



MOUNTAIN  
**RESCUE**  
ASSOCIATION

# The Role of Geospatial in the Mountain Rescue Association

# MRA Mission

The Mountain Rescue Association (MRA) was established in 1959 at Timberline Lodge at Mount Hood, Oregon making us the oldest Search and Rescue Association in the United States.

The MRA is an organization of teams dedicated to saving lives through rescue and mountain safety education. We do so by improving the quality, availability, and safety of mountain search and rescue.

With over 90 government authorized units, the MRA has grown to become the critical mountain search and rescue resource in the United States.

**The “Search” is  
inherently a location  
based problem**



**Expert navigation  
and detailed maps  
are mission critical**



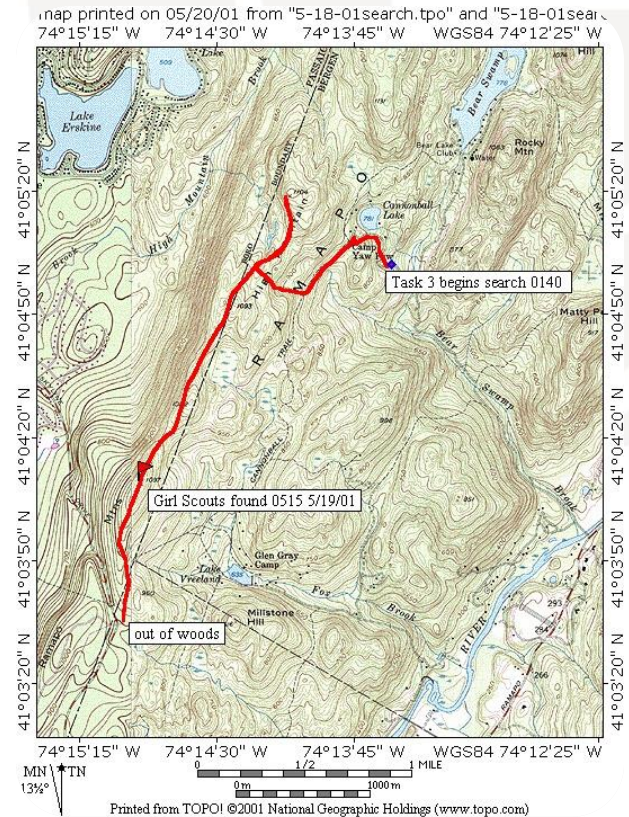


MOUNTAIN  
**RESCUE**  
ASSOCIATION

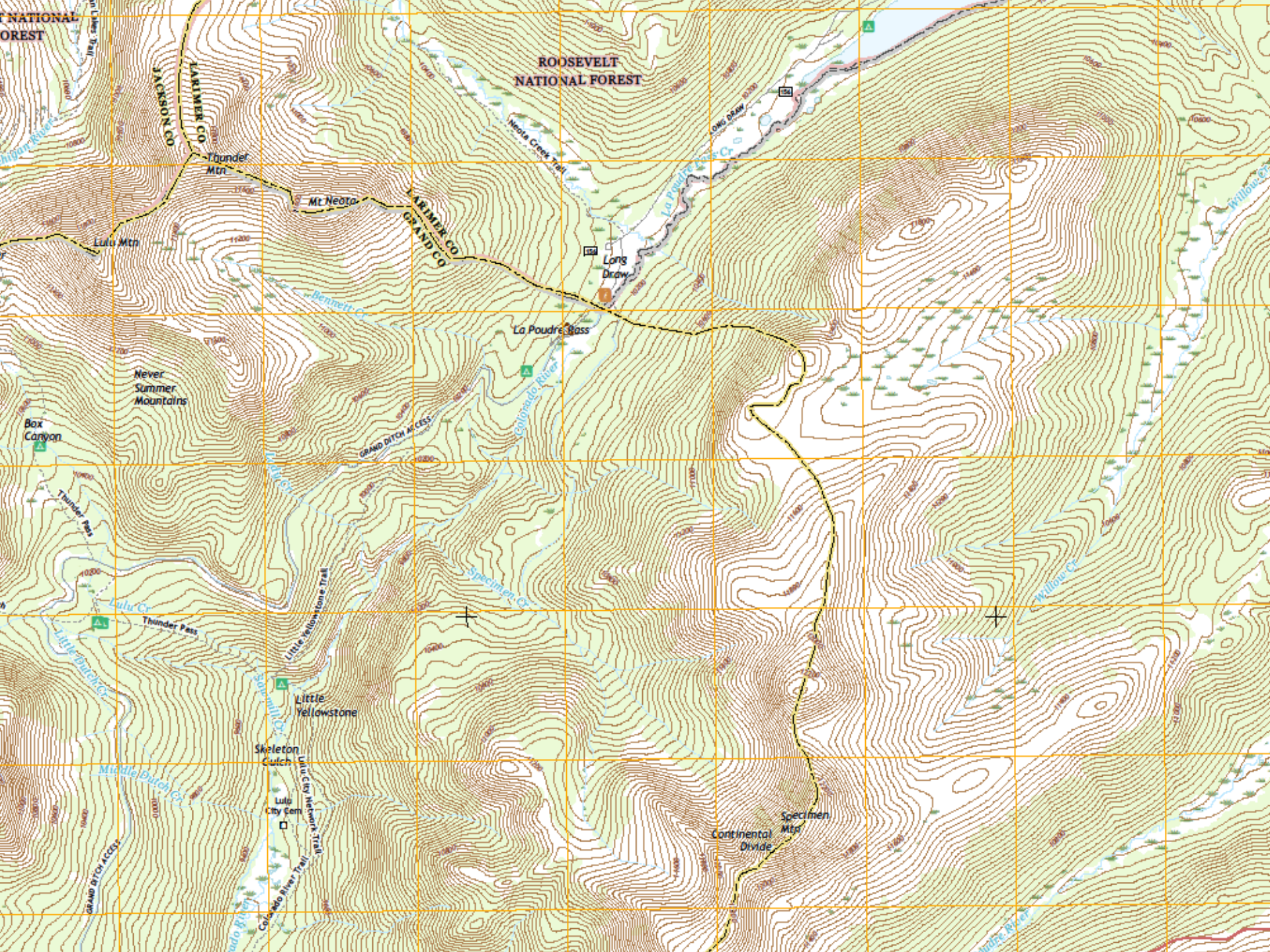
# Response to a SAR Mission

## DON'T JUST DO SOMETHING!

## THINK!







# Response to a SAR Mission

- Initial Actions:
  - Ensure Safety!
  - Protect the Scene
  - Evaluate Search Urgency
  - Lost Person Questionnaire
  - Evaluate Lost Subject Behavior

# Response to a SAR Mission

- Establish the Search Area
- Establish Probability Zones
- Initiate Confinement
- Allocate SAR Resources
- Document using ICS Forms and GIS





# Predictive Subject Modeling

## Lost Person Behavior Statistics for the Hiker Category

*Pages 184-185 in Lost Person Behavior*

184 Lost Person Behavior

### Hiker

Distance (horizontal) from the IPP (miles)					
	Temperate		Dry		Urban
	Men	Flar	Men	Flar	
n	568	274	221	58	8
25%	0.7	0.4	1.0	0.8	
50%	1.9	1.1	2.0	1.3	1.6
75%	3.6	2.0	4.0	4.1	
95%	11.3	6.1	11.9	8.1	

Distance (horizontal) from the IPP (kilometers)					
	Temperate		Dry		Urban
	Men	Flar	Men	Flar	
n	568	274	221	58	8
25%	1.1	0.6	1.6	1.3	
50%	3.1	1.8	3.2	2.1	2.6
75%	5.8	3.2	6.5	6.6	
95%	18.3	9.9	19.3	13.1	

Elevation (vertical) Change from the IPP (feet)						
	Temperate			Dry		
	Uphill	Down	Same	Uphill	Down	Same
%	32%	52%	16%	48%	52%	
25%	182	160		317	500	
50%	480	400		956	975	
75%	1175	1166		1500	2109	
95%	2634	2175		3623	5094	

Horizontal Change from IPP (miles) for Mtn Terrain						
	Temperate			Dry		
	Uphill	Down	Same	Uphill	Down	Same
<b>n</b>	<b>58</b>	<b>131</b>	<b>34</b>	<b>47</b>	<b>57</b>	<b>0</b>
25%	0.5	0.7	0.0	1.8	1.0	
50%	1.4	1.7	0.0	2.2	2.0	
75%	2.6	4.0	1.5	4.0	5.0	
95%	7.2	17.4	12.8	10.7	12.3	

Subject Categories 185

### Hiker

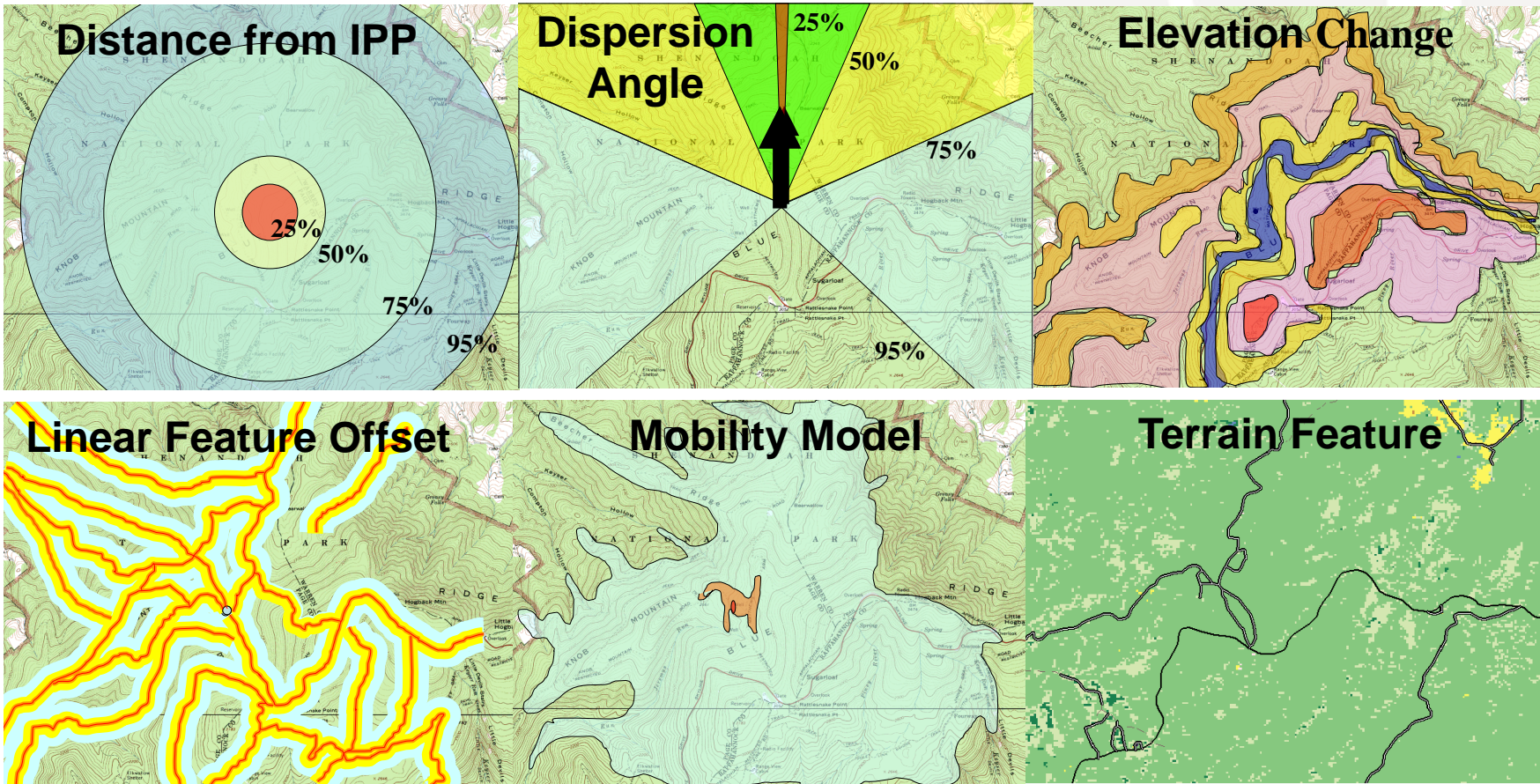
Mobility (hours)			Dispersion Angle (degrees)		
	Temperate		Dry		
	Men	Flar	Men	Flar	
n	232	112			
25%	0	4			
50%	3	8			
75%	6	12			
95%	14	26			

Find Location (%)				Scenario (%)	
	Temp	Dry	Urban	n	2242
n	312	196	17		
Structure	13%	10%	24%	Avalanche	
Road	13%	17%	35%	Criminal	
Linear	25%	31%	18%	Despondent	
Drainage	12%	18%	6%	Evading	1%
Water	8%	9%	12%	Investigative	1%
Brush	2%	2%		Lost	68%
Scrub	3%	3%		Medical	2%
Woods	7%	6%		Drowning	
Field	14%	1%	6%	Overdue	16%
Rock	4%	2%		Stranded	4%
				Trauma	7%

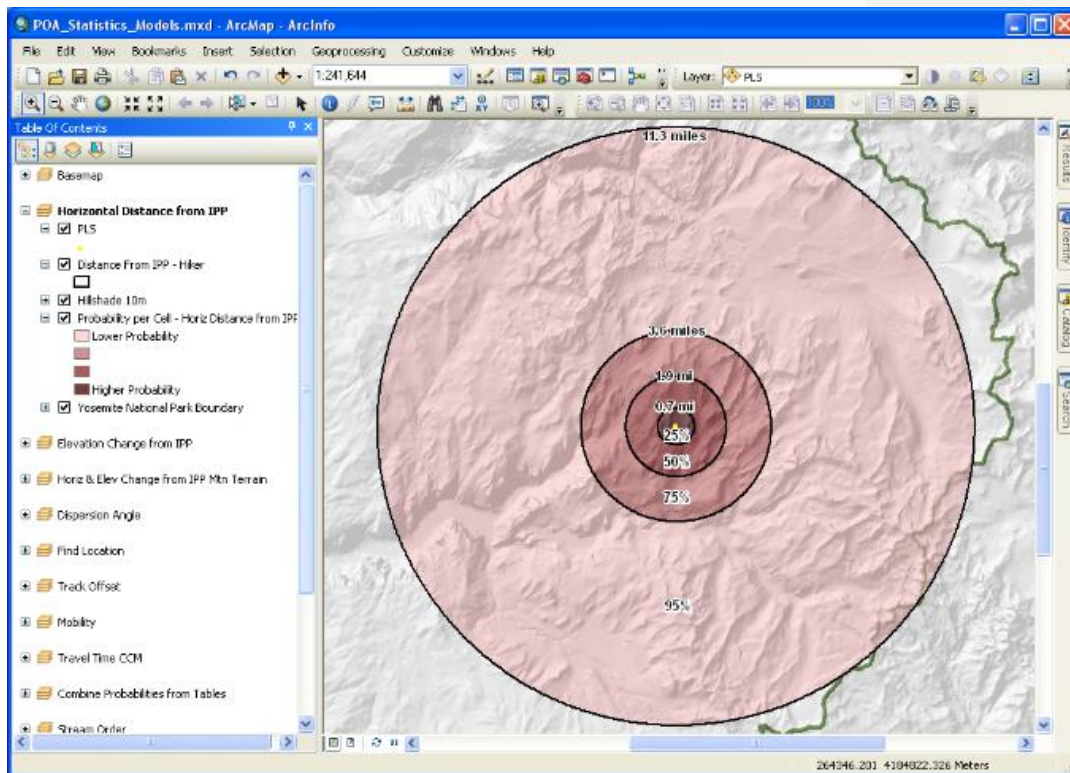
Survivability			Track Offset (meters)	
	Wilderness	Urban	n	40
Uninjured	78%	59%		
Injured	16%	24%	25%	50
Fatality	6%	12%	50%	100
No Trace		6%	75%	238
Survivability	Alive	n	95%	424
<24 hours	97%	2460		
>24 hours	76%	361		
>48 hours	60%	118		
>72 hours	52%	51		
>96 hours	49%	23		



# Different Methods for POA



# Horizontal Distance from IPP (miles)

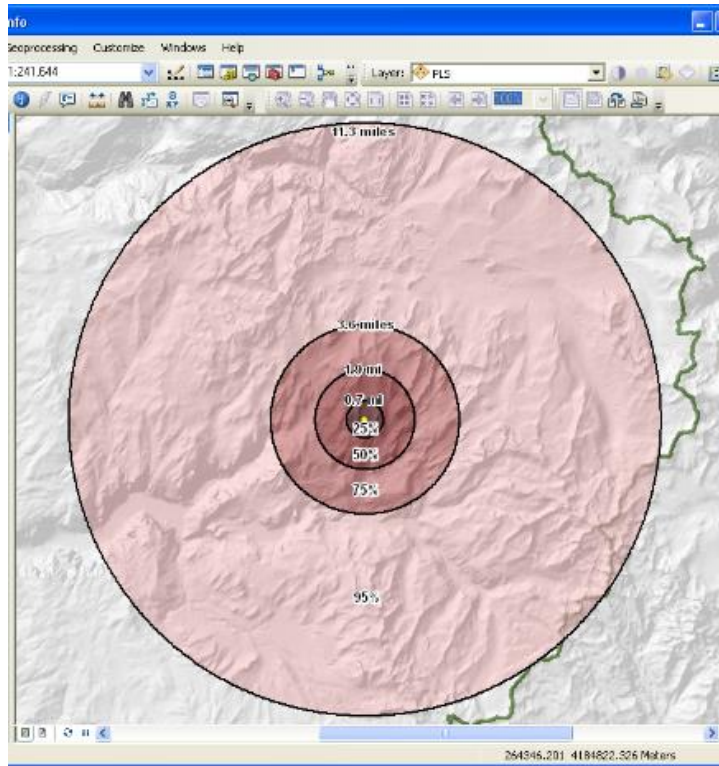


Distance (horizontal) from the IPP (miles)					
	Temperate		Dry		Urban
	Mtn	Flat	Mtn	Flat	
n	568	274	221	58	8
25%	0.7	0.4	1.0	0.8	
50%	1.9	1.1	2.0	1.3	1.6
75%	3.6	2.0	4.0	4.1	
95%	11.3	6.1	11.9	8.1	

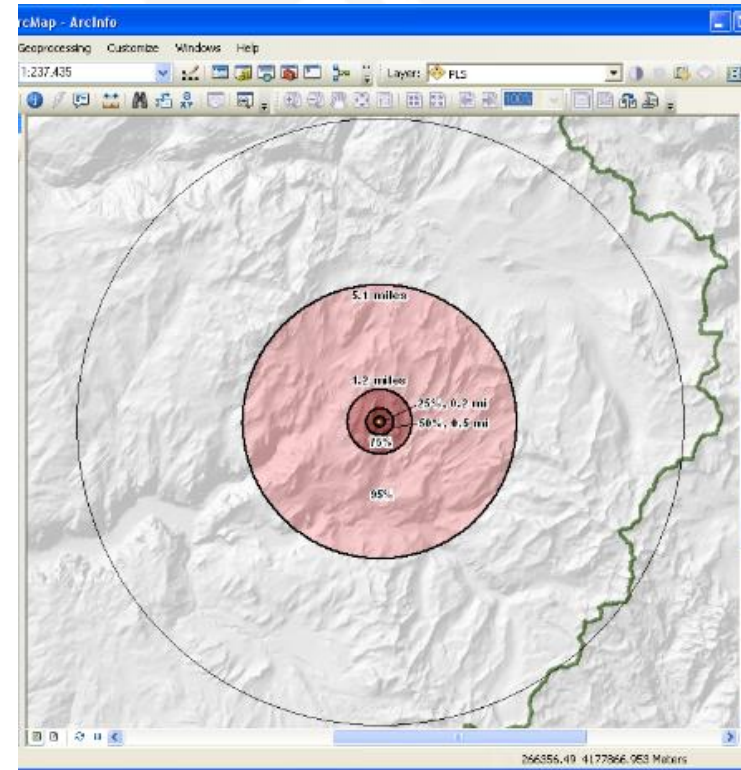


# Comparison of Hiker and Dementia Categories

## Horizontal Distance from IPP (miles)



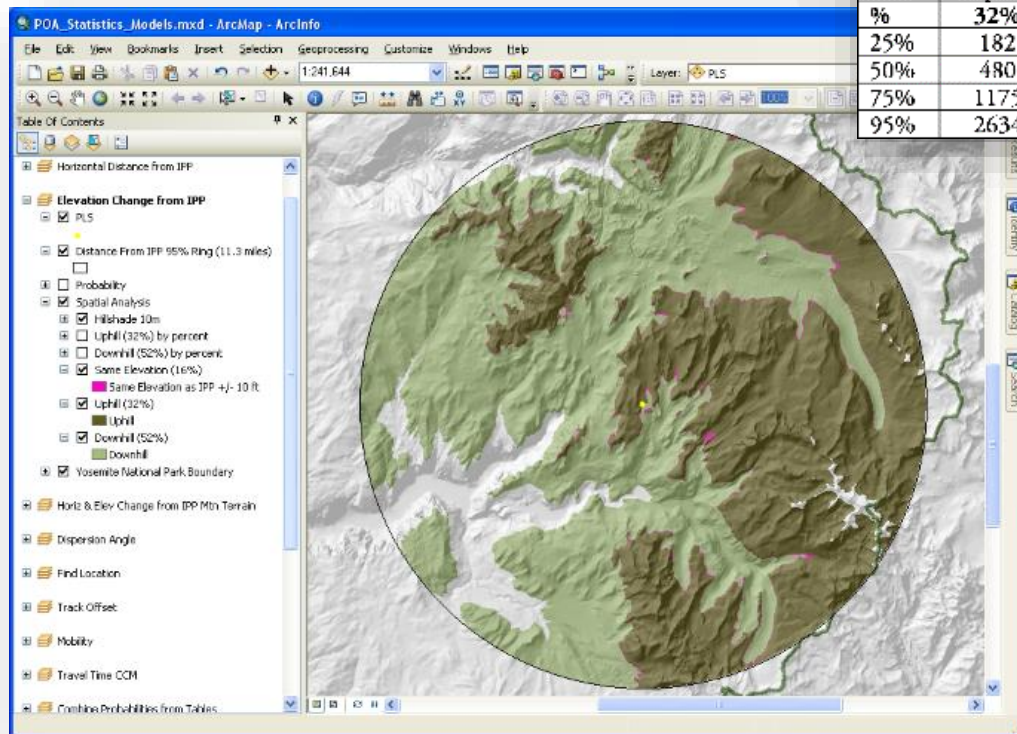
Hiker



Dementia



# Elevation Change from IPP (feet)

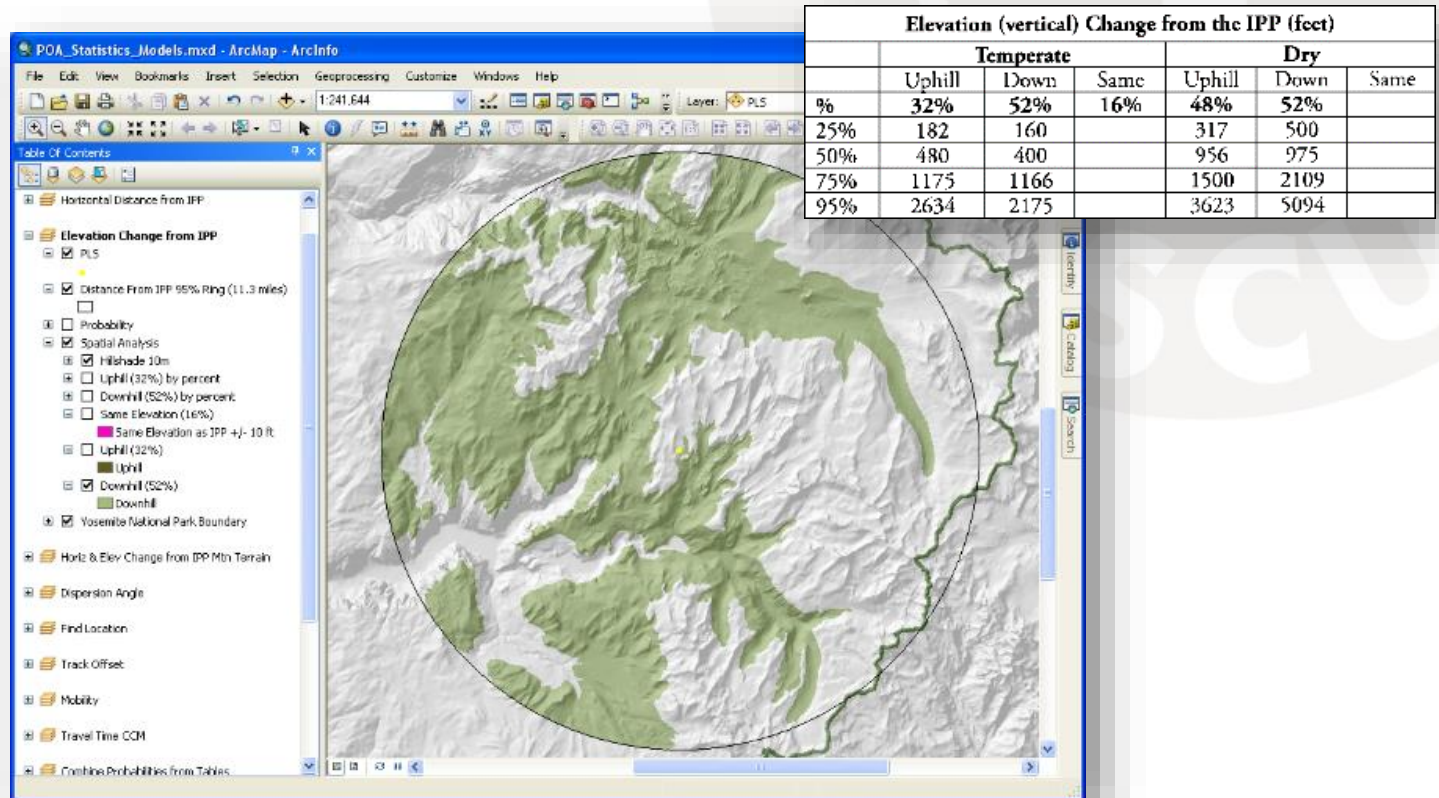


Elevation (vertical) Change from the IPP (feet)						
	Temperate			Dry		
	Uphill	Down	Same	Uphill	Down	Same
%	32%	52%	16%	48%	52%	
25%	182	160		317	500	
50%	480	400		956	975	
75%	1175	1166		1500	2109	
95%	2634	2175		3623	5094	



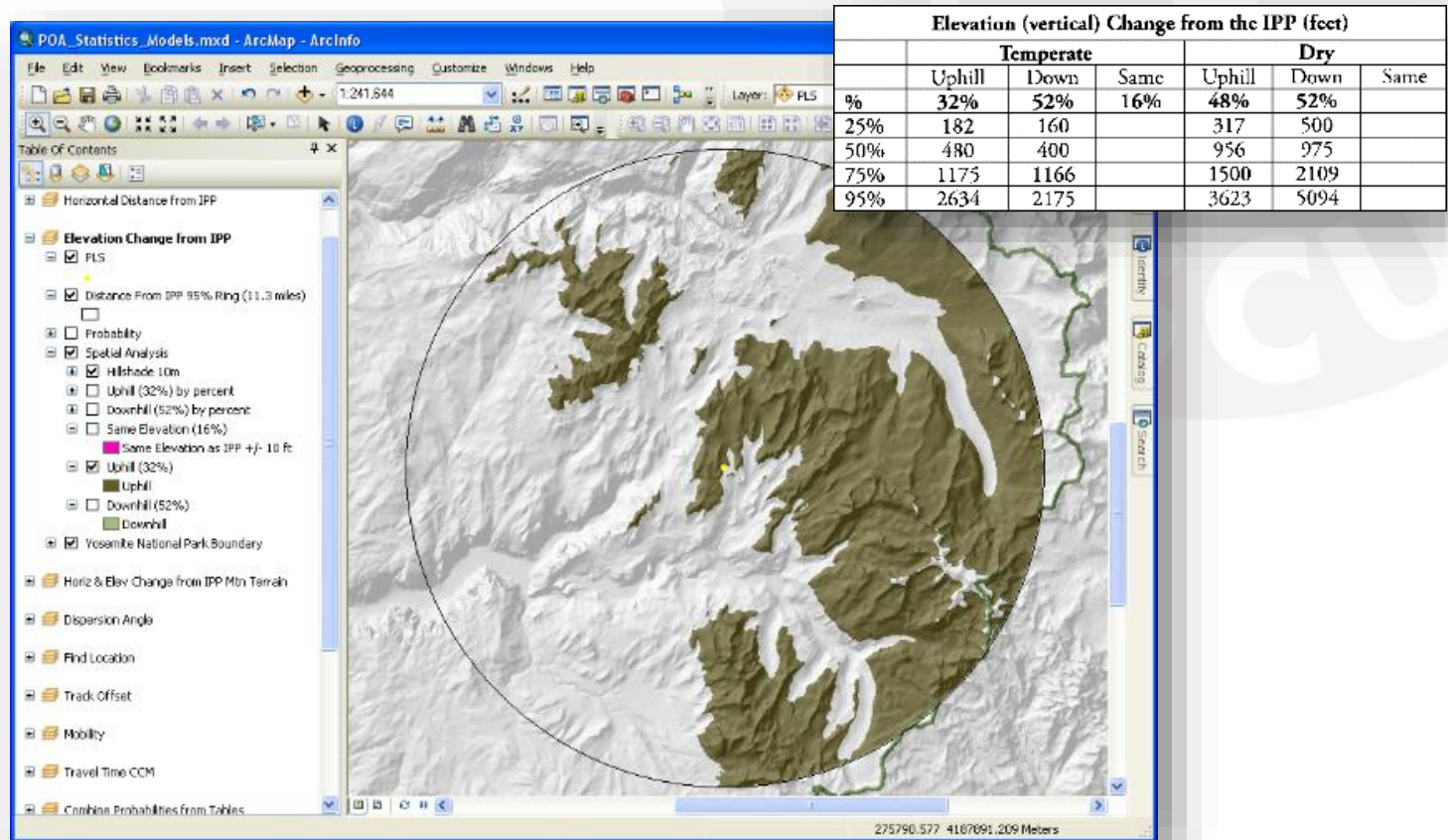


# Elevation Change from IPP (feet) – Downhill (52%)



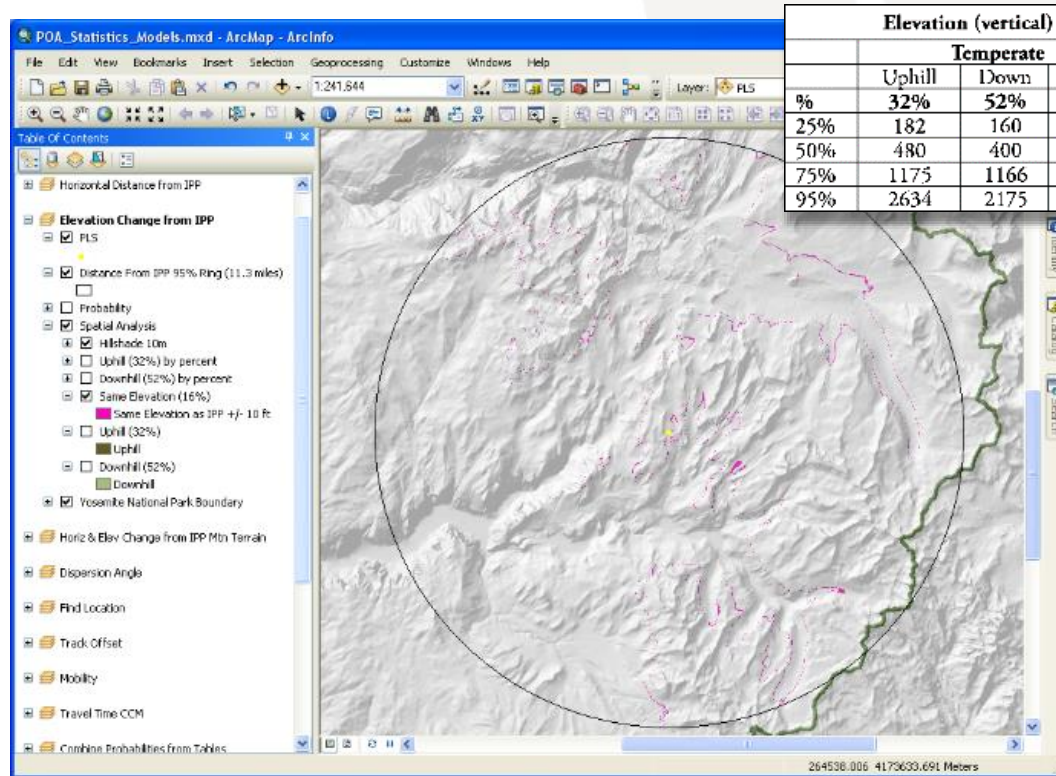


# Elevation Change from IPP (feet) – Uphill (32%)





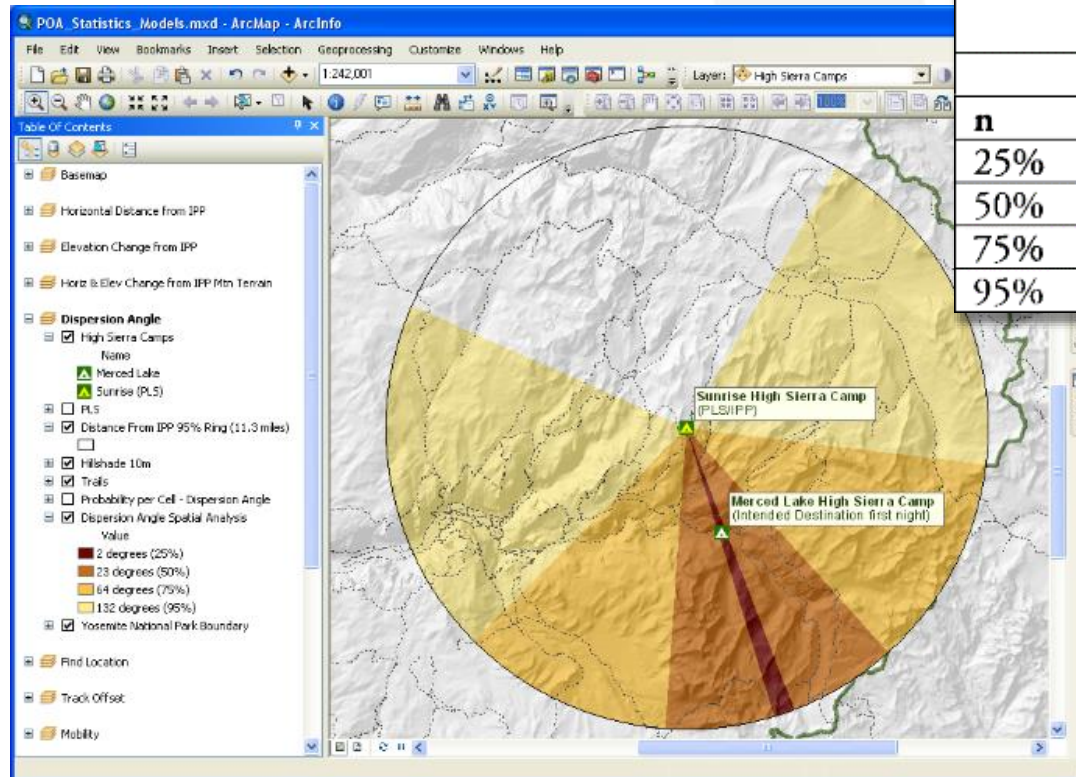
# Elevation Change from IPP (feet) – same (16%)



Elevation (vertical) Change from the IPP (feet)						
	Temperate			Dry		
	Uphill	Down	Same	Uphill	Down	Same
%	32%	52%	16%	48%	52%	
25%	182	160		317	500	
50%	480	400		956	975	
75%	1175	1166		1500	2109	
95%	2634	2175		3623	5094	



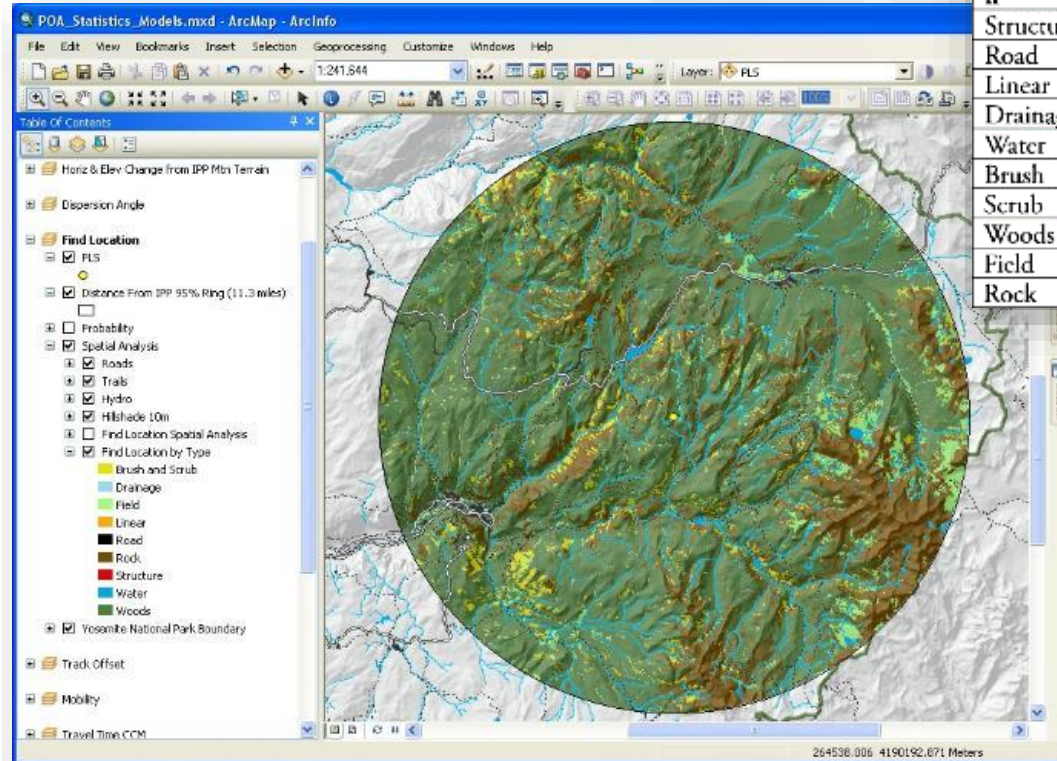
# Dispersion Angle – Percentages



	Dispersion Angle (degrees)	
	Temperate	Dry
n	134	28
25%	2	20
50%	23	47
75%	64	124
95%	132	175

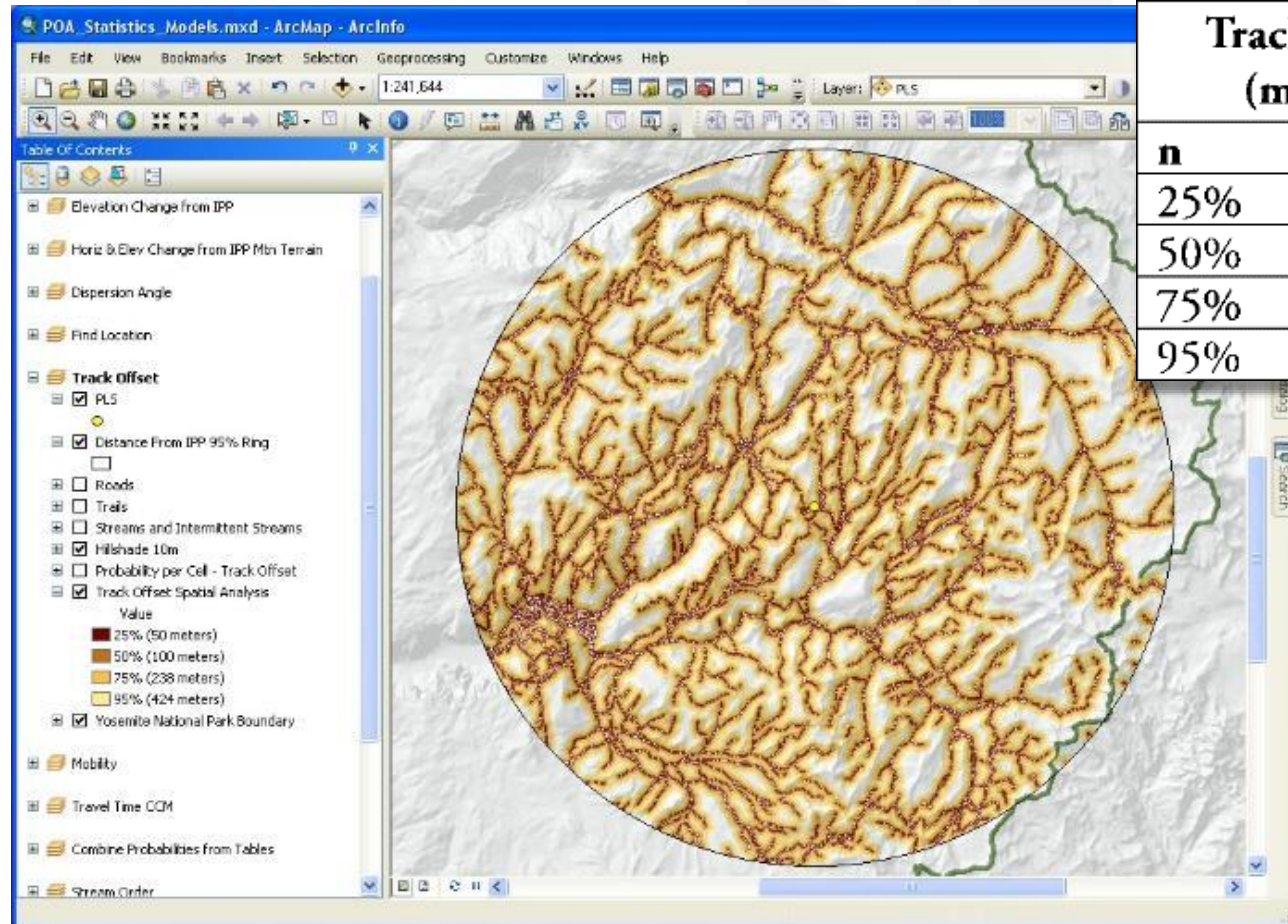


# Find Location by Type



Find Location (%)			
	Temp	Dry	Urban
<b>n</b>	<b>312</b>	<b>196</b>	<b>17</b>
Structure	13%	10%	24%
Road	13%	17%	35%
Linear	25%	31%	18%
Drainage	12%	18%	6%
Water	8%	9%	12%
Brush	2%	2%	
Scrub	3%	3%	
Woods	7%	6%	
Field	14%	1%	6%
Rock	4%	2%	

# Track Offset - Percentages

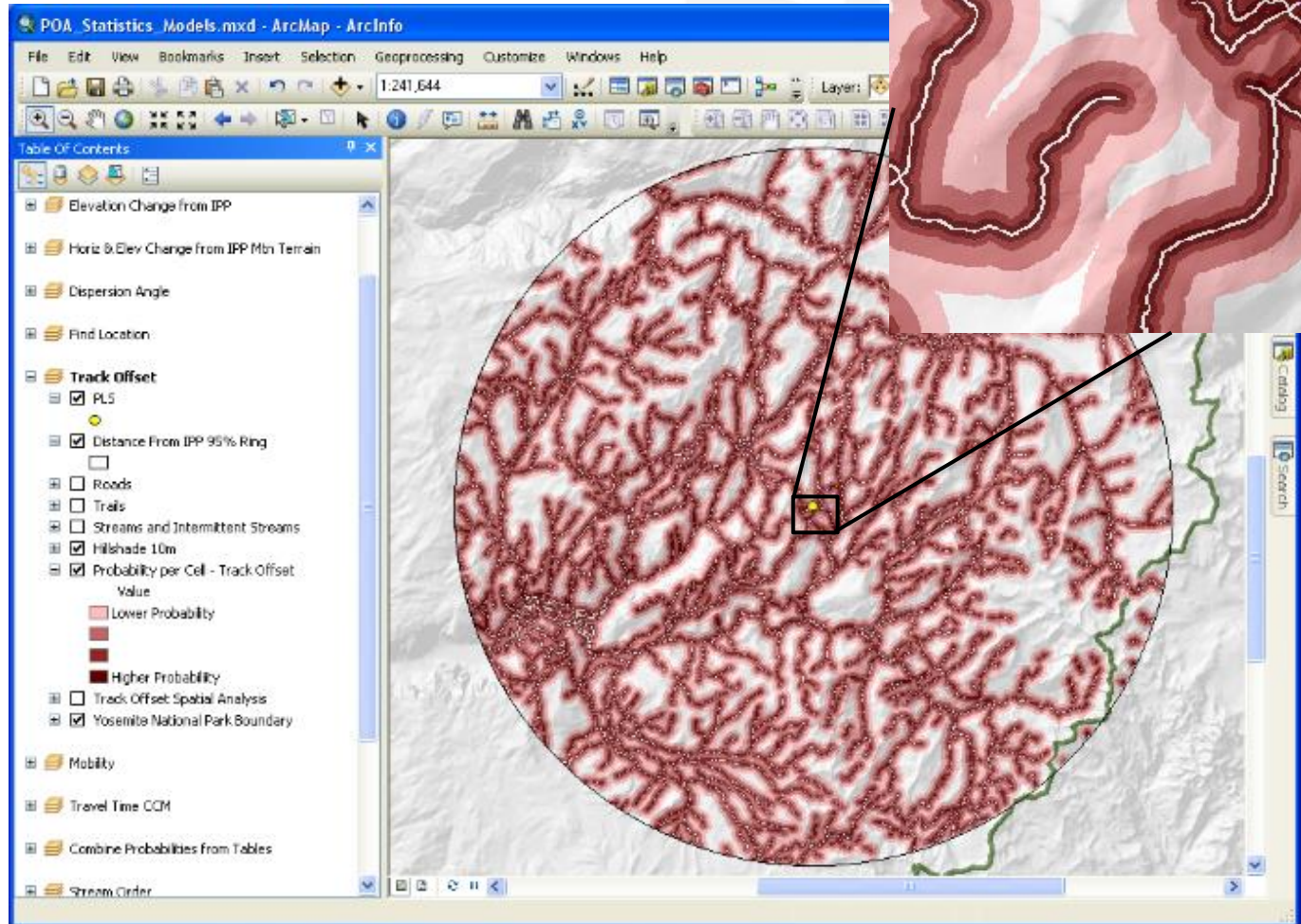


Track Offset (meters)	
n	40
25%	50
50%	100
75%	238
95%	424

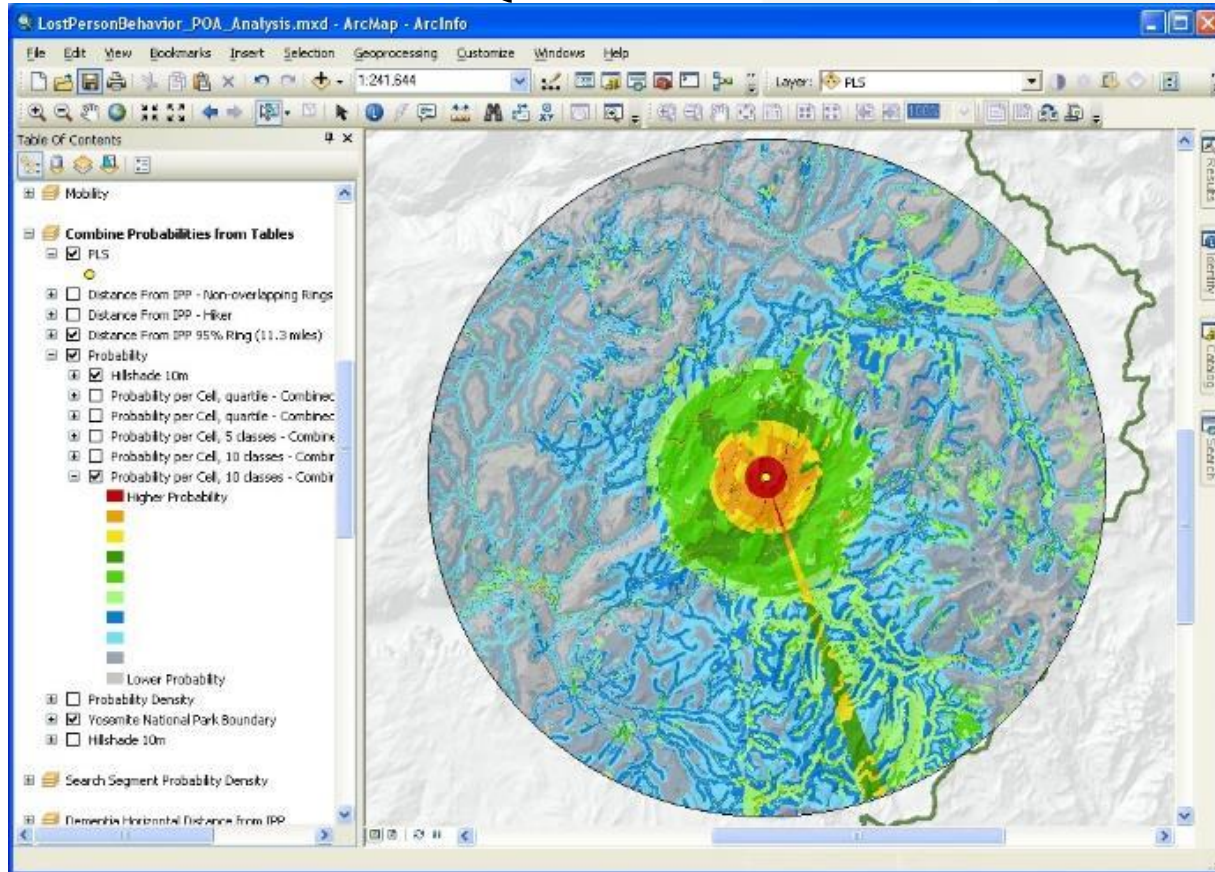




# Track Offset Range



# Combined Probabilities: Probability - 10 classes (different colours)





## Response to a SAR Mission

- You need to determine:
  - How many and what kind of resources will you need to resolve the incident
  - How long it will take to resolve it
  - How much bigger or more complex will it get before you control it



MOUNTAIN  
**RESCUE**  
ASSOCIATION



You fight like you train.

— *George S. Patton* —

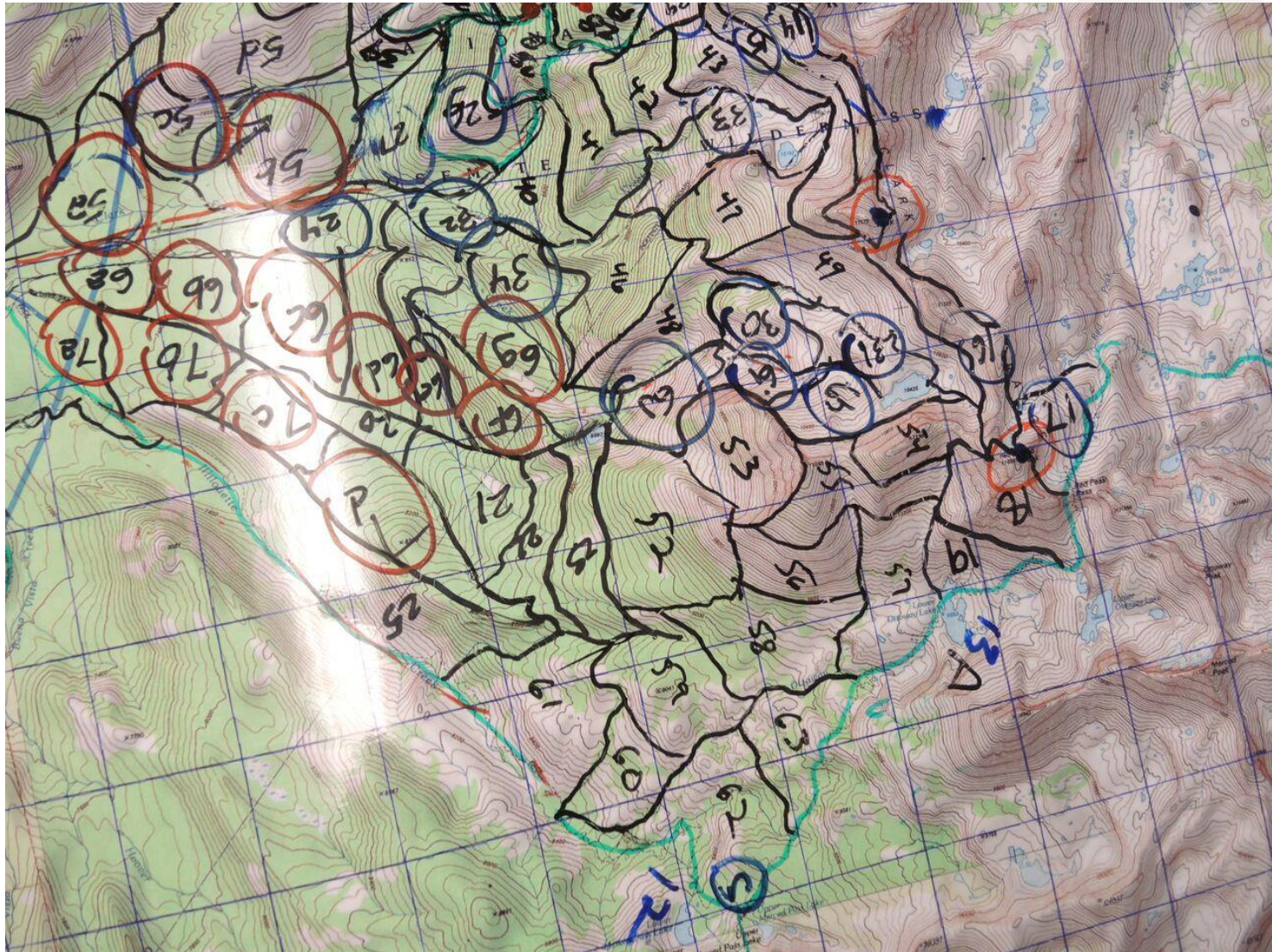
AZ QUOTES

This is ABSOLUTELY CRITICAL

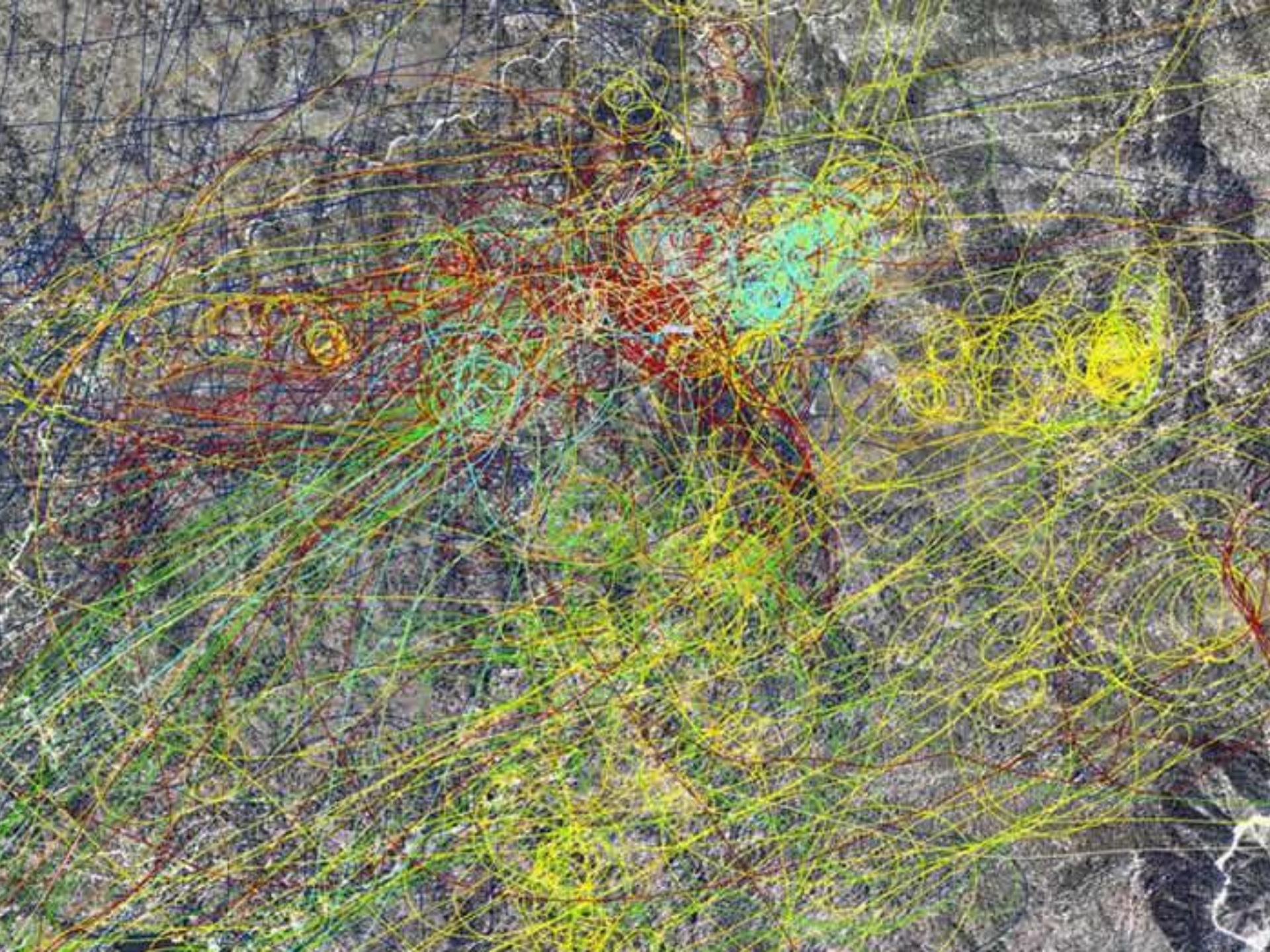




MOUNTAIN  
**RESCUE**  
ASSOCIATION











[Logout](#)
[Leave Mission](#)
 User: bryan.enberg@gmail.com
 [Support Community](#)
[v16.8 Copyright 2010 - 2017 Mission Manager Inc.](#)  
[Change Password](#)
[Terms of Service](#)
 TEAM Account: NJSAR Mission: General Drill - MRC Mock Search - Ramapo Reservation - 10/08/17
 [Share](#)
[Windows](#)
[Help](#)







MOUNTAIN  
**RESCUE**  
ASSOCIATION



**esri**








MOUNTAIN  
**RESCUE**  
ASSOCIATION

# MRA Team Locator

Maps - Mission Manager x All MRA Teams | Mounta x

mra.org/all-teams/

Apps ★ Bookmarks Gmail SARACADEMY Mission Manager myNewJersey NASAR Email SARTopo E Teams NJSP Guest NASAR - Dropbox Other bookmarks



**MOUNTAIN RESCUE ASSOCIATION**  
Courage. Commitment. Compassion.

Home About MRA Donate **Teams** Sponsors Training & Education Member Service Links

## All MRA Teams

Zoom in and click on any dot for information on that MRA team  
Zoom In will display team names

About

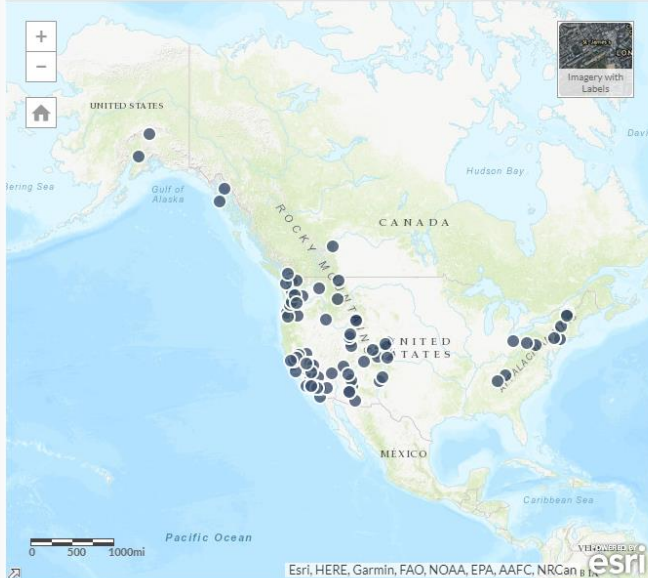
+


-

Home

Find address or place

Imagery with Labels






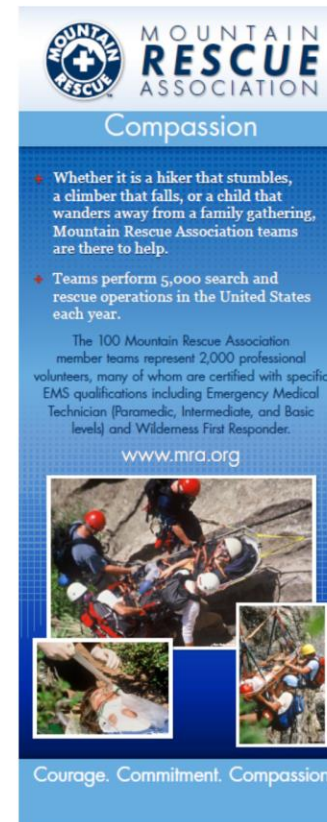
**MOUNTAIN RESCUE ASSOCIATION**  
Courage

- ★ Saving lives through rescue and mountain safety education
- ★ 100 rescue teams, 2,000 professional volunteer mountain rescuers.
- ★ Accrediting rescue teams in specific mountain rescue disciplines.
- ★ Professional volunteers respond 24/7/365 to turn a potential tragedy into a successful rescue.

Member teams do not charge for their services.  
[www.mra.org](http://www.mra.org)



Courage. Commitment. Compassion.



# MRA Mission Reporting

A simple system to  
answer a complicated  
question





MOUNTAIN  
**RESCUE**  
ASSOCIATION

# MRA Mission Reporting





MOUNTAIN  
**RESCUE**  
ASSOCIATION

# Hold on, we are going live!!

- [MRA.ORG](http://MRA.ORG)