



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

Unit 18: Monitoring

Slide 1



Unit 18: Monitoring

Slide 2

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



RX-300 Unit 18: Monitoring

2

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.

Slide 3

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.

Slide 4

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

Slide 5

Why Burn?



What is the difference between prescribed fire and arson?



RX-300 Unit 18: Monitoring

5

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!

Slide 6

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?



RX-300 Unit 18: Monitoring

6

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.

Slide 7

Why Monitor?



Consequences of not **MEASURING** objectives?

Consequences of not **REPORTING** observations on objectives?



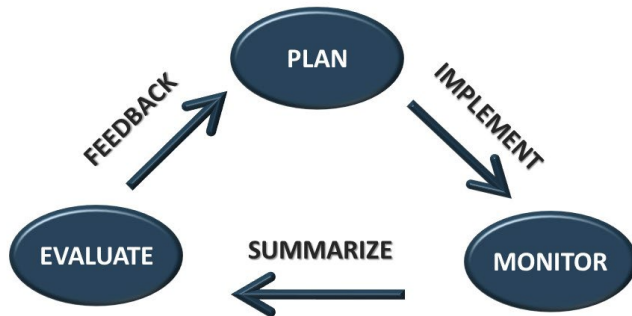
Time estimate – 3 minutes

Discuss

- ☐ What are the consequences of not **MEASURING** 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

Slide 8

Why Monitor?



RX-300 Unit 18: Monitoring

8

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.

Slide 9

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



RX-300 Unit 18: Monitoring

9

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.

Slide 10

What to Monitor

- Environmental data**
- Fire observations**
- 1st order fire effects**
- 2nd order fire effects**



RX-300 Unit 18: Monitoring 10

Time estimate – 1 minute

Outline

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

Slide 11

What to Monitor



Environmental data

Fire observations

1st order fire effects

2nd order fire effects

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

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

RX-300 Unit 18: Monitoring

11

Time estimate – 4 minutes

Outline

- ☐ Review the slide

Discuss

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

Slide 12

What to Monitor



Environmental data

Fire observations

1st order fire effects

2nd order fire effects

- Rate of spread
- Flame length
- Flame zone depth
- Residence time
- Smoke

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

Time estimate – 3 minutes

Outline

- ☐ Review the slide

Discuss

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

Slide 13

What to Monitor



Environmental data

Fire observations

1st order fire effects

2nd order fire effects

- Fuel consumption
- Tree mortality
- Area burned
- Scorch height

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

Time estimate – 3 minutes

Outline

- ☐ Review the slide

Discuss

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

Slide 14

What to Monitor

Environmental data

Fire observations

1st order fire effects

2nd order fire effects

- Delayed tree mortality
- Species composition
- Site productivity

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

Time estimate – 1 minute Outline

- ☐ Review the slide

Slide 15

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

RX-300 Unit 18: Monitoring 15

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

Slide 16

FEMO

- **FEMO Duties**
 - Observe
 - Monitor
 - Track
 - Document
 - Communicate
 - Report
- **Second set of eyes for the burn boss.**



RX-300 Unit 18: Monitoring 16

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.

Slide 17

FEMO



Do you need a FEMO?



RX-300 Unit 18: Monitoring

17

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.

Slide 18

FEMO



Do you need a FEMO?



RX-300 Unit 18: Monitoring

18

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.

Unit 18: Monitoring

Slide 19

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?

RX-300 Unit 18: Monitoring

19

Time estimate – 2 minutes

Outline

- ☐ Review the slide

Slide 20

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



RX-300 Unit 18: Monitoring

20

Time estimate – 1 minute

Outline

- ☐ Review the slide

Slide 21

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 fire regime and improving overall forest health and habitat diversity.

(Red italics show accomplishment observed three days post burn.)

Specific Prescribed Fire Objectives:

- Burn 40%-90% of the unit
- Surface litter 90% burned.
- Reduce 1-hr fuels by 40%-90%.
- 1-hr fuels 40% top-charred, 50% 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.

RX-300 Unit 18: Monitoring

21

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.

Slide 22

Monitoring examples

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

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



RX-300 Unit 18: Monitoring




22

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.

Slide 23



Monitoring examples

20 to 40% Mortality in trees
>6 inches

- Met or not met?

Time estimate – 1 minute

Outline

20 to 40% mortality in trees > 6 inches

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

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

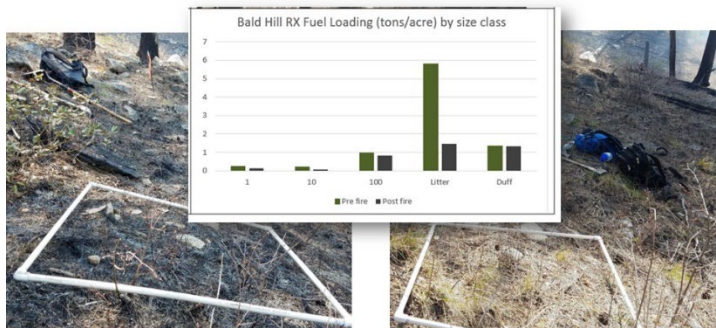
Repeated photo points can be powerful tools to measure objectives.

Slide 24

Monitoring examples

Reduce fuel loading by >50%

- Photo is helpful, measured is better



RX-300 Unit 18: Monitoring

24

Time estimate – 1 minute

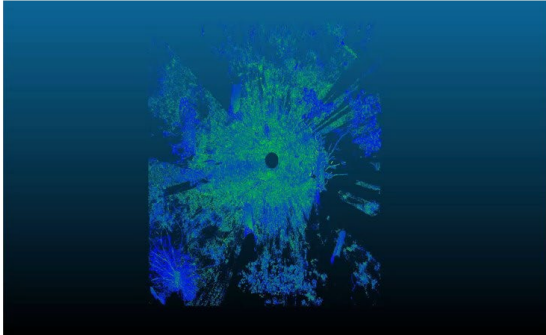
Outline

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

Slide 25

What to Monitor

The future....



RX-300 Unit 18: Monitoring

25

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.

Slide 26


Barriers to Monitoring



Barriers to monitoring?

Solutions to monitoring?

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



RX-300 Unit 18: Monitoring 26

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

Slide 27

Unit Summary



- 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

RX-300 Unit 18: Monitoring

27

Time estimate – 1 minute

Outline

Review the summary.