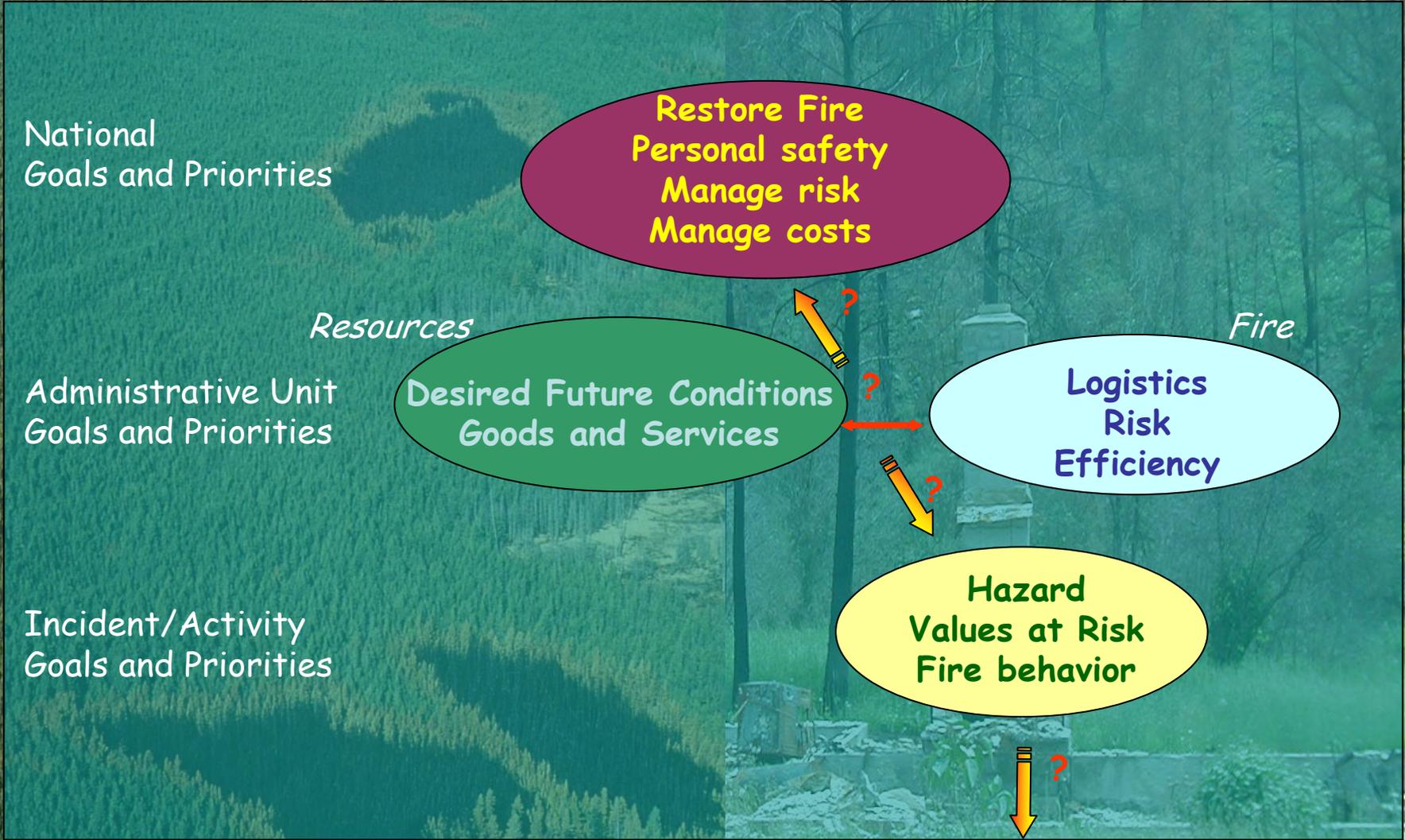


# Fire Effects Planning Framework: mapping benefits and risks of fire to support wildland management

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*Sub-District Ranger*  
Yellowstone National Park





# National Policy

Restore Fire  
Public safety  
Manage risk  
Manage costs

## Land Management

## Fire Management

DFC's -  
Habitats  
Fuels  
Risk

Public safety - logistics  
Habitats  
Fuels  
Risk

OPPORTUNITIES  
Risk

## Incident/Activity

Hazard  
OPPORTUNITIES  
Risk  
Fire Fighter Safety  
Logistics

**FEPF:**  
Provide  
means to identify  
benefits and risks

- Best available science

- Existing data, and tools

- At scale

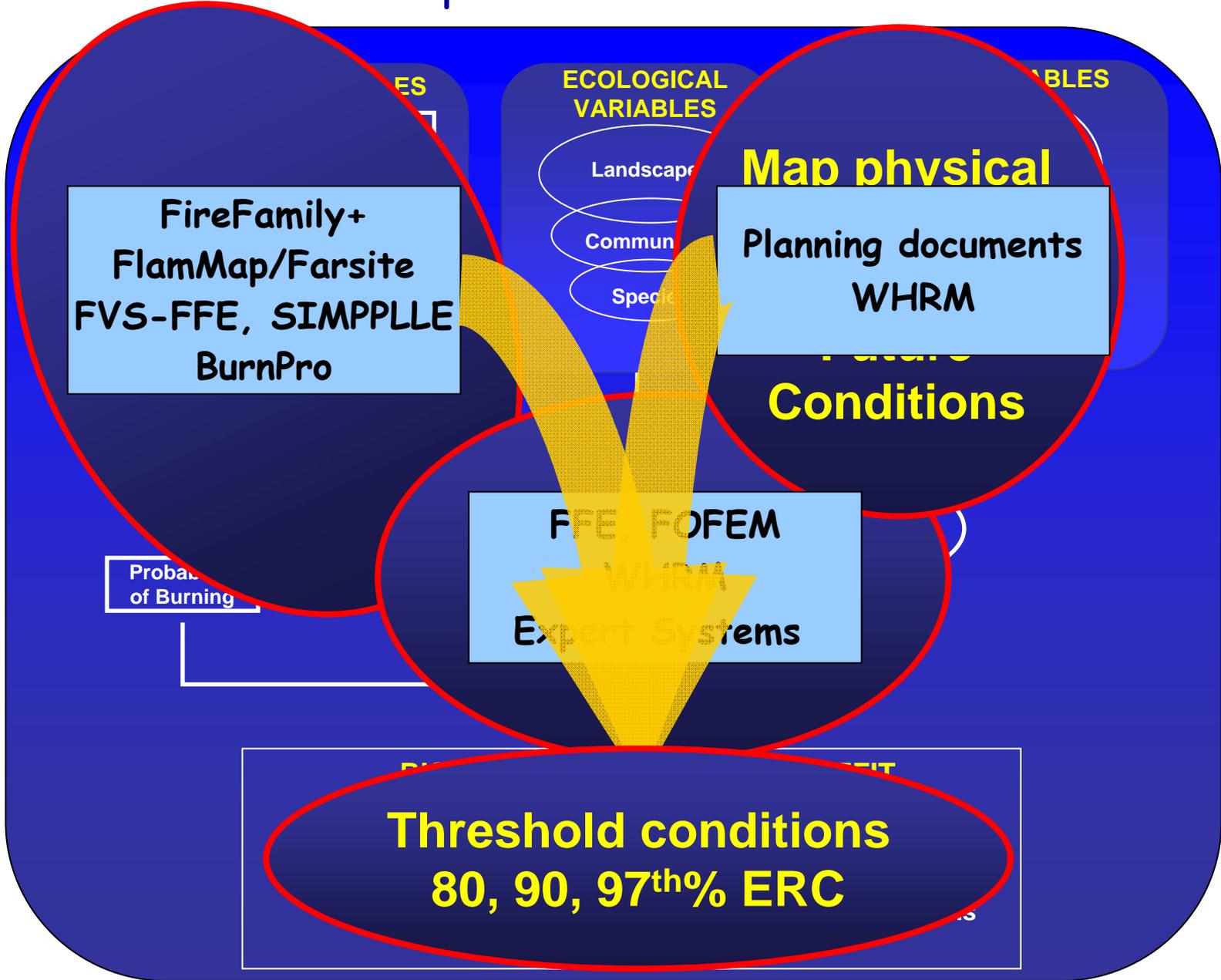
- Within and between work units

- Common units

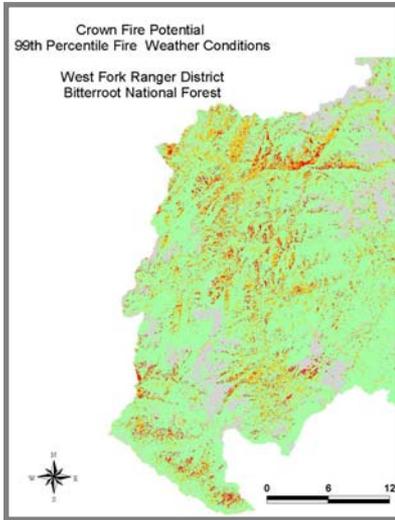
- Insert into planning



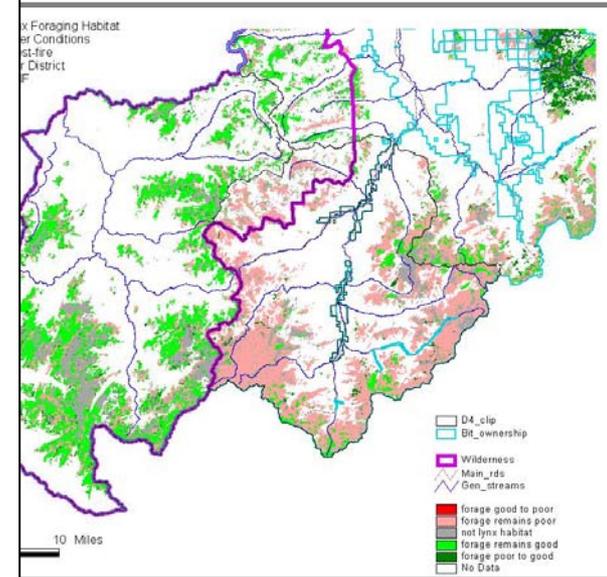
# Conceptual Model and Tools



# Map Library for Fire Planning

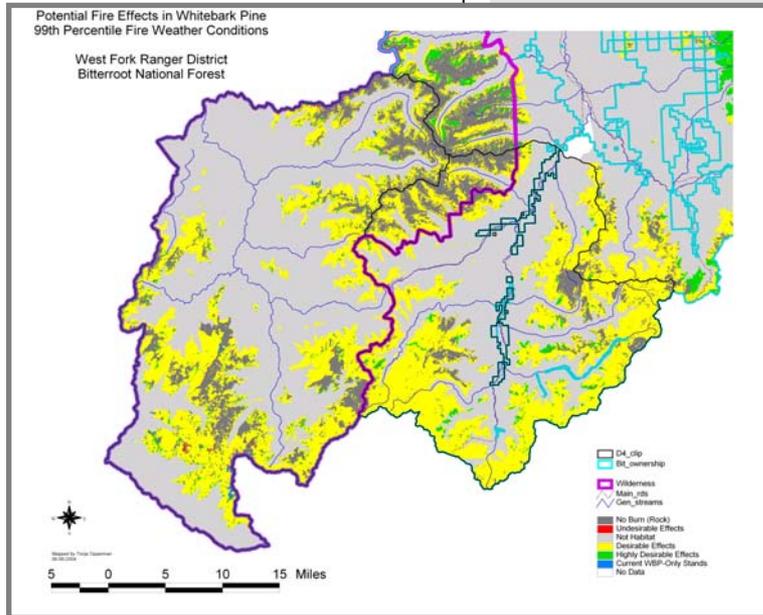


BITTERROOT NATIONAL FOREST



## 2004 Fire Effects Map Library

- Fire Behavior
- Fire Effects



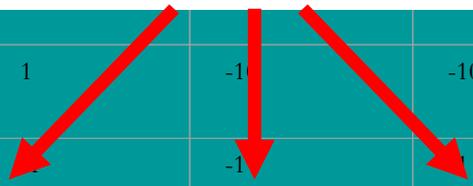
# The Guts of FEPF: Crosswalks

Species/ Species Mix	Size/ Structure	Fire Severity	0-14 years post-fire	15-39years post-fire	40+years post-fire
WB, DF, L, PP,	Single story	Low	-1	-1	-1
<b>Physical habitat characteristics</b>			1	1	-10
Mixes, FF-mixes	Single or multi-story	High	-1	10	10
Mixtures of DF, ES,AF, WB, LP, AL, L, GF	Single story	Low	-1	-1	-1
	Single story	Mixed	1	1	-10
	Single or multi-story	High	-1	10	10
ES, GF,AL, C, QA, WH, MH, AF, CW	Single story	Mixed	1	1	-10
	Single or multi-story	High	-1	10	10
All forested	Seed/sap	High			
Shrubs	All	Mixed or High			
		No Burn	1	-10	-10
Non-stocked, non-forest, forbs, grasses	All	Low, Mixed, No Burn	-1	-1	
Unburnable, Agriculture, No Data	n/a	All	0	0	0

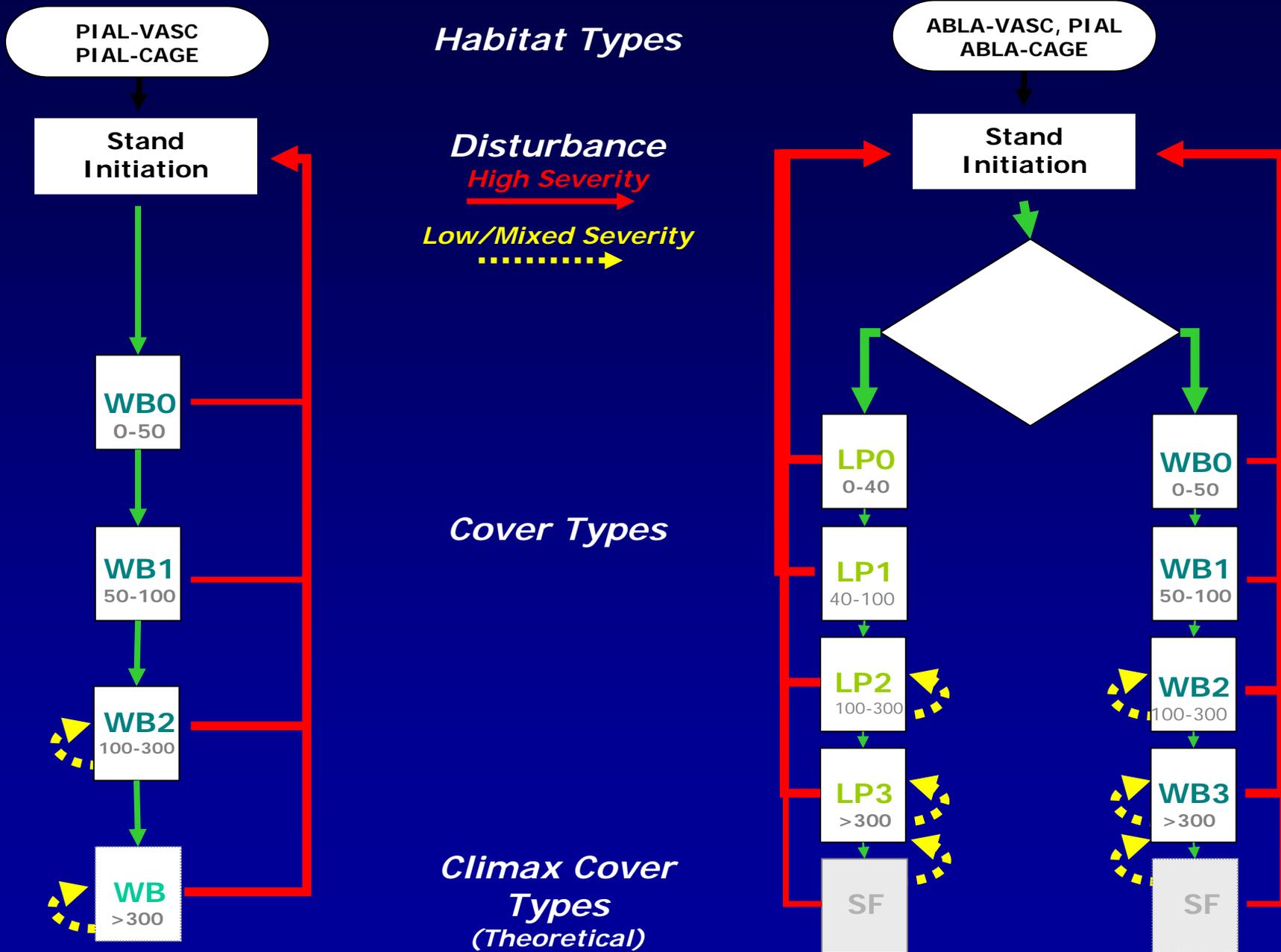
**Fire Intensity**

**Fire Severity**

**Fire effects on target over time**



# Successional Pathways for Whitebark Pine in YNP



# Table 1. Fire Effects Crosswalk for Whitebark Pine Cover Types in YNP

Cover Types <sup>x</sup>	Severity	Benefits/Risks
<p><b>WB0:</b> Newly disturbed sites to ~50 years of age. Seedlings and saplings.</p> <p><b>WB1:</b> Stands ~50-100 years old. Young trees entering cone-producing years.</p>	All fires	<p><b>Unfavorable</b>—whitebark pine has established, but trees may not have reached age of reproduction. Even low intensity fire likely to kill whitebark pine less than 80 years of age.</p>
<p><b>WB2:</b> Stands ~100-300 years of age in prime cone producing years. Understory may contain SF in SF habitat types; overstory may contain LP.</p>	High	<p><b>3% of Favorability determined at landscape scale;</b> stands burned per decade recommended. Minimum and maximum acreage burned may need to be established; extensive fires of 1988 may have already met minimum recommendation for foreseeable future.</p>
	Low/Mixed	<p><b>Highly favorable</b>— mature whitebark pine moderately fire-tolerant; competitors less fire-tolerant. May create caching sites.</p>
<p><b>WB3:</b> Stands older than ~300 years. Late seral whitebark pine with moderately dense SF clearly dominating the understory and co-dominating the overstory. Cone productivity declining.</p>	High	<p><b>Favorable</b>—stands are declining in cone productivity and subject to beetle attack. Some productivity may be lost in stands at the earlier end of this stage.</p>
	Low/Mixed	<p><b>Highly favorable</b> —co-dominant species are less fire-tolerant; will out-compete WB without fire. May create caching sites.</p>
<p><b>WB:</b> Climax whitebark pine forest; may have minor component of SF in understory.</p>	All fires	<p><b>Favorable</b>—stands are declining in productivity and subject to beetle attack, although some productivity may be lost in stands at the earlier end of this stage. WB may persist without periodic fire in this cover type, but recruitment of WB is low and may depend on disturbance.</p>

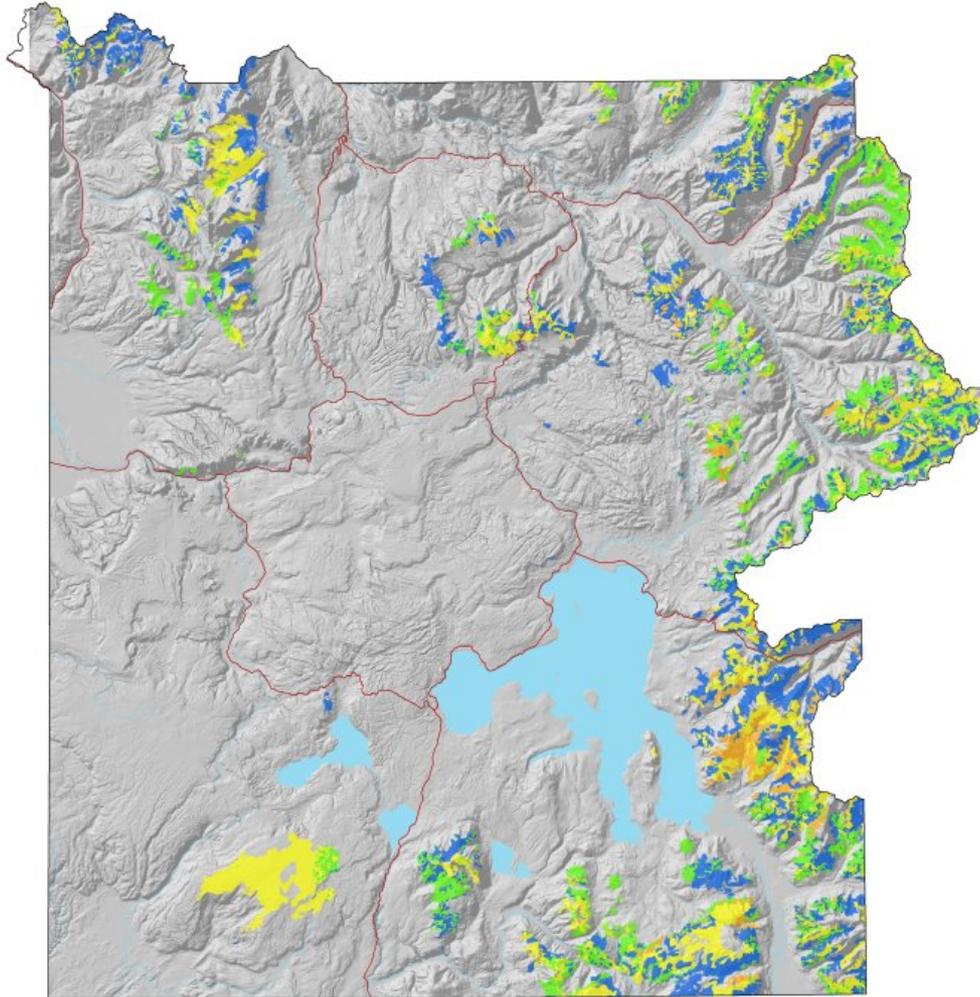
# Table 2. Fire Effects Crosswalk for Whitebark Pine Habitat in YNP

Habitat Types Containing WB Component		
Habitat Types <sup>x</sup>	Severity	Benefits/Risks
ABLA-VASC, PIAL and ABLA-CAGE habitat types with LP0 cover type within 5 miles (8 km) of reproducing WB cover type	All fires	<b>Favorable</b> —creation of seed bed without on-site LP seed source; whitebark may be able to re-establish first if lodgepole has not yet produced serotinous cones. Favorability increases with elevation.
ABLA-VASC, PIAL and ABLA-CAGE habitat types with LP1-LP3 or LP cover types within 5 miles (8 km) of reproducing WB cover type	High	<b>Favorable</b> —large patch sizes may favor establishment of whitebark pine; creation of LP0 may favor whitebark if re-burned. Favorability increases with elevation.
	Low/Mixed	<b>No effect</b> —lodgepole will re-establish in burned areas from serotinous cones
Subalpine fir habitat type with SF cover type	High	<b>Highly favorable</b> —creates large patch sizes and extensive caching sites with minimal availability of lodgepole seed.
	Low/Mixed	<b>Highly favorable</b> to minor whitebark pine component.
WB/NF: Open, scattered copses of whitebark pine in non-forest cover type.	High	<b>Favorable</b> —rare, but provides regeneration opportunities.
	Low/Mixed	<b>Highly favorable</b> —creates potential caching sites without removing existing whitebark pines.

(After Despain 1990)



# Whitebark Pine in Yellowstone National Park



Major Roads	WB0 cover types	WB3 cover types
Major Lakes	WB1 cover types	WB cover types
Major Rivers	WB2 cover types	WB/NF cover types
Park Boundary		

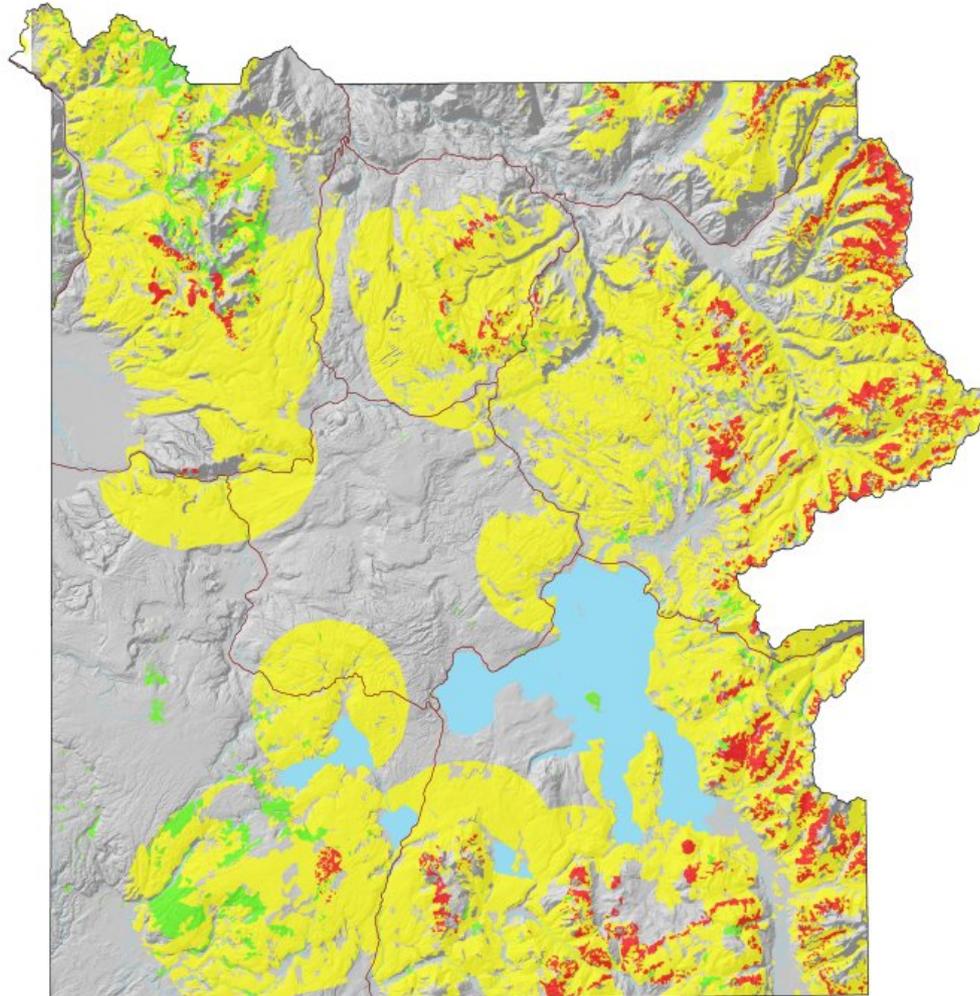
Acreage of Whitebark Pine by Category	
WB0 cover types	69,588.61
WB1 cover types	13,420.53
WB2 cover types	32.12
WB3 cover types	50.95
WB cover types	94,202.15
WB/NF cover types	88,899.88







## Favorability of High Severity Fire for Whitebark Pine

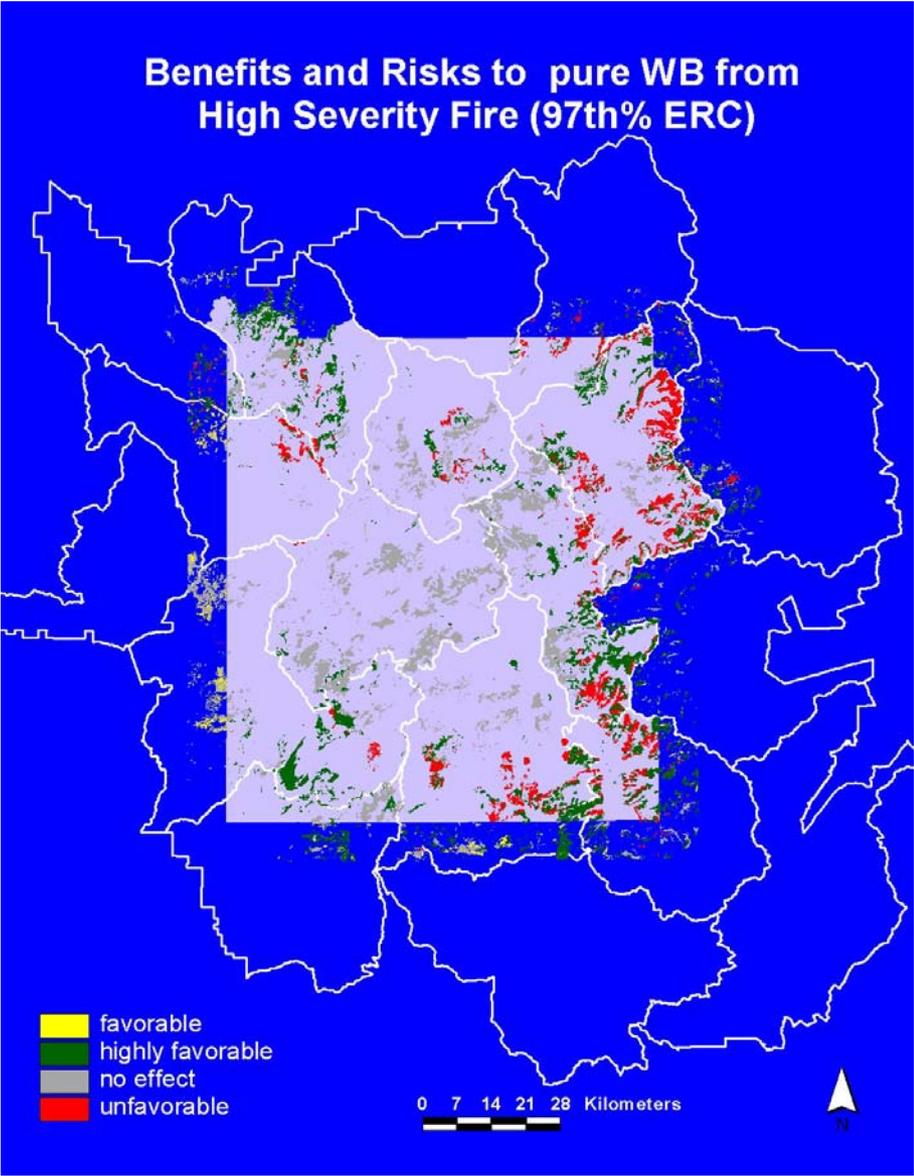
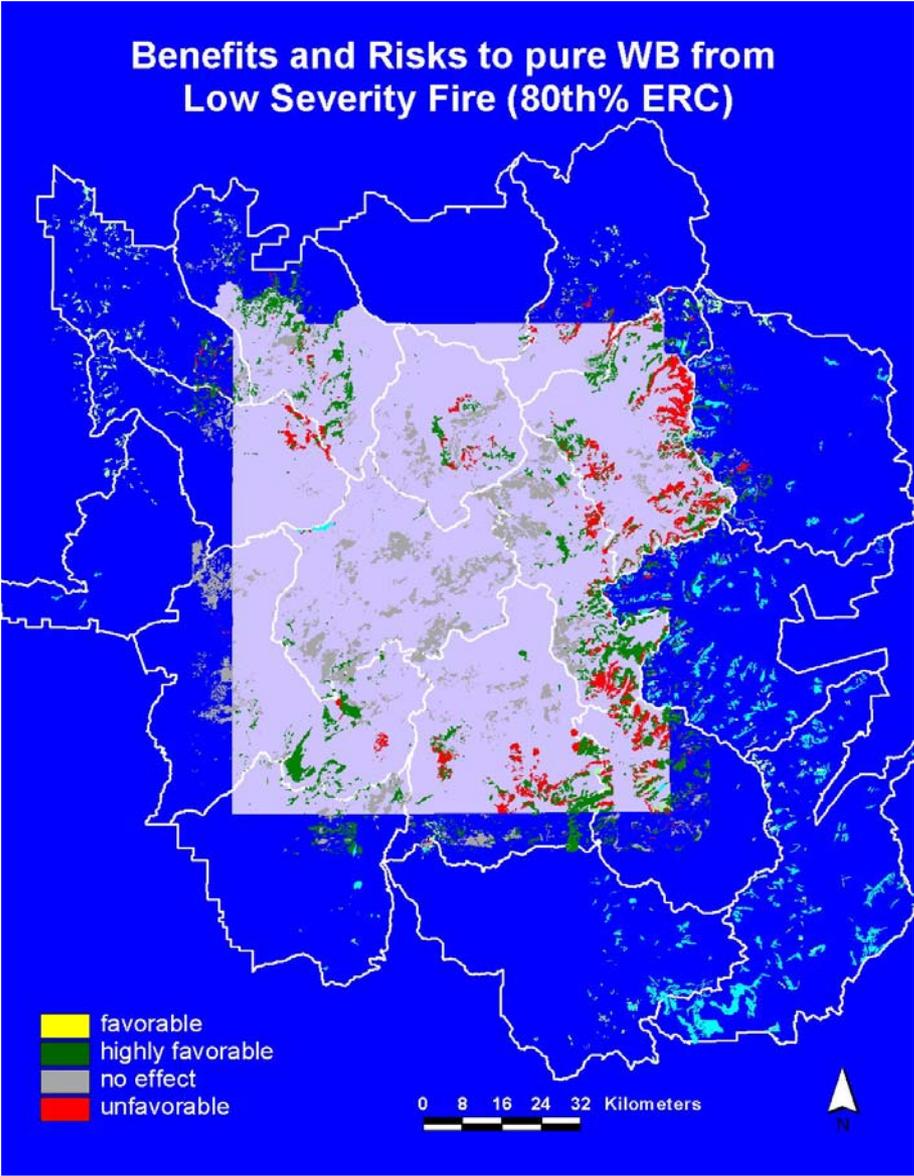


### Acreeage of Favorability by Category

Highly favorable	45,749.99
Favorable	863,302.59
Unfavorable	78,410.36
WB2 cover types	32.12

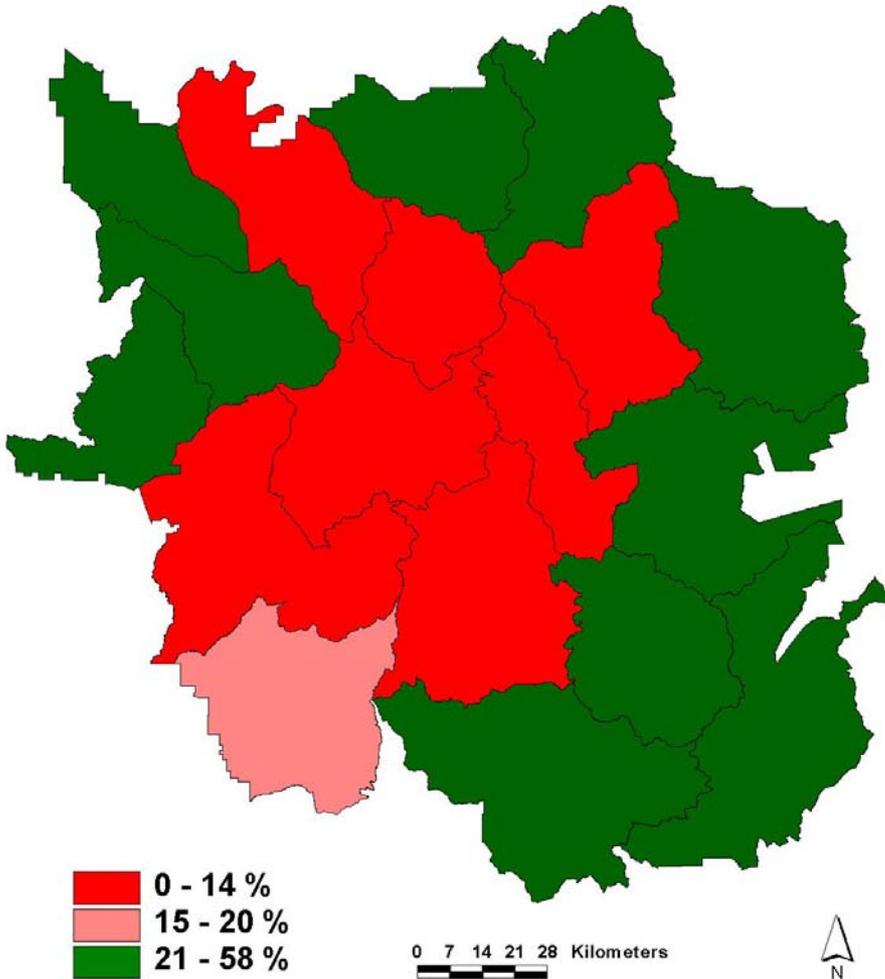


# Fire effects modeled using fire behavior parameters

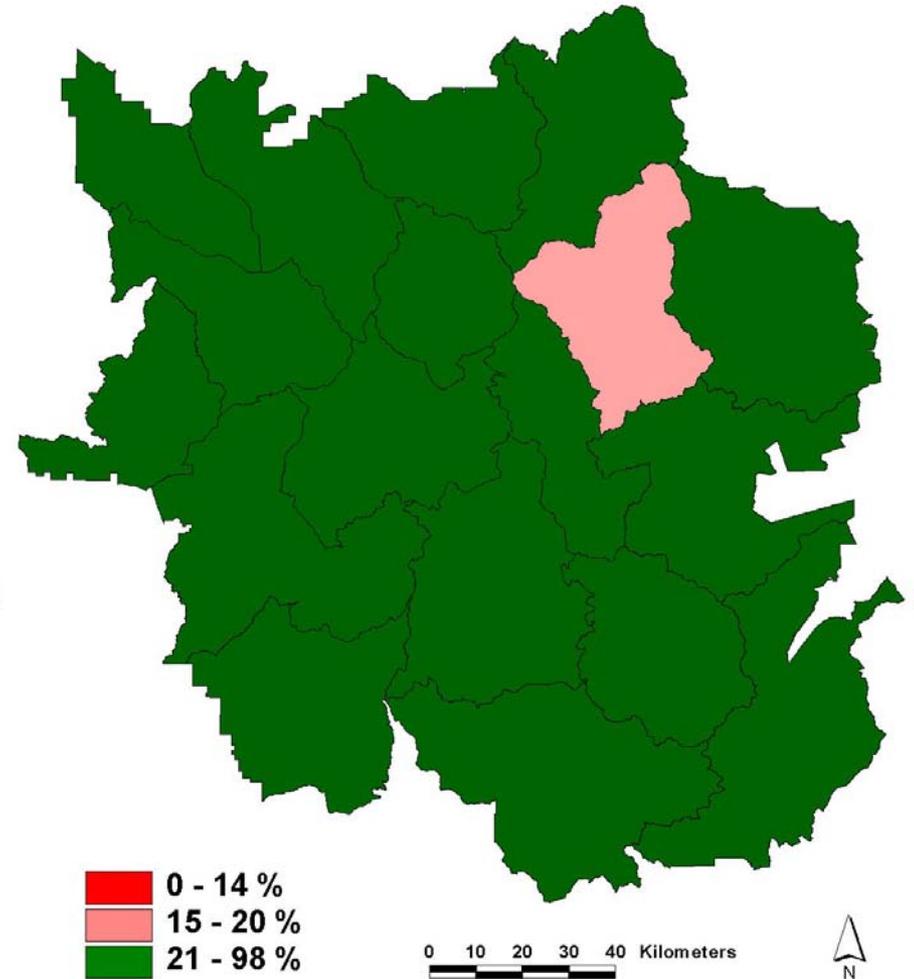


# Information on Basal Area of WB is essential for mapping impact of fire on Grizzly Bear habitat

Percent of WB2 and WB3 in both continuous and mosaic stands for each Bear Management Unit

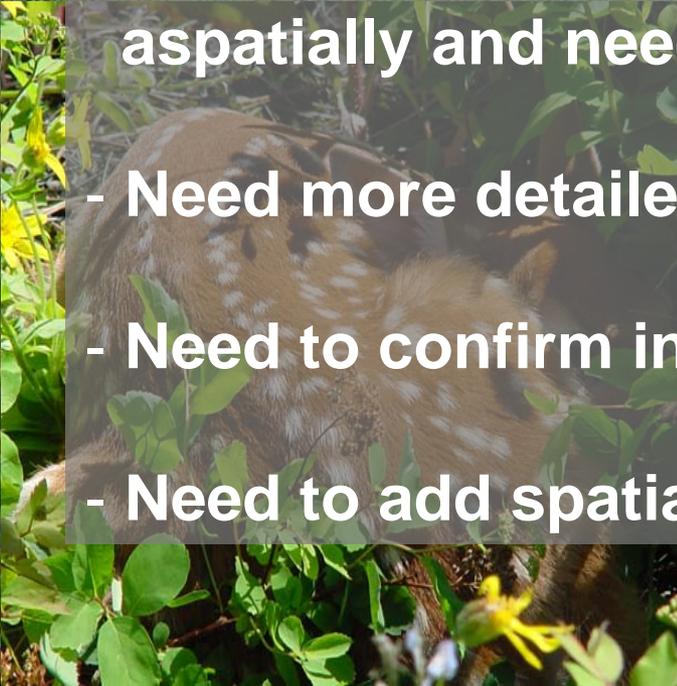
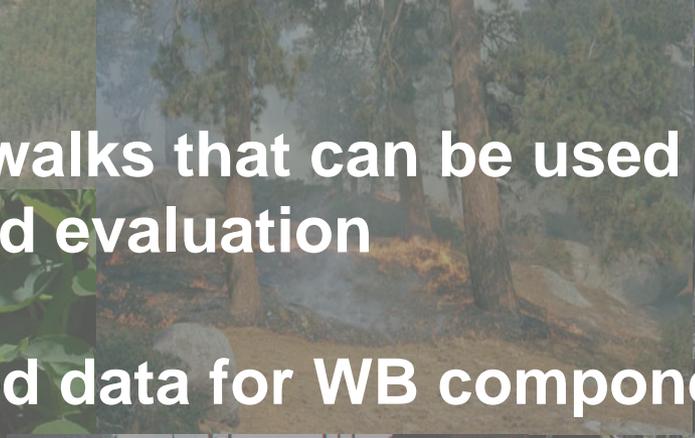


Percent of WB2 and WB3 as major and MINOR component of continuous and mosaic stands for each Bear Management Unit





Where are we and where do we go from here:

- Have the process scripted out and demonstrated
  - Have useful crosswalks that can be used aspatially and need evaluation
  - Need more detailed data for WB component
  - Need to confirm initial GB crosswalk
  - Need to add spatial component for CN
- 
- 
- 

Thank you!



Funding sources: National Fire Plan, Joint Fire Sciences Program

