



RX-300 Unit 18: Monitoring

Summary:

This unit covers the who, when, and why of monitoring on prescribed fires. Students will discuss the barriers and possible solutions to improving the monitoring on prescribed fires.

Incident Position Description (IPD) Alignment:

- Evaluate environmental, fire behavior and fire effects monitoring plans in conjunction with existing agency requirements.
- Ensure fuels and weather conditions are conducive to achieving prescribed fire objectives as outlined in the plan.
- Evaluate and document fire behavior and fire effects.

Unit Objectives:

- List the considerations for determining monitoring needs.
- Identify and discuss the four levels of monitoring and what needs to be covered in the prescribed fire plan.

Unit at a Glance:

Topics	Method	Duration
Why Monitor?	Presentation	11 Minutes
What to Monitor	Discussion	17 Minutes
FEMO	Presentation	22 Minutes
Total Unit Duration		50 Minutes

Materials:

- Example FEMO reports

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Performance Standards Duties and Responsibilities

- Establish environmental, fire behavior and fire effects monitoring plans in conjunction with existing agency requirements.
- Ensure fuels and weather conditions are conducive to achieving prescribed fire objectives as outlined in the plan.
- Evaluate and document fire behavior and fire effects.
- PMS 484-1 Element
- Element 20: Monitoring



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Time estimate – 30 seconds

Outline

- Allow students time to read standards on their own. Refrain from reading the standards verbatim off the slide.
- Refer students to the incident position standards for direction for completing these duties and responsibilities.

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Learning Objectives



- List the considerations for determining monitoring needs.
- Identify and discuss the four levels of monitoring and what needs to be covered in the prescribed fire plan.

At the end of this unit, you will be able to answer the following questions:

- How do you determine what to monitor?
- What is the role of the burn boss in monitoring?
- What are the roles of a FEMO?
- What are the barriers and possible solutions to monitoring?

Time estimate – 1 minute

Outline

- Allow students time to read objectives on their own. Refrain from reading the objectives verbatim off the slide.
- Review the questions or have the students read them.

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Monitoring Defined

Management objectives

Prescribed fire



Time estimate – 2 minutes

Outline

Monitoring can include management objectives or prescribed fire monitoring

Monitoring for management objectives includes

- Evaluate changes in condition and progress toward meeting management objectives
- Usually facilitated by project proponent (i.e., fuels specialist)

Monitoring for prescribed fire includes

- Weather
- Fuel moisture
- Fire behavior
- Smoke dispersal

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Why Burn?



What is the difference between prescribed fire and arson?



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Time estimate – 1 minute

Outline

- This question is a review from the Goals and Objectives lesson.
- What is the difference between prescribed fire and arsons?
 - Goals and objectives!

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Why Burn?



If a tree falls and no one is there, does it make a sound?

If an objective is never measured or reported, is it met?



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Time estimate – 2 minutes

Discuss

- If an objective is never measured or reported, is it met?
 - Just like the tree falling in the forest – we will never know if we have met objectives if we do not measure.

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Why Monitor?



Consequences of not MEASURING objectives?



Time estimate – 3 minutes

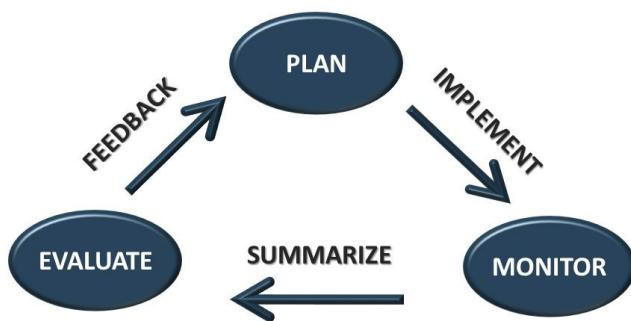
Discuss

- What are the consequences of not MEASUREING objectives?
 - Unknown if you met objectives
 - Not able to refine process to better meet objectives in the future
 - Repeating mistakes
 - Not capturing the unexpected benefits
- What are the consequences of not REPORTING the observations on whether you met objectives?
 - Less support for future work
 - Less tracking of previous fire events

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Why Monitor?



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Time estimate – 1 minute

Discuss

- Monitoring is an important part of the adaptive management loop to check if the plan is working and adjust as needed.

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Role of the Burn Boss

Planning

- What will be monitored
- Who will complete the monitoring
- Frequency of observation
- Format of the information collected

Implementation

- Who will complete the monitoring
 - Experienced?
- Process for reporting information



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Time estimate – 2 minutes

Outline

- ❑ The role of the burn boss is to plan for and **FACILITATE** the completion of monitoring.
- ❑ Planning
 - What will be monitored?
 - Who will complete the monitoring?
 - What is the format of the information collected?
 - What is the frequency of observation?
- ❑ Implementation
 - Who will complete the monitoring?
 - How experienced are they? Less experience could lead to variability in the results.
 - Process for reporting information.

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What to Monitor

Environmental data

Fire observations

1st order fire effects

2nd order fire effects



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Time estimate – 1 minute

Outline

- There are four levels of monitoring:
 - Environmental
 - Fire observations
 - 1st order fire effects
 - 2nd order fire effects

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What to Monitor



Environmental data

- Weather
- Fuel Moisture
- Soils/duff moisture
- Fuel loading
- Fuel model

Fire observations

1st order fire effects

2nd order fire effects

**What is in your plan?
Is it adequate?**

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Time estimate – 4 minutes

Outline

- Review the slide

Discuss

What monitoring requirements are in your plan? Is it adequate?

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What to Monitor



Environmental data

- Rate of spread

Fire observations

- Flame length
- Flame zone depth

1st order fire effects

- Residence time
- Smoke

2nd order fire effects

**What is in your plan?
Is it adequate?**

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Time estimate – 3 minutes

Outline

- Review the slide

Discuss

What monitoring requirements are in your plan? Is it adequate?

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What to Monitor



Environmental data

- Fuel consumption

Fire observations

- Tree mortality
- Area burned
- Scorch height

1st order fire effects

2nd order fire effects

**What is in your plan?
Is it adequate?**

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Time estimate – 3 minutes

Outline

- Review the slide

Discuss

What monitoring requirements are in your plan? Is it adequate?

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What to Monitor

Environmental data

- Delayed tree mortality
- Species composition
- Site productivity

1st order fire effects

2nd order fire effects

**Not typically included
in the prescribed fire
plan**

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Time estimate – 1 minute Outline

- Review the slide

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Who will Monitor

Qualifications to monitor

- Training
- Experience
- Tools

Inconsistent ability = inconsistent results

Use a Fire Effects Monitor (FEMO)
Day Job Plug – build more FEMOs



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Time estimate – 2 minutes

Outline

- What are the qualifications to be able to monitor?
 - Right training
 - Right experience
 - Right tools
- Inconsistent ability = inconsistent results
- Using a FEMO will help increase consistency in ability and results.
- Day Job Plug – build more FEMOs

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FEMO

FEMO Duties

- Observe
- Monitor
- Track
- Document
- Communicate
- Report

Second set of eyes for the burn boss.



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Time estimate – 3 minutes

Outline

- ❑ The duties of a FEMO are to:
 - Observe any and all aspects of the burn.
 - Monitor requested items such as weather, fire behavior, and smoke.
 - Track the trigger points of the burn and ensure weather objectives are being met.
 - Document the events of the burn and the results of the monitoring.
 - Communicate with the burn boss and other burn resources as necessary.
 - Compile a report summarizing the information.
- ❑ In short – A FEMO can be a second set of eyes for the burn boss.

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Do you need a FEMO?



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Time estimate – 2 minutes

Discuss

- It is January 15th and you are burning piles in a remote unit. Do you need a FEMO?

Outline

For routine maintenance burns you may be fine with assigning anyone to take weather observations or just using a spot weather forecast depending on the requirements of your home unit.

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FEMO



Do you need a FEMO?



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Time estimate – 3 minutes

Discuss

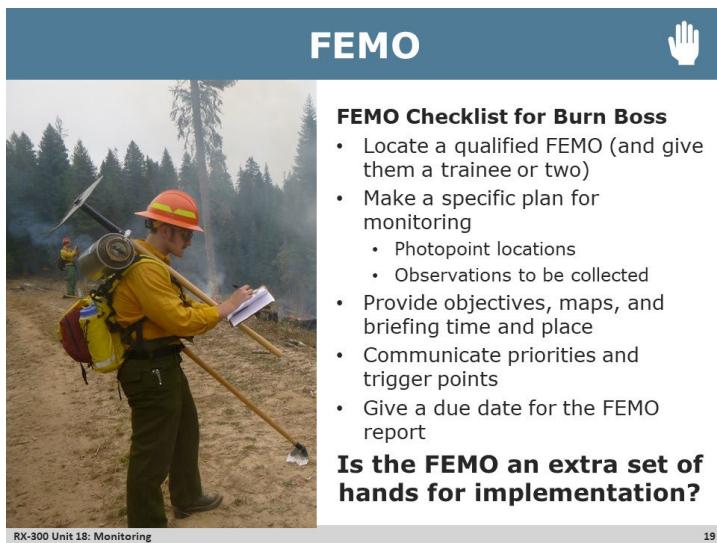
- It is September 30th and you are burning at the high end of your prescription. Do you need a FEMO?
- How could you use a FEMO in this scenario?

Outline

- Confirm objectives are being met.
- Maintain a close eye on trigger points and prescription.
- If you exceed prescription parameters, consult with FEMO to gather information. Prescriptions may be negotiable if the modeled fire behavior used to write the prescription is not matching what you are seeing on the ground.

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FEMO 

FEMO Checklist for Burn Boss

- Locate a qualified FEMO (and give them a trainee or two)
- Make a specific plan for monitoring
 - Photopoint locations
 - Observations to be collected
- Provide objectives, maps, and briefing time and place
- Communicate priorities and trigger points
- Give a due date for the FEMO report

Is the FEMO an extra set of hands for implementation?

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Time estimate – 2 minutes

Outline

- Review the slide

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FEMO

"The need for good documentation in the event of an escape and/or investigation is one of the reasons we recommend assigning a qualified FEMO on prescribed burns."

- Arapaho Declared Wildfire Review, 2015 Wildland Fire Lessons Learned Center



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Time estimate – 1 minute Outline

- Review the slide

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FEMO Report

- Results of the objectives
- Weather outline
- Fire behavior summary
- What happened and why
- Notes from briefing and AAR
- Photos

Purpose and Resource Management Goals:
The purpose of this prescribed burn was to break up surface fuel continuity and decrease intensity of future wildfires in the Metolius WUI. Other goals include working to restore the unit to a historic regime and improving overall forest health and habitat diversity.

(Fuel traffics show accomplishment observed three days prior to the burn)

Specific Prescribed Fire Objectives:

- Burn 40%-90% of the unit
Surface litter 90% burned.
- Reduce 1-hr fuels by 40%-90%
1-hr fuel 40% topsoared, 30% consumed.
- Reduce 10 and 100-hr fuels by 30%-60%
10 and 100-hr 20% charred, 60% consumed.
- Reduce 1000-hr fuels by 20%-50%
1000-hr fuels 20% charred, 60% consumed.



Typical fire behavior in needles and brush. Photo was taken at 10:15 with unit shaded out by smoke column.

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Time estimate – 2 minutes

Outline

- A FEMO report should contain:
 - Results of the objectives
 - Weather outline
 - Fire behavior summary
 - What happened and why
 - Notes from briefing and AAR
 - Photos
- A good FEMO report can help the planner fine-tune the next prescription. It can also help build trust and credibility with resource specialists on ID teams.
- There are example FEMO reports in the resources for the class.

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Monitoring examples

Reduce junipers <10"DBH by 50-80%.

- A FEMO can't determine this – it needs 3-5 years



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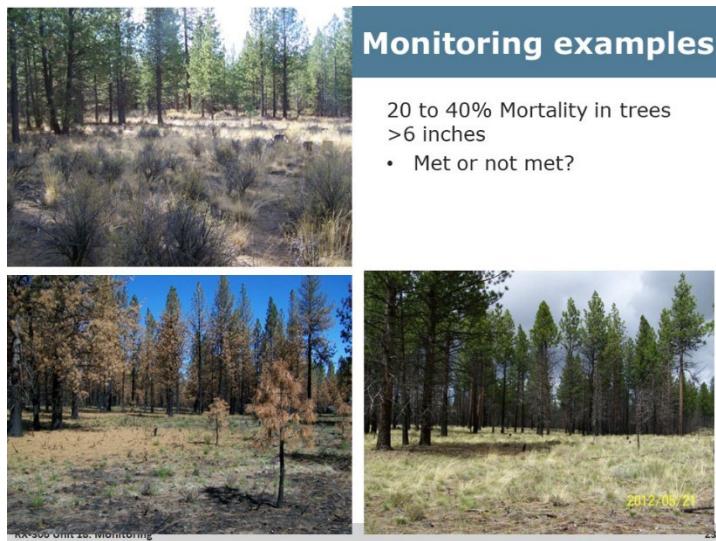
Time estimate – 1 minute

Outline

- Reduce junipers <10" DBH by 50-80%.
 - A FEMO can't determine this – it needs 3-5 years.
 - A good FEMO will set up plots and photo points that other people can find for resampling.

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Monitoring examples

20 to 40% Mortality in trees
>6 inches
• Met or not met?

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2012/08/21

This slide displays three images illustrating tree mortality. The top image shows a forest with many dead, brown trees. The middle image shows a mix of living green trees and dead, brown trees. The bottom image shows a forest with many dead, brown trees. A blue box labeled 'Monitoring examples' contains text about mortality thresholds and a question about whether objectives were met. A date stamp '2012/08/21' is visible in the bottom right corner of the images.

Time estimate – 1 minute

Outline

20 to 40% mortality in trees > 6 inches

Based on the picture immediately post fire does it looks like this objective was over met or under met?

<<click>>What about the picture from several years later?

Repeated photo points can be powerful tools to measure objectives.

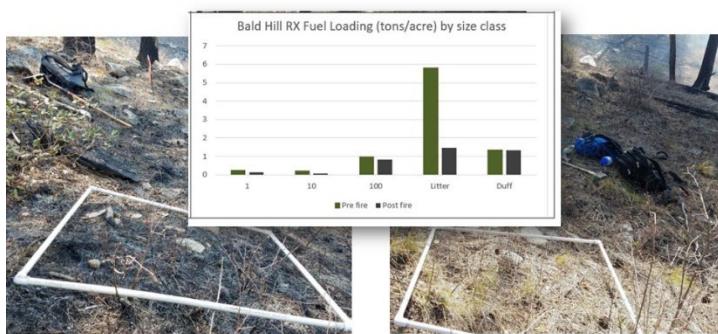
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Monitoring examples

Reduce fuel loading by >50%

- Photo is helpful, measured is better



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Time estimate – 1 minute

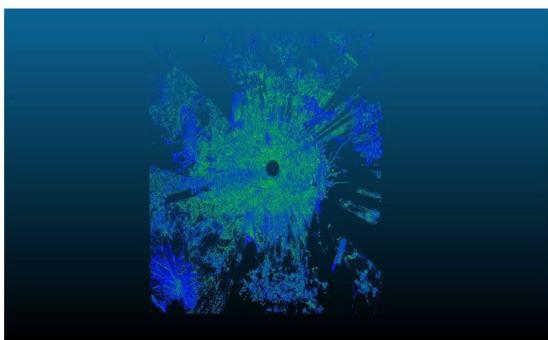
Outline

- Reduce fuel loading by >50%
 - Photo is helpful
 - <<click>> measured is better

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What to Monitor

The future....



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Time estimate – 2 minutes

Outline

- Terrestrial LiDAR units are growing in availability and functionality.
- They are a quick and repeatable way to collect fuels and vegetation information.
- Play the video to show the LiDAR acquisition.

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Barriers to Monitoring



Barriers to monitoring?

More practice in monitoring =
more efficient monitoring =
less time required to monitor

Solutions to monitoring?

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Time estimate – 4 minutes

Discuss

- What are the barriers to effective monitoring?
 - Time
 - Experience
 - Equipment
 - Motivation
 - Others?
- What are some possible solutions to overcoming these barriers?
 - Buy equipment
 - Provide training
 - Provide time during implementation
 - Provide time after implementation for reporting
- <<Click>> More practice in monitoring = more efficient monitoring = less time required to monitor

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Unit Summary



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- You need to monitor to show objectives have or have not been met.
- A FEMO help with monitoring and documentation
- Experienced monitors are worth developing

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Time estimate – 1 minute

Outline

Review the summary.