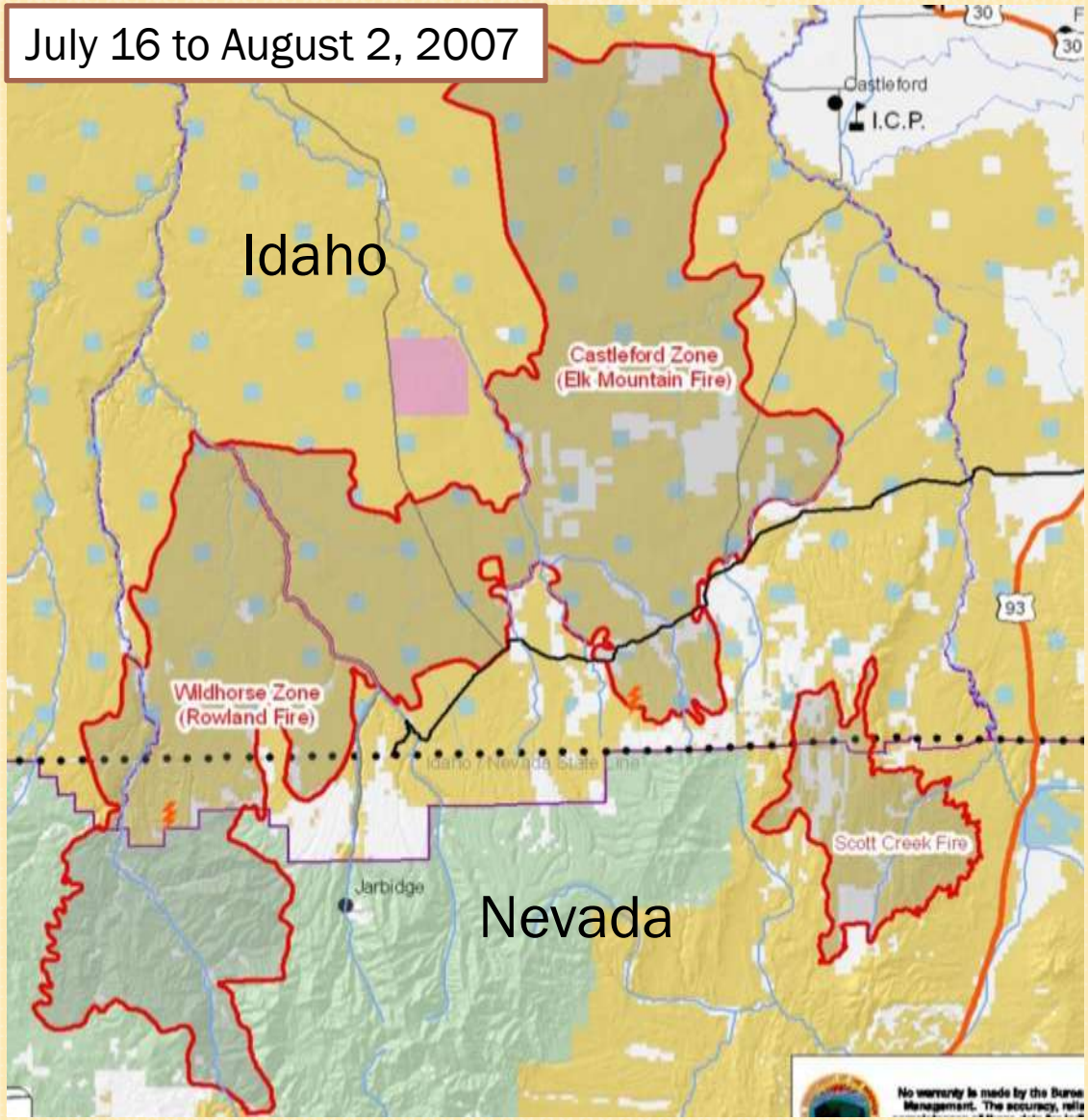
Murphy Complex Livestock-Fuels Team

Interactions Among Livestock Grazing, Vegetation Type, and Fire Behavior

August 2008

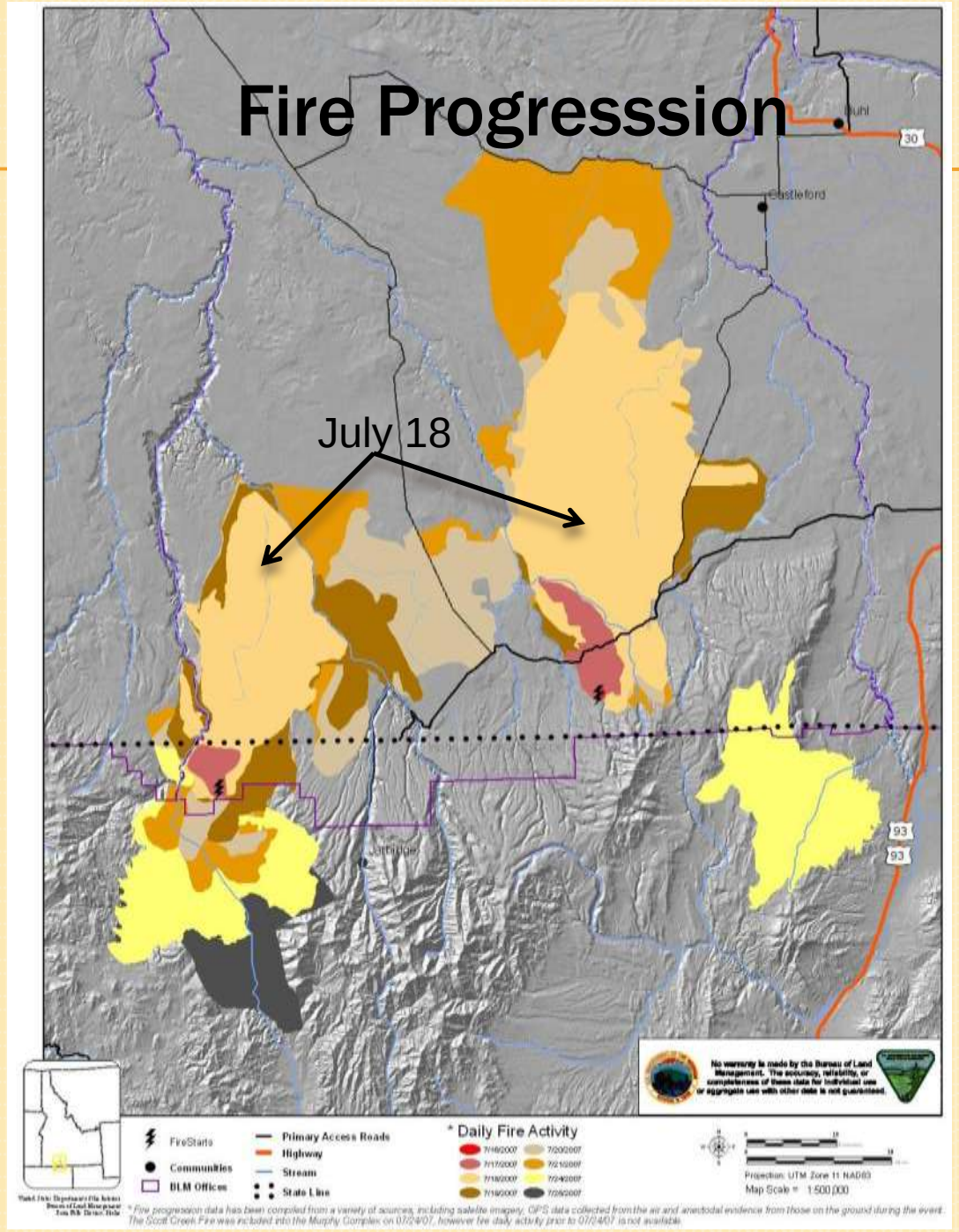
Murphy Complex Fire Background

- **Total acreage burned was 652,000 acres:**
  - **Idaho**: 482,000 (largest fire in ID history since 1910).
  - **Nevada**: 170,000 acres.



Fire Conditions

- Dry spring & hot summer with record low fuel moisture.
- July 18:
  - 95-100 degrees
  - RH under 10%
  - Winds to 34 mph



Task Group Assembled

Core Team Members

- Karen Launchbaugh Univ. of Idaho
- Bob Brammer Idaho Dept. of Lands
- Matt Brooks US Geological Survey
- Steve Bunting University of Idaho
- Pat Clark Agricultural Research Service
- Jay Davison University of Nevada
- Mark Fleming Idaho Fish and Game
- Ron Kay Idaho Department of Agriculture
- Mike Pellant Bureau of Land Mgmt
- Dave Pyke US Geological Survey

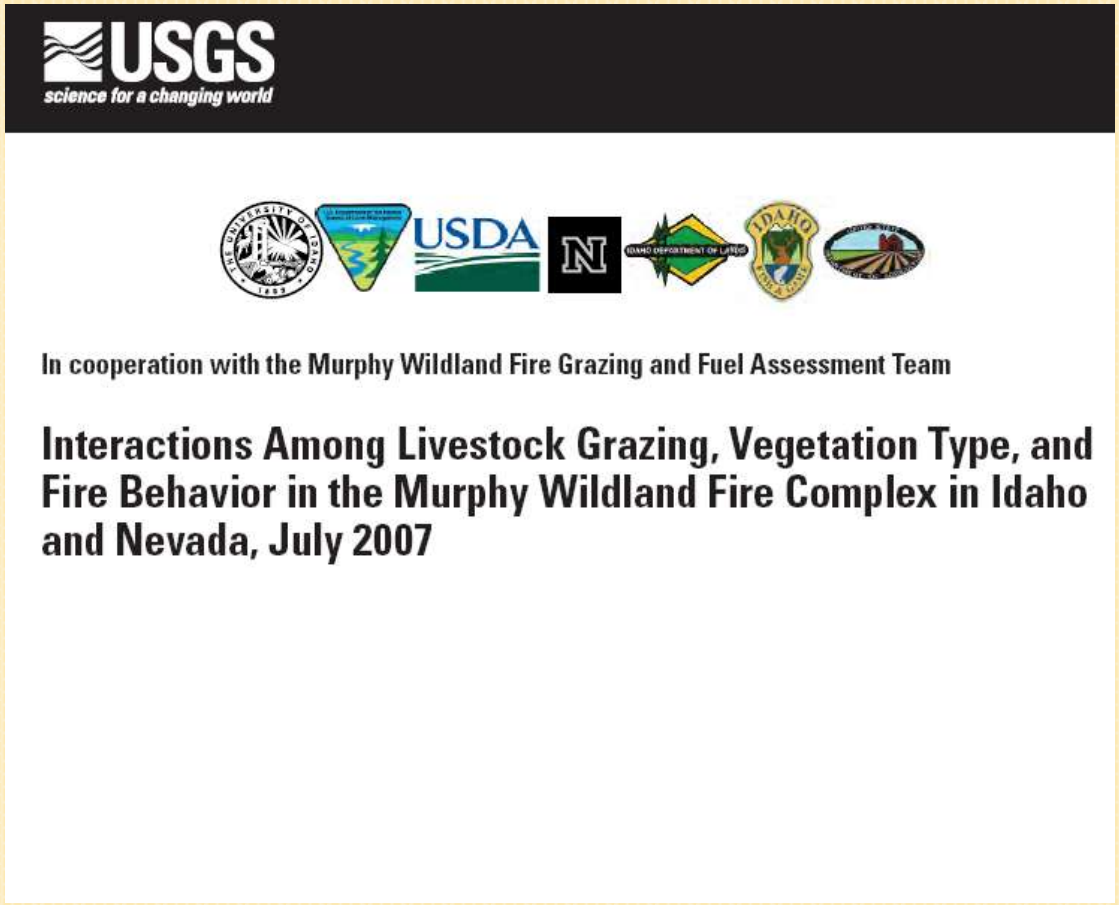
Technical Support Team

- Matt Bobo (BLM)
- Ken Crane (BLM)
- Jesse German (BLM)
- Don Major (BLM & The Nature Conservancy)
- Randy McKinley (ASRC Res. & Tech. Solutions)
- Danelle Nance (BLM)
- Arnie Pike (BLM)
- Bruce Wylie (ASRC Res. & Tech. Solutions)

Task Group Charge

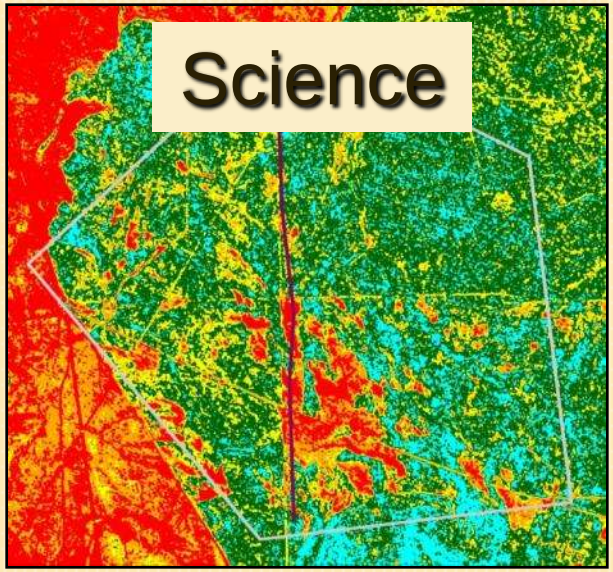
- Provide **preliminary observations and recommendations** on how plant communities and livestock grazing affected fire behavior.
- Provide recommendations for **long-term research/studies** needed to address issues regarding the use of livestock to reduce fuels while maintaining post-fire resource values.
- Discuss the **potential application of the findings** from the Murphy Complex wildfires to other areas.

Case Study Report

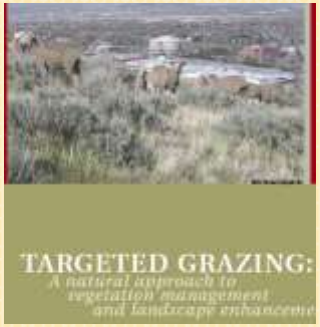


www.cnr.uidaho.edu/range/MurphyFireComplex

Murphy Complex Livestock-Fuels Report



Literature

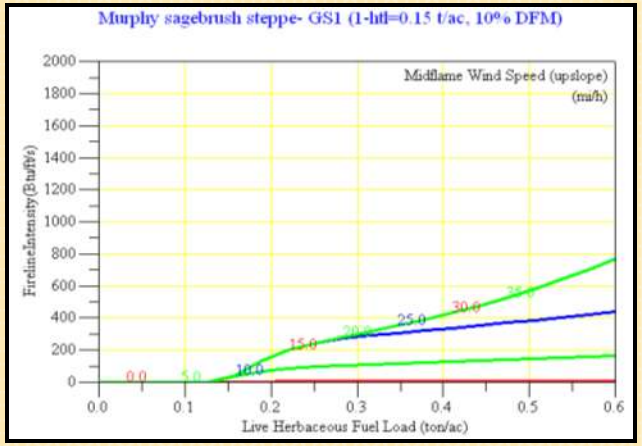


Targeted Grazing = *The application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals.*

Murphy Complex Livestock-Fuels Report

Study Approaches

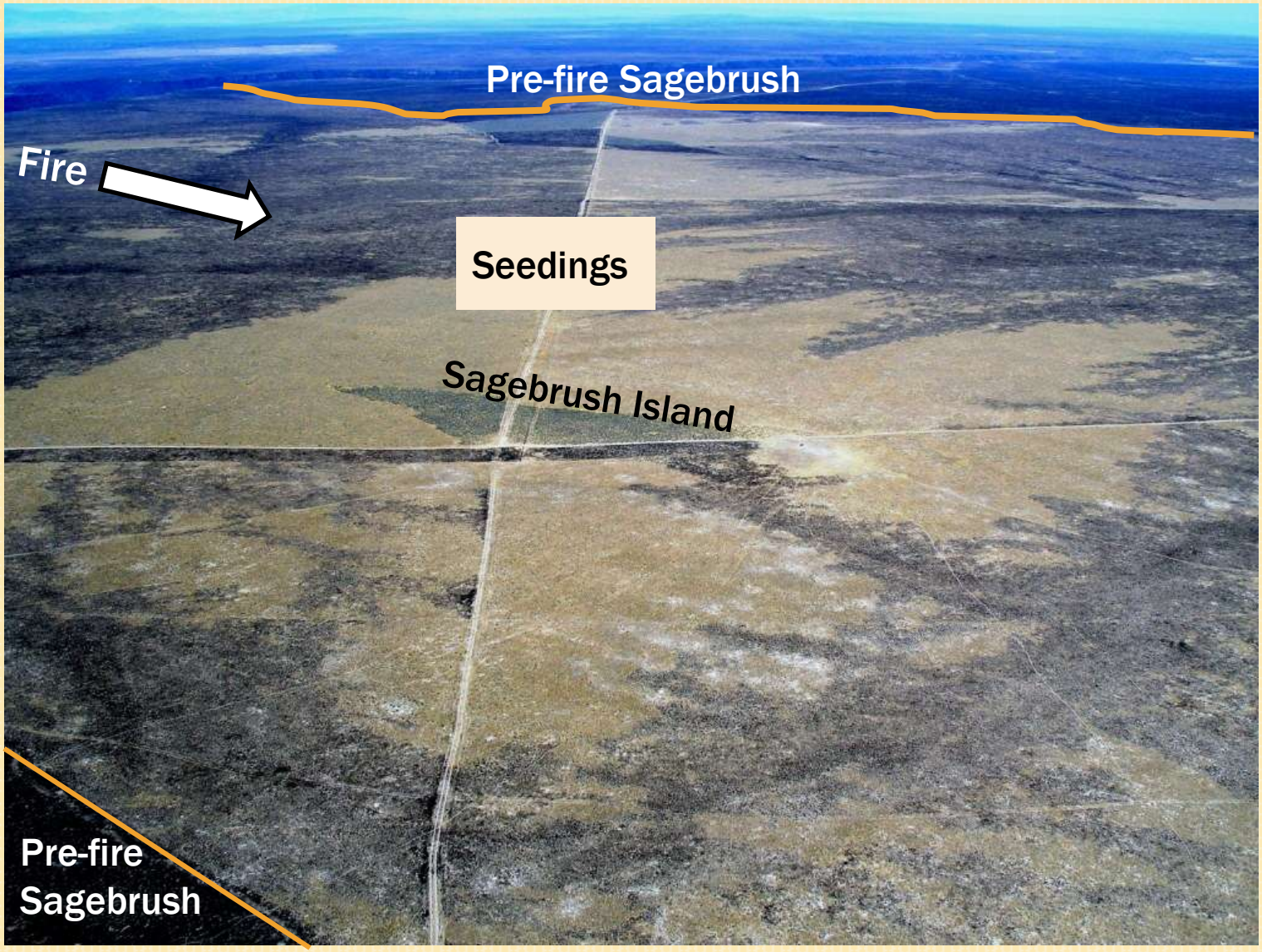
- Observed Effects - Mike Pellant
- Fire-Modeling Approach- Steve Bunting
- Vegetation Types and Fuel Consumption- Matt Brooks
- Discontinuity and Contrast Examination- Jay Davison



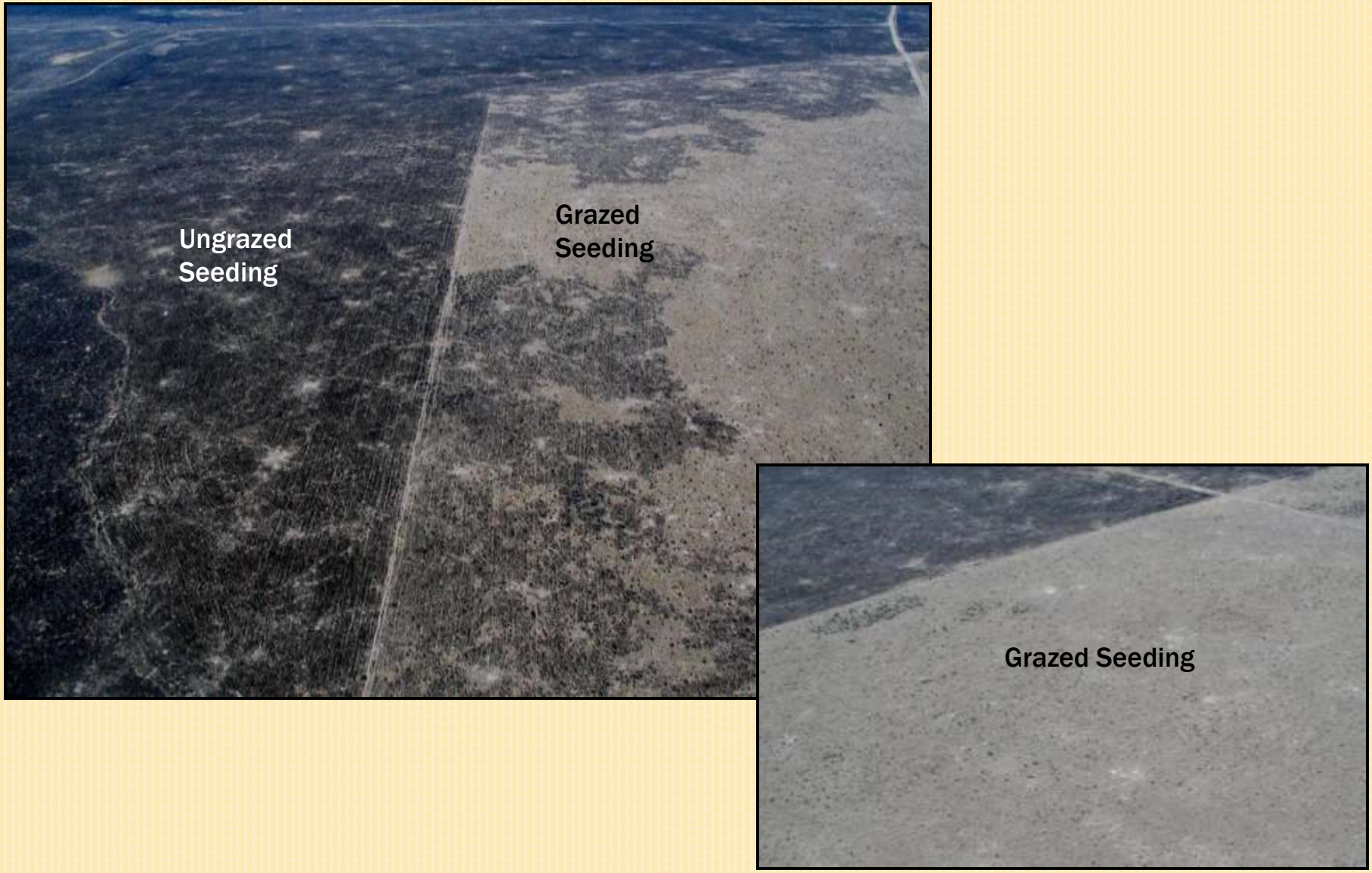
Observed Effects

Five Pastures: Pre-fire sagebrush dominated

Fire Effects in Seedings and Sagebrush



East Poison Butte Seeding: Fenceline Contrast



Fire Modeling

- What is the potential for livestock grazing in shrub steppe and grassland communities to reduce fire intensity and promote containment and control?

- Under the environmental conditions of the Murphy Complex Fires, would grazing have affected fire behavior?

Fire Modeling

USDA United States Department of Agriculture
Forest Service
Rocky Mountain Research Station

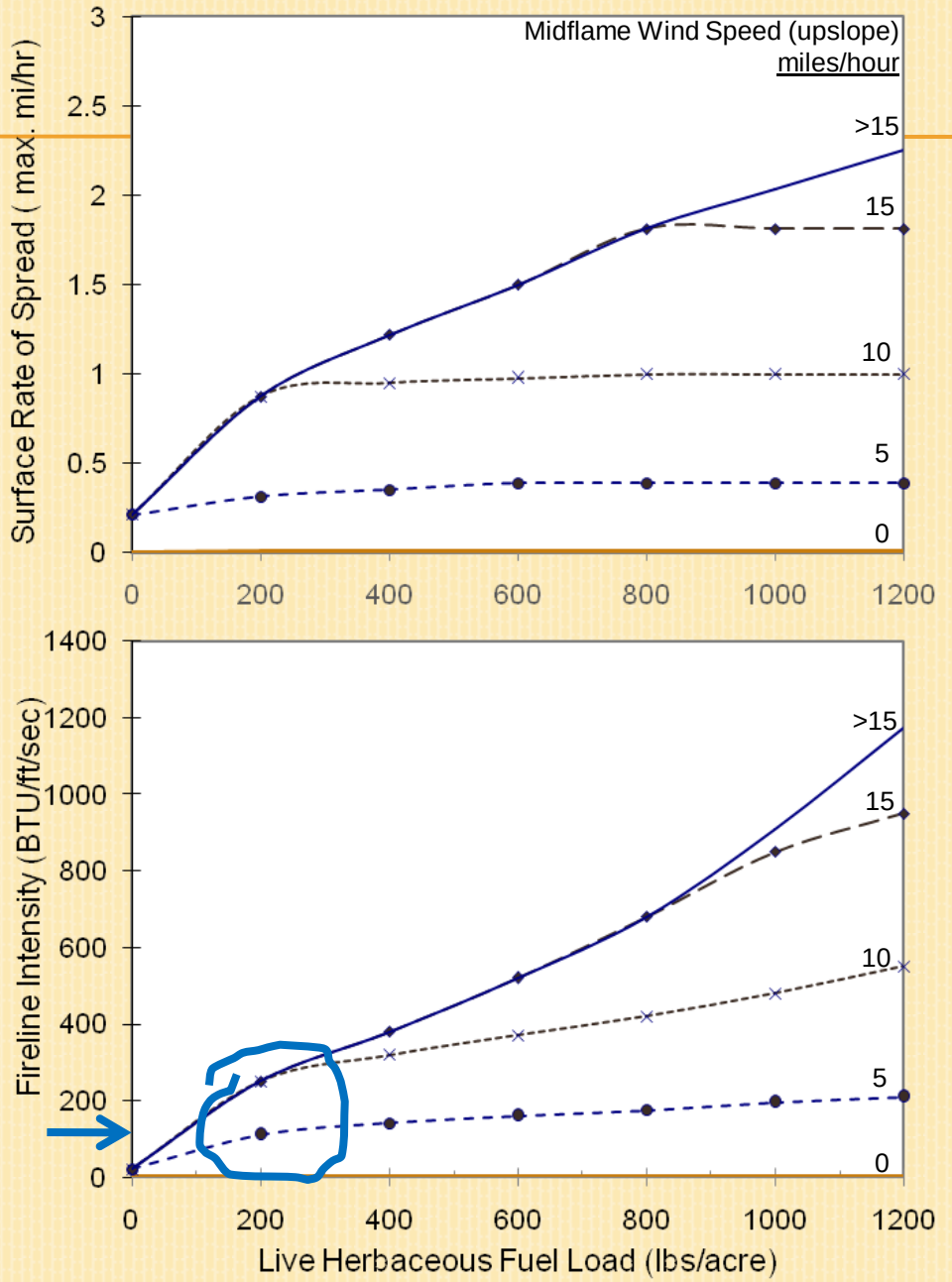
BehavePlus fire modeling system
Version 3.0

- Developed 4 fuel models
  (2 sagebrush steppe, cheatgrass and seeded grass)

- Simulated grazing effects on fire behavior while incrementally reducing herbaceous fuel loading and holding other factors constant.

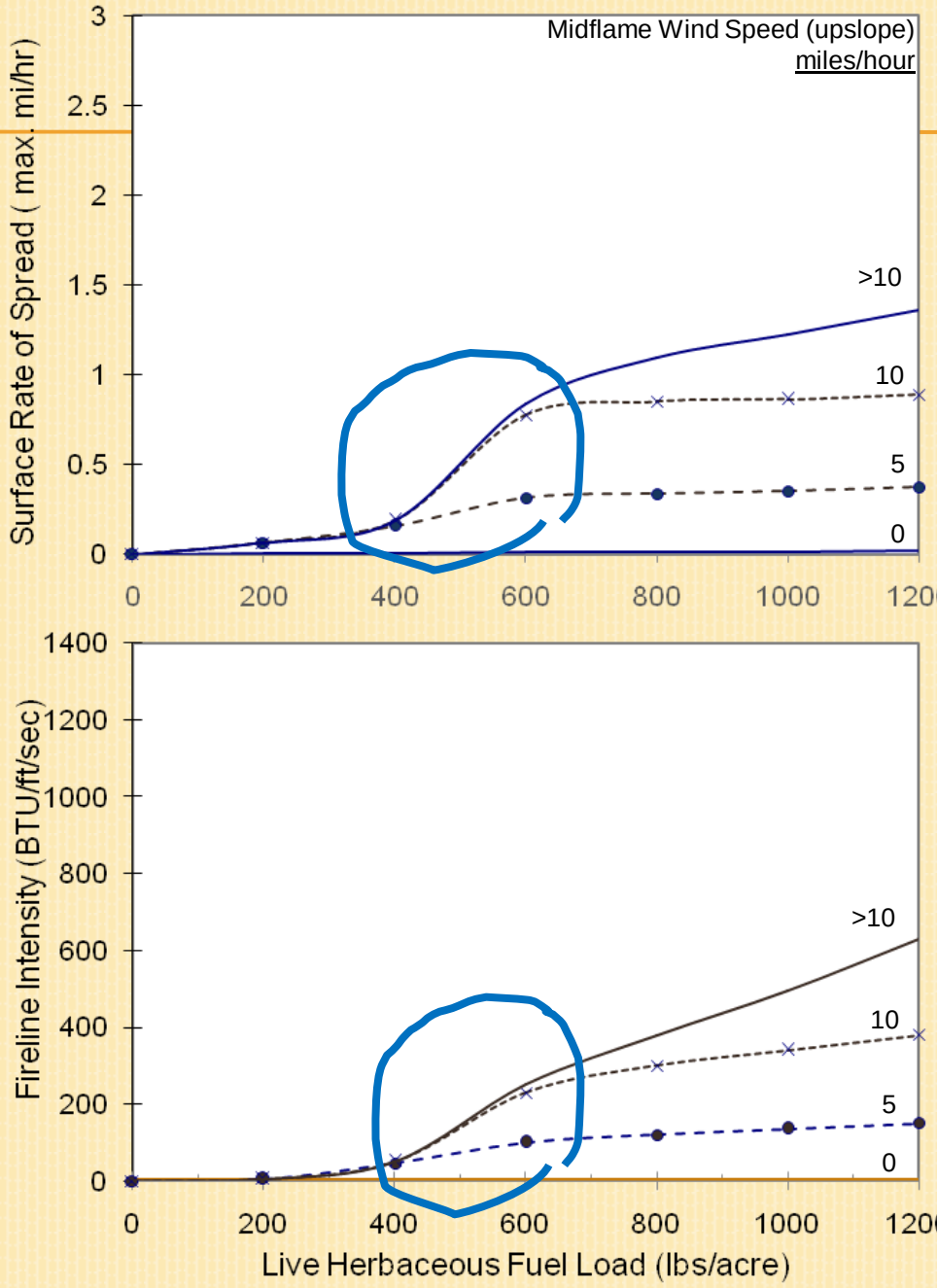
Sagebrush Steppe (GS1)

10% Dead Fuel Moisture



Sagebrush Steppe (GS1)

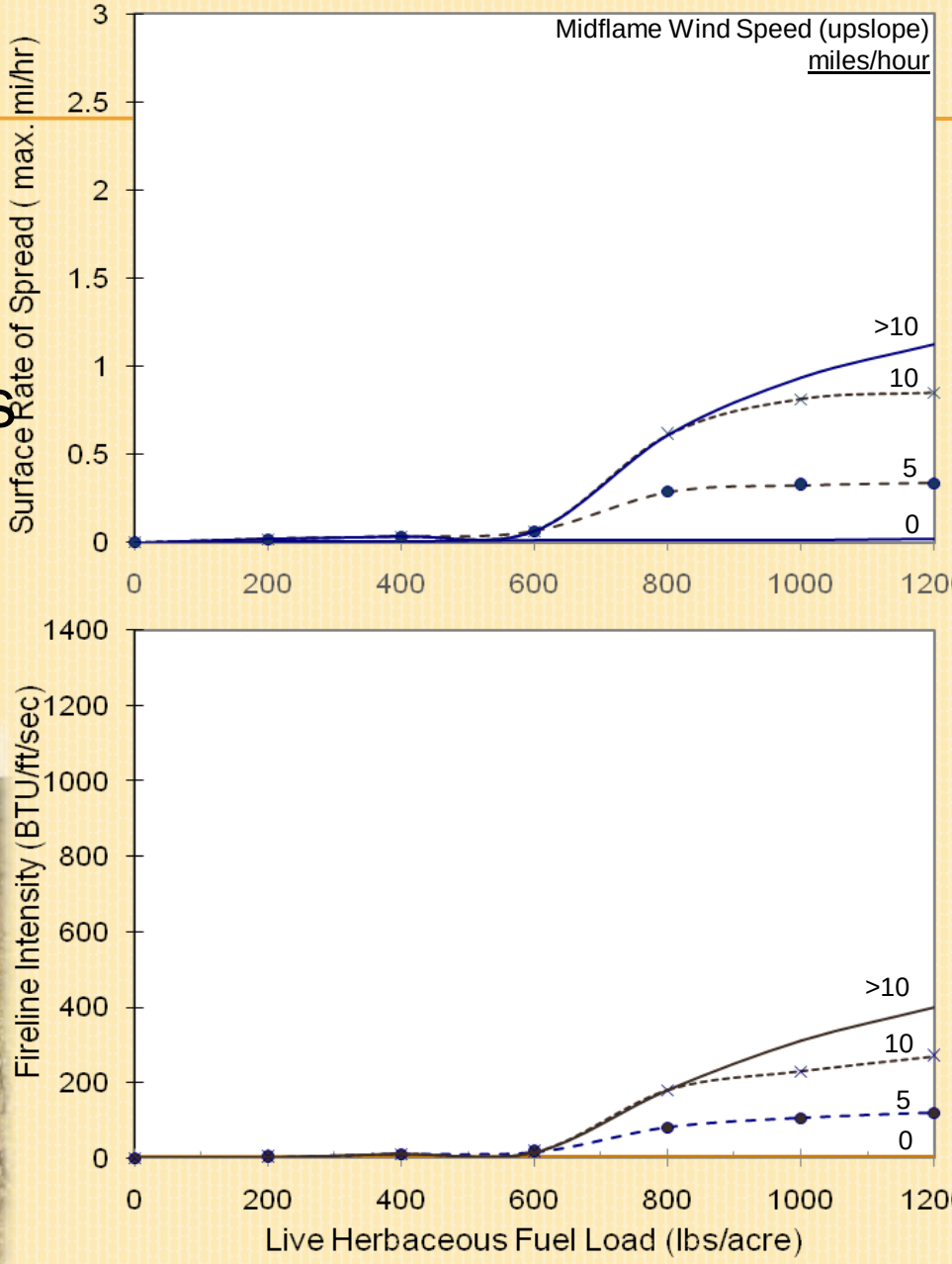
12% Dead Fuel Moisture



Sagebrush Steppe (GS1)

12% Dead Fuel Moisture

Carryover herbaceous fuels from previous years reduced by 50 percent (to 300 lb/acre)



Summary

- Reducing fine fuels reduced the modeled surface rate of spread, fireline intensity and other fire behavior characteristics.

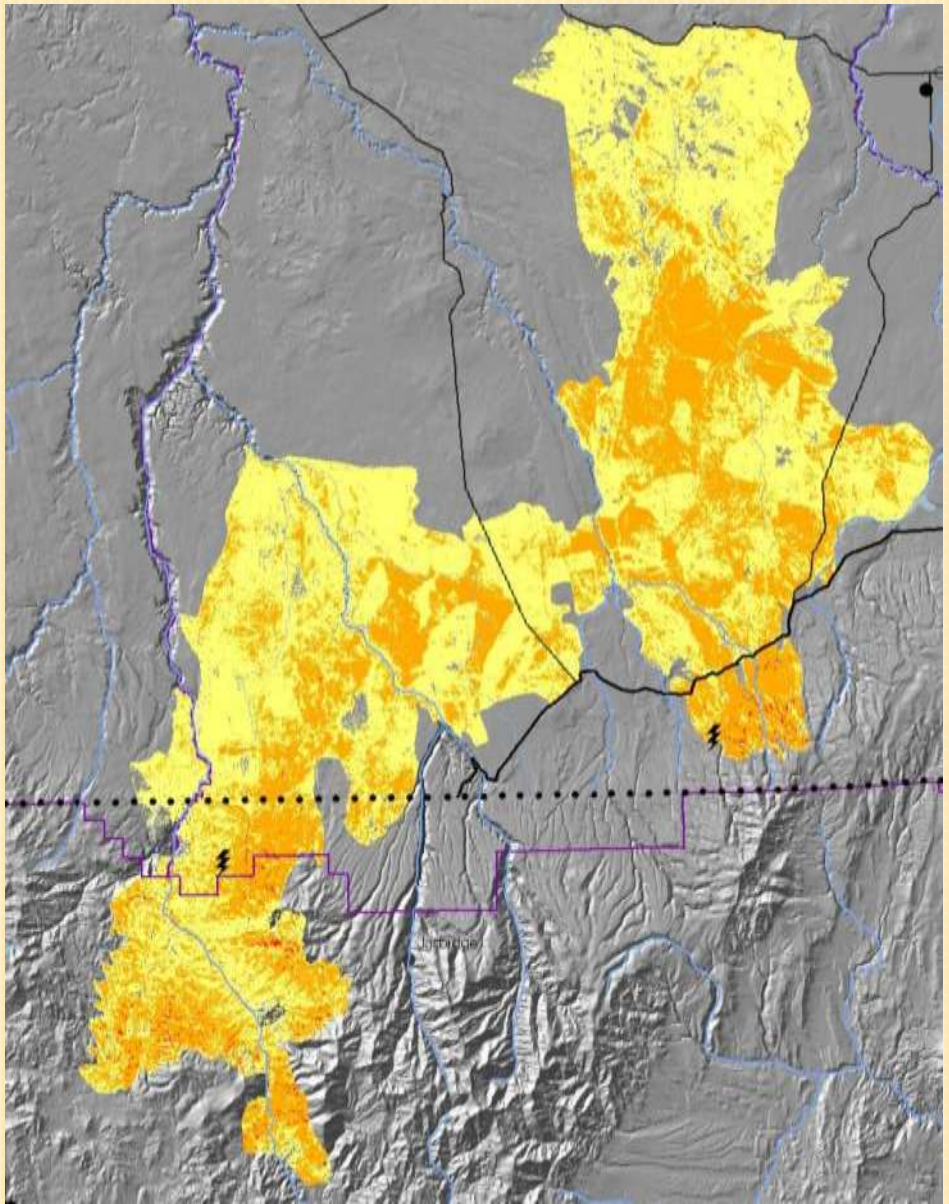
- The effects were more pronounced at lower wind speeds and higher fuel moisture levels.

- Changes in fine fuel loading had little effect on modeled fire behavior under extreme fire conditions.

Burn Severity (Fuel Consumption)

Fuel consumption can be measured over vast expanses using satellite imagery (Landsat) before and after fire.

We used a type of imagery analysis (dNBR) that estimated the amount of vegetation consumed and produced a soil burn severity classification.



Soil Burn Severity Classification

- Non Burn
- Low Severity
- Moderate Severity
- High Severity

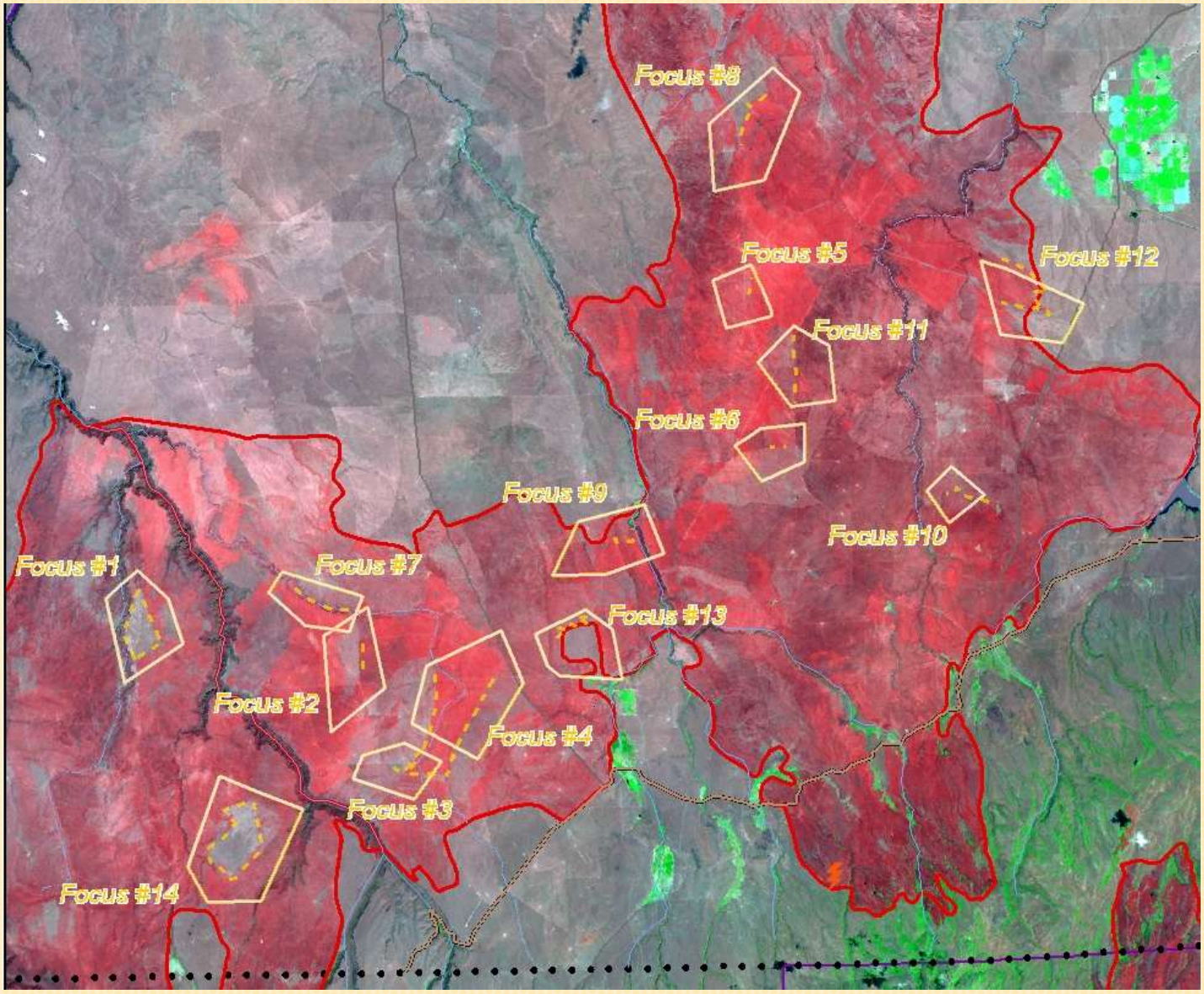
Discontinuity and Contrast

Goals

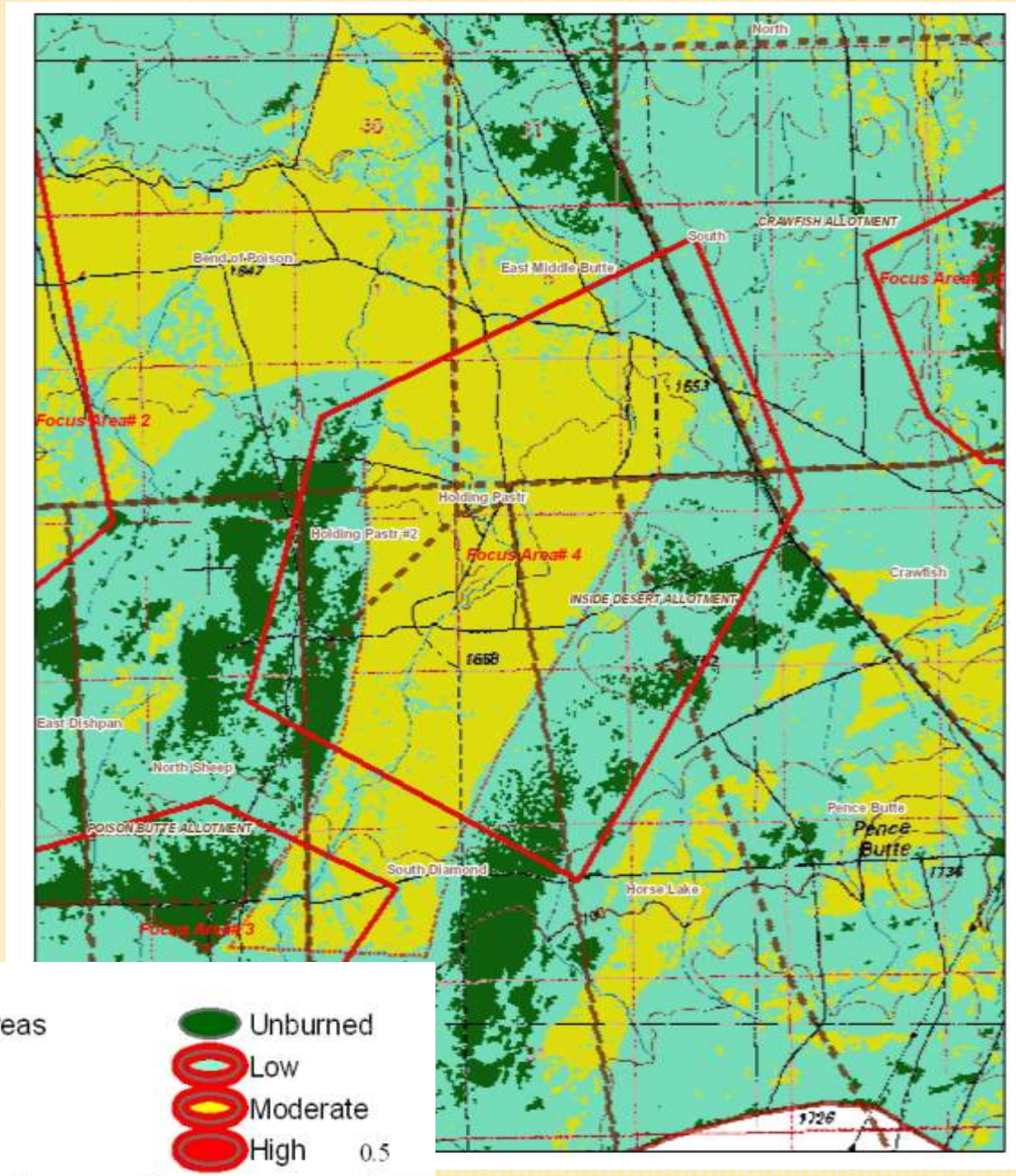
1) Identify Obvious Differences in Burned Areas

2) Evaluate Factors Responsible for the Differences

Focus Areas


Focus #8
Focus #5
Focus #12
Focus #11
Focus #6
Focus #9
Focus #10
Focus #1
Focus #7
Focus #13
Focus #2
Focus #4
Focus #3
Focus #14

Burn Severity Maps Used to Select 14 Focus Areas

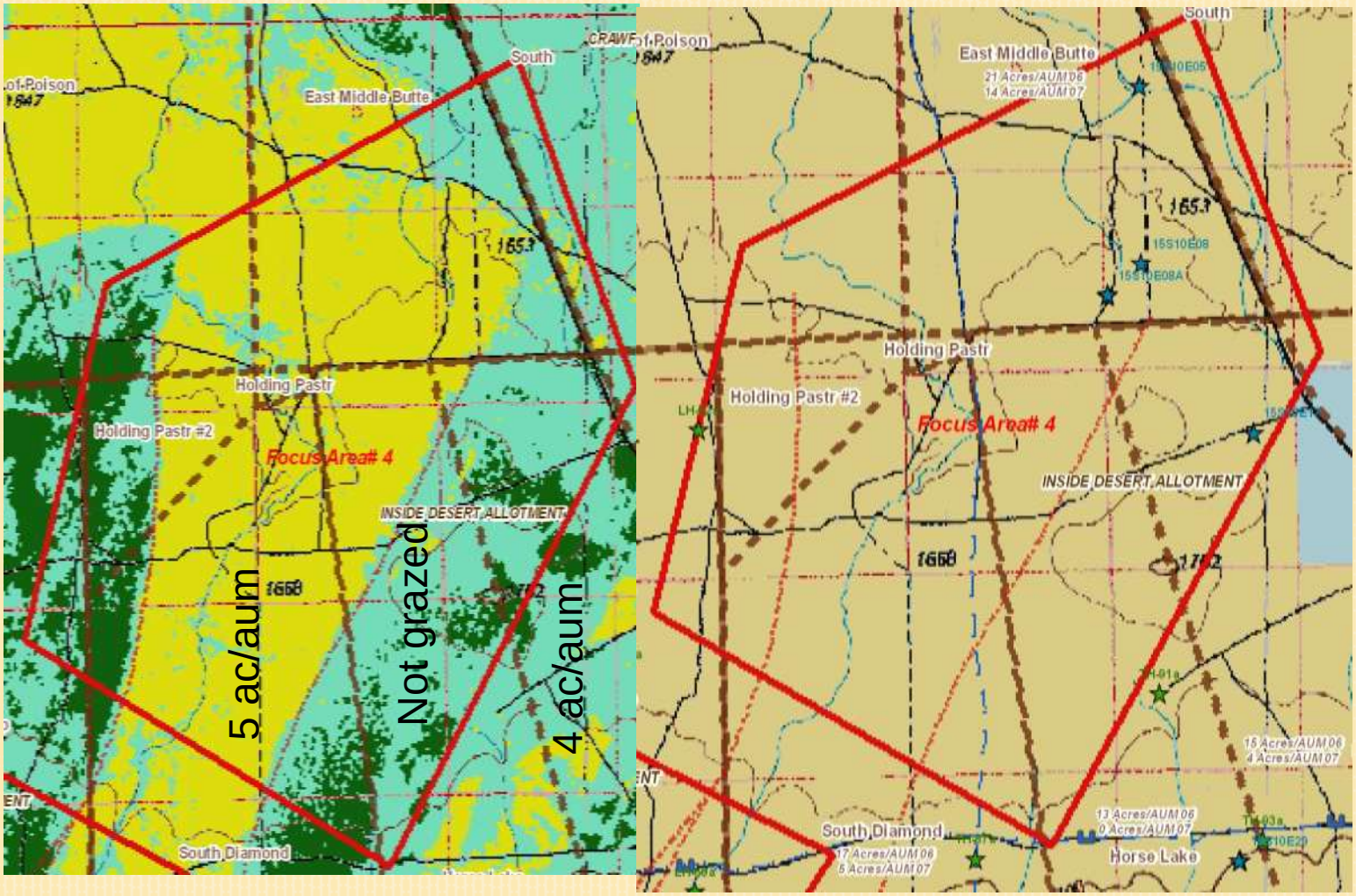


Evaluated Each Area Using 10 Factors

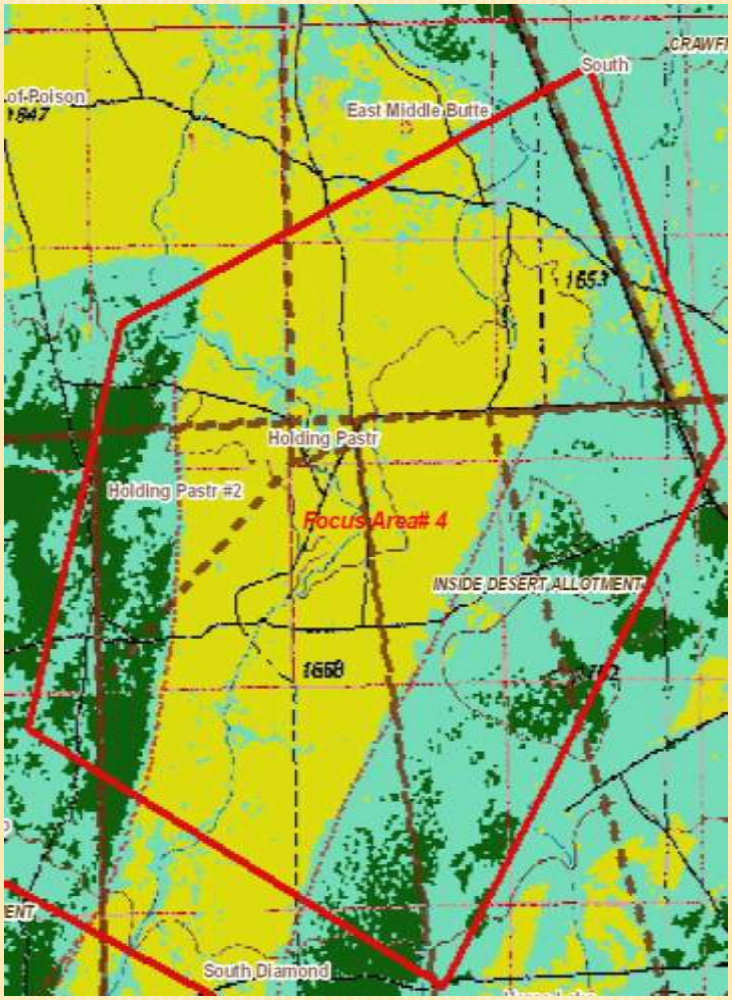
- Actual Use
- Distance from Water
- Anomaly performance
- Fire History
- Seedings
- Vegetation type
- Shrub cover
- Cheatgrass
- Biomass
- Fire behavior/suppression

4 observers scored each factor (1=low --10=high) for impacts on fire severity contrasts

Actual use


East Middle Butte
South
Holding Pastr
Holding Pastr #2
Focus Area# 4
INSIDE DESERT ALLOTMENT
South Diamond
Horse Lake
5 ac/aum
Not grazed
4 ac/aum

Shrub Cover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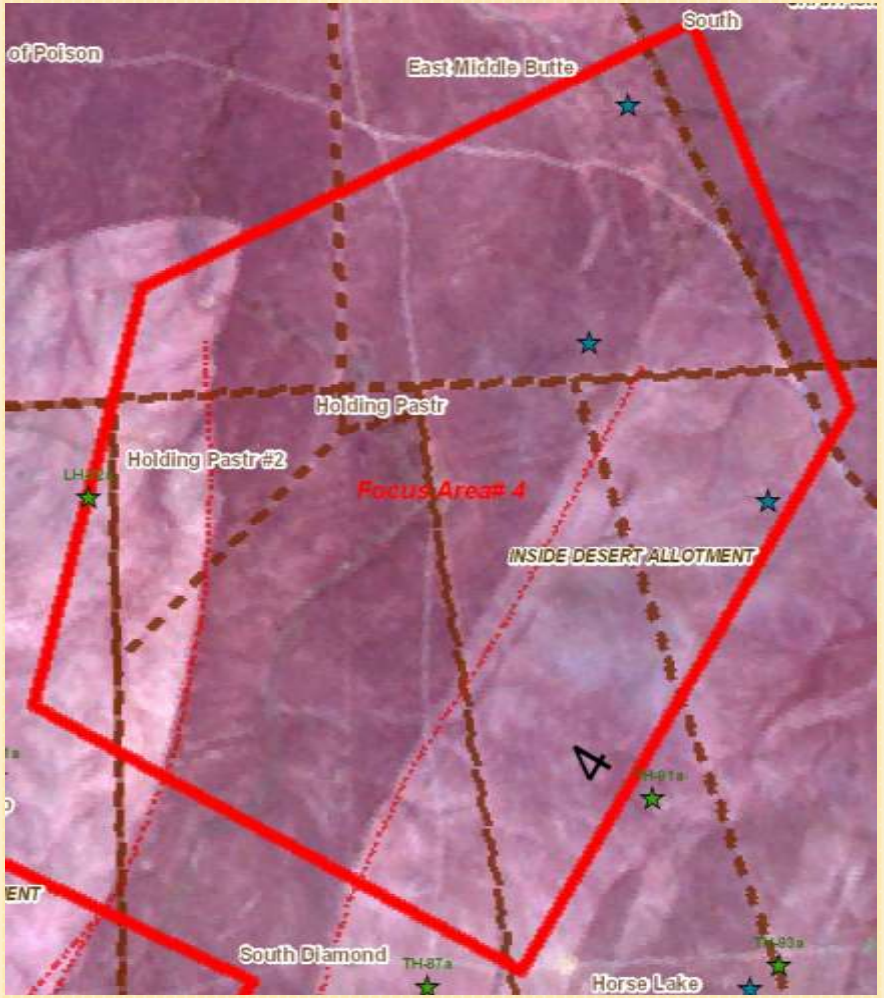
South
East Middle Butte
Holding Pastr
Holding Pastr #2
Focus Area# 4
INSIDE DESERT ALLOTMENT
South Diamond
Horse Lake

Ranking of burn severity factors across all focus areas

(1 = low, 10 = high)

Factor	Rank	Mean Importance	Standard Deviation	# times ranked > 6
Shrub cover	1	6.5	0.7	42
Biomass	2	4.8	0.3	23
Vegetation type	3	3.9	0.6	20
Fire history	4	3.8	0.4	21
Seedings	5	3.0	0.8	16
Actual use	6	2.9	0.5	9
Vegetation Anomaly performance	7	2.6	0.5	5
Distance from water	8	2.3	1.0	4
Cheatgrass	9	2.1	0.6	1
Fire behavior	10	1.4	1.0	4

Ranking of burn severity factors across grass dominated areas (3) (1 = low, 10 = high)

Factor	Rank	Mean Importance	Standard Deviation	# times ranked > 6
Biomass	1	6.1	0.9	6
Shrub cover	2	5.9	1.7	6
Actual use	3	4.2	1.2	2
Seedings	4	3.9	1.4	4
Vegetation Anomaly Performance	5	2.8	1.0	2
Distance from Water	6	2.4	0.9	1
Cheatgrass	7	1.8	1.6	0
Fire History	8	1.8	1.9	2
Vegetation type	9	1.7	1.5	1
Fire behavior	10	0.6	0.3	0

Discontinuity and Contrast

- Vegetation (fuel loads) was the most important factor in determining burn severity contrasts
- Grazing effects increased in grassland systems and decreased as shrub cover increased
- Post-fire determinations of grazing impacts difficult at best
- Additional large-scale research on grazing/fire behavior is necessary

Major Findings

- Burn severity was affected primarily by plant communities.
- Extreme fire conditions likely overshadowed livestock grazing as a factor influencing fire in many areas.
- When weather and fuel moisture conditions are less extreme, grazing may reduce the rate of spread and intensity of fires.
- Livestock grazing that reduces the carryover of dead fuels from one year to the next can influence fire behavior

Major Findings (cont)

- Potential effects for livestock grazing to reduce fuel and affect fire behavior were dependent on the vegetation type.
  - Fire behavior in sagebrush vegetation types is driven mostly by sagebrush cover and height.
  - Opportunities to influence fire behavior through cattle grazing are greatest in grassland vegetation types.

Management Opportunities

- Reducing fuel loads could enhance fire suppression activities, under normal weather conditions

- Potential exists for managed grazing to reduce fine fuels and affect wildfire behavior.

- Targeted grazing programs to accomplish fuel management could be both feasible and achievable.

- Distinctions must be made between standard grazing management practices and fuels reduction prescriptions.

Management Recommendations

- **Create a pilot project** to evaluate management opportunities and ecological implications of targeted grazing for fuel reduction.

- **Prepare a technical report** that synthesizes existing research and field examples for use in planning fuel reduction programs using grazing.

- **Continue to research and monitor** the Murphy complex fires to improve future management decisions.

Research Recommendations

- Conduct additional research on the relationship between dNBR techniques, burn severity and vegetation mortality.

- Develop fire behavior models appropriate to the sagebrush steppe and fires that burn under more extreme conditions.

- Investigate remote sensing technology to assess fuels in sagebrush steppe and to detect the influence of grazing levels at landscape scales.

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