior Trim	1	LS		3016.79			0	3017	0	0	3,017
	Deck Package	1	LS		303.46			0	303	0	0	303
	Stairs	1	LS		500			0	500	0	0	500
	Trusses	1	LS		1296			0	1296	0	0	1,296
*	Porch Addition	1	LS	997.70	605			998	605	0	0	1,603
*	Hallway Closet Addition	1	LS	332.57	75			333	75	0	0	408
	Fasteners	1	LS		750			0	750	0	0	750
	TOTAL DIVISION 6											27,883
	Insulation (Ceiling & Floor)	2,809	SF		0.45		0.1	0	1264	0	281	1,545
	Insulation (Walls)	2,257	SF		0.40		0.1	0	903	0	226	1,129
*	Class A Composition	18.3	Sq				145.36	0	0	0	2660	2,660
	TOTAL DIVISION 7											5,333
08114	Front Door Allowance	1	EA	42	275			42	275	0	0	317
	2-6 x 6-8 6 Panel Pine	21	EA	42	131			873	2751	0	0	3,624
*	Closet Door Addition	1	EA	42	131			42	131	0	0	173
08210	4-0 x 6-8 Bifold	1	EA	31	130			31	130	0	0	161
	2-4 x 2-0 DH Wind	14	EA	42	153			582	2142	0	0	2,724
	2-4 x 2-0 DH Wind Mulled	2	EA	42	326			83	652	0	0	735
	2-4 x 1-6 DH Wind	4	EA	42	135			166	540	0	0	706
08700	Hardware	22	EA	42	95			915	2090	0	0	3,005
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											11,711
09260	Gypsum Board Systems - 8'	778.1	LF				28.50	0	0	0	22176	22,176
09650	VCT Flooring	56	SYS	7	0.25		15.95	389	14	0	886	1,289
	Rubber Base	1,556.2	LF				1.40	0	0	0	2179	2,179
09680	Carpet	227	SYS				12.95	0	0	0	2941	2,941
09900	Painting	2,553.8	SF				2.50	0	0	0	6385	6,385
	TOTAL DIVISION 9											34,969

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PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				28700	0	0	0	28700	28,700
	TOTAL DIVISION 15											28,700
16	Electrical	1	LS				22,612	0	0	0	22612	22,612
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											22,962
	SUBTOTAL							12,263	31,065	0	95,168	138,496
0.00%	Tax (On Material)											0
	SUBTOTAL ASPEN (3085) – TYPE A											138,496

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Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Unit Cost: Materials	Unit Cost: Equip	Unit Cost: Subs	Total Cost: Labor	Total Cost: Materials	Total Cost: Equip	Total Cost: Subs	Total Dollars
	LODGE POLE (3088) TYPE A		2,553.8 SF									
	DEMOLITION	BY OTHERS										
	Excavation / Clean out	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	6	HRS	19.30	W/ GC'S			116	0	0	0	116
	TOTAL DIVISION 2											270
	Concrete Footing	8.27	CYS	25	65		95.00	207	538	0	786	1,530
	Rebar	0.08	TNS				850	0	0	0	68	68
	Concrete Pads	1.68	CYS	25	65		1.40	42	109	0	2	154
	TOTAL DIVISION 3											1,752
04200	Masonry	811	SF				6.00	0	0	0	4866	4,866
	Masonry Rebar	0.06	TNS				850	0	0	0	51	51
	TOTAL DIVISION 4											4,917
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		3332.26			0	3332	0	0	3,332
	1st Wall Package	1	LS		2521.83			0	2522	0	0	2,522
	2nd Subfloor Package	1	LS		1709.46			0	1709	0	0	1,709
	2nd Wall Package	1	LS		2308.76			0	2309	0	0	2,309
	Roof Package	1	LS		2399.47			0	2399	0	0	2,399
	Backout Package	1	LS		609.03			0	609	0	0	609
	Exterior Trim	1	LS		3016.79			0	3017	0	0	3,017
	Deck Package	1	LS		303.46			0	303	0	0	303
	Stairs	1	LS		500			0	500	0	0	500
	Trusses	1	LS		1296			0	1296	0	0	1,296
*	Porch Addition	1	LS	997.70	605			998	605	0	0	1,603
*	Ramp Addition	1	LS	665.14	265			665	265	0	0	930
*	Hallway Closet Addition	1	LS	332.57	75			333	75	0	0	408
	Fasteners	1	LS		750			0	750	0	0	750
	TOTAL DIVISION 6											28,813
	Insulation (Ceiling & Floor)	2,809	SF		0.45		0.1	0	1264	0	281	1,545
	Insulation (Walls)	2,257	SF		0.40		0.1	0	903	0	226	1,129
*	Class A Composition	18.3	Sq				145.36	0	0	0	2660	2,660
	TOTAL DIVISION 7											5,333
08114	Front Door Allowance	1	EA	42	275			42	275	0	0	317
	2-6 x 6-8 6 Panel Pine	21	EA	42	131			873	2751	0	0	3,624
*	Closet Door Addition	1	EA	42	131			42	131	0	0	173
08210	4-0 x 6-8 Bifold	1	EA	31	130			31	130	0	0	161
	2-4 x 2-0 DH Wind	14	EA	42	153			582	2142	0	0	2,724
	2-4 x 2-0 DH Wind Mulled	2	EA	42	326			83	652	0	0	735
	2-4 x 1-6 DH Wind	4	EA	42	135			166	540	0	0	706
08700	Hardware	22	EA	42	95			915	2090	0	0	3,005
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											11,711
09260	Gypsum Board Systems - 8'	778.1	LF				28.50	0	0	0	22176	22,176
09650	VCT Flooring	56	SYS	7	0.25		15.95	389	14	0	886	1,289
	Rubber Base	1,556.2	LF				1.40	0	0	0	2179	2,179
09680	Carpet	227	SYS				12.95	0	0	0	2941	2,941
09900	Painting	2,553.8	SF				2.50	0	0	0	6385	6,385
	TOTAL DIVISION 9											34,969

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	BASE RT:	BURDEN	TOTAL RATE
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15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				28700	0	0	0	28700	28,700
	TOTAL DIVISION 15											28,700
16	Electrical	1	LS				22,612.00	0	0	0	22612	22,612
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											22,962
	SUBTOTAL							12,928	31,330	0	95,168	139,426
	0.00% Tax (On Material)											0
	SUBTOTAL LODGE POLE (3088) TYPE A											139,426

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REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	OUTHOUSE ALLOWANCE 3054		70.0 SF									
	DEMOLITION	BY OTHERS										
	Excavation	4	HRS	19.30	W/ GC's			77	0	0	0	77
	TOTAL DIVISION 2											77
	Concrete Pads	0.95	CYS	25	65		10.50	24	62	0	10	95
	TOTAL DIVISION 3											95
06100	Rough Carpentry											
	(2) Carpenters	32	HRS	20.79				665	0	0	0	665
	(1) Laborer	16	HRS	17.81				285	0	0	0	285
	Lumber	1	LS		800.00			0	800	0	0	800
	Asphalt Roof	0.8	Sq				241.94	0	0	0	194	194
	TOTAL DIVISION 7											1,944
09900	Stain & Sealer	70	SF				2.50	0	0	0	175	175
	TOTAL DIVISION 9											175
	SUBTOTAL							1,051	862	0	379	2,291
0.00%	Tax (On Material)											0
	SUBTOTAL OUTHOUSE ALLOWANCE 3054											2,291

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AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.

PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	NORTH DOMITORY (3053)		3,331.2 SF									
	DEMOLITION	BY OTHERS										
	Excavation	16	HRS	19.30	W/ GC's			309	0	0	0	309
	Backfill	8	HRS	19.30	W/ GC's			154	0	0	0	154
	TOTAL DIVISION 2											463
	Concrete Footings	16.6	CYS	25	65		86.00	415	1079	0	1428	2,922
	Concrete Piers	5.1	CYS	25	65		86.00	127	332	0	439	898
	Rebar	0.5	TNS				850	0	0	0	393	393
*	Pour Pads	0.2	CYS	25	65		86.00	6	16	0	21	43
	TOTAL DIVISION 3											4,255
	Masonry	844.0	SF				6	0	0	0	5064	5,064
	Masonry Rebar	0.1	TNS				850	0	0	0	73	73
	TOTAL DIVISION 4											5,137
06100	Rough Carpentry - Carpenters	400	HRS	20.79				8,314	0	0	0	8,314
	Laborers	200	HRS	17.81				3,561	0	0	0	3,561
	Subfloor Package	1	LS		5383.28			0	5383	0	0	5,383
	Wall Package	1	LS		8988.19			0	8988	0	0	8,988
	2nd Subfloor Package	1	LS		3574.92			0	3575	0	0	3,575
	2nd Wall Package	1	LS		3575.49			0	3575	0	0	3,575
	Roof Package	1	LS		3662.75			0	3663	0	0	3,663
	Backout Package	1	LS		1092.56			0	1093	0	0	1,093
	Deck / Stair Package	1	LS		1648.03			0	1648	0	0	1,648
	Stair Package	1	LS		500.00			0	500	0	0	500
	Interior Trim Package	1	ALLOW		3800			0	3800	0	0	3,800
	Interior Trim Labor	32.0	HRS	20.79				665	0	0	0	665
	Trusses	1	LS		2200			0	2200	0	0	2,200
*	Tear out & Replace Stairs	1	LS		500			0	500	0	0	500
*	Carpenters	16	HRS	20.79								
*	Laborers	8	HRS	17.81								
	Exterior Trim Package	1	LS		4937.98			0	4938	0	0	4,938
	(2) Carpenters	192	HRS	20.79				3,991	0	0	0	3,991
	(1) Laborer	96	HRS	17.81				1,709	0	0	0	1,709
	Fasteners	1	LS		750			0	750	0	0	750
	TOTAL DIVISION 6											58,854
	Insulation (3 1/2" Wall)	3,825	SF				0.42	0	0	0	1606	1,606
	Insulation (3 1/2" Ceiling)	3,331	SF				0.42	0	0	0	1399	1,399
	Asphalt Roofing	29.3	Sq				145.05	0	0	0	4250	4,250
	TOTAL DIVISION 7											7,255
08114	Exterior Door Allowance	6	EA	42	325			249	1950	0	0	2,199
	36 - 6 Panel Doors	12	EA	42	147.50			499	1770	0	0	2,269
	Bifold 5068	1	EA	31	99.99			31	100	0	0	131
08700	Hardware	18	EA	42	95			748	1710	0	0	2,458
*	Add Closers	4	EA	42	65			166	260	0	0	426
*	Add Keyed Locks	9	EA	42	25			374	225	0	0	599
08800	Windows (Sliders) 2436	33	EA	42	185			1,372	6105	0	0	7,477
	Casement 1628	2	EA	42	133			83	266	0	0	349
	TOTAL DIVISION 8											15,909
09260	Gypsum Board Systems - 8'	1,306	LF				28.50	0	0	0	37220	37,220
*	Quarry Tile Floors	549.0	SF				10.50	0	0	0	5765	5,765
*	Quarry Base	175	LF				3	0	0	0	525	525
09680	Carpet	365.5	SYS				14.00	0	0	0	5117	5,117
09900	Painting	3,331	SF				2.50	0	0	0	8328	8,328
	TOTAL DIVISION 9											56,955

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AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.
PINGREE PARK FIRE RECONSTRUCTION
AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	Toilet Partitions	6	EA				350	0	0	0	2100	2,100
	Toilet Accessories	1	LS				1500	0	0	0	1500	1,500
	TOTAL DIVISION 10											3600
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				36000	0	0	0	36000	36,000
*	ADD HOT WATER HEATER	1	LS				1200	0	0	0	1200	1,200
*	Add Exhaust Fans	1	LS				530	0	0	0	530	530
	TOTAL DIVISION 15											37,730
16	Electrical	1	LS				34,242.00	0	0	0	34242	34,242
	Site Electrical	1	LS				350.00	0	0	0	350	350
	TOTAL DIVISION 16											34,592
	SUBTOTAL							22,775	54,426	0	147,549	224,750
0.00%	Tax (On Material)											0
	SUBTOTAL SUBTOTAL											224,750

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WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	NEW STAFF CABIN (3089)		2,659.9 SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	6	HRS	19.30	W/ GC'S			116	0	0	0	116
	TOTAL DIVISION 2											270
	Concrete Foundation	56	CYS	25	65		75	1,400	3640	0	4200	9,240
	Center Support Footing	1.86	CYS	25	65		95	47	121	0	177	344
	Rebar #5	1.2	TNS				850	0	0	0	1013	1,013
	TOTAL DIVISION 3											10,597
06100	Rough Carpentry											
	(2) Carpenters	480	HRS	20.79				9,977	0	0	0	9,977
	(1) Laborer	240	HRS	17.81				4,273	0	0	0	4,273
	Exterior Trim	1	LS		5,204.62			0	5205	0	0	5,205
	(2) Carpenters	160	HRS	20.79				3,326	0	0	0	3,326
	(1) Laborer	80	HRS	17.81				1,424	0	0	0	1,424
	Subfloor Package	1	LS		5,593.97			0	5594	0	0	5,594
	Wall Package	1	LS		7,185.46			0	7185	0	0	7,185
	Loft Floor	1	LS		837.71			0	838	0	0	838
	Roof Package	1	LS		3,764.60			0	3765	0	0	3,765
	Backout Package	1	LS		629.97			0	630	0	0	630
	Deck Package	1	LS		987.54			0	988	0	0	988
	South End Deck & Ramps	1	LS		758.18			0	758	0	0	758
	Trusses	1	LS		5,640.00			0	5640	0	0	5,640
	Interior Trim	1	Allow		4800			0	4800	0	0	4,800
	Interior Trim Labor	80	HRS	20.79				1,663	0	0	0	1,663
	Fasteners	1	LS		1,150.00			0	1150	0	0	1,150
06300	Countertops	8	LF	6.50	7.60	2.06		52	61	17	0	129
06400	Base Cabinets	1	LS	166	616.80			166	617	0	0	783
	TOTAL DIVISION 6											58,128
	R-11 Wall Insulation	3,084	SF	0.35	0.16			1,079	486	0	0	1,565
	R-30 Ceiling Insulation	4,800	SF	0.35	0.43			1,680	2040	0	0	3,720
*	Class A Composition	41.0	Sq				147.07	0	0	0	6030	6,030
	TOTAL DIVISION 7											11,315
08114	Entry Door Allowance	2	EA	42	275			84	550	0	0	634
	3068 6 Panel Doors	12	EA	28	147.50			335	1770	0	0	2,105
08210	4040 Trap Door	4	EA	28	368			112	1472	0	0	1,584
	Awning Pict Window	4	EA	28	335			112	1340	0	0	1,452
	4242 Set Windows	6	EA	28	187			167	1122	0	0	1,289
08700	Hardware	18	EA	28	95			502	1710	0	0	2,212
	TOTAL DIVISION 8											9,275
09260	Gypsum Board Systems - 8'	587	LF				28.50	0	0	0	16741	16,741
*	Quarry tile	523.8	SF				10.50	0	0	0	5500	5,500
*	Quarry tile base	211.2	LF				3.00	0	0	0	634	634
09680	Carpet	258.6	SYS				14.00	0	0	0	3620	3,620
09900	Painting	2,660	SF				2.50	0	0	0	6650	6,650
	TOTAL DIVISION 9											33,144

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PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				5,800	0	0	0	5800	5,800
	PLUMBING	1	LS				16600	0	0	0	16600	16,600
	TOTAL DIVISION 15											22,400
16	Electrical	1	LS				16,972.00	0	0	0	16972	16,972
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											17,322
	SUBTOTAL							26,669	51,480	17	84,286	162,452
	Tax (On Material)											0
	SUBTOTAL		**NEW STAFF CABIN (3089)**									162,452

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AS IS RECONSTRUCTION ESTIMATE

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WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Unit Cost: Materials	Unit Cost: Equip	Unit Cost: Subs	Total Cost: Labor	Total Cost: Materials	Total Cost: Equip	Total Cost: Subs	Total Dollars
	STAFF DUPLEX CABIN NO. 7 (3007)	1,364.6	SF									
	DEMOLITION	BY OTHERS										
	Excavation / Clean out	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Pads	1.8	CYS	25	65			45	117	0	0	162
	Rebar	0.09	TNS				850	0	0	0	77	77
	TOTAL DIVISION 3											239
04200	Masonry	82.5	SF				6.00	0	0	0	495	495
	Masonry Rebar	0.03	TNS				850	0	0	0	26	26
	TOTAL DIVISION 4											521
06100	Rough Carpentry (Framing)											
	(2) Carpenters	160	HRS	20.79				3,326	0	0	0	3,326
	(1) Laborer	80	HRS	17.81				1,424	0	0	0	1,424
	Exterior Trim	1	LS		5204.62			0	5205	0	0	5,205
	(2) Carpenters	48	HRS	20.79				998	0	0	0	998
	(1) Laborer	24	HRS	17.81				427	0	0	0	427
	Subfloor Package	1	LS		8049.26			0	8049	0	0	8,049
	Wall Package	1	LS		2583.91			0	2584	0	0	2,584
	Roof Package	1	LS		1451.39			0	1451	0	0	1,451
	Backout Package	1	LS		2500.54			0	2501	0	0	2,501
	Porch Stairs	1	LS		603.23			0	603	0	0	603
	Trusses	1	LS		1712.00			0	1712	0	0	1,712
	Fasteners	1	LS		550			0	550	0	0	550
06300	Countertops	8	LF	6.50	7.60	4.25		52	61	34	0	147
	Upper Cabinets	3	HRS	20.79				62	0	0	0	62
	Wall 36"	1	LS		547.2			0	547	0	0	547
	Wall 18"				W/ ABOVE							
06400	Base Cabinets	3	HRS	20.79				62	0	0	0	62
	Base 36"				W/ ABOVE							
	Base 27"				W/ ABOVE							
	32" Sink Front				W/ ABOVE							
	TOTAL DIVISION 6											29,649
	Insulation (Walls)	1,530	SF	No Exterior Insulation Shown				0	0	0	0	0
	Insulation (Ceiling/Floor)	2,729	SF	No Exterior Insulation Shown				0	0	0	0	0
	Int Soundproof Insulation	136	SF	0.25	0.42			34	57	0	0	91
	Class A - Composition Shakes	21.5	SQ				144.97	0	0	0	3117	3,117
	TOTAL DIVISION 7											3,208
08114	No. 3 - Ext 2'-8" U274	2	EA	46	275.00			93	550	0	0	643
	No. 3a - 2'-8" Wood Screen	2	EA	28	29.99			56	60	0	0	116
08210	No. 1 - 2'-8" 2 panel doors	5	EA	37	131.00			185	655	0	0	840
	No. 2 - 2'-0" 2 panel door	2	EA	37	122.50			74	245	0	0	319
	No. 4 - 3'-0" U274	2	EA	46	275.00			93	550	0	0	643
	No. 4a - 3'-0" Wood Screen	2	EA	28	29.99			56	60	0	0	116
08700	Hardware	15	EA	37	75.00			556	1125	0	0	1,681
08800	Windows - 2928 Casement	2	EA	W/ Ex Trim	152.00			0	304	0	0	304
	2028-2 Casement	5	EA	W/ Ex Trim	298			0	1490	0	0	1,490
	2428 Casement	6	EA	W/ Ex Trim	160			0	960	0	0	960
	TOTAL DIVISION 8											7,110
09260	Gypsum Board Systems - 8'		LF	No Int finishes shown			28.50	0	0	0	0	0
	Linoleum	15.4	SYS	7	0.25		15.50	107	4	0	238	349
09680	Carpet	26	SYS				12.95	0	0	0	335	335
09900	Painting	1,365	SF				2.50	0	0	0	3412	3,412
	TOTAL DIVISION 9											4,096

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PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0.00	0	0	0	0	0
	PLUMBING	1	LS				6800	0	0	0	6800	6,800
*	ADD HOT WATER HEATER	1	LS				1200	0	0	0	1200	1,200
	TOTAL DIVISION 15											8,000
16	Electrical	1	LS				6,545	0	0	0	6545	6,545
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											6,895
	SUBTOTAL							7,958	29,440	34	22,593	60,025
0.00%	Tax (On Material)											0
	SUBTOTAL STAFF DUPLEX CABIN NO. 7 (3007)											60,025

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REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	STAFF DUPLEX C (3083)	1,364.6	SF									
	(Same as 3007)											
	DEMOLITION	BY OTHERS										
	Excavation / Clean out	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Pads	1.8	CYS	25	65			45	117	0	0	162
	Rebar	0.09	TNS				850	0	0	0	77	77
	TOTAL DIVISION 3											239
04200	Masonry	82.5	SF				6.00	0	0	0	495	495
	Masonry Rebar	0.03	TNS				850	0	0	0	26	26
	TOTAL DIVISION 4											521
06100	Rough Carpentry (Framing)											
	(2) Carpenters	160	HRS	20.79				3,326	0	0	0	3,326
	(1) Laborer	80	HRS	17.81				1,424	0	0	0	1,424
	Exterior Trim	1	LS		5204.62			0	5205	0	0	5,205
	(2) Carpenters	48	HRS	20.79				998	0	0	0	998
	(1) Laborer	24	HRS	17.81				427	0	0	0	427
	Subfloor Package	1	LS		8049.26			0	8049	0	0	8,049
	Wall Package	1	LS		2583.91			0	2584	0	0	2,584
	Roof Package	1	LS		1451.39			0	1451	0	0	1,451
	Backout Package	1	LS		2500.54			0	2501	0	0	2,501
	Porch Stairs	1	LS		603.23			0	603	0	0	603
	Trusses	1	LS		1712.00			0	1712	0	0	1,712
	Fasteners	1	LS		550			0	550	0	0	550
*	ADD EXTERIOR SKIRTING	375	SF	0.89	1.41			333	527	0	0	860
06300	Countertops	8	LF	6.50	7.60	4.25		52	61	34	0	147
	Upper Cabinets	3	HRS	20.79				62	0	0	0	62
	Wall 36"	1	LS		547.2			0	547	0	0	547
	Wall 18"				W/ ABOVE							
06400	Base Cabinets	3	HRS	20.79				62	0	0	0	62
	Base 36"				W/ ABOVE							
	Base 27"				W/ ABOVE							
	32" Sink Front				W/ ABOVE							
	TOTAL DIVISION 6											30,509
	Insulation (Walls)	1,530	SF	No Exterior Insulation Shown				0	0	0	0	0
*	Insulation (Ceiling/Floor)	2,729	SF	0.25	0.42			682	1146	0	0	1,829
	Int Soundproof Insulation	136	SF	0.25	0.42			34	57	0	0	91
	Class A - Composition Shakes	21.5	SQ				144.97	0	0	0	3117	3,117
	TOTAL DIVISION 7											5,037
08114	No. 3 - Ext 2'-8" U274	2	EA	46	275.00			93	550	0	0	643
	No. 3a - 2'-8" Wood Screen	2	EA	28	29.99			56	60	0	0	116
08210	No. 1 - 2'-8" 2 panel doors	5	EA	37	131.00			185	655	0	0	840
	No. 2 - 2'-0" 2 panel door	2	EA	37	122.50			74	245	0	0	319
	No. 4 - 3'-0" U274	2	EA	46	275.00			93	550	0	0	643
	No. 4a - 3'-0" Wood Screen	2	EA	28	29.99			56	60	0	0	116
08700	Hardware	15	EA	37	75.00			556	1125	0	0	1,681
08800	Windows - 2928 Casement	2	EA	W/ Ex Trim	152.00			0	304	0	0	304
	2028-2 Casement	5	EA	W/ Ex Trim	298			0	1490	0	0	1,490
	2428 Casement	6	EA	W/ Ex Trim	160			0	960	0	0	960
	TOTAL DIVISION 8											7,110
09260	Gypsum Board Systems - 8'		LF	No Int finishes shown			28.50	0	0	0	0	0
	Linoleum	15.4	SYS	7	0.25		15.50	107	4	0	238	349
09680	Carpet	26	SYS				12.95	0	0	0	335	335
09900	Painting	1,365	SF				2.50	0	0	0	3412	3,412
	TOTAL DIVISION 9											4,096

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AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.

PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				6800	0	0	0	6800	6,800
*	ADD HOT WATER HEATER	1	LS				1200	0	0	0	1200	1,200
*	ADD SHOWER	1	LS				1400	0	0	0	1400	1,400
	TOTAL DIVISION 15											9,400
16	Electrical	1	LS				6,545	0	0	0	6545	6,545
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											6,895
	SUBTOTAL							8,973	31,113	34	23,993	64,114
0.00%	Tax (On Material)											0
	SUBTOTAL STAFF DUPLEX C (3083)											64,114

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AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Unit Cost: Materials	Unit Cost: Equip	Unit Cost: Subs	Total Cost: Labor	Total Cost: Materials	Total Cost: Equip	Total Cost: Subs	Total Dollars
	FACULTY CABIN NO. 8 (3008)	494.9	SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC's			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC's			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Pads	0.98	CYS	25	65		10.50	25	64	0	10	98
	Rebar	0.02	TNS				850	0	0	0	17	17
	Concrete Piers	1.3	CYS	25	65		10.50	33	85	0	14	131
	TOTAL DIVISION 3											246
06100	Rough Carpentry											
	(2) Carpenters	128	HRS	20.79				2,661	0	0	0	2,661
	(1) Laborer	80	HRS	17.81				1,424	0	0	0	1,424
	Subfloor Package	1	LS		3,433.23			0	3433	0	0	3,433
	Wall Package	1	LS		1244.58			0	1245	0	0	1,245
	Roof Package	1	LS		1088.06			0	1088	0	0	1,088
	Backout Package	1	LS		219.14			0	219	0	0	219
	Trusses	1	LS		1050.00			0	1050	0	0	1,050
	Exterior Trim Labor:											
	(2) Carpenters	48	HRS	20.79				998	0	0	0	998
	(1) Laborer	24	HRS	17.81				427	0	0	0	427
	Exterior Trim Package	1	LS		1220.68			0	1221	0	0	1,221
	Interior Walls:											
	1/4" AD Plywood Walls	1,529.7	SF		0.47			0	717	0	0	717
	3/8" AD Plywood Ceilings	501.3	SF		0.54			0	268	0	0	268
	Stairs / Porches	1	LS		365.41			0	365	0	0	365
*	Porch Addition	1	LS	997.70	605			998	605	0	0	1,603
	Interior Trim Labor	24	HRS	20.79				499	0	0	0	499
	Fasteners	1	LS		500			0	500	0	0	500
06300	Countertops	8	LF	5.20	7.60	4.25		43	63	35	0	141
	Upper Cabinets	3	EA	20.79	309.3			62	928	0	0	990
	Base Cabinets	3	EA	20.79	309.3			62	928	0	0	990
	TOTAL DIVISION 6											19,839
	1/2" Ridgid Sheathing	900.6	SF	0.25	0.35			225	315	0	0	540
	3 1/2" Batt Insul Walls	849.2	SF				0.42	0	0	0	357	357
	3 1/2" Batt Insul Ceiling	544.5	SF				0.42	0	0	0	229	229
*	Class A Composition	9.3	Sq				150.537	0	0	0	1400	1,400
	TOTAL DIVISION 7											2,526
08114	Front Door Allowance	1	EA	42	275			42	275	0	0	317
08210	No. 2 – 2'-0" 6 panel door	1	EA	42	122			42	122	0	0	164
	No. 2 – 2'-6" 6 panel door	2	EA	42	131			83	262	0	0	345
	No. 4a – 3'-0" Wood Screen	2	EA	42	29.99			83	60	0	0	143
08700	Hardware	6	EA	42	95			249	570	0	0	819
08800	2-4 X 4-2 Casement	4	EA	42	374			166	1496	0	0	1,662
	2-8 x 1-6 Awning Window	2	EA	42	245			83	490	0	0	573
	TOTAL DIVISION 8											4,023
	Linoleum	11.9	SYS	7	16.20			83	192	0	0	275
	Rubber Base	52.4	LF				1.4	0	0	0	73	73
09680	Carpet	40	SYS				12.95	0	0	0	524	524
09900	Stain & Sealer	495	SF				2.50	0	0	0	1237	1,237
	TOTAL DIVISION 9											2,110

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PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				3400	0	0	0	3400	3,400
*	ADD HOT WATER HEATER	1	LS				1200	0	0	0	1200	1,200
	TOTAL DIVISION 15											4,600
16	Electrical	1	LS				3,160	0	0	0	3160	3,160
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											3,510
	SUBTOTAL							8,596	16,560	35	11,971	37,162
0.00%	Tax (On Material)											0
	SUBTOTAL FACULTY CABIN NO. 8 (3008)											37,162

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DATE: 19-Oct-94
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WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Materials	Equip	Subs	Total Cost: Labor	Materials	Equip	Subs	Total Dollars
	FACULTY CABIN NO. 9 (3009)		494.9 SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC's			154	0	0	0	154
	Backfill	**8**	**HRS**	**19.30**	**W/ GC's**			**154**	**0**	**0**	**0**	**154**
	TOTAL DIVISION 2											309
	Concrete Pads	0.98	CYS	25	65		10.50	25	64	0	10	98
	Rebar	0.02	TNS				850	0	0	0	17	17
	Concrete Piers	1.3	CYS	25	65		10.50	33	85	0	14	131
	TOTAL DIVISION 3											246
06100	Rough Carpentry											
	(2) Carpenters	128	HRS	20.79				2,661	0	0	0	2,661
	(1) Laborer	80	HRS	17.81				1,424	0	0	0	1,424
	Subfloor Package	1	LS		3,433.23			0	3433	0	0	3,433
	Wall Package	1	LS		1244.58			0	1245	0	0	1,245
	Roof Package	1	LS		1088.06			0	1088	0	0	1,088
	Backout Package	1	LS		219.14			0	219	0	0	219
	Trusses	1	LS		1050.00			0	1050	0	0	1,050
	Exterior Trim Labor:											
	(2) Carpenters	48	HRS	20.79				998	0	0	0	998
	(1) Laborer	24	HRS	17.81				427	0	0	0	427
	Exterior Trim Package	1	LS		1220.68			0	1221	0	0	1,221
	Interior Walls:											
	1/4" AD Plywood Walls	1,529.7	SF		0.47			0	717	0	0	717
	3/8" AD Plywood Ceilings	501.3	SF		0.54			0	268	0	0	268
	Stairs / Porches	1	LS		365.41			0	365	0	0	365
*	Porch Addition	1	LS	997.70	605			998	605	0	0	1,603
	Interior Trim Labor	24	HRS	20.79				499	0	0	0	499
	Fasteners	1	LS		500			0	500	0	0	500
06300	Countertops	8	LF	5.20	7.60	4.25		43	63	35	0	141
	Upper Cabinets	3	EA	20.79	309.3			62	928	0	0	990
	Base Cabinets	3	EA	20.79	309.3			62	928	0	0	990
	TOTAL DIVISION 6											19,839
	1/2" Ridgid Sheathing	900.6	SF	0.25	0.35			225	315	0	0	540
	3 1/2" Batt Insul Walls	849.2	SF				0.42	0	0	0	357	357
	3 1/2" Batt Insul Ceiling	544.5	SF				0.42	0	0	0	229	229
*	Class A Composition	9.3	Sq				150.537	0	0	0	1400	1,400
	TOTAL DIVISION 7											2,526
08114	Front Door Allowance	1	EA	42	275			42	275	0	0	317
08210	No. 2 – 2'-0" 6 panel door	1	EA	42	122			42	122	0	0	164
	No. 2 – 2'-6" 6 panel door	2	EA	42	131			83	262	0	0	345
	No. 4a – 3'-0" Wood Screen	2	EA	42	29.99			83	60	0	0	143
08700	Hardware	6	EA	42	95			249	570	0	0	819
08800	2-4 X 4-2 Casement	4	EA	42	374			166	1496	0	0	1,662
	2-8 x 1-6 Awning Window	2	EA	42	245			83	490	0	0	573
	TOTAL DIVISION 8											4,023
	Linoleum	11.9	SYS	7	16.20			83	192	0	0	275
	Rubber Base	52.4	LF				1.4	0	0	0	73	73
09680	Carpet	40	SYS				12.95	0	0	0	524	524
09900	Stain & Sealer	495	SF				2.50	0	0	0	1237	1,237
	TOTAL DIVISION 9											2,110

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PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<----------Total Cost----------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC (Electric Baseboard)	1	LS			0		0	0	0	0	0
	PLUMBING	1	LS			3400		0	0	3400	0	3,400
*	ADD HOT WATER HEATER	1	LS				1200	0	0	0	1200	1,200
	TOTAL DIVISION 15											4,600
16	Electrical	1	LS				3,160.00	0	0	0	3160	3,160
	Site Electrical	1	LS				350	0	0	0	350	350
	TOTAL DIVISION 16											3,510
	SUBTOTAL							8,596	16,560	3,435	8,571	37,162
0.00%	Tax (On Material)											0
	SUBTOTAL FACULTY CABIN NO. 9 (3009)											37,162

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WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost: Labor	Unit Cost: Materials	Unit Cost: Equip	Unit Cost: Subs	Total Cost: Labor	Total Cost: Materials	Total Cost: Equip	Total Cost: Subs	Total Dollars
	PAINTBRUSH (3082) Type B	1,436.7	SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Footing	5.4	CYS	25	65			135	351	0	0	486
	Concrete Pads	0.73	CYS	25	65			18	47	0	0	66
	Rebar	0.23	TNS				850	0	0	0	196	196
	TOTAL DIVISION 3											747
04200	Masonry	669	SF				6.00	0	0	0	4013	4,013
	Masonry Rebar	0.03	TNS				850	0	0	0	26	26
	TOTAL DIVISION 4											4,038
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		1818.78			0	1819	0	0	1,819
	1st Wall Package	1	LS		2662.00			0	2662	0	0	2,662
	2nd Subfloor Package	1	LS		1151.63			0	1152	0	0	1,152
	2nd Wall Package	1	LS		1117.84			0	1118	0	0	1,118
	Roof Package	1	LS		1298.17			0	1298	0	0	1,298
	Backout Package	1	LS		702.18			0	702	0	0	702
	Stairs Package	1	LS		500.00			0	500	0	0	500
	Trusses	1	LS		952.00			0	952	0	0	952
	Deck Package	1	LS		495.39			0	495	0	0	495
	Exterior Trim Package	1	LS		1729.96			0	1730	0	0	1,730
	(2) Carpenters	80	HRS	20.79				1,663	0	0	0	1,663
	(1) Laborer	40	HRS	17.81				712	0	0	0	712
	Fasteners	1	LS		500			0	500	0	0	500
	TOTAL DIVISION 6											22,428
	Insulation (Walls)	3,203	SF	0.25	0.42			801	1345	0	0	2,146
	Insulation (Ceilings)	2,873	SF	0.25	0.42			718	1207	0	0	1,925
	Asphalt Roofing	11.0	Sq				145	0	0	0	1595	1,595
	TOTAL DIVISION 7											5,666
	3-0 x 6-8 Entrance Door	1	EA	42	275.00			42	275	0	0	317
	6 Panel Pine Doors	11	EA	42	131.00			457	1441	0	0	1,898
	Bifold Door	1	EA	31	129.99			31	130	0	0	161
	2-4 x 2-0 Double Hung Windov	8	EA	42	153.00			333	1224	0	0	1,557
	2-0 x 2-0 Double Hung Winds	1	EA	42	150.00			42	150	0	0	192
	2-4 x 2-0 Double Hung Mulled	2	EA	42	326.00			83	652	0	0	735
08700	Hardware	12	EA	42	95.00			499	1140	0	0	1,639
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											6,764
09260	Gypsum Board Systems - 8'	421	LF				28.50	0	0	0	12007	12,007
09650	VCT Flooring	30	SYS	7	16.20	2		209	483	50	0	742
	Rubber Base	842.6	LF				1.40	0	0	0	1180	1,180
09680	Carpet	114	SYS				12.95	0	0	0	1476	1,476
09900	Painting	1,437	SF				2.50	0	0	0	3592	3,592
	TOTAL DIVISION 9											18,997

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AS IS RECONSTRUCTION ESTIMATE

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REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0.00	0	0	0	0	0
	PLUMBING	1	LS				8300	0	0	0	8300	8,300
	TOTAL DIVISION 15											8,300
16	Electrical	1	LS				12,771.00	0	0	0	12771	12,771
	Site Electrical	1	LS				350.00	0	0	0	350	350
	TOTAL DIVISION 16											13,121
	SUBTOTAL							13,342	21,474	50	45,504	80,370
0.00%	Tax (On Material)											0
	SUBTOTAL PAINTBRUSH (3082) Type B											80,370

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WAGE RATES:	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	Unit Cost Labor	Unit Cost Materials	Unit Cost Equip	Unit Cost Subs	Total Cost Labor	Total Cost Materials	Total Cost Equip	Total Cost Subs	Total Dollars
	CINQUEFOIL (3086) TYPE B	1,436.7	SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Footing	5.4	CYS	25	65			135	351	0	0	486
	Concrete Pads	0.73	CYS	25	65			18	47	0	0	66
	Rebar	0.23	TNS				850	0	0	0	196	196
	TOTAL DIVISION 3											747
04200	Masonry	669	SF				6.00	0	0	0	4013	4,013
	Masonry Rebar	0.03	TNS				850	0	0	0	26	26
	TOTAL DIVISION 4											4,038
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		1818.78			0	1819	0	0	1,819
	1st Wall Package	1	LS		2662.00			0	2662	0	0	2,662
	2nd Subfloor Package	1	LS		1151.63			0	1152	0	0	1,152
	2nd Wall Package	1	LS		1117.84			0	1118	0	0	1,118
	Roof Package	1	LS		1298.17			0	1298	0	0	1,298
	Backout Package	1	LS		702.18			0	702	0	0	702
	Stairs Package	1	LS		500.00			0	500	0	0	500
	Trusses	1	LS		952.00			0	952	0	0	952
	Deck Package	1	LS		495.39			0	495	0	0	495
	Exterior Trim Package	1	LS		1729.96			0	1730	0	0	1,730
	(2) Carpenters	80	HRS	20.79				1,663	0	0	0	1,663
	(1) Laborer	40	HRS	17.81				712	0	0	0	712
	Fasteners	1	LS		500			0	500	0	0	500
	TOTAL DIVISION 6											22,428
	Insulation (Walls)	3,203	SF	0.25	0.42			801	1345	0	0	2,146
	Insulation (Ceilings & Floors)	2,873	SF	0.25	0.42			718	1207	0	0	1,925
*	Class A Composition	11.0	Sq				145	0	0	0	1595	1,595
	TOTAL DIVISION 7											5,666
	3-0 x 6-8 Entrance Door	1	EA	42	275.00			42	275	0	0	317
	6 Panel Pine Doors	11	EA	42	131.00			457	1441	0	0	1,898
	Bifold Door	1	EA	31	129.99			31	130	0	0	161
	2-4 x 2-0 Double Hung Windov	8	EA	42	153.00			333	1224	0	0	1,557
	2-0 x 2-0 Double Hung Winds	1	EA	42	150.00			42	150	0	0	192
	2-4 x 2-0 Double Hung Mulled	2	EA	42	326.00			83	652	0	0	735
08700	Hardware	12	EA	42	95.00			499	1140	0	0	1,639
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											6,764
09260	Gypsum Board Systems - 8'	421	LF				28.50	0	0	0	12007	12,007
09650	VCT Flooring	30	SYS	7	16.20	2		209	483	50	0	742
	Rubber Base	842.6	LF				1.40	0	0	0	1180	1,180
09680	Carpet	114	SYS				12.95	0	0	0	1476	1,476
09900	Painting	1,437	SF				2.50	0	0	0	3592	3,592
	TOTAL DIVISION 9											18,997

PALACE CONSTRUCTION COMPANY, INC.
90 Galapago Street
Denver, Colorado 80223
(303) 777-7999
(303) 777-5256 FAX

AMERICAN INTERNATIONAL ADJUSTMENT COMPANY, INC.

PINGREE PARK FIRE RECONSTRUCTION

AS IS RECONSTRUCTION ESTIMATE

DATE: 19-Oct-94
REVISION: 2

WAGE RATES:

	BASE RT:	BURDEN	TOTAL RATE
Carpenter	$13.95	1.49	$20.79
Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
15	HVAC	1	LS				0	0	0	0	0	0
	PLUMBING	1	LS				8300	0	0	0	8300	8,300
	TOTAL DIVISION 15											8,300
16	Electrical	1	LS				12,771.00	0	0	0	12771	12,771
	Site Electrical	1	LS				350.00	0	0	0	350	350
	TOTAL DIVISION 16											13,121
	SUBTOTAL							13,342	21,474	50	45,504	80,370
0.00%	Tax (On Material)											0
	SUBTOTAL CINQUEFOIL (3086) TYPE B											80,370

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Operator / Laborer	$12.95	1.49	$19.30
Laborer	$11.95	1.49	$17.81

Div	Description	Quan	Unit	<-------Unit Cost-------> Labor	Materials	Equip	Subs	<---------Total Cost---------> Labor	Materials	Equip	Subs	Total Dollars
	KINNIKINNIK (3087) TYPE B		1,436.7 SF									
	DEMOLITION	BY OTHERS										
	Excavation	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	Backfill	8	HRS	19.30	W/ GC'S			154	0	0	0	154
	TOTAL DIVISION 2											309
	Concrete Footing	5.4	CYS	25	65			135	351	0	0	486
	Concrete Pads	0.73	CYS	25	65			18	47	0	0	66
	Rebar	0.23	TNS				850	0	0	0	196	196
	TOTAL DIVISION 3											747
04200	Masonry	669	SF				6.00	0	0	0	4013	4,013
	Masonry Rebar	0.03	TNS				850	0	0	0	26	26
	TOTAL DIVISION 4											4,038
06100	Rough Carpentry											
	(2) Carpenters	240	HRS	20.79				4,989	0	0	0	4,989
	(1) Laborer	120	HRS	17.81				2,137	0	0	0	2,137
	1st Subfloor Package	1	LS		1818.78			0	1819	0	0	1,819
	1st Wall Package	1	LS		2662.00			0	2662	0	0	2,662
	2nd Subfloor Package	1	LS		1151.63			0	1152	0	0	1,152
	2nd Wall Package	1	LS		1117.84			0	1118	0	0	1,118
	Roof Package	1	LS		1298.17			0	1298	0	0	1,298
	Backout Package	1	LS		702.18			0	702	0	0	702
	Stairs Package	1	LS		500.00			0	500	0	0	500
	Trusses	1	LS		952.00			0	952	0	0	952
	Deck Package	1	LS		495.39			0	495	0	0	495
	Exterior Trim Package	1	LS		1729.96			0	1730	0	0	1,730
	(2) Carpenters	80	HRS	20.79				1,663	0	0	0	1,663
	(1) Laborer	40	HRS	17.81				712	0	0	0	712
	Fasteners	1	LS		500			0	500	0	0	500
	TOTAL DIVISION 6											22,428
	Insulation (Walls)	3,203	SF	0.25	0.42			801	1345	0	0	2,146
	Insulation (Ceilings)	2,873	SF	0.25	0.42			718	1207	0	0	1,925
*	Class A Composition	11.0	Sq				145	0	0	0	1595	1,595
	TOTAL DIVISION 7											5,666
	3-0 x 6-8 Entrance Door	1	EA	42	275.00			42	275	0	0	317
	6 Panel Pine Doors	11	EA	42	131.00			457	1441	0	0	1,898
	Bifold Door	1	EA	31	129.99			31	130	0	0	161
	2-4 x 2-0 Double Hung Windov	8	EA	42	153.00			333	1224	0	0	1,557
	2-0 x 2-0 Double Hung Winds	1	EA	42	150.00			42	150	0	0	192
	2-4 x 2-0 Double Hung Mulled	2	EA	42	326.00			83	652	0	0	735
08700	Hardware	12	EA	42	95.00			499	1140	0	0	1,639
*	Add Keyed Locks	4	EA	42	25.00			166	100	0	0	266
	TOTAL DIVISION 8											6,764
09260	Gypsum Board Systems - 8'	421	LF				28.50	0	0	0	12007	12,007
09650	VCT Flooring	30	SYS	7	16.20	2		209	483	50	0	742
	Rubber Base	842.6	LF				1.40	0	0	0	1180	1,180
09680	Carpet	114	SYS				12.95	0	0	0	1476	1,476
09900	Painting	1,437	SF				2.50	0	0	0	3592	3,592
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DATE: 19-Oct-94
REVISION: 2

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16	Electrical	1	LS				12,771.00	0	0	0	12771	12,771
	Site Electrical	1	LS				350.00	0	0	0	350	350
	TOTAL DIVISION 16											13,121
	SUBTOTAL							13,342	21,474	50	45,504	80,370
0.00%	Tax (On Material)											0
	SUBTOTAL KINNIKINNIK (3087) TYPE B											80,370

A Comparison of Understory Vegetation Following Disturbance at Pingree Park, Colorado

Prepared by Dave Farmer
June 27, 1997

General Description of Area - Pingree Park, Colorado State University's mountain campus, is located 53 miles west of Fort Collins. Primary life zones are upper montane and subalpine forests. Elevation in the vicinity of the study area is approximately 9040 feet above sea level. The central valley of Pingree Park is the result of glacial activity. The South Fork of the Cache la Poudre River flows through the valley. Lodgepole pine dominates the lateral moraine to the north while lodgepole pine, limber pine, and Engelmann spruce dominate the southern moraine. Ponderosa pine, aspen, and Douglas-fir are also common in the area. Prior to the fire this area was dominated by 110 year old lodgepole pine. Small remnant aspen populations were common. Basal area ranged from 120 to over 200 square feet

Background Information - On July 1, 1994, a lightning ignited wildfire burned 1200 acres in the Pingree Park area. Before the day was over, 170 people were evacuated from the campus, 13 buildings were destroyed, and 1200 acres of forest were burned by what became known as the Hourglass Fire. Historical records show this area last burned during the summer of 1890.

Survey Objective - The primary objective of this survey is to compare the vegetation response to various forest management practices on burned and unburned sites on the Pingree Park campus. Vegetation on five plots were inventoried in an attempt to compare understory vegetation following fire and in combination with various forest management practices.

Plot Descriptions - The five plots studied are:

Plot 1. Burned forest (crown fire) with no forest management activities.
Plot 2. Burned forest (crown fire) with all timber salvaged for safety reasons.
Plot 3. Burned forest (surface fire) followed by thinning to reduce fire hazards.
Plot 4. Unburned forest thinned to reduce fire hazards
Plot 5. Unburned forest with no forest management activities.

Survey Results - The following information was compiled in the survey area on June 27, 1996.

Plot 1. Burned forest (crown fire)/no forest management activities.

Scientific Name	Common Name	Percent Ground Cover
	Bare ground/rock	50-60
Thermopsis divaricarpa	Golden Banner	5-20
Carex spp	Sedge	5-10
Penstemon virens	Low Penstemon	5
Populus tremuloides	Quaking Aspen	5-70 (600-5000 trees/acre)
Potentilla fissa	Leafy Cinquefoil	1-2
Chamerion angustifolium	Fireweed	1-2
Rosa woodsii	Woods Rose	1-2
Achillea lanulosa	Western Yarrow	1
Phacelia sericea	Purple Fringe	1
Pinus contorta	Lodgepole Pine	0

Plot 2. Burned forest (crown fire) with all timber salvaged.

Scientific Name	Common Name	Percent Ground Cover
	Bare ground/rock	50-70
Carex spp.	Sedge	5-10
Thermopsis divaricarpa	Golden Banner	5-10
Arnica cordifolia	Heartleaf Arnica	2-5
Pinus contorta	lodgepole pine	1-2 (500-1400 trees/acre)
Populus tremuloides	Quaking Aspen	1 (500 trees/acre)
Penstemon virens	Low penstemon	1
Rosa woodsii	Woods rose	1
Potentilla fissa	Leafy Cinquefoil	1
	unknown	1
Phacelia sericea	Purple Fringe	<1
Chenopodium capitatum	Strawberry blight	<1
Castilleja spp.	Paintbrush	<1
Antennaria rosea	Rose Pussytoes	<1
Rubus idaeus	Wild Raspberry	<1
Chamerion angustifolium	Fireweed	<1
Koeleria macrantha	June-grass	<1

Plot 3. Burned forest (surface fire) followed by thinning.

Scientific Name	Common Name	Percent Ground Cover
	Bare ground/rock	50-60
Carex spp. and grasses	Sedges and grasses	10-25
	unknown	5-10
Thermopsis divaricarpa	Golden Banner	2
Chamerion angustifolium	Fireweed	1
Rosa woodsii	Woods Rose	1
Fragaria ovalis	Strawberry	1
Juniperus communis	Common Juniper	1
Taraxacum spp.	Dandelion	1
Arnica cordifolia	Heartleaf Arnica	1
Phacelia sericea	Purple Fringe	1
Aquilegia caerulea	Columbine	1
Chenopodium capitatum	Strawberry Blight	1
Pinus contorta	Lodgepole Pine	1 (100 trees/acre)
Achillea lanulosa	Western Yarrow	1
Cerastium arvense	Field Mouse-ear	1

Plot 4. Unburned and thinned

Scientific Name	Common Name	Percent Ground Cover
	Litter and duff	90
Juniperus communis	Common juniper	2
Fragaria ovalis	Strawberry	1
Rosa woodsii	Woods Rose	1
Carex spp.	Sedge	1
	Unknown	1

Plot 5. Unburned forest with no forest management.

Scientific Name	Common Name	Percent Ground Cover
	Bare ground and rock	50
Juniperus communis	Common Juniper	10-20
Rosa woodsii	Woods Rose	2
Arctostaphylos uva-ursi	Kinnikinnik	1-2
Fragaria ovalis	Strawberry	1
Mahonia repens	Oregon grapeholly	1
Arnica cordifolia	Heartleaf Arnica	1
Populus tremuloides	Quaking Aspen	<1 (100 trees/acre)
Corallorhiza striata	Corral root	<1

Results and Observations - Four interesting observations resulted from this study.

1. The areas that were both burned and salvaged appear to have the highest plant diversity (i.e. the greatest number of individual plant species). This may be due to the increased amount of sunlight resulting from harvesting and less aspen regeneration.

2. Any burned area seems to have greater plant diversity. When comparing the two thinned areas, more plant species were present in the burned area. Perhaps this is due to increased sunlight and an increase in available nitrogen following the fire.

3. Aspen regeneration is greatest in areas burned with no timber harvesting. Harvesting equipment probably significantly damages aspen regeneration during tree removal.

4. Lodgepole pine regeneration is greatest in areas burned followed by salvage harvesting. I suspect that harvesting equipment reduces aspen competition and improves a seed-bed for lodgepole seedlings.

Project Evaluation - I believe this project should receive an A-. I would like to have spent more time (in fact, I plan to continue these observations) and included several more plots in the survey area to adequate represent the response of vegetation to fire and forest management. This project has been very valuable to me. I will be leading tours of the fire area and the information I've gained should help me paint a better picture of disturbance ecology.

References:

Nelson, Ruth Ashton. 1976. Plants of Rocky Mountain National Park. Rocky Mountain Nature Association, Inc. 168 pp.

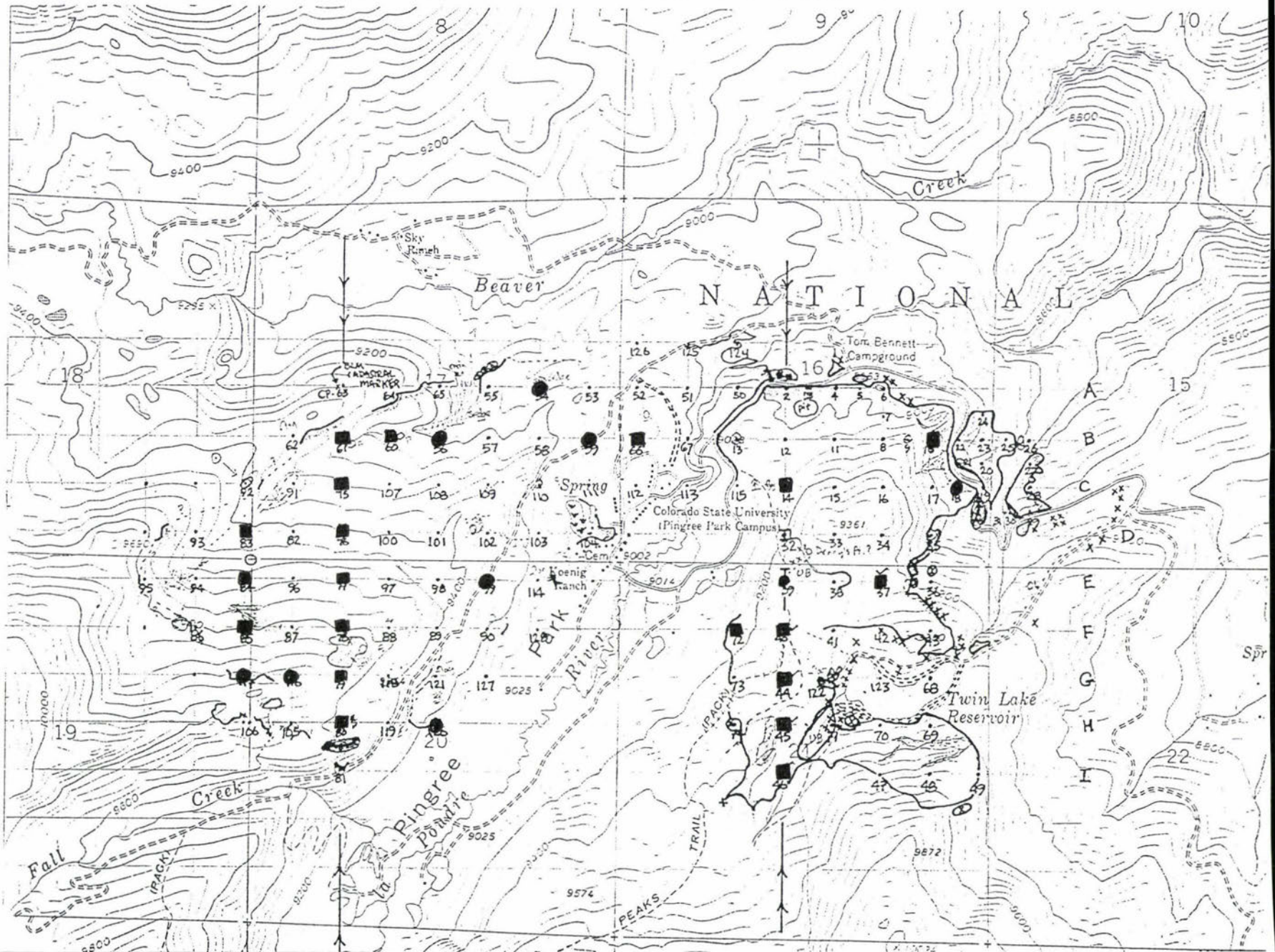
Weber, William A. 1976. Rocky Mountain Flora. University of Colorado Press. 479 pp.

■ = permanant plots, marked with green fence posts & orange flagging

● = 6" metal stake

Sampling planned for spring/summer 75 (and ongoing):

1- fuel loading transects.
2- revegetation plots.
3 - Riparian transects.



Sampling scheduled for spring/75: fuel loading
Summer

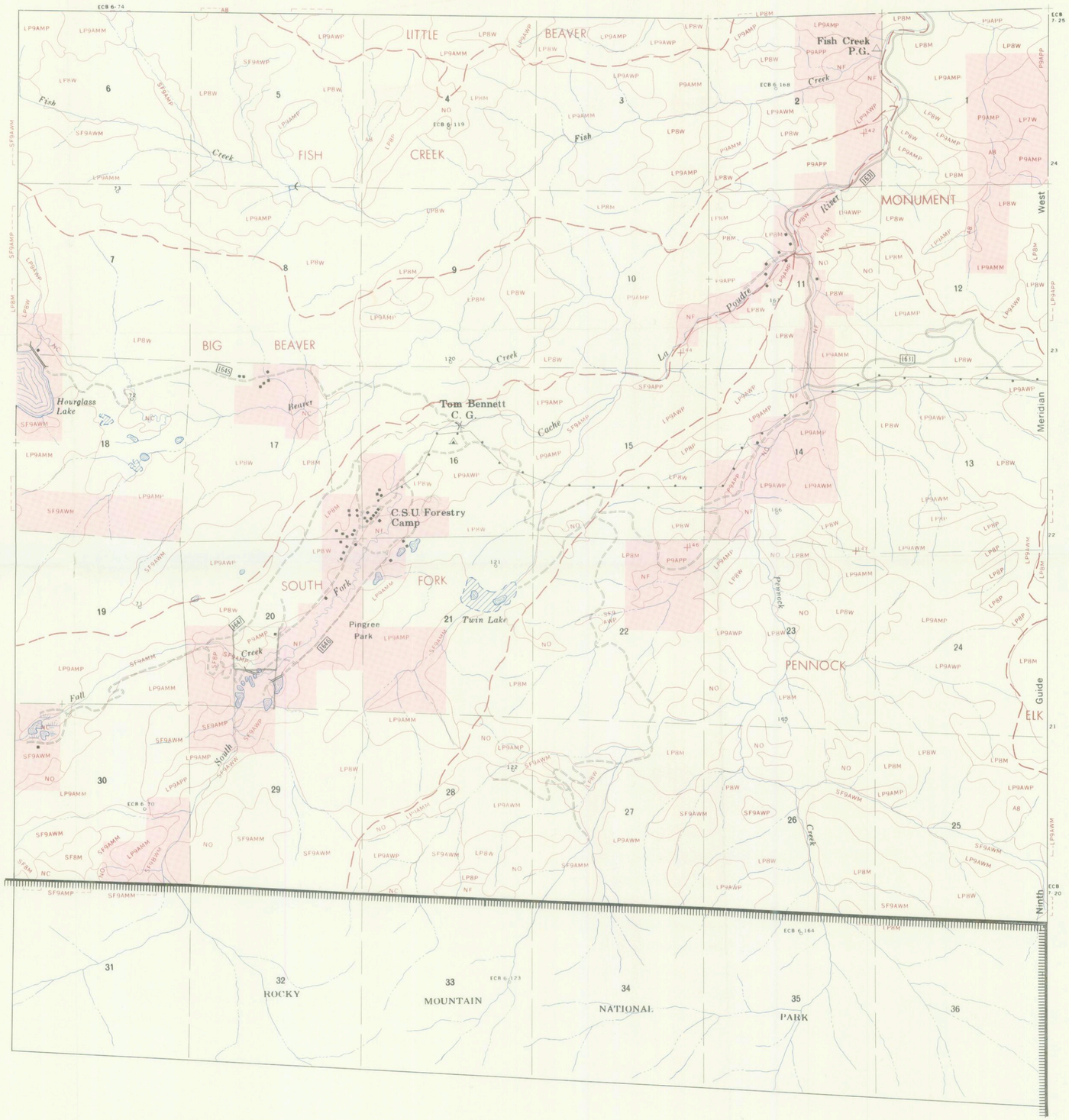
R-2

T7N-R73W 6th P.M.

U. S. DEPT. OF AGRICULTURE

ROOSEVELT NATIONAL FOREST

FOREST SERVICE



LEGEND

- State Line
- County Line
- National Forest Boundary Line
- Special Area Boundary Line
- Wild or Wilderness Area
- Located Land Corner
- All Weather Motor Road
- Unimproved Road
- Trail
- U.S. & State Highways
- Forest Road
- Power Line
- Telephone Line
- Mine or Prospect
- Building
- Supervisor Headquarters
- Ranger District Station
- Guard Station
- Permanent Lookout
- Airport
- Picnicground
- Campground
- Perennial Stream
- Perennial Lake
- Intermittent Stream
- Intermittent Lake
- Spring
- Non National Forest Land
- Photo Center & Number
- Plot Center & Number

FOREST TYPE SYMBOLS

Commercial

P	Ponderosa Pine
LP	Lodgepole Pine
WLP	Whitebark, Limber or Bristlecone Pine
SF	Engelmann, Blue or Black Hills Spruce
	Alpine & Corkbark Fir
D	Douglas Fir
DS	Dead Spruce
WF	White Fir
A	Aspen
Co	Cottonwood
OH	Other Hardwoods

Non Commercial

NA	Aspen
NC	Chaparral (Oak Brush, Dwarf Trees, etc.)
NPJ	Pinyon, Juniper
NO	Others

Non Forest

NF	Grass, Rock, Cultivated Land

Stand Size Class

6	Non Stocked or Deforested (burns, clearcuts)
7	Seedling, Sapling, 0" to 4.9" d.b.h.
8	Pole 5.0" to 10.9" d.b.h.
9A	Small Sawtimber 11.0" to 20.9" d.b.h.
9B	Large Sawtimber 21.0" and over d.b.h.

Crown Density

P	Poor 10% to 39%
M	Medium 40% to 69%
W	Well 70% to 100%

Use dual density symbols for sawtimber stand. First symbol refers to stocking on the basis of total crown cover. Second symbol refers to stocking by sawtimber crowns only

EXAMPLE

SF9AWM Spruce, Small Sawtimber, well stocked on total crown basis, medium stocked on sawtimber crown basis

- Compartment Boundary
- Working Circle Boundary

WORKING CIRCLE

ROOSEVELT

T7N-R73W-6th P.M.

Compiled By Rocky Mtn. Region, Denver, Colo. 1960

Aerial Photography ECB 1956

Planimetric base from Forest Service class C map

Compiled by Photogrammetric methods

The accuracy of the land net is based upon photo identified corners as indicated. Any section that has no corner shown will not necessarily be in its true position.

Scale 0 ¼ ½ 1 2 Miles

Colorado State FOREST SERVICE

MEMORANDUM

OCT 17 1995

DATE: 17 October '95

TO: Dave Farmer

FROM: Dave Leatherman

SUBJECT:

The name I gave you for the big black & white ichneumon wasp from Pingree Park was incorrect. The specimens in the CSU collection were labeled incorrectly.

The new name is

Rhyssa persuasoria

See attached article on how they find their prey. They don't feel the vibrations. They don't hear them. They smell the fungus that they vector. Amazing!

Anim. Behav., 1970, 18, 103–114

HOST FINDING BY *RHYSSA PERSUASORIA* (L.), AN ICHNEUMONID PARASITE OF SIRICID WOODWASPS

BY J. P. SPRADBERY

Sirex Biological Control Unit, Division of Entomology, C.S.I.R.O. (Australia), Silwood Park, Ascot, England

In Europe, siricid woodwasps attack dead, dying or weakened coniferous trees in a variety of ecological situations. Female siricids drill into trees, making characteristic punctures in the bark and wood, and oviposition shafts in which no eggs or one or more eggs are deposited. Arthrospores of a symbiotic fungus, which are stored in paired mycangia at the base of the oviduct, are injected into the wood by the drilling female. After introduction, the fungus develops in the wood. The burrowing larvae feed on the wood and fungus, and produce cylindrical tunnels packed with frass, which contain the exuviae.

One of the most common and widely distributed insect parasites of woodwasp larvae and pupae is *Rhyssa persuasoria* (L.) (Hymenoptera: Ichneumonidae), which drills into the wood during its search for hosts. The present paper describes the activity of searching *R. persuasoria* females in relation to the infested log environment, and analyses the factors involved in the detection of woodwasp hosts.

Behaviour on Infested Logs

Methods

R. persuasoria females from a variety of host tree species collected in many European countries were used. They were mated after emergence and studied at 25°C, or stored at 5°C, in gauze-covered observation cages (30 cm^3). The adults were supplied with water and with honey containing 1 per cent protein hydrolysate.

Culture logs of Scots pine (*Pinus sylvestris* L., 19 to 25 cm long; 10 to 16 cm diameter; bark 2 to 7 mm thick) containing larvae of *Sirex noctilio* F., *S. juvencus* L. or *S. cyaneus* F. were used, the cut surfaces being sealed with beeswax to protect against secondary fungal infection and desiccation. With few exceptions, the tunnels and hosts occupied the peripheral 2 cm. Logs which had not been exposed to siricids, or with oviposition punctures but no larval development were also used. Observations were made at 25°C and 70 per cent relative humidity, using fluorescent lighting. In many experiments, the logs were dissected and the positions of hosts and galleries in relation to parasite activities graphically recorded.

To determine the behaviour of females on logs containing inactive host larvae, culture logs were placed at —20°C for 6 days and controls maintained at 25°C. Dissection of treated logs confirmed that the larvae had been killed. Exploratory and drilling activity on treated and control logs was recorded on 5 successive days (total observation time was 10 hr), and afterwards the logs were dissected to determine the number of host and parasite larvae.

Results

Exploratory behaviour. The searching behaviour of the female on an infested log comprises three major behavioural components. Firstly, there is 'surveying', a preliminary exploration in which the female walks fairly rapidly over the log with the tips of the antennae tapping the surface and the head moving from side to side so that a narrow field about 3 cm wide is examined. Secondly, in some areas the female stops and examines the surface with the tips of the antennae more thoroughly by rapid tapping, an activity termed 'palpating'. Finally, the parasite draws up the ovipositor, manoeuvres it into position near the antennae and begins drilling. Exploratory drills of less than 2 min duration and having a depth of less than 3 mm in the wood are termed 'probes', and the more prolonged insertions to a greater depth are 'drills'.

The behaviour of one female exploring an infested log during 1 hr is illustrated in Fig. 1. The exploratory routes in areas which stimulated little or no palpating and drilling were typically less convoluted than in areas where oviposition activity was more intense. Assuming a survey width of 3 cm, an average of 42 per cent of the total surface area (750 cm^2) was surveyed per female per hr (range 14 to 62 per cent, n=6). During 5 hr of continous exploratory activity one female surveyed 85 per cent of a log. Uninfested logs elicited no oviposition behaviour although surveying and occasional palpating were observed. During 12 hr of observations on

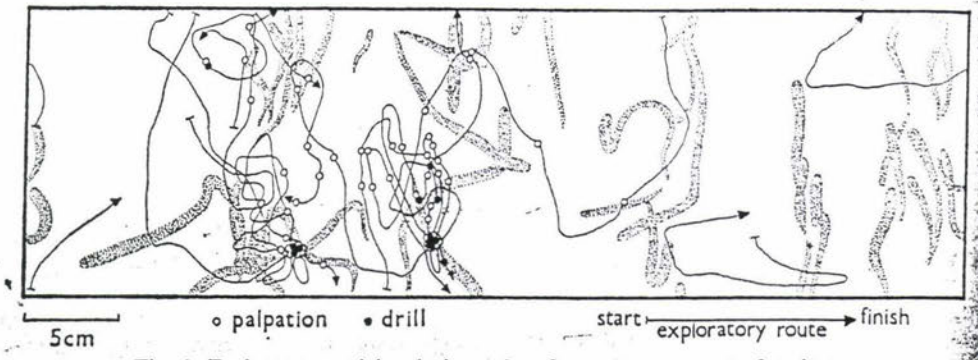


Fig. 1. Exploratory activity during 1 hr of one *R. persuasoria* female on an infested log. (Area occupied by hosts and tunnels indicated by stippling.)

four females on infested logs, 20·5 per cent of the time was spent surveying, 11·7 per cent palpating, 58·2 per cent drilling and 9·6 per cent resting or not on the logs, with a mean of 30·2 palpations, 8·3 probes and 1·3 drills per female per hr. When drilling occurs, it takes up most of the time. The mean durations of a palpation, probe and drill were 13 (2 to 42) s, 1·7 (1 to 3) min and 13·9 (5 to 33) min respectively (n=50).

Surface features that possibly influence the point of ovipositor insertion include debarked areas, cracks in the bark, fissures in the wood, siricid oviposition punctures and exit holes. The results of observations on logs with one or more of these features are given in Table I and demonstrate that cracks in the wood and bark act as a focus for drilling.

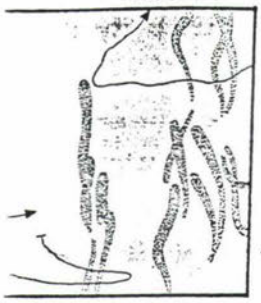
Two or more females on an infested log frequently become antagonistic. This behaviour is released when two females come into close proximity when surveying or when one is drilling. During threat display, the females face each other, raise the body, lift the prothoracic legs and 'fence' with their antennae. Threat postures generally result in a brief conflict, when the females attempt and occasionally succeed in biting each other, after which one of the combatants moves to a different part of the log. In this way, individual females acquire loosely defined territories that tend to persist for several days. Observations showed that females drilled readily in areas previously drilled by other females.

Drilling in relation to hosts and tunnels. The parasite ovipositor is normally inserted into the wood at an angle of 75° to 90° to the surface and does not always pass through the wood in a straight line. Therefore, insertions made at some

Table I. The Influence of Surface Features of Logs on the Drilling Response

Feature	Per cent of total surface area occupied by feature	Number of replicates	logs examined	females per replicate	Total drills recorded	Per cent of total drills into feature	Significance P
Fissures in wood	1·7	9	2	1	89	61	<0·001
Cracks in bark	3·3	3	1	1	39	41	<0·001
De-barked areas	4·7	6	1	1	50	12	ns
Siricid exit-holes	0·6	5	5	3	107	9	<0·001
Siricid oviposition punctures (galleries present)	0·3 (498 punctures)	4	4	3	231	0·4	ns*
Siricid oviposition punctures (galleries absent)	0·03 (11 punctures)	3	1	1	13	0	ns

*If a puncture is assumed to occupy 1 mm² or 10 mm² the results were still not significant.



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previously drilled by other

on to hosts and tunnels. The
is normally inserted into the
of 75° to 90° to the surface,
s pass through the wood in a
ore, insertions made at some

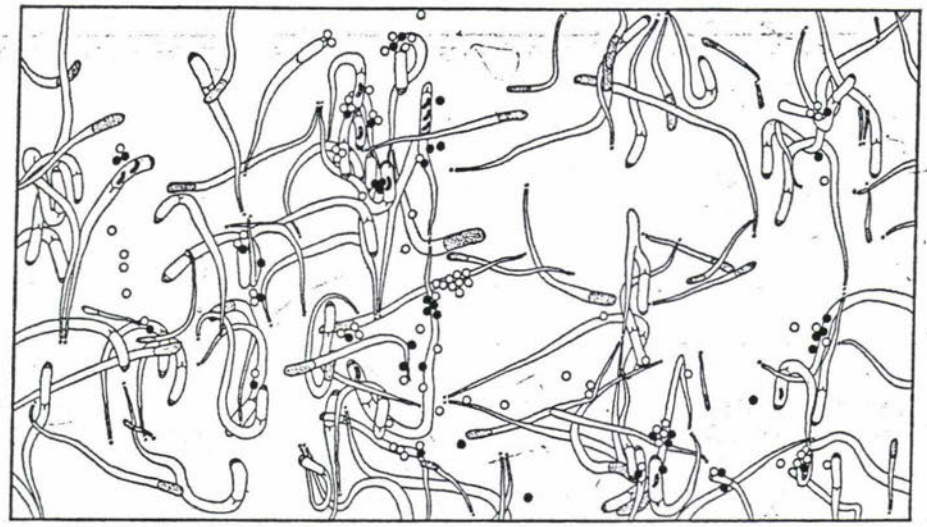
g Response

al ls ded	Per cent of total drills into feature	Significance *P*
	61	<0·001
	41	<0·001
	12	ns
	9	<0·001
	0·4	ns*
	0	ns

nt.

distance from the host (in surface view) can result in its detection. For example, in Fig. 2a, eleven drills resulted in host detection of which only two were directly over hosts. The maximum distance from the point of insertion to a point overlying a 2-cm deep parasitized host was 12 mm, giving an insertion angle of 31°. Consequently, in the study of drilling activity in relation to the position of hosts and tunnels, the proportions of drills within 5 mm and 10 mm boundaries around hosts and tunnels was computed.

Table II shows the proportion of the total surface area immediately above hosts or above



a

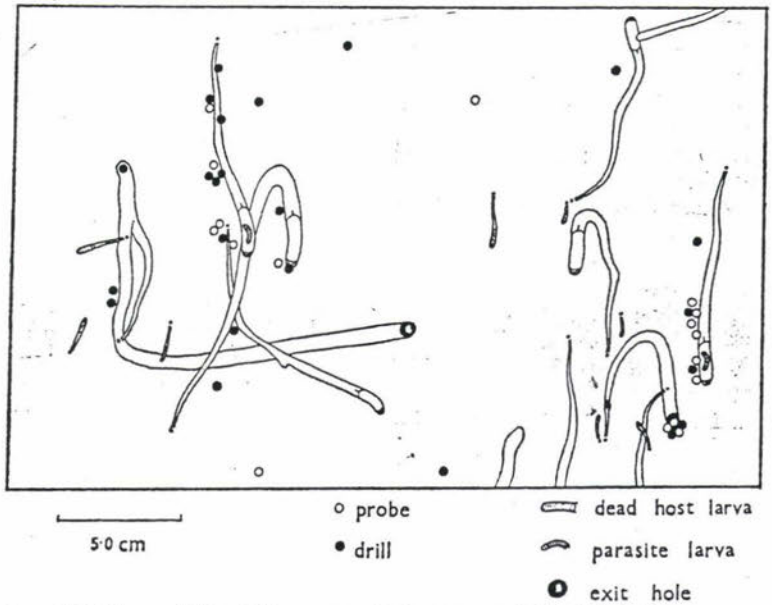


Fig. 2. Drilling activity of *R. persuasoria* females on siricid infested logs. a, Heavily infested log no. 5. b, Lightly infested log no. 1. N.B. Two-dimensional drawings of the logs in which galleries and larvae were 0 to 2 cm deep in the wood.

Table II. Drilling activity in Relation to Hosts and Tunnels in Infested Logs

Log no.	Surface area sq. cm (excluding cut ends)	Number of			Per cent of drills near							
		host larvae	drills by parasite	hosts parasitized	tunnels and hosts				hosts only			
					0	0–5	5–10	>10	0	0–5	5–10	>10
					distance from host and/or tunnels (mm)							
1	570	5	23	2	30(5)	44(23)	17(16)	9(56)	4(0·7)	9(1·7)	9(3·6)	78
2	615	5	32	3	28(7)	35(27)	3(24)	34(42)	13(1·4)	12(4·6)	9(5·0)	66
3	656	1	20	0	20(7)	25(17)	5(15)	40(61)	0(1·7)	5(4·3)	25(4·0)	70
4	656	21	47	2	57(8)	34(30)	3(42)	6(20)	9(0·7)	23(7·3)	23(7·0)	45
5	720	48	40	8	75(20)	18(23)	7(32)	0(25)	11(3·5)	30(11·5)	16(11)	43
Mean	643	16	32	3	42(9)	31(24)	9(26)	18(41)	7(1·6)	16(5·9)	16(6)	60
		Significance P			<0·001	>0·05	<0·001	<0·001	<0·001	<0·001	<0·001	<0

The percentages of the surface area occupied and tunnels and/or hosts are given in parentheses.

hosts and their tunnels, and the percentage of the areas within 5 mm and 5 to 10 mm of their boundaries. If drilling was random, it would be expected that the proportion of drills within a particular area would be equal to the proportion of the total area occupied. There were 4·8 (range 3 to 7) and 5·8 (4 to 13) times more drills over tunnels and hosts respectively than would be expected if drilling was random. Comparison of drilling activity in relation to tunnels showed a small difference in the 0 to 5 mm boundary, but significantly fewer drills were recorded into the 5 to 10 mm and beyond the 10 mm boundary. Significantly more drills were made near host material alone than if drilling were random, even into the 5 to 10 mm boundary. In log 3, there was only one living larva, the remainder having been invaded by secondary fungus, which probably accounts for the low proportion of drills near the larvae.

The relationship between probes and drills, and the geography of hosts and tunnels in the wood is illustrated in Fig. 2. In the heavily infested log 5 (Fig. 2a), 95 per cent of the probes and all the drills were within 10 mm of host material. Non-random drilling was emphasized by log 1 (Fig. 2b) in which 88 per cent of the probes and 91 per cent of the drills were within 10 mm of host material which occupied only 5 per cent of the total surface area.

The overall parasitism was 23 per cent, but 89 per cent of the drills did not result in host detection.

Drilling by the parasite does not follow a well defined sequence in relation to a particular tunnel suggestive of following a concentration gradient, although some areas stimulate repeated drilling.

Behaviour on logs containing inactive host larvae. The results of parasite host-searching behaviour on logs containing dead and live host larvae are given in Table III. Exploratory behaviour (number of palpations and probes) was similar in both groups but more drills were made in the control logs with live larvae (P < 0·01), although the total number of ovipositor insertions (probes + drills) was not significantly different between the two groups. Dead host larvae, including those in early stages of decomposition, were successfully located and parasitized. The percentages of drills resulting in parasitism were 13·4 in the treated group and 10·5 in the controls, and were not significantly different, but parasitism was 17 per cent in the treated logs and 51 per cent in the controls.

Experimental Data

Procedure

To study the different components of the infested log environment in relation to host detection, a bioassay procedure was developed whereby females were stimulated to host-searching activity, permitting a quantitative study of the factors which elicit the drilling response. The apparatus consisted of a sheet of Perspex (30 cm × 15 cm × 1 cm thick) which had

Table III. Activity of Females on Logs Containing Dead and Live Host Larvae

Replicate	No. ♀♀	Logs with dead larvae					Logs with live larvae				
		Number of					Number of				
		palpations	probes	drills	host larvae	parasitized hosts	palpations	probes	drills	host larvae	parasitized hosts
1	3	58	23	22	20	2	73	31	56	38	23
2	3	*	*	20	4	0	*	*	33	2	1
3	4	88	63	12	14	7	54	43	12	3	1
4	3	39	12	1	11	0	48	21	4	2	0
5	4	72	48	11	5	0	54	46	4	4	0
Total		257	146	66	54	9	229	141	109	49	25

*No observations made.

forty cavities (20 mm × 7 mm²). Test materials were put into the cavities which were then covered with paper fixed with cellulose acetate tape. The same quantities of test materials were each put into 3 to 6 cavities per sheet, the same number of cavities being used for each substance. The test materials in cavities were arranged at random. The sheet was put on the top of an observation cage with the cavities facing downwards thus making them accessible to the female. Except where indicated, three females were used in each cage. Generally young females were offered siricid-infested logs to initiate drilling before being used in bioassay studies. Activity was recorded by observing the palpations and drills, or by counting the number of drills made in the paper. The durations of experiments was 1, 16 and 64 hr. Except where indicated, frass samples used in bioassay studies were 7 mg samples taken from the 3 cm of tunnel directly behind developing siricid larvae. Fungal cultures were maintained at 24°C on potato dextrose agar medium, and samples were obtained with a 5 mm diameter cork borer, using 3 to 4 discs of fungus-impregnated agar per cavity.

Experiments were made at approximately 25°C and 70 per cent relative humidity with fluorescent lighting or total darkness.

Materials and Results

Analysis of log components. To evaluate the relative attractiveness of the gross components of the infested log, the following were compared: sawdust from infested logs (but not including larval frass); sawdust from clean logs; siricid larvae; frass from siricid tunnels; the fungal symbiont of *S. juvencus*; and larvae and frass of the melandryid beetle, *Serropalpus barbatus* Schaller, whose larvae are frequently found in the same log with siricid larvae. The larvae were not washed before testing. The results of nine replicates (each of 1 hr duration) are summarized in Table IV and clearly show the dominant attractiveness of siricid frass and, at a much lower level, of wood from infested timber.

To compare the relative attractiveness of siricid frass and the beetle frass from the same log, samples of each were bioassayed, demonstrating (Table V, test 1) that compared to siricid frass, the beetle frass elicits little host-searching activity.

To determine whether the presence of siricid larvae stimulates the drilling response, samples of siricid frass with and without larvae in the cavities, were bioassayed. The results (Table V, test 2) did not demonstrate any difference in drilling response, although significantly more palpations were made over cavities containing frass and larvae ($P<0{\cdot}001$). When washed siricid larvae were compared with frass, drilling was only elicited by the frass (Table V, test 3).

The effects of frass on host-searching behaviour. Frass was bioassayed to determine whether there was a gradient in response to different parts of the tunnel extending from the siricid larva to the oviposition shaft. Frass samples from each 1-cm length of 5-cm tunnels were tested, using three cavities per 4 mg sample in each of five replicates. The results are summarized in Table VI. The differences in attract-

Table IV. Host-searching Behaviour of Females when Exposed to Different Materials Associated with Timber

Materials tested	No. palpations	Per cent of total palpations	No. drills	Per cent of total drills
Siricid frass	142	58	93	84
Sawdust from infested log	38	16	10	8
Symbiotic fungus (*S. juvencus*)	31	13	2	2
S. barbatus frass	8	3	2	2
Sawdust from uninfested log	2	1	2	2
Siricid larvae	17	7	1	1
S. barbatus larvae	5	2	1	1
Total	243		111	

The cultured symbiotic fungus was bioassayed 30 to 120 days after inoculation.
9 replicates using 3 females per replicate.

Table V. Comparison of Different Materials on Host-searching Behaviour

Test	Experimental details: Contents of cavity	Cavities per sheet	No. of replicates	♀♀ per replicate	Results: No. of palpations	No. of drills
1	a *Serropalpus* frass	5	10	3	8	2
	b Siricid frass	5			49	24
2	a Siricid frass with 1 siricid larva present	4	8	3	148	18
	b Siricid frass without larvae	4			93	21
3	a Washed siricid larvae	6	4	4	(not recorded)	0
	b Siricid frass only	6				300

Table VI. The Response of Females to Frass from Different Parts of Siricid Tunnels

	Distance of frass samples from siricid larva (cm)				
	0–1	1–2	2–3	3–4	4–5
No. of drills	317	213	124	118	88
% of total drills	36·8	24·7	14·4	13·7	10·2
Mean	63·4	42·6	24·8	23·6	17·6
S.E. of mean	(±13·5)	(±10·8)	(±7·7)	(±5·4)	(±12·6)

5 replicates, using 4 females per replicate.
Frass from a different tunnel used in each replicate.

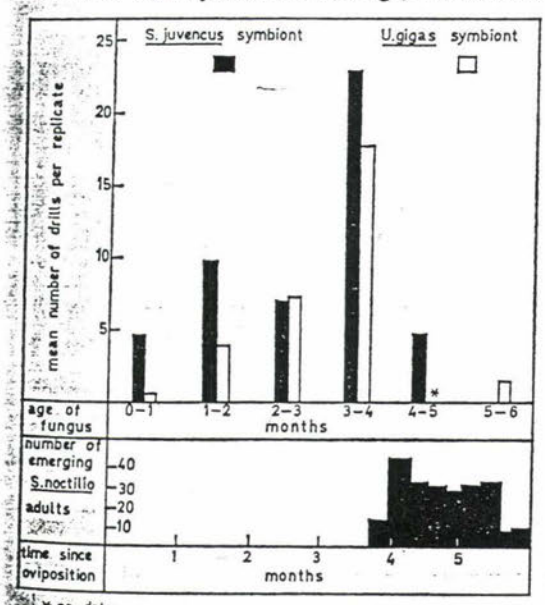
ion between 1st, 2nd, and 3rd cm of frass were significant ($P<0·001$), but there were no significant differences between 3rd, 4th and 5th cm. There was some difference in attraction between 3rd and 5th cm of frass ($P<0·02$).

To determine the effect of frass moi content on host-searching behaviour, fra mixed and dried, and 0·1, 0·2, and 0·4 water added to it in the cavities, to mak frass damp, moderately wet, and so

respectively. Samples of dry frass were also tested. In nine replicates, soaked frass accounted for 37 per cent of the 1236 drills, wet and damp frass for 26 per cent each, and dry frass for 9 per cent. The differences in attraction between soaked and moderately wet frass, and between damp and dry treatments were significant ($P<0{\cdot}001$). When untreated 1st cm frass was compared with soaked 5th cm frass, 71 per cent of the 370 drills were made into 5th cm of frass (eleven replicates).

The effects of fungi on host-searching behaviour. Several experiments were made to clarify the role of the symbiotic fungus and other fungi in the detection of hosts.

To determine whether the age of fungal symbionts influences their attractiveness to the parasite, fungal cultures of *S. juvencus* and *Urocerus gigas* (L.) symbionts*, aged 0 to 6 months, were compared using five cavities per monthly sample in ten replicates. As can be seen from Fig. 3, there was an increase in the attractiveness of both symbionts with age, a maximum



* no data

Fig. 3. Attractiveness of symbionts as a function of age.

being reached at 3 to 4 months. This was followed by a sharp decrease by 4 to 5 months (in *S. juvencus*) and attractiveness being negligible after 5 months. The between-month differences were significant ($P<0{\cdot}001$) except between 1 to 3 and 2 to 3 month *S. juvencus* symbionts. The emergence of *S. noctilio* adults from culture logs maintained at 25°C are given in Fig. 3 and illustrate that maximum attractiveness of the symbiont coincides with the maturation of siricid larvae prior to emergence.

When Scots pine sawdust was added to cultures of *S. juvencus* symbiont, its attractiveness was considerably increased (Table VII).

Table VII. Relative Attractiveness of Scots Pine Sawdust and Symbiotic Fungus

Materials tested	No. drills	Per cent of total
S. juvencus symbiont plus sawdust	378	73
S. juvencus symbiont only	134	26
Sterile sawdust only	4	1

10 replicates, using 3 females per replicate.

To determine differences in the responses of the parasite from three siricid host species to the symbiotic fungi associated with these siricids, two experiments were made. The results of the first (Table VIII, test 1) showed a preference by all parasites for the *S. noctilio* symbiont and a low level of attractiveness to the *U. gigas* symbiont, irrespective of the host source of the insect. Similarly in a comparison of *S. juvencus* and *U. gigas* symbiont, (Table VIII, test 2) the latter proved less attractive, particularly to parasites reared from *U. gigas* hosts.

Several fungi of the genus *Stereum*, which are associated with timber, were compared with *S. juvencus* symbiont, using three cavities per species in each of ten replicates. The results (Table IX, test 1) demonstrated the dominant attractiveness of the symbiont, although *S. chailletii* accounted for 47 per cent of the drills made in response to the named *Stereum* species. When *S. chailetii* and two European species of *Amylostereum* were compared with the symbionts (Table IX, test 2), the *S. juvencus* symbiont proved the most attractive and *U. gigas* symbiont the least attractive. The differences in attractiveness between the named fungi were not significant but significant differences were found between them and the two symbiont species ($P<0{\cdot}001$).

To determine whether other species of fungi associated with woodlands are attractive to

* The symbiotic fungi associated with different *Sirex* species and *U. gigas* are characteristically different in appearance and growth rates, and are probably different strains or species.

Table VIII. Attractiveness of Symbiotic Fungi from Different Siricid Species to Females from Different Siricid Host Species

Test	Host origin of parasite	No. replicates	Age of cultures (days)	No. ♀♀ per replicate	Per cent of total drills into symbionts from			Total drills
					S. noctilio	*S. juvencus*	*U. gigas*	
1	*S. noctilio*	9	20	3	54	41	5	78
	S. juvencus				54	32	14	50
	U. gigas and *S. juvencus*				48	35	17	82
	Total drills				108	77	25	210
2	*S. juvencus*	8	20–60	5		55	45	363
	U. gigas					70	30	107
	Total drills					277	195	472

Table IX. Attraction of Females to Different Species and Strains of Symbiotic Fungi, *Stereum* and *Amylostereum*

Fungus	Test	No. of replicates (age of fungus (in days)	No. ♀♀ per replicate	No. drills	Per cent of total drills
S. juvencus symbiont	1	16 (10–46)	4	117	44
S. chailletii (Pers.) Fr.				68	26
S. purpureum Fr.				48	18
S. pini Fr.				23	9
S. sanguinolentum (Alb. and Schw.) Fr.				7	3
Total				263	100
S. juvencus symbiont	2	10 (49–56)	5	88	41
A. laevigatum (Fr.) Boid.				50	24
A. areolatum (Fr.) Boid.				31	15
S. chailletii				28	13
U. gigas symbiont				16	7
Total				213	100

female parasites, several fungi were bioassayed after 10, 24 and 50 days incubation. The results (Table X) demonstrated that *S. juvencus* symbiont exerted the dominant attractiveness, and that *Lenzites abietana* was the most attractive of the remainder. When *L. abietana* was compared directly with *U. gigas* symbiont, sixty-five of the ninety-two drills (four replicates) were made in response to the former.

The effects of frass and symbiotic fungus extracts. Aqueous and alcoholic extracts of frass and fungus were bioassayed, using 1 cm diameter filter paper discs impregnated with concentrated extracts, on the gauze roofs of cages. Two standard extracts were prepared using 0·5 g and 3·0 g of frass, and 11 cm diameter entire plates of 4-month old *S. juvencus* symbiont in 10 ml and 50 ml of water and

Table X. The Relative Attractiveness of Different Species of Woodland Fungi

Species of fungus	Number of drills	Per cent of total drills
S. juvencus symbiont	68	53
Lenzites abietana (Bull.) Fr.	20	16
Trametes odorata Wulf	13	10
Fusarium oxysporum Fr.	12	10
Coniophora puteana (Fr.) Karst.	7	5
Trichoderma sp.	7	5
Fomes annosus (Fr.) Cooke	1	1
Polyporus abietinus Fr.	0	0

15 replicates, using 3 females per replicate.
3 cavities with each fungus used per replicate.

per cent ethanol respectively. Extraction was made at 25°C for 5 days and the solutions centrifuged and evaporated under vacuum until almost dry. The extracts elicited intense palpating activity, and also the ovipositor probing response (Table XI).

Table XI. The Attractiveness of Aqueous and Alcoholic Extracts of Frass and Symbiotic Fungi

Material extracted	Solvent	Total number of palpations	Total number of drills
Frass	water	29	22
Frass	ethanol	34	24
Fungus	water	27	3
Fungus	ethanol	49	12
Total		139	61

12 replicates, using 3 females per replicate.

The influence of the host on searching behaviour. Experiments were made to assess the role of host larvae and their by-products on the subsequent attractiveness of frass, cellulose or fungus. The experimental details and results are summarized in Table XII. They demonstrated that the presence of siricid larvae in frass or on fungal cultures increased the attractiveness of the substrate. Similarly, powdered cellulose contaminated with excretory and/or secretory products of siricid larvae, elicited much ovipositor probing. Although siricid gut extracts increased the attractiveness of fungal cultures, pure uric acid on plates had an inhibitory effect, siricid head extracts had no effect, and chitinase increased their attractiveness.

Discussion

The specific factors that attract a parasite to its host's environment and enable it to locate the host have aroused much speculation and study. Parasites are often attracted by their host's food rather than by the host itself (Laing 1937). Many parasites find their hosts by first detecting host indicators; thus the frass beside the burrows of the potato tuber worm attracts *Macrocentrus ancylivorus* Roh. (DeBach 1964), and *Solenotus begini* Ashmead finds its host, *Phytomyza atricornis* Meigan, by progressing along the length of the leaf-mine (Doutt 1957). Sound emanating from the chewing larvae of woodborers could play a role in their detection by parasites, but Heatwole *et al.* (1963, 1964), from studies on *Megarhyssa* species parasitizing *Tremex columba* L. concluded that sound plays no part in host detection, though they state that males aggregate in response to the chewing sounds of the emerging females.

Madden (1968) has shown that *Megarhyssa nortoni nortoni* Cresson and *R. persausoria* respond to paper that had been in contact with siricid-infested wood, and also to extracts of the paper, of frass and of fungal cultures, and he concluded that the symbiotic fungus is involved in host location behaviour. The present study confirmed that fungus-infested wood stimulates the female to oviposition behaviour, and demonstrated that the attractiveness of fungal symbionts is considerably increased when sawdust is present. All this evidence points to a fungus-produced odour in the timber being responsible for attracting the parasite. If the symbiotic fungus plays a major role in the production of attractants, the comparative lack of response to other common woodland fungi illustrates the rather specific nature of the attractants involved. It is possible that sight plays a part in host habitat detection although infested trees are often visually indistinguishable from dead but uninfested trees.

The exploratory route over the surface of infested logs exhibited some features of the kinokinetic response; little turning in areas which elicited few if any palpations and drills, and considerable turning in areas where drilling was stimulated. This behaviour is suggestive of orientation to a diffuse stimulus where a

Table XII. The Effect of Various Treatments of Frass, Cellulose and Fungus on the Drilling Response

Test	Substrate (controls)	Age (days)	Treatment			No. replicates	Drilling activity		
			Quantity	Additive	Duration (days)		No. drills	Per cent of drills into exp. group	Signific. P
1	*U. gigas* symbiont	63	1	Siricid larva	8	6	273	60	0·01
2	*S. juvencus* symbiont	38	1	„ „	8	6	127	92	0·001
3	Siricid frass	—	1	„ „	14	5	169	57	0·05
4	Powdered cellulose	—	5	Siricid larvae	14	8	180	82	0·001
5	*S. juvencus* symbiont	25	2 ml	Siricid head extract	30	9	347	50	n.
6	*S. juvencus* symbiont	25	2 ml	Siricid gut extract	30	9	265	70	0·001
7	*S. juvencus* symbiont	54	0·7 mg	Uric acid	30	8	280	40	0·01
8	*U. gigas* symbiont	23	0·7 mg	Chitinase	50	6	78	70	0·001

Siricid larvae surface-sterilized in 100 per cent ethanol before use.
Siricid extracts using 13 larval heads and guts each in 15 ml water, and extracted for 5 days at 0°C.

steep gradient is lacking, or simply that the active material acts as an arrestant during exploratory behaviour. When the parasite probes the wood with the ovipositor, it possibly avoids extraneous odours associated with the bark and obtains further information on the distribution and concentration of stimuli in the wood.

Complete insertion of the ovipositor into the wood is not a prerequisite to parasitization, in apparent contrast to the three species of *Megarhyssa* studied by Heatwole *et al.* (1964), which only parasitized larvae 'which are at a depth in the wood equal to the length of the female's ovipositor'. Despite the non-randomness of drilling, the proportion of drills resulting in successful detection of hosts was small (11 per cent).

Although antagonistic behaviour between females on infested logs resulted in the acquisition of loosely-defined territories, previous drilling by one female did not apparently inhibit other females from drilling in the same area.

The female parasitized dead larvae in timber, demonstrating that active hosts are not necessary to stimulate drilling, and confirming that sounds made by larvae are not essential for host detection.

Drilling is elicited by a substance which most potent in siricid frass and not by the larva itself, and successful detection depend locating the end of the tunnel near the h Bioassay of frass demonstrated an increa attractiveness, from oviposition shaft to chamber, even when the same quantities compared, although in timber the volum frass per unit length of tunnel increases to the host end. Madden (1968) found moisture content associated with recently posited frass, and the current study show the attractiveness of frass was conside enhanced when its moisture content w creased. Nevertheless, the sequence of made by females in logs gave no indication they followed concentration gradients of a ants in individual tunnels.

The symbiotic fungus elicited the d response, attractiveness increasing with a to 3 to 4 months. The changes in attracti of fungal cultures could be due to the acc ation of attractants caused by autol hyphae and bacterial action, or a seq production of attractive substances. The mum attractiveness of fungal cultures co with the maturation of siricid larvae cul

similar temperatures, and if this correlation applies to conditions in the forest, trees containing mature larvae would exert the greatest attraction to the searching parasite. Within the timber, Coutts (1965) has observed the fungus growing most densely in the wood bordering larval tunnels. It is of interest that fungus-decayed wood attracts termite foragers, probably assisting in food detection and collection (Esenther & Coppel 1964).

There is no apparent pre-imaginal conditioning of the parasite to the strain of fungal symbiont associated with the host; indeed females reared exclusively from *U. gigas* hosts preferred samples of *S. juvencus* symbiont. Cartwright (1938) considered that the siricid symbiont closely resembles *Stereum sanguinolentum* but in a comparison of named *Stereum* species *S. sanguinolentum* elicited the least response. Recent studies by Talbot (1964) strongly suggest that the symbiont associated with *S. noctillo* in Australia is a species of *Amylostereum*, and *S. chailletii* (recently transferred to the genus *Amylostereum*) proved the most attractive of the *Stereum* species. When *S. chailletii* was compared with *A. areolatum*, *A. laevigatum*, and the symbionts, *S. juvencus* symbiont elicited more drilling than the named fungi which were not distinguished by the parasite. This suggests that the symbiotic fungus is closely related to but not identical with the named *Amylostereum* spp. Marked differences between the symbiotic fungi of *S. noctilio*, *S. juvencus* and *U. gigas* were also demonstrated.

Siricid and beetle frass were readily distinguished by the parasite, possibly due to specific host factors. Siricid larval gut extracts and also chitinase increased the attractiveness of fungal cultures, but head extracts did not. This suggests that the increase was not simply due to the addition of nitrogeneous products, although Madden (1968) found that the frass immediately behind larvae was characterized by high nitrogen content. It is possible that extra-corporal digestion of fungus preceding ingestion, and also larval excretory products, contribute directly or indirectly to an increase in the production of attractants. Certainly, powdered cellulose contaminated by active siricid larvae elicited intense drilling. Logs containing dead larvae are less attractive, possibly because of a cessation of larval secretory and excretory activities, although a masking of attractive odours by decomposition may be responsible.

Attractants, which are most potent in the tunnel behind the host larva, presumably diffuse through the wood, their movements influenced by factors such as wood density, aeration, and moisture content. Madden (1968) has pointed out that moisture gradients in the timber may modify the concentration of attractants which are released. Odour concentration or emission would probably be greater at cracks or fissures in the wood. If the parasite locates tunnels by comparison of odour concentrations with the tips of the antennae and ovipositor, the odour diffusion gradient should be sufficiently steep and steady to permit comparisons to be made at different points on the log surface. Although the parasite does not follow individual tunnels, it does distinguish those parts of the log with tunnels from uninhabited areas, demonstrating an initial non-random search for host material. When the host area has been located, drilling becomes more random within the vicinity of hosts, and relatively few drills result in successful host detection.

Summary

1. Exploratory behaviour over the bark of infested timber comprises a survey of the surface with the antennae, sustained antennal activity (palpating) in areas of special interest, and ovipositor probing to a depth of 1 to 3 mm into the wood.

2. Drilling to a depth of more than 5 mm is elicited by stimuli emanating from within the timber, with surface features such as cracks in bark and wood, influencing the point of ovipositor insertion. Siricid oviposition punctures do not attract the parasite or stimulate drilling.

3. Antagonistic behaviour between females results in the acquisition of loosely defined territories.

4. The majority of drills are made in response to siricid tunnels and are not random, but the parasite does not apparently follow concentration gradients along individual tunnels.

5. Females are able to detect and parasitize dead hosts in logs, demonstrating that sound is not a necessary stimulus for drilling, and is not essential for host detection.

6. The majority of drills are elicited by siricid frass; washed siricid larvae alone stimulate no host-searching response. The frass nearest the host is most attractive, and the attraction of the frass decreases with increase in distance from the host. Wet frass elicits more drilling than dry frass.

7. Cultured fungal symbionts 3 to 4 months

old are the most attractive, coinciding with maturation of host larvae in timber under similar conditions. There is no evidence that the species of tree influences attraction, or of pre-imaginal conditioning of the parasite to its host's symbiont. Comparison of the symbiont with several common woodland fungi demonstrated the specific attractiveness of the symbiont.

8. Comparison of named *Stereum* and *Amylostereum* species with the symbionts demonstrated a marked preference for the *S. juvencus* symbiont which is probably closely related to *Amylostereum* species.

9. Aqueous and ethanolic extracts of frass and fungus stimulate drilling.

10. When siricid larvae are maintained on frass or fungus medium, or when siricid larval-gut extract, and chitinase are incorporated into the medium, the attractiveness of the substrate is increased.

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(*Received* 9 *July* 1969; *revised* 18 *August* 196[illegible]
MS. number: 912)

1997 Larimer County Tree Farm Picnic
Handout #2

The Hourglass Fire at Pingree Park

Fire Facts

Cause.....Lightning
Size.....1275 Acres

Date Fire .....Friday July 1, 1994
Date Fire Contained.....Tuesday July 5, 1994

Suppression Costs.....$1.5 Million
Cost of New Buildings.....$2.5 Million
Lost Revenue.....$300,000

Buildings Destroyed.....13
Buildings Damaged.....2
People Evacuated.....170

Firefighters.....602
Air Tankers.....9
Helicopters.....4
Fire Engines.....15

Pingree Park Forest Management (1995 to 1997)

Table 1. Salvage Sales at Pingree Park (1995-1997)

Sale #	PP94-SLV-1	PP94-SLV-1	ST-Pingree (SLV)96-1	ST-Pingree (SLV)96-1	TOTAL
Block	1A	1B	A	B	4 blocks
Acres	19.5	4	5.4	2.7	31.6
Volume	435 cords	82 cords	107 cords	54 cords	678 cords
Total Revenue	$3412.50	$700.00	$943.25	$472.50	$5528.25
Avg. DBH	6.5"	6.6"	6.9"	6.9	6.5"
Avg. Height	42'	38'	42'	42'	40'
Starting Date	2/17/96	2/17/96	12/16/96	3/6/97	--
Completion Date	5/2/96	5/2/96	3/6/97	In progress	--

Other Forest Management/Public Education Activities:

1. Two acres thinned around student cabins by Pingree staff (1995).
2. One acre thinned north of student parking lot by Oklahoma State University students (1995).
3. *The Hourglass Fire at Pingree Park, July 1, 1994* brochure.
4. Forest management/fire ecology/wildfire mitigation tours/workshops:
   - Poudre R-1 Teachers (7/18/95 - 20 teachers)
   - Colorado Biology Teacher Assoc. (9/16/95 - 17 teachers)
   - Youth at Risk (7/16/96 - 20 students)
   - Elderhostel (7/31-8/1/96 - 18 people)
   - Front Range Forum (9/25/96 - 20 people)
   - SAF Walk in the Woods (10/12/96 - 91 people)

****

1997 Larimer County Tree Farm Picnic
Handout #1

A Survey of Understory Vegetation Following the Hourglass Fire at Pingree Park

Survey Objective - The primary objective of this survey is to compare the vegetation response to various forest management practices on burned and unburned sites on the Pingree Park campus. Vegetation on five plots were inventoried in an attempt to compare understory vegetation following fire and in combination with various forest management practices.

Plot Descriptions - The five plots studied are:

Plot 1. Burned forest (crown fire) with no forest management activities.
Plot 2. Burned forest (crown fire) with all timber salvaged for safety reasons.
Plot 3. Burned forest (surface fire) followed by thinning to reduce fire hazards.
Plot 4. Unburned forest thinned to reduce fire hazards
Plot 5. Unburned forest with no forest management activities.

Initial Results and Observations

1. The areas that were both burned and salvaged appear to have the highest plant diversity (i.e. the greatest number of individual plant species). This may be due to the increased amount of sunlight resulting from harvesting and less aspen regeneration.

2. Any burned area seems to have greater plant diversity. When comparing the two thinned areas, more plant species were present in the burned area. Perhaps this is due to increased sunlight and an increase in available nitrogen following the fire.

3. Aspen regeneration is greatest in areas burned with no timber harvesting. Harvesting equipment probably significantly damages aspen regeneration during tree removal.

4. Lodgepole pine regeneration is greatest in areas burned followed by salvage harvesting. I suspect that harvesting equipment reduces aspen competition and improves a seed-bed for lodgepole seedlings.

****

Plot 1. Crown fire/no forest management

Bare ground/rock	50-60%
Golden Banner	5-20
Sedge	5-10
Low Penstemon	5
Quaking Aspen	5-70 (600-5000 t/ac)
Leafy Cinquefoil	1-2
Fireweed	1-2
Woods Rose	1-2
Western Yarrow	1
Purple Fringe	1
Lodgepole Pine	0

Plot 2. Crown fire/timber salvaged

Bare ground/rock	50-70%
Sedge	5-10
Golden Banner	5-10
Heartleaf Arnica	2-5
Lodgepole Pine	1-2 (500-1400 t/ac)
Quaking Aspen	1 (500 t/ac)
Low Penstemon	1
Woods Rose	1
Leafy Cinquefoil	1
Unknown species	1
Purple Fringe	<1
Strawberry Blight	<1
Paintbrush	<1
Rose Pussytoes	<1
Wild Raspberry	<1
Fireweed	<1
June-grass	<1

Plot 3. Surface fire/followed by thinning

Bare ground/rock	50-60%
Sedges and grasses	10-25
Unknown species	5-10
Golden Banner	2
Fireweed	1
Woods Rose	1
Strawberry	1
Common Juniper	1
Dandelion	1
Heartleaf Arnica	1
Purple Fringe	1
Columbine	1
Strawberry Blight	1
Lodgepole Pine	1 (100 t/ac)
Western Yarrow	1
Field Mouse-ear	1

Plot 4. No fire/forest thinned

Litter and duff	90%
Common juniper	2
Strawberry	1
Woods Rose	1
Sedge	1
Unknown	1

Plot 5. No fire/no forest management

Bare ground and rock	50%
Common Juniper	10-20
Woods Rose	2
Kinnikinnik	1-2
Strawberry	1
Oregon grapeholly	1
Heartleaf Arnica	1
Quaking Aspen	<1 (100 trees/acre)
Corral root	<1

Guidelines for Managing Vegetation to Create Defensible Space in the Main Campus of Pingree Park

This management unit is primarily an even-aged, single story stand with a low to moderate windfall risk.

1. The initial cut should be limited to thinning from below to remove about 30% to 50% of the current basal area, depending on the stand's susceptibility to windthrow. A general guideline for spacing between trees is diameter of the tree + 5 feet. For example, if a tree is 7" in diameter, spacing between it and other trees should be 12 feet (i.e. 7+5). Current basal area ranges from 180 to 200+. The general canopy height should be maintained.

   The second entry should occur in about five to ten years or when stand becomes windfirm. This entry should also remove about 30% of the original basal area. Ultimately, a basal area of 80 is desired.

2. Remove as many trees infected with comandra blister rust and/or dwarf mistletoe as possible without removing more than the recommended basal area or creating large openings in the canopy. Openings of one tree height or less should be considered within the defensible space area.

3. Remove lodgepole pine in Tree Vigor Classes "C" and "D". All dead trees should be removed from the defensible space area.

4. Retain engelmann spruce and subalpine fir in areas where ladder fuels are not a significant threat. The area around these trees should be more open than if ladder fuels were not present.

5. Remove most trees between cabins, trees leaning towards cabins, and trees within five to ten feet of cabins.

6. Minimize tall grasses and other vegetation within ten feet of structures. Areas with continual grass cover should be mowed to a height of 2" or less after the grass has cured out.

7. Remove all ladder fuels within 50 feet of structures. Remove any tree limbs within 15 feet of a chimney. Lower branches should be pruned off to a height of about 8 to 10 feet.

8. Eliminate firewood pile stacked against student cabins. Designate areas for firewood storage. These areas should be at least 30 feet away from any structures and uphill or on the contour from buildings.

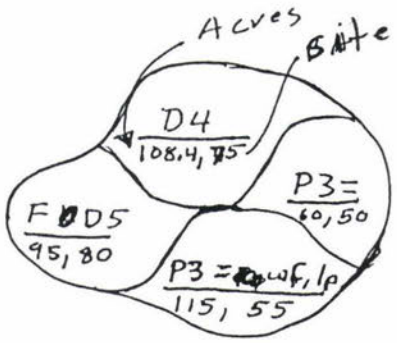
9. Remove conifers from clumps of aspen to increase aspen regeneration.

10. Attempt to obtain a separation between crowns of at least 10 feet.

11. Slash should be piled and burned or chipped.

c:\wp6docs\pingree\defspace.gdl

FOREST TYPE MAPS



Forest Type R D2 = h, c 1950

① ② ③ ④ ⑤ ⑥

History - R - ~~Restocked clear cut area~~ Residual stand after partial cut

Species - D - Douglas fir

Size - 2 - pole timber saplings

Stocking = - medium stocking

Minor Sp h - hemlock

c - red cedar

Birthdate - 1950

History

X - Recent clear cut (last 5 yrs)

XO - old clear cut (over 5 yrs)

F - Area destroyed by fire, nonstocked

I - " " " insects, nonstocked

WT - " " " wind, nonstocked

R - residual stand after partial cut

PL - planted

NF - non forested

Major Species >30% Ba

D - Douglas-fir
P - Ponderosa pine
H - western hemlock
A - aspen
WF - white fir
WL - western larch
LP - lodgepole pine
ES - Englemann spruce
HD - hardwoods
C - cedars
FM - True-fir-mountain hemlock

Stand size

1 seedlins / saplins
2 ~~Pole timber~~ Pulpwood
3 Small saw timber
4 Large saw timber
5 old growth timber

Density

- Poorly stocked 10-39%
= Medium stocked 40-69%
≡ well stocked 70-100%
≡ over stocked 7160%

minor species (lower, case)

must consist of 20% of basal area or volume of stand

Examples

D4 - large Douglas-fir saw timber

F[redacted]D5 - Fire killed but merchantable old growth Douglas-fir

P3 = small ponderosa pine saw timber, medium density

P3 = [redacted] wf, lp Small ponderosa pine saw timber, medium density 20% of volume (basal area) in white fir and lodge pole pine, each with the lodgepole pine least abundant.

OH Intro

Pingree Park - A History of Natural Disturbance

OH 1. Pingree Park - A history of natural disturbance.

2. Like most valleys, Pingree was created and has been maintained by disturbances (glaciers, fire, tornados, floods, MPB, dwarf mistletoe)

3. Not much is know about human activity until George Pingree established a tie camp in 1868. Logs were cut and run down the South Fork of the Poudre River each spring. Logs were pulled out at Ted's Place and hauled by wagon to Tie Siding, Wyoming, where the logs were made into railroad ties for the westward expansion of the railroad.

OH 4. Wildfire of 1890. Created the forests that burned in 1994

5. Numerous other fires about same time in RMNP.

6. We knew that Pingree Park would probably burn again, but failed to convince others. Plenty of evidence.

7. Over 700 fires documented in RMNP.

8. Studies indicated that most fires in lodgepole pine ecosystems occurred in JULY.

OH 9. Sure enough on July 1, 1994, a dry lightning storm passed through Larimer county ignited at least a dozen fires.

10. One fire ignited near the Hourglass Reservoir north of Pingree Park...

11. ...and by the end of the day threatened lives and burned 13 buildings in the Pingree Park campus.

OH 12. Buildings were burned to the foundation.

13. Many people thought the forest was destroyed.

14. October 1994.

15. May 1995, ~~out of the ashes came a new forest.~~

OH 16. Aspen proliferated in many areas,

17. Succession had begun,

18. Lodgepole pine was doing what the textbooks said, 94,000 seeds per pound,

19. Cones at a young age,

~~OH~~ 20. A new forest was born. out of the ashes

21. Flowers flourished,

OH 22. Salvage work began to reduce future fire danger, and remove potentially hazardous trees.

23. About 30 acres were salvaged in the first few years after the fire.

24. Log truck – logs once again were being sent down river

25. The campus began mitigation activities. See the student cabins?

OH 26. Creating defensible work began and continues.

27. More thinning;.

28. If this fire had occurred in a valley or two to the north, it may not have made much of a headline. Because it occurred where it did, we've been able to take advantage of numerous opportunities to share fire ecology and forest management with people through formal presentations, brochures, and conversations. As the latest large scale natural disturbance, fire has changed much in the Pingree valley. In our forested ecosystems disturbance should be expected. Disturbance is natural. Disturbance is good. Disturbance can be dangerous. Some disturbance can be mitigated and some cannot. In the case of fire we believe it can.

OH END

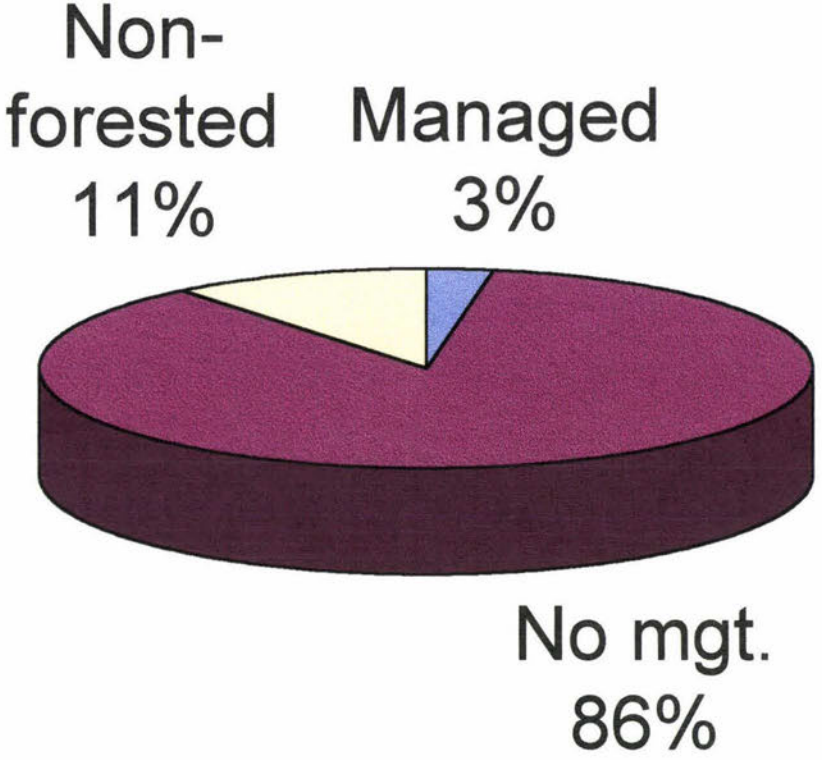
YEAR	Sale #	Block	Acres	Treatment	Volume (cords)	Revenue to Pingree	Avg DBH	Avg Height	Starting Date	Completion Date
1995	-	A	1	THINNING (OSU)	10	$0.00	No data	No data	7/95	7/95
1995	-	B	2	THINNING (Staff)	20	$0.00	No data	No data	6/95	10/95
	PP94-SLV-1	1A	19.5	SALVAGE/CLEARCUT	435	$3,314.50	6.5"	42'		
	PP94-SLV-1	1B	4	SALVAGE/CLEARCUT	82	$700.00	6.6"	38'		
	PP96-SLV-1	A	5.4	SALVAGE/CLEARCUT	107	$943.25	6.9"	42'		
				SALVAGE/CLEARCUT	54	$472.50	6.9"	42'		

EDUCATIONAL ACTIVITIES:

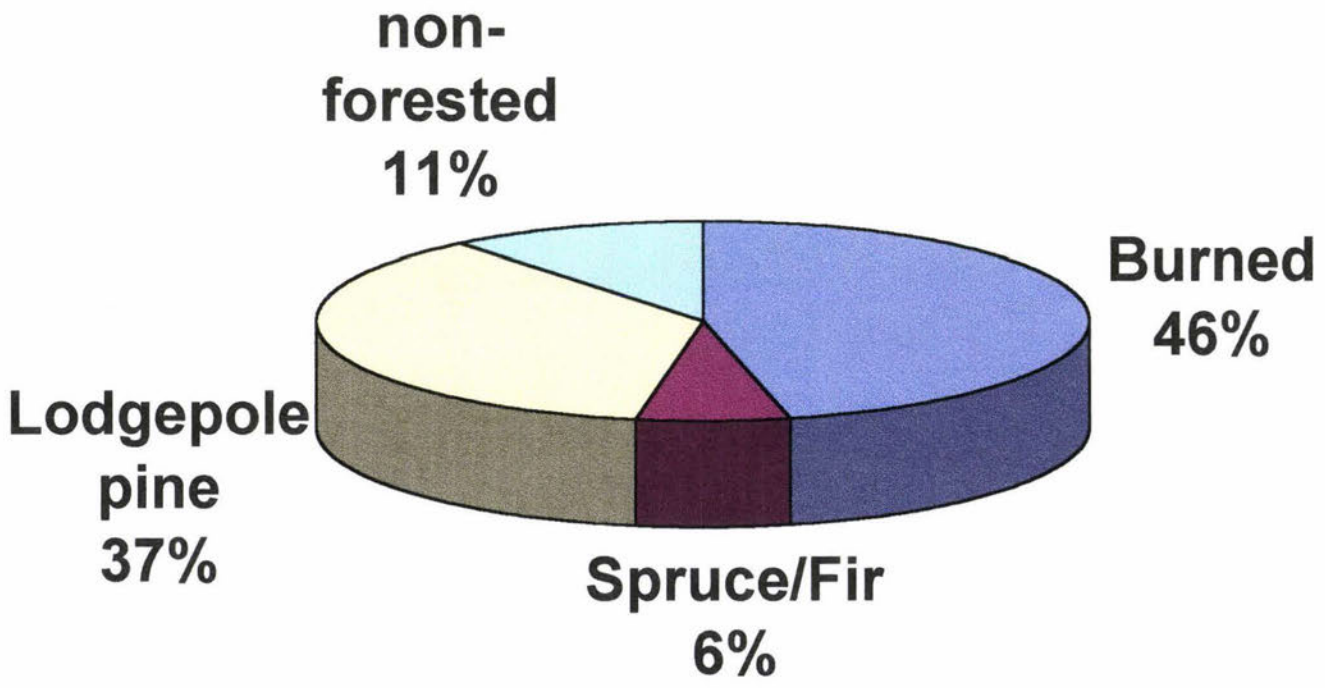
1. *Hourglass Fire at Pingree Park, July 1, 1994* brochure
2. Presentations given at Pingree Campus:
   - Poudre R-1 Teachers (7/18/95 - 20 teachers)
   - Colorado Biology Teacher's Assoc. (9/16/95 - 17 teachers)
   - Volunteer Forest Rangers (10/28/95 - 22 people)
   - Youth at Risk (7/16/96 - 20 students)
   - Elderhostel (7/31-8/1/96 - 18 people)
   - Front Range Forum (9/25/96 - 20 people)
   - SAF Walk in the Woods (10/12/96 - 91 people)
   - CSFS Annual Meeting (10/15/96 - 50 people)
   - Larimer County Tree Farmers Annual Meeting (7/12/97 - 55 people)
   - Fire Ecology, High school students, Southeast US (7/7/99 - 40 students)

YEAR	Acres	Treatment	Revenue
1980	9.9	SANITATION (Dwarf mistletoe control)	?
1987	7.7	TORNADO SALVAGE/PUBLIC FUELWOOD	$308.00
1995	1	THINNING (OSU)	$0.00
1995	2	THINNING (Staff)	$0.00
1995-1996	19.5	SALVAGE/CLEARCUT	$3,314.50
1995-1996	4	SALVAGE/CLEARCUT	$700.00
1997	5.4	SALVAGE/CLEARCUT	$943.25
1998	2.0	SALVAGE/CLEARCUT	$472.50
TOTAL	51.5		$5738.25

Pingree Park Forest Management Since 1994

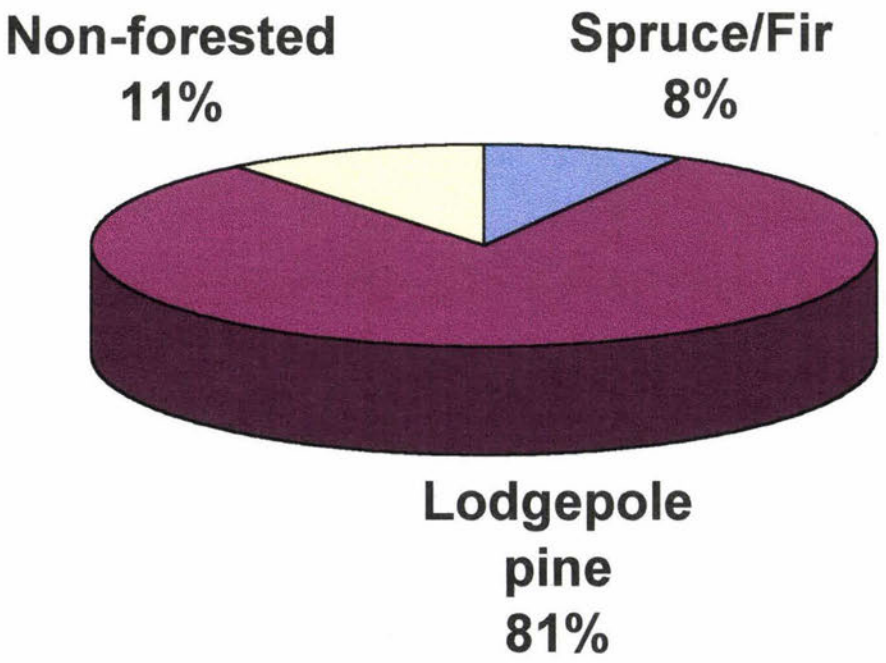


Pingree Park Forest Cover Types
After the Hourglass Fire (1994)



Pingree Park Forest Cover Types

Prior to the Hourglass Fire (1994)



Colorado State Board of Agriculture
C-24788
offered - 927 acres
selected - ~~1,012~~ acres
991

Transferred to Sky Ranch

RECEIVED FROM SKY RANCH

Privately owned

120 acres not yet transferred

Existing CSU Pingree Park land holdings to be retained

CSU Pingree Park and other mountain properties offered to the US Forest Service

US Forest Service lands selected by CSU in exchange for offered lands

OFFICE OF
ADMINISTRATIVE SERVICES

Date: 1-8-85

JAN 9 1985

TO: Ray Mahaffey
CSFS Foothills #1052

FROM: Art Jesser

- [ ] For your disposition
- [x] For your information
- [ ] For your files
- [ ] Please note and return
- [ ] Please reply
- [ ] Please sign and return

Notes _____

Lodgepole Pine Fire Ecology

Wildfire is a natural and often necessary element of a healthy forest ecosystem. Lodgepole pine, the dominant tree species in the Pingree Park area, is considered a fire-dependent species.

Lodgepole pine have both closed (serotinous) and open (nonserotinous) cones. The closed cones need a fire's intense heat to melt resins and open the cones to release seeds. During prolonged periods without fire, seed for regeneration comes from open-coned trees. The forest will eventually become dominated by "nonserotinous" trees if wildfires do not occur. Fire also burns the forest floor to prepare the seed bed needed for lodgepole seedlings to become established.

The fire that burned through Pingree Park was a high intensity fire. This type of fire destroys all trees in the area and therefore is referred to as a stand replacement fire. Aspen are thriving in many of the burned areas. In the future, lodgepole pine will once again become the dominant tree species.

Colorado State FOREST SERVICE

This brochure received major funding from the Colorado State Forest Service.

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Printed and Produced by Publications and Printing

Fire Facts

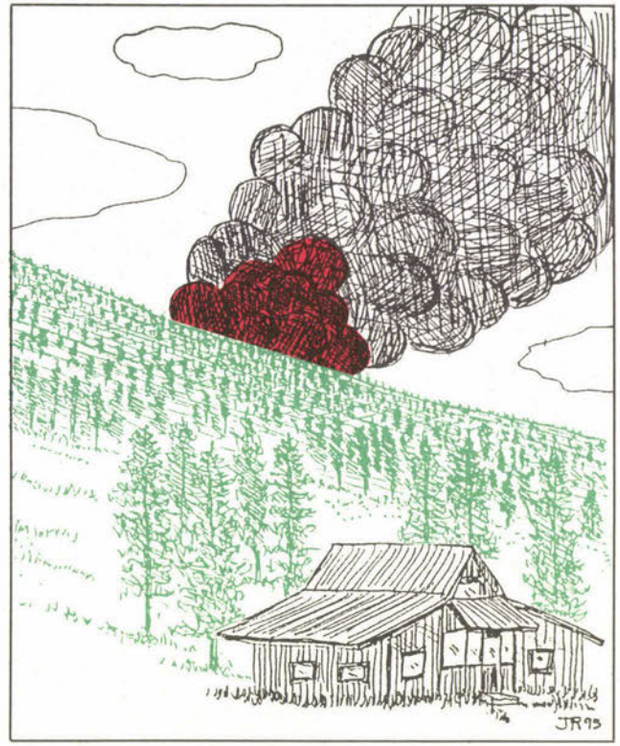
Cause ..... **Lightning**
Size ..... **1,275 Acres**
Suppression Costs ..... **$1.5 Million**
People Evacuated **170**

Buildings Destroyed **13**
Damaged Buildings **2**
Estimated $ Building Loss ..... **$2.2 Million**

Firefighters **602**
Air Tankers Involved **9**
Helicopters **4**
Fire Engines **15**

Date Fire Started ..... **July 1, 1994 (Friday)**
Date Fire Contained .. **July 5, 1994 (Tuesday)**

The Hourglass Fire at Pingree Park July 1, 1994



Nature, People, and Wildfire: A Delicate Balance

Pingree Park Campus

Colorado State University

July 1, 1994

On Friday morning, July 1, 1994, smoke was detected in the sky over Pingree Park. Authorities were notified of a wildfire in the Arapaho-Roosevelt National Forest southwest of the Pingree Park campus. Before the day was over, 170 people were evacuated from the campus, the fire destroyed 13 buildings, and consumed hundreds of acres of lodgepole pine forest.

Cause of the Fire

A dry lightning storm passed through the Pingree Park area at approximately 1:45 a.m. Friday. Several Pingree Park staff members remembered being awakened at that time by thunder. Fire danger was high in the Northern Colorado mountains. Storms of that nature can occur in early July. However, there had been little rain and the forests were dry. Governor Romer had implemented an unpopular statewide ban on open fires for the upcoming fourth of July weekend.

How the Fire Got Its Name

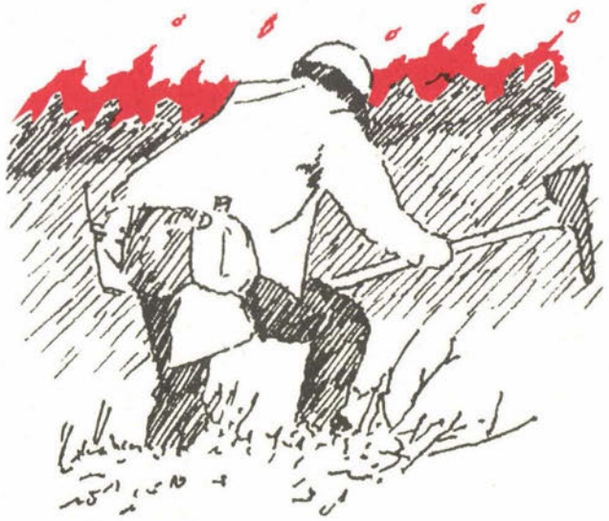
Whenever wildfires are reported they are given an official name that reflects some local geological or topographic feature. In this case the fire was named after the Hourglass Reservoir north of the fire's origin. Unofficially, many refer to the fire as the "Pingree Park Fire," due to the damage to buildings on the Pingree Park campus.

Summary of the Fire

The fire was started by a lightning strike in a remote area west of Pingree Park. The fire was reported to the Larimer County Sheriff's Department at 10:27 a.m. Initial fire crews from the Arapaho-Roosevelt National Forest were quickly dispatched. Due to heavy fuel loading (dry, down timber) and gusting winds, the fire escaped initial attack efforts and grew to 25 acres by 1:00 p.m. Strong westerly winds pushed the fire toward Pingree Park. Evacuation of the campus began shortly after 1:30 p.m.

By mid-afternoon, the wind-driven fire was raging, with flame lengths over 100 feet burning through the crowns of the trees. Fate had put the Pingree Park campus directly in the line of the fire. Wind gusts were estimated in the fifty mph range when the fire swept through the campus destroying three faculty cabins, the North Dormitory, a newly built staff housing facility, six conference center residence buildings, and a staff duplex cabin located near the conference center.

The conference center lodge was partially burned as was the maintenance shop/water treatment plant. Firefighters on the scene worked hard to restrain the fire. It was fortunate that no one was injured and most of the older/historic parts of the campus were untouched.



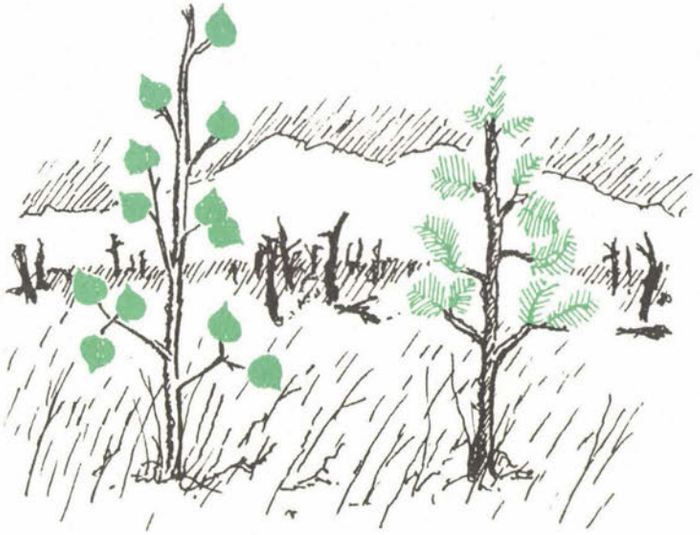
By evening the fire had grown to 800 acres and was threatening the Poudre Springs subdivision. Firefighting efforts, in particular machine and hand-dug fire lines, kept the fire away from the summer cabins. The fire remained active through Saturday July 2, threatening Poudre Springs and burning another 475 acres.

The fire was declared contained on Tuesday July 5th, having burned an estimated 1,275 total acres.

Historic Note: Fourteen firefighters were tragically killed in a wildfire above Glenwood Springs, Colorado, several days after the Hourglass Fire.

Suppression Costs

Approximately $1.5 million was spent on the Hourglass Fire. Firefighters and equipment from volunteer fire departments, Larimer County Sheriff's Department, Colorado State Forest Service, Arapaho-Roosevelt National Forest, and several out-of-state agencies assisted in the suppression efforts.



The Future

Scheduled rebuilding of the conference center and other destroyed buildings began in the summer of 1995. Efforts to salvage the burned timber on University land will continue for years to come.

In an effort to minimize future fire hazard, forests in the unburned areas of the campus are being thinned. Grass seeding and tree planting will continue to help minimize erosion. Willows from upstream have been transplanted to stabilize burned slopes adjacent to the South Fork of the Poudre River. A management plan was developed by the Colorado State Forest Service to address future wildfire hazards, forest health, and other issues prevalent when people live in fire-dependent ecosystems.