S-390

FIRE BEHAVIOR

UNIT V
FUEL MOISTURE

STUDENT WORKBOOK
for Individual Study

1981

The NATIONAL WILDFIRE COORDINATING GROUP consists of representatives from: United States Department of Agriculture Forest Service; United States Department of Interior Bureau of Indian Affairs; Bureau of Land Management, Fish and Wildlife Service, and National Park Service; and National Association of State Foresters.

ACKNOWLEDGEMENTS

Contributions to this course were made by numerous individuals within agencies represented in the National Wildfire Coordination Group. Special recognition should be given to individuals within these organizations:

US Forest Service, Region 1, Missoula, MT.

Northern Forest Fire Laboratory, Missoula, MT.

Montana State Division of Forestry, Missoula, MT.

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Bureau of Land Management, BIFC, Boise, ID.

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COURSE SCHEDULE

SELF-STUDY UNITS		APPROXIMATE HOURS *
0	Student Guide**	1/2
I	The Fire Environment**	2 1/2
II	Fuels Classification**	3
III	Topography and Fire Behavior	2 1/2
IV	Temperature-Moisture Relationship**	2 1/2
V	**Fuel Moisture**	**3**
VI	Local and General Winds	2 1/2
VII	Atmospheric Stability and Instability	3
VIII	Keeping Current with the Weather	2 1/2
IX	Extreme Fire Behavior	3
X	Fire Behavior Affects Fireline Tactics	3
XI	Fire Behavior Predictions	4
	Total Review Period for all Units	3
CONTROLLED ACTIVITY		
--	Final Examination	2 1/2

* Includes time for unit tests or evaluations, but not for break periods.

** Prerequisite units to this unit.

INSTRUCTIONS TO STUDENTS

This unit has been designed for self-instruction. In addition to the workbook, you will need an audio cassette tape player and the cassette tape for the unit, or you may use the reference text.

The workbook section contains a series of exercises and note-taking items which help you interact with the materials. You are asked to write down certain information as provided by the narrator on tape. If the tape proceeds too fast for note taking, manually pause it. An audible "beep" will signal when you are to stop the tape and perform an assignment. When you complete an assignment, restart the tape as instructed in the workbook. Follow the workbook sequence. Do not go ahead until instructed.

FOR UNFAMILIAR TERMS USE THE GLOSSARY IN THE STUDENT GUIDE.

START THE TAPE, OR TURN TO THIS UNIT IN THE REFERENCE TEXT

UNIT OBJECTIVES

UPON COMPLETION OF THIS UNIT YOU WILL BE EXPECTED TO:

1. Explain fuel moisture timelag and its value to fire managers.

2. Name the six stages of vegetative development of living fuels (foliage), and give the average percent moisture content of each.

3. Explain the relationships between relative humidity, wind, and moisture content of fine fuels and of large fuels.

4. Explain how the amount and duration of precipitation affects moisture content of both fine fuels and large fuels.

5. Describe how fuel moisture is determined for fuels in each of the four timelag categories for a fire area.

*6. Determine fuel moisture contents for dead 1-hour timelag fuels from fuel moisture tables, given necessary site data.

7. Explain moisture of extinction, how it varies in natural fuel complexes, and how it affects fire ignition and spread.

* Key skill objective

RESTART THE TAPE

NATURAL FUELS AND THEIR MOISTURE CONTENTS

FIGURE 1 — NATURAL FUEL SITUATIONS

FUEL MOISTURE CONTENT

HIGH

FIRES IGNITE AND BURN POORLY, IF AT ALL.

LOW

FIRES START EASILY, AND SPREAD AND BURN RAPIDLY.

FUEL MOISTURE CONTENT IS THE AMOUNT OF WATER IN A FUEL EXPRESSED AS A PERCENT OF THE OVEN DRY WEIGHT OF THAT FUEL.

FIRE DANGER IS MOSTLY DEPENDENT ON FUEL MOISTURE:

- Live to dead ratio
- Stage of growing cycle
- Size classes of fuels
- Daily weather elements
- Accumulative weather

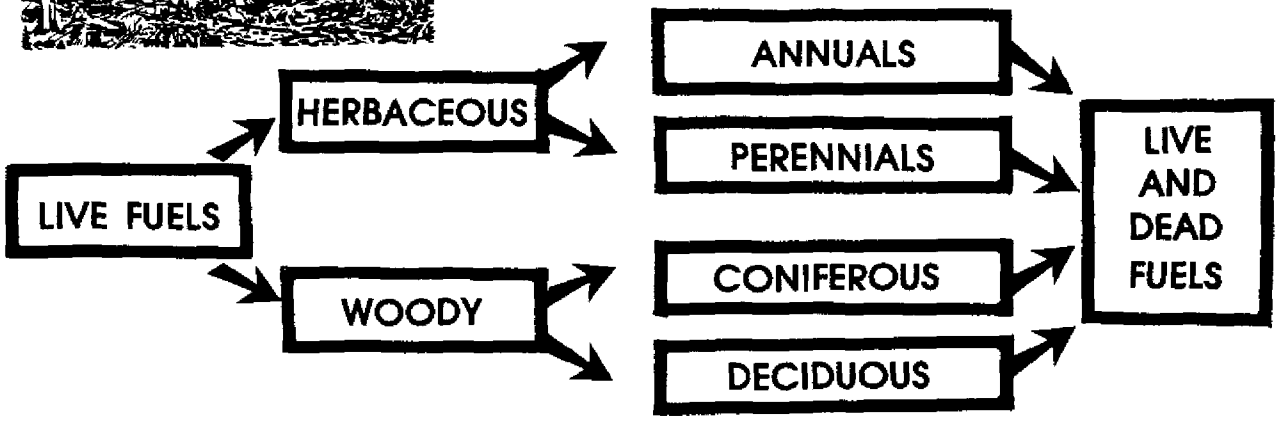
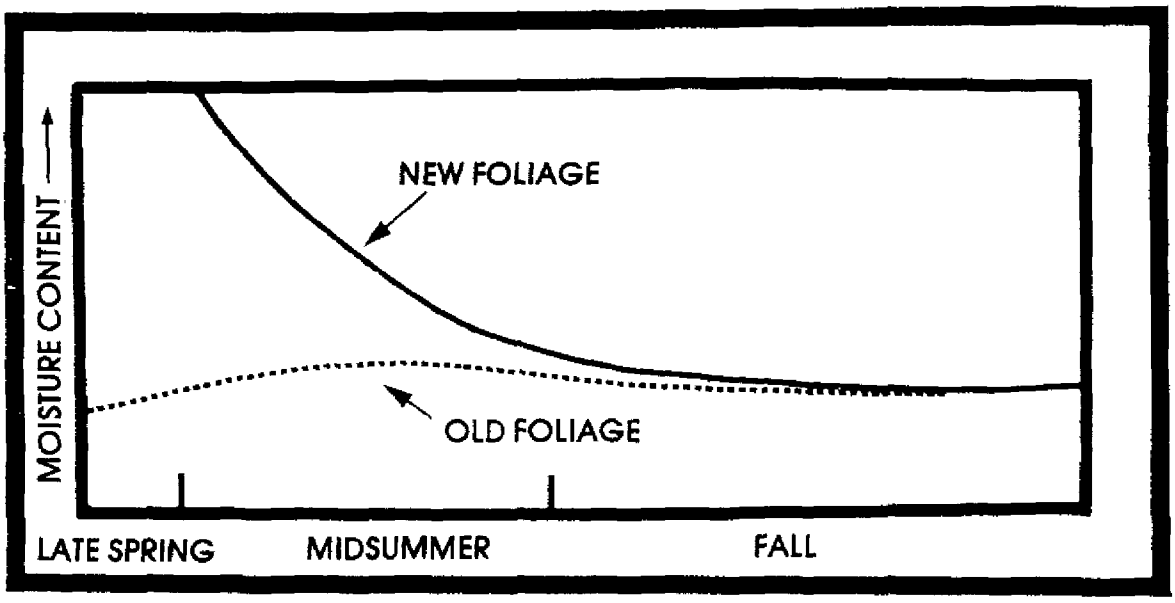


FIGURE 2 — MOISTURE CONTENT IN LIVE CONIFER FOLIAGE BY SEASON



A. FUEL MOISTURE RANGES IN NATURAL FUELS ARE:

1. Living fuels _____

2. Dead fuels _____

FIGURE 3 -- LIVE FUEL (FOLIAGE) MOISTURE CONTENT

MOISTURE CONTENT (Percent)	STAGE OF VEGETATIVE DEVELOPMENT
300	Fresh foliage, annuals developing, early in the growing cycle.
200	Maturing foliage, annuals developing with full turgor.
150	Maturing foliage midway in development cycle.
120	Foliage nearing maturity, new growth nearly complete.
90	Mature foliage, new growth complete and comparable to older perennial foliage.
60	Entering dormancy, coloration starting, some leaves may have dropped from stems.

QUESTION 1

Which factors can lower the moisture contents given in Figure 3 above?

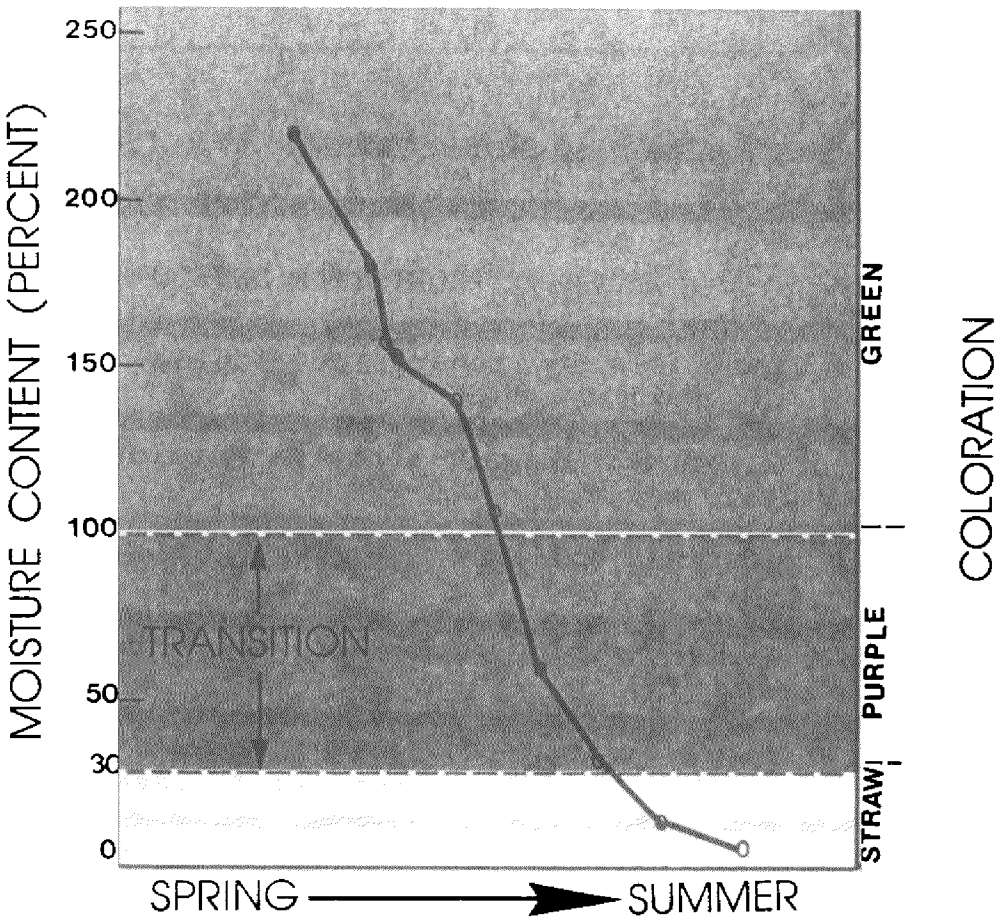
1. Long drought periods.

2. Natural disasters, i.e., disease, insects, etc.

3. Annuals curing out early in the season.

4. Harvesting of timber and other vegetation.

FIGURE 4 — MOISTURE CONTENT CHANGES IN CHEATGRASS (ANNUAL)



QUESTION 2

The coloration of cheatgrass allows one to estimate its moisture content. What are the moisture percent ranges at different stages of its life cycle?

1. Living (Green) stage _____

2. Curing (Purple) stage _____

3. Dead (Straw) stage _____