Ground-Based Forest Machinery: Improving Wildland Fire Suppression

FORMEC/COFE 2019

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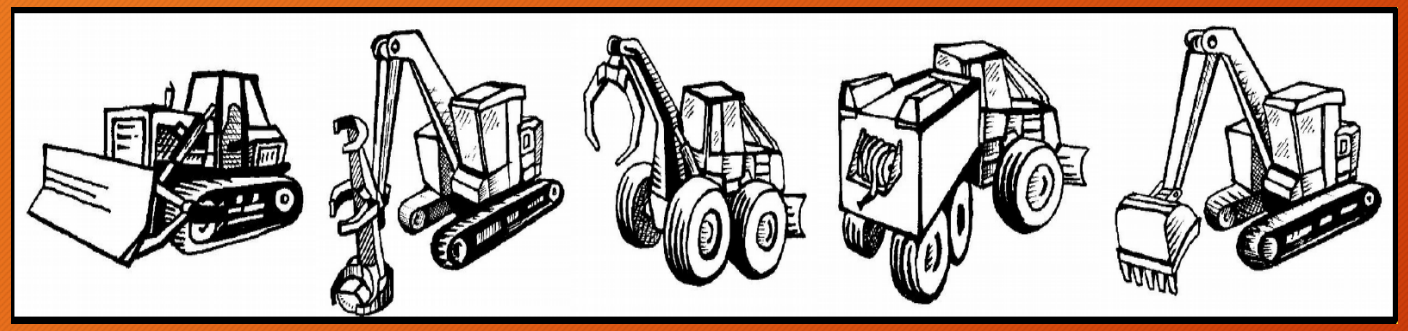
Introduction

- *2018 California (USA):*
  - *nearly 2 million acres burned*
  - *exceeding $12 billion in damages*
  - *almost 23,000 homes were destroyed*
  - *103 people were killed*

Agenda

- *Machines & Tasks*
- *Safety*
- *Dispatch, Transport, & Access*
- *Remote Delivery of Water*
- *Northern California*
- *Innovations*

Machines & Tasks



Forestry machines are purpose-built for many tasks

Graphics credit: Ry Basko

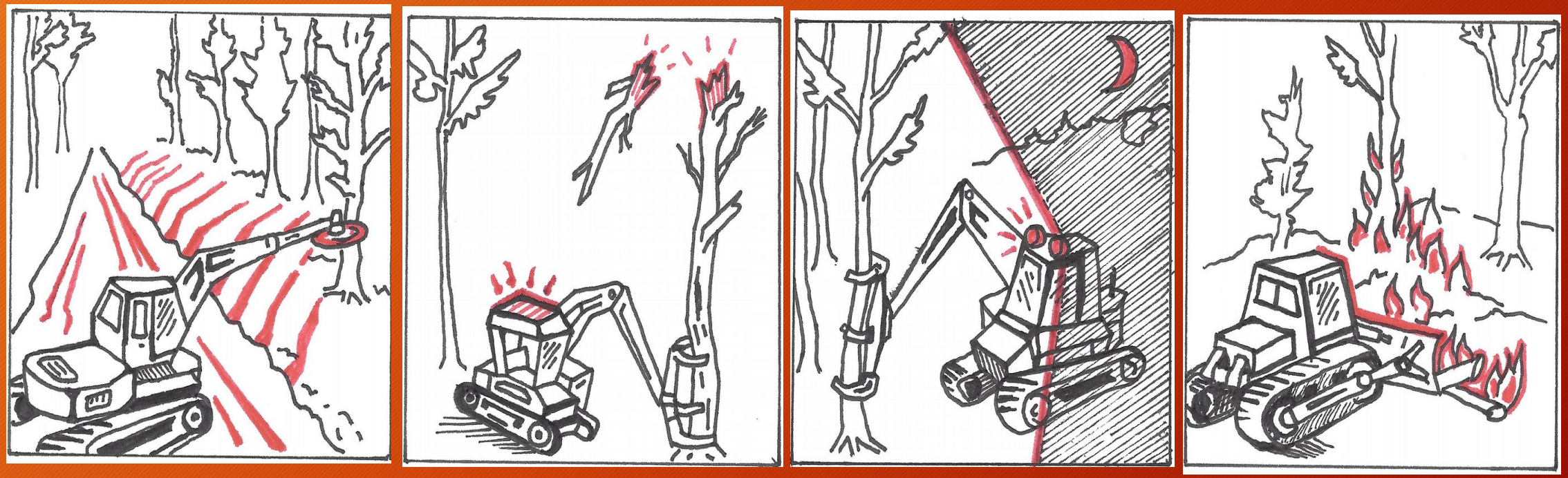
MACHINE TYPE / FIRE TASK	Feller Bunchers & Harvesters	Wheeled Skidder	Dozer & Tracked Skidders	SoftTrack Skidgines	Excavators, Shovels and Loaders	Forwarders & SuperSkidgines	Skidgines (Tracked, Wheeled)	Mulchers	Road Grader
Fireline and Fuelbreak Construction	X	X	X	X	X	X	X	X	X
Night Operation	X	X	X	X	X	X	X	X	X
Site Rehab	X	X	X	X	X	X	X	X	X
Vehicle Assistance	X	X	X	X	X	X	X	X	X
Tree Felling or Snagging	X	X	X	X	X		X	X	
Tree or Log Skidding		X	X	X	X	X	X		
Tree or Log Decking		X	X	X	X	X	X		
Tree or Log Bunching	X	X	X		X				
Brush Piling		X	X		X		X		
Brush Trampling			X		X		X		
Brush Cutting	X				X			X	
Pruning	X				X			X	
Water Hauling				X		X	X		
Water Application				X		X	X		
Road Work			X		X				X

Machines & Tasks

Machines & Tasks

- *Heavy forestry equipment offers firefighters increased capabilities:*
- *Safer night-time fireline construction*
- *Faster, safer indirect and contingency fireline construction*
- *More opportunities for direct line >4 ft. flame length*
- *Safer methods of hazardous tree removal and brush clearing*
- *A force multiplier to increase crew capabilities, efficiency and safety*
- *Contracted equipment is an economic option (call-when-needed resources*

Safety



Safety advantages using mechanized wildfire operations: cut, position, night operations, clear hotspots (Art: Ry Basko)

Safety

Dispatch, Transport, Access

- *Need to consider:*
  - *Mobilization Time*
  - *Transport*
  - *Access Roads*
    - *Geometry*
    - *Condition*
  - *Machine speed*

Remote Water Delivery

- *Skidgine: skidder + engine*
- *Can carry large volumes of water long distances*
- *Aerial refill capability*

Northern California

- *Stone Fire observations*

Northern California

- *Stone Fire observations*

Northern California

- *Leadership*:
  - Good potential yet limited use of logging equipment on federally managed fires in California
  - Most use involves repair and rehabilitation late during fire suppression.
  - Construction of safety zones and escape routes in timber.

Northern California

- *Leadership*:
  - Use and choice: probability of success.
  - Concerns with decked timber.
  - Experience and assurance with fire managers is another factor.

Northern California

- *Leadership*:
  - Political and environmental challenges exist.
  - Efficient and safe fire suppression vs. circumventing the National Environmental Policy Act process, including the required public involvement.

Innovations

- *Tethered Equipment*

Innovations

- *Heavy Equipment Task Force – Northern Rocky Mountains, USA*

Innovations

- *Fashioned after mechanical whole-tree logging side:*
  - *Felling*
  - *Skidding*
  - *Earthwork*
  - *Water delivery*
  - *Siderod (foreman)*

Innovations

- *Info*

MACHINES: TYPES AND TASKS

Many individuals working in fire and fuels management are unfamiliar with the broad range of forestry equipment. This is particularly true when incident managers are brought in from out-of-state or region. Likewise, many agency land managers are not familiar with machine limitations, capabilities, costs, and site impacts when heavy equipment is used to manage fire.

Your knowledge of these machines will help you make the right choice in ordering and using machinery on fires.

Fire personnel need better access to equipment training and knowledge to correctly match their task objectives with machine capabilities and limitations. The goal is to assign the right tool for the right task.

Information Source: http://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=508c5da9-5543-477e-8ec6-017160f3edcb

SAFETY

Hazard trees exist before, during, and especially after a fire. It is a dynamic condition that changes the longer the fire burns. A special concern on wildland fires is the increased presence of dead and burned-out trees that result in falling snags. These overhead hazards are of critical concern for personnel out of machine cabs and under poor visibility conditions.

There are three primary hazards for in-woods equipment operators addressed by features of forestry equipment and cab structure: machine rollover, falling objects and cab penetration by limbs or trees. In response to these hazards forest equipment manufacturers design and build forest machine cabs which meet OSHA specifications for: Operator Protection System (OPS), Falling Object Protection System (FOPS) and Rollover Operator Protection System (ROPS).

Key safety factors in using machinery in the wildland fire environment is to stay within the safe operating slope limits and site conditions for the machine design and the operator's experience.

Machine and ground factors need to be understood to use the right equipment in the right places: Tracks or Wheels (chains, track bands); Traction (slope limits, soil conditions); Float (soil strength, machine ground pressure).

Determining operational slope limits depends on what the machines are doing, machine design (woods safety package, leveling cab, longer tracks with deeper grousers), as well as site conditions (amount of rock, jack-strawed deadfall, bogs).

Frame and Tracks - Dozers and strip mulchers are designed with a heavy rigid frame and tracks, making a solid unit that can turn tightly using differential steering. Another track configuration features track bands on bogey wheels that move up and down independently of the carriage, increasing traction.

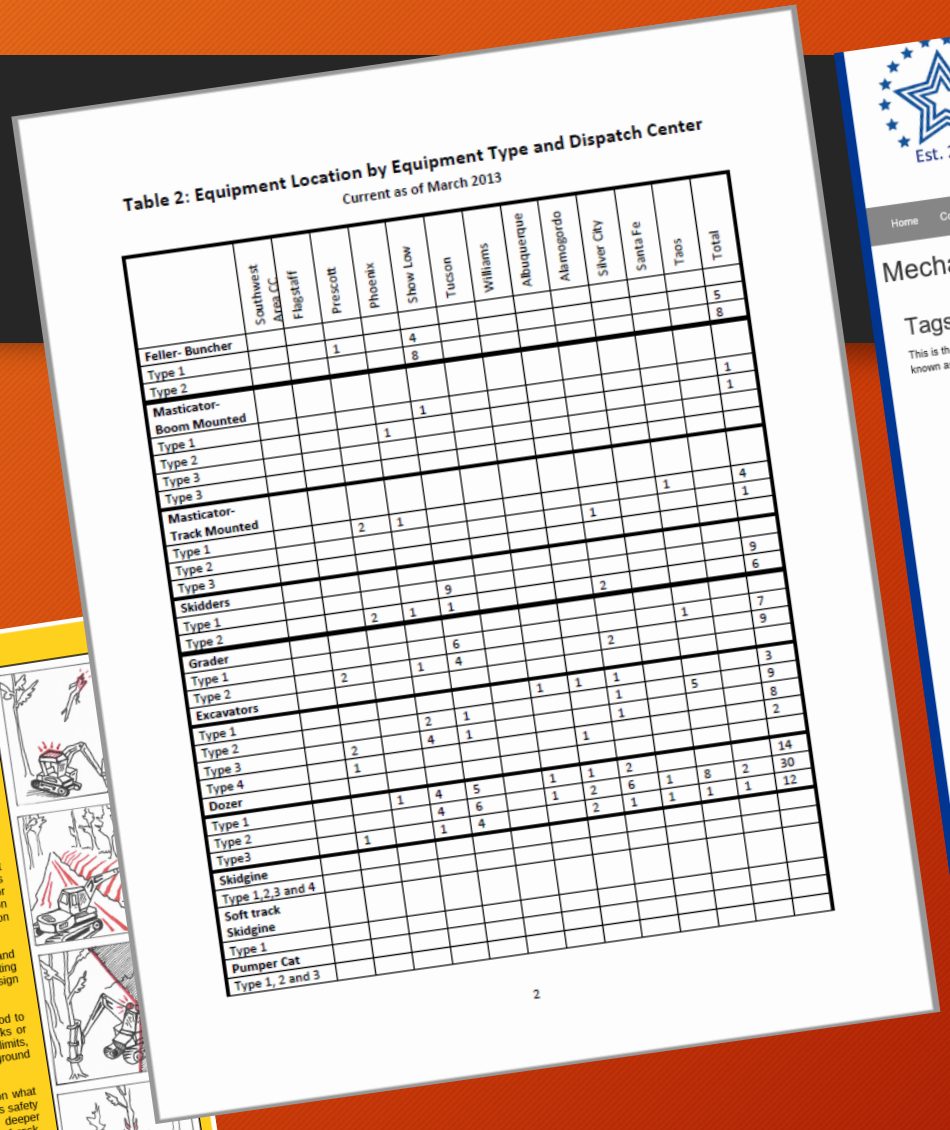


Table 2: Equipment Location by Equipment Type and Dispatch Center

Current as of March 2013

	Southwest Area CC	Flagstaff	Prescott	Phoenix	Show Low	Tucson	Williams	Albuquerque	Alamogordo	Silver City	Santa Fe	Taos	Total
Feller- Buncher					4								5
Type 1			1		8								8
Type 2													
Masticator-Boom Mounted					1								1
Type 1				1									1
Type 2													
Type 3													
Masticator-Track Mounted												1	4
Type 1			2	1						1			1
Type 2													
Type 3													
Skidders						9				2			9
Type 1						1							6
Type 2			2	1								1	7
Grader						6				2			9
Type 1					1	4							
Type 2			2										
Excavators								1	1	1		5	3
Type 1					2	1				1			9
Type 2			2		4	1				1			8
Type 3			1										2
Type 4										1			
Dozer				1	4	5		1	1	2			14
Type 1					4	6		1	2	6	1	8	30
Type 2			1		1	4			2	1	1	1	12
Type3													
Skidgine													
Type 1,2,3 and 4													
Soft track Skidgine													
Type 1													
Pumper Cat													
Type 1, 2 and 3													

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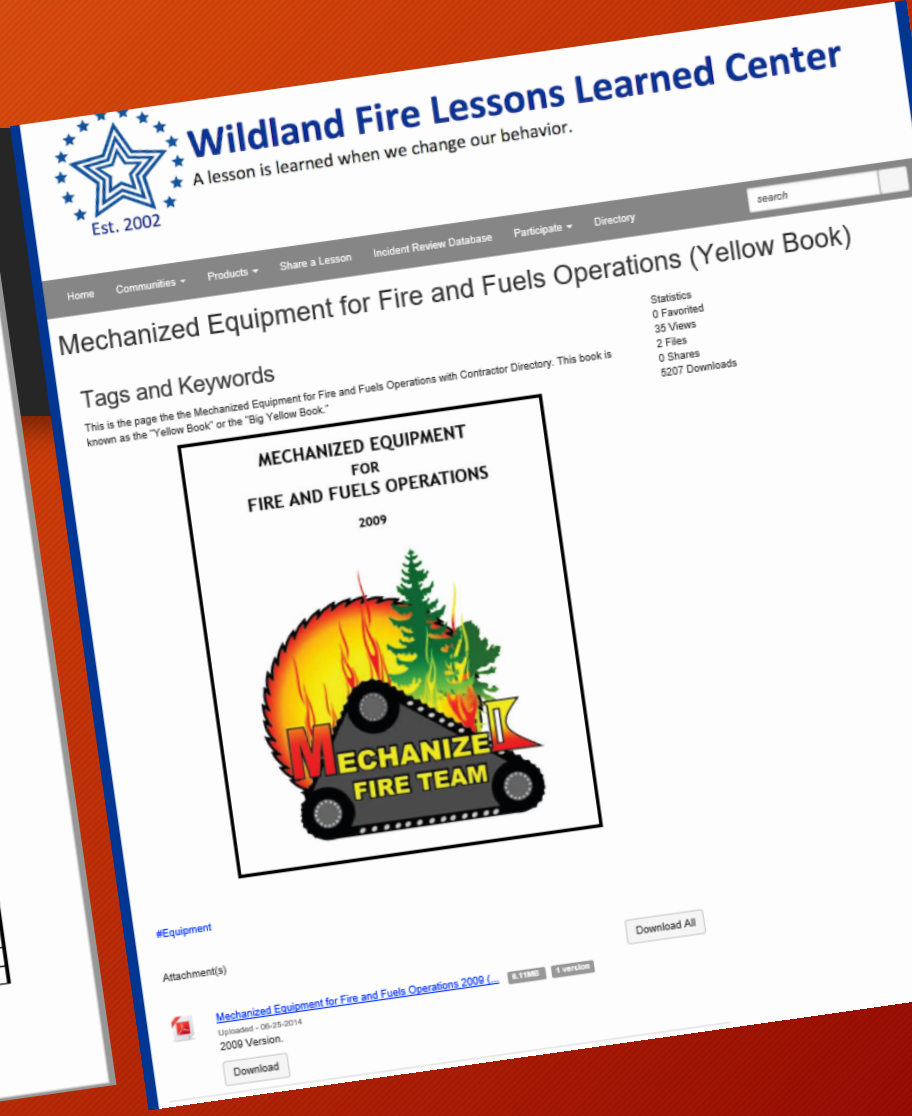

Wildland Fire Lessons Learned Center

A lesson is learned when we change our behavior.

Est. 2002

Home | Communities | Products | Share a Lesson | Incident Review Database | Participate | Directory

Mechanized Equipment for Fire and Fuels Operations (Yellow Book)

Tags and Keywords

This is the page the the Mechanized Equipment for Fire and Fuels Operations with Contractor Directory. This book is known as the "Yellow Book" or the "Big Yellow Book."

MECHANIZED EQUIPMENT FOR FIRE AND FUELS OPERATIONS 2009

MECHANIZED FIRE TEAM

Statistics
0 Favorited
35 Views
2 Files
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#Equipment

Download All

Attachment(s)

Mechanized Equipment for Fire and Fuels Operations 2009 (...

Uploaded - 06-25-2014

2009 Version.

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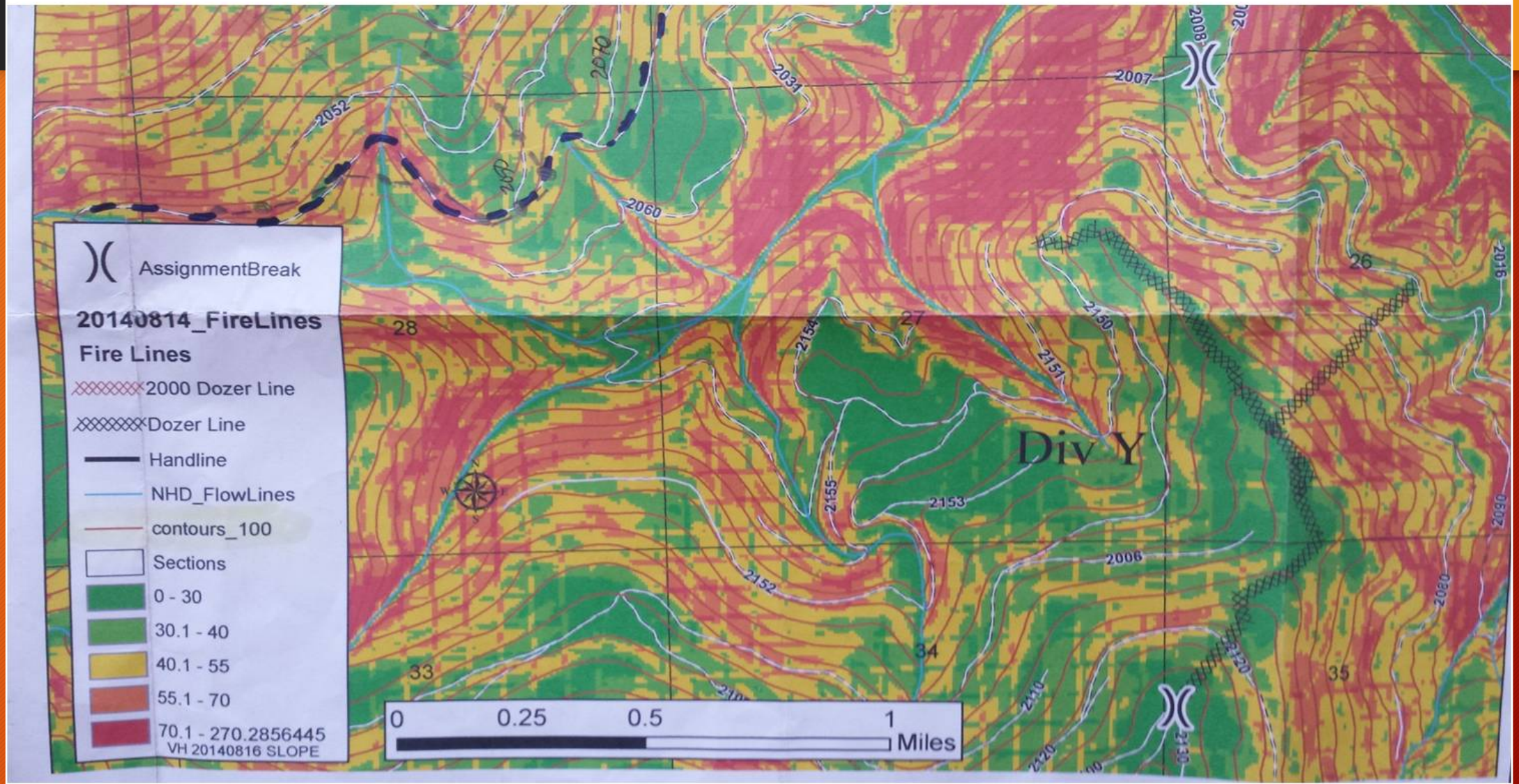
Innovations

- *Ground Slope Maps on the Fireline*

SLOPE MAP: THE FIRST THREE SLOPE BRACKETS INDICATE POTENTIAL UPSLOPE CONSTRUCTION; THE FOURTH IS DOWNSLOPE CONSTRUCTION.

0-25% **26-40%** **41-55%** **56-70%** **70%+**



Questions?

Graphics credit: Ry Basko