

Soil Surface Susceptibility to Wind Erosion

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Dust front approaching Lubbock, Texas

Ahead of Spring convective storm





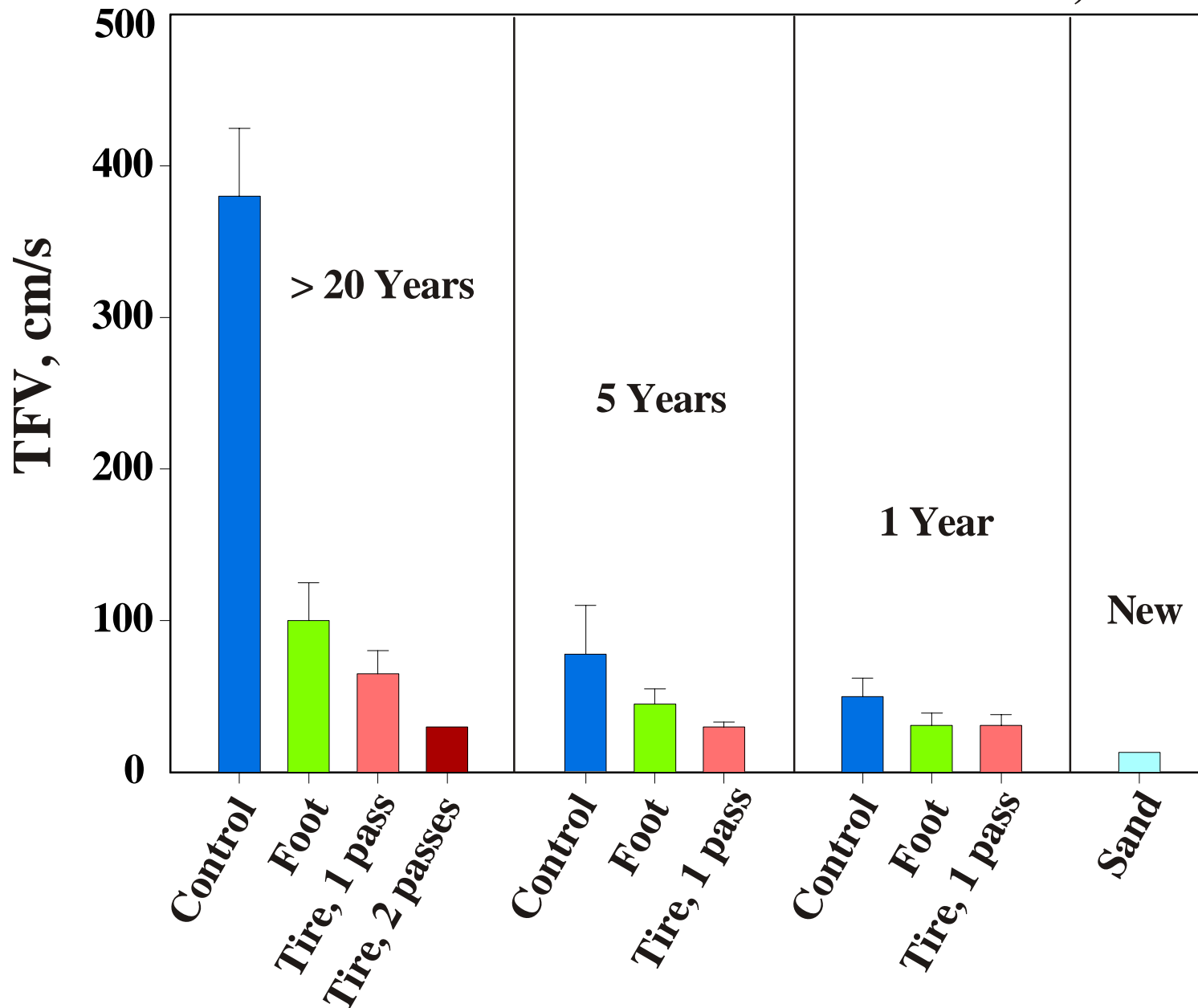


TFV= Threshold Friction Velocity

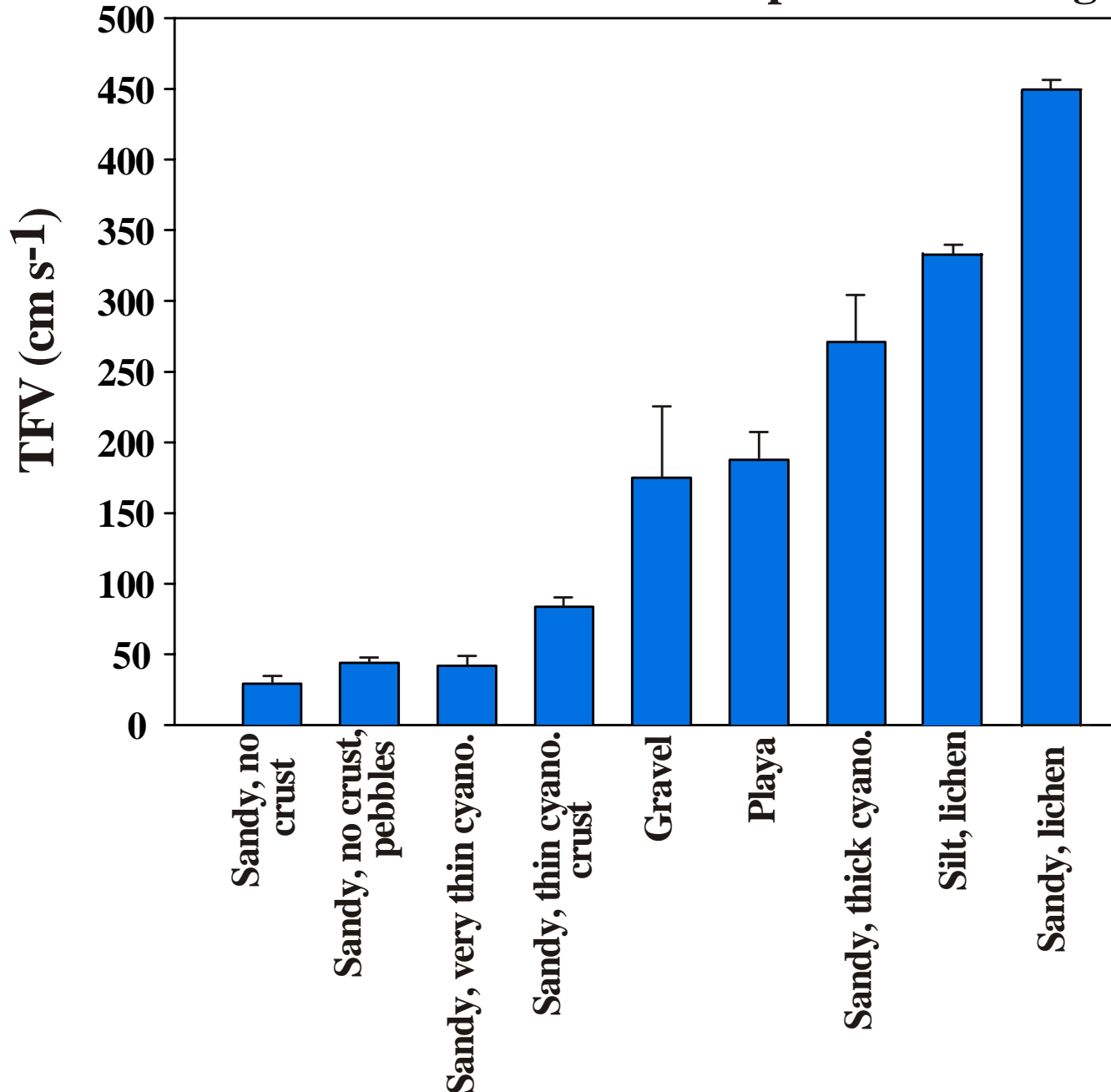
The wind speed at which particles move

**Sediment = amount of soil blown off the soil
surface at high spring wind speed**

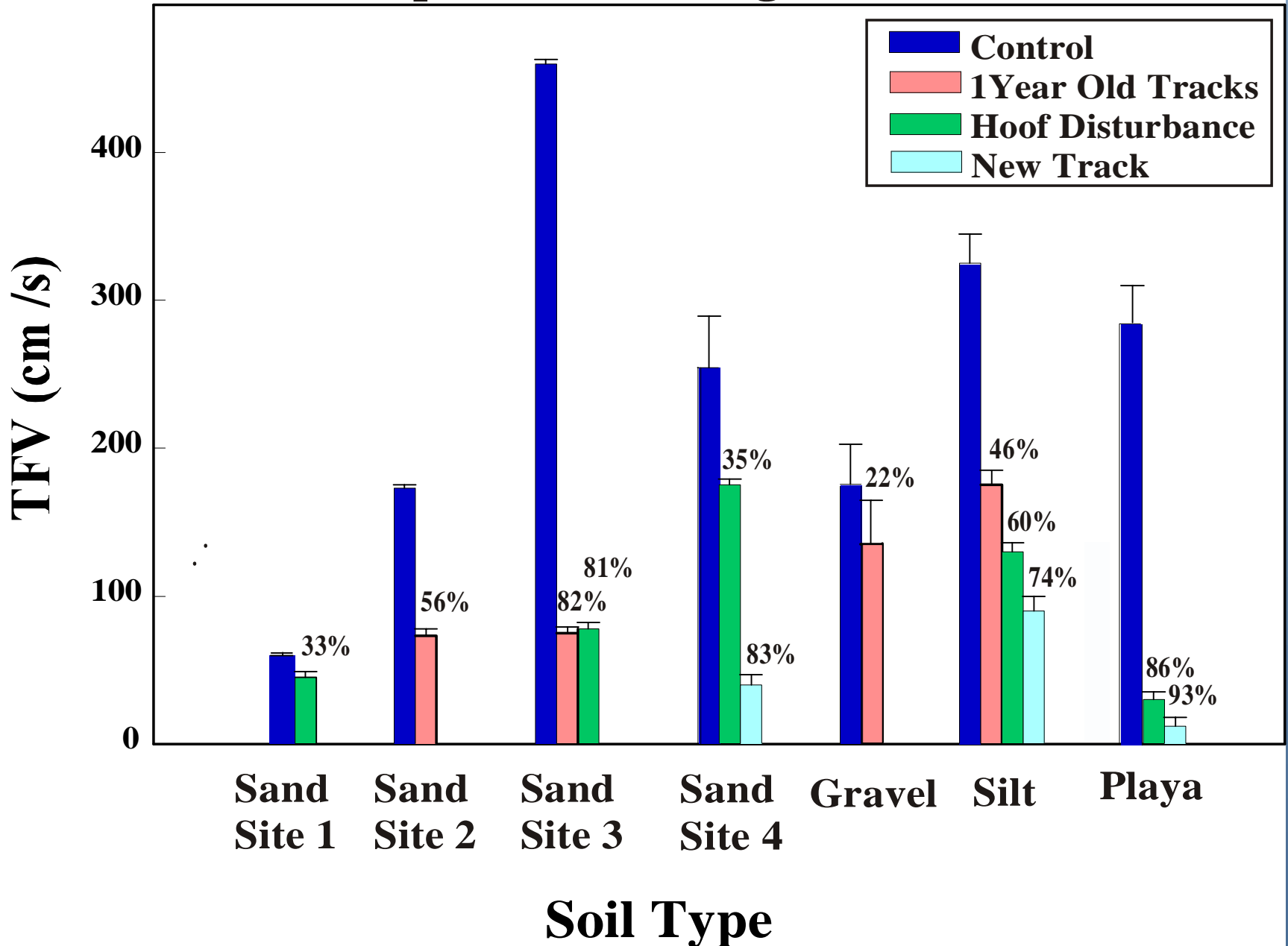
Moab, Utah



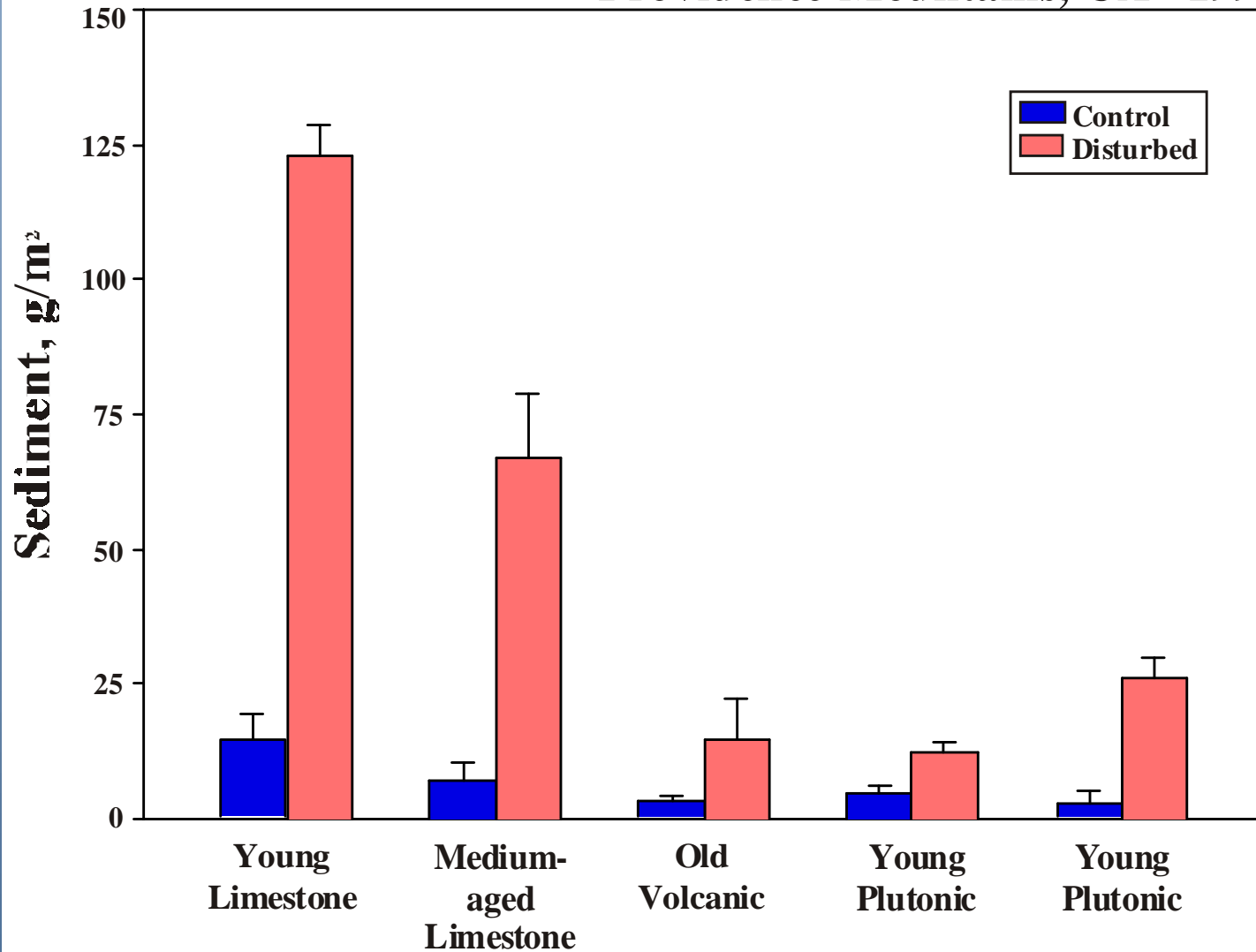
Jornada Experimental Range



Jornada Experimental Range



Providence Mountains, CA 1999

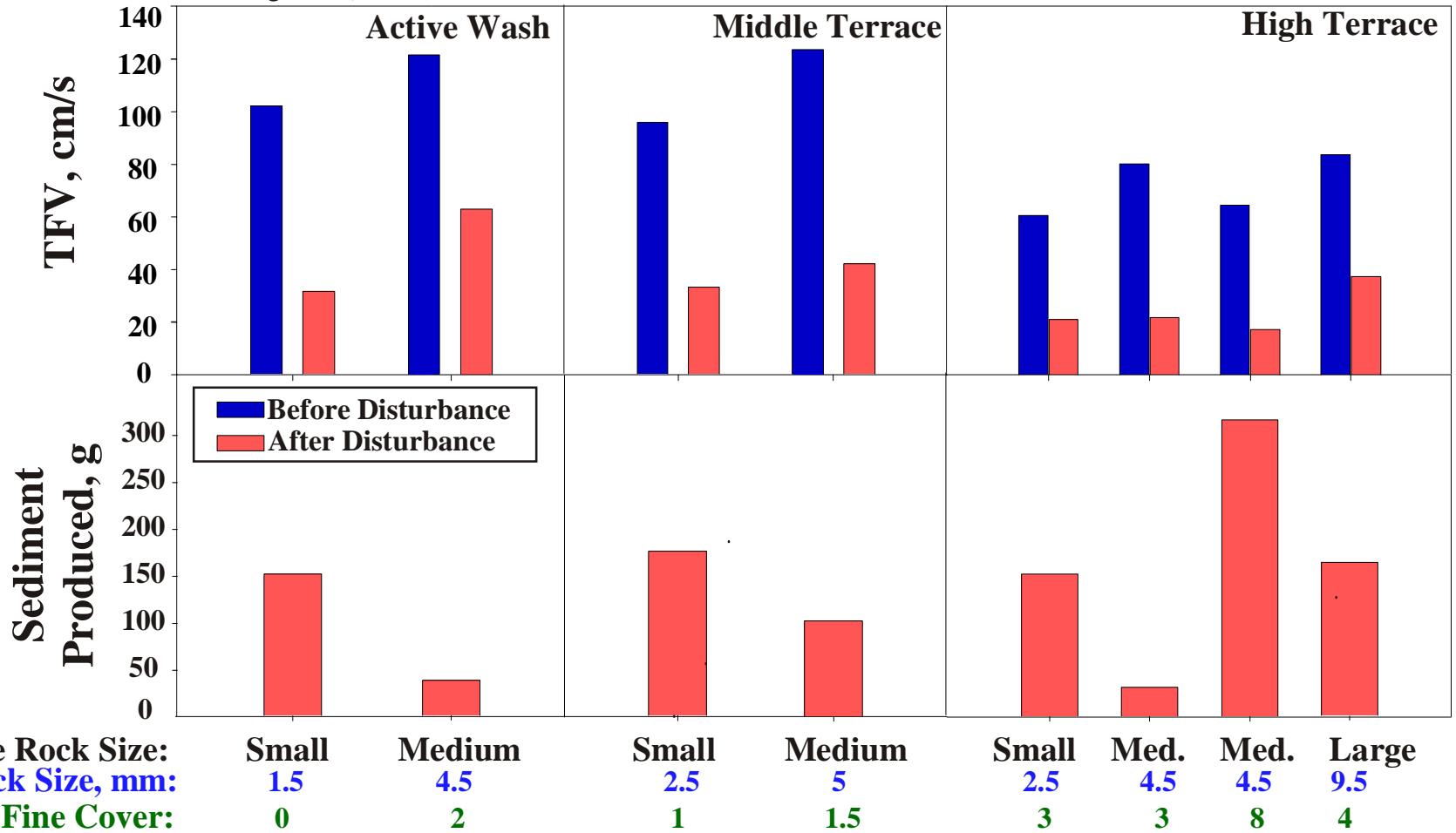


Sites of Different Substrate: Distal Alluvial Fan

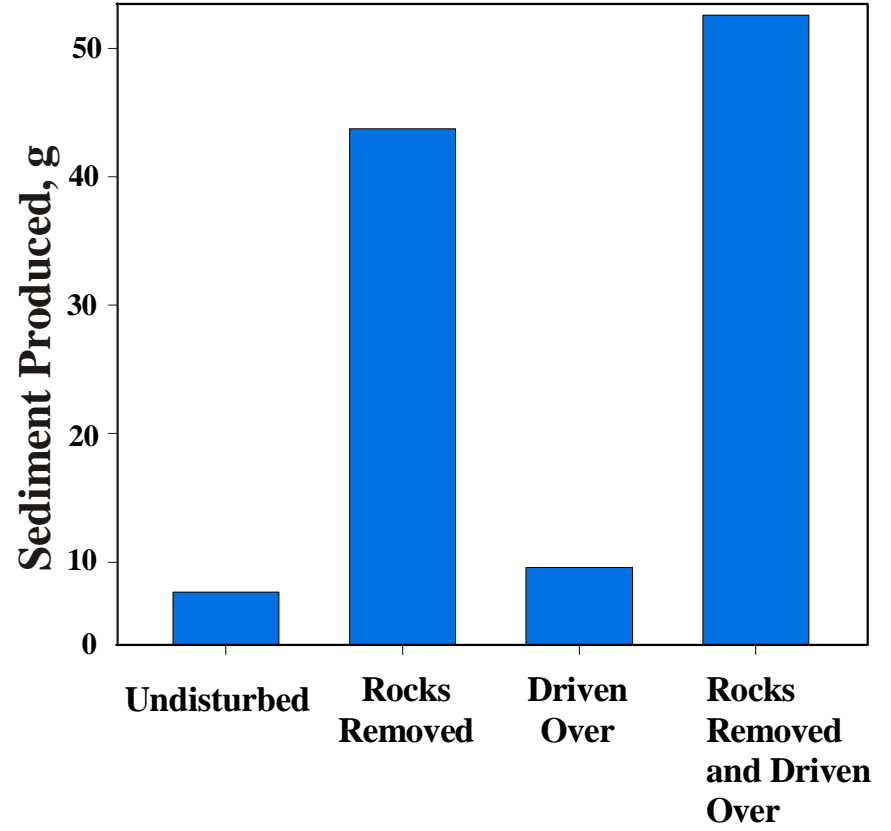
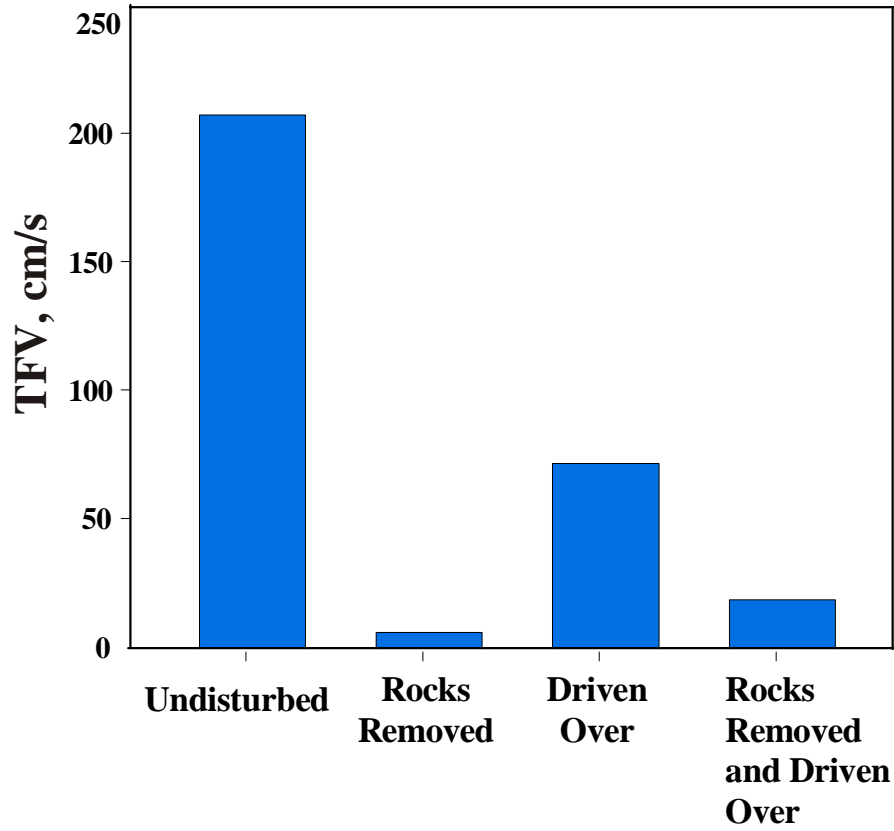
Rock Cover: Control $r^2=0.86$

Disturbed $r^2=0.97$

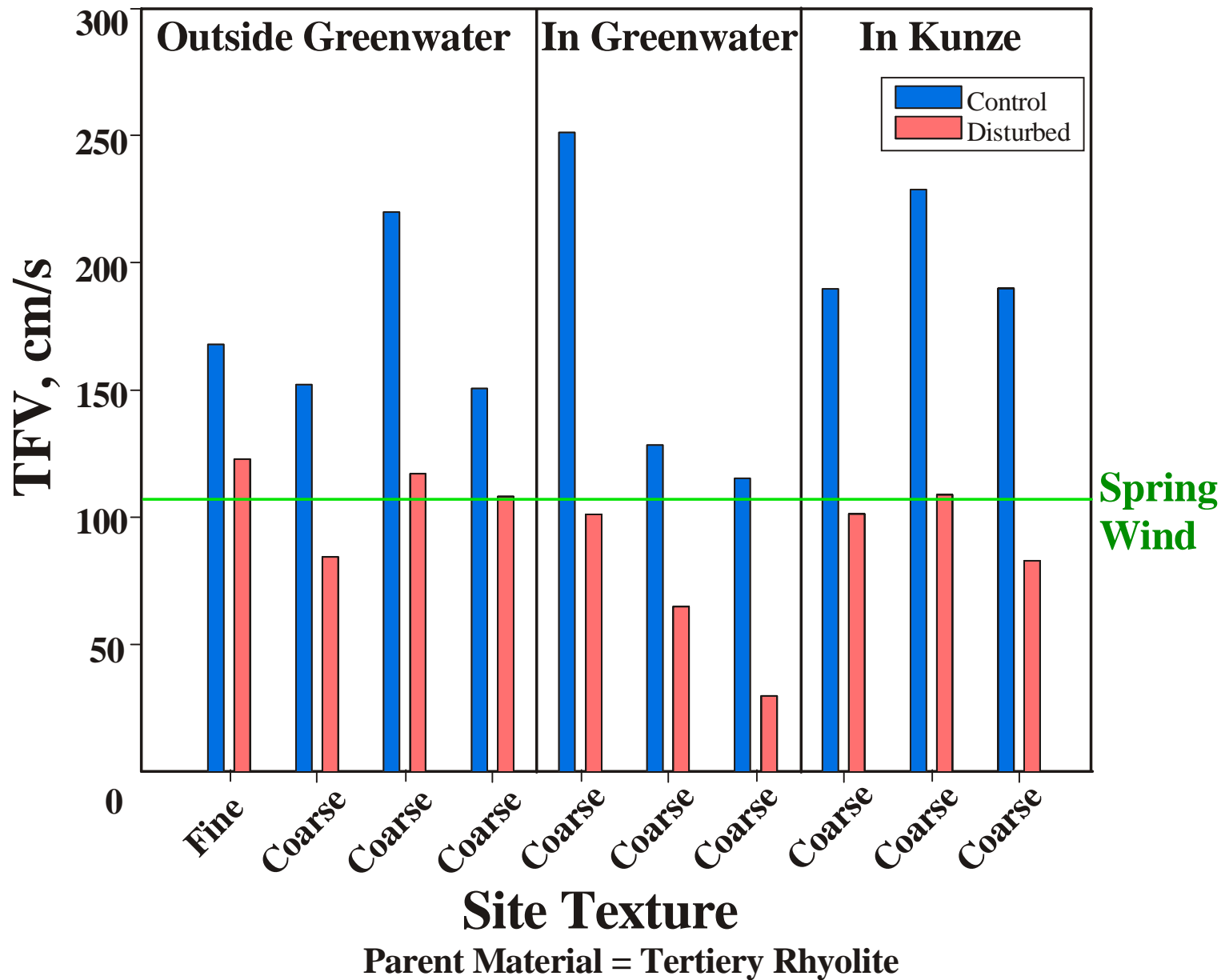
Valjean, CA



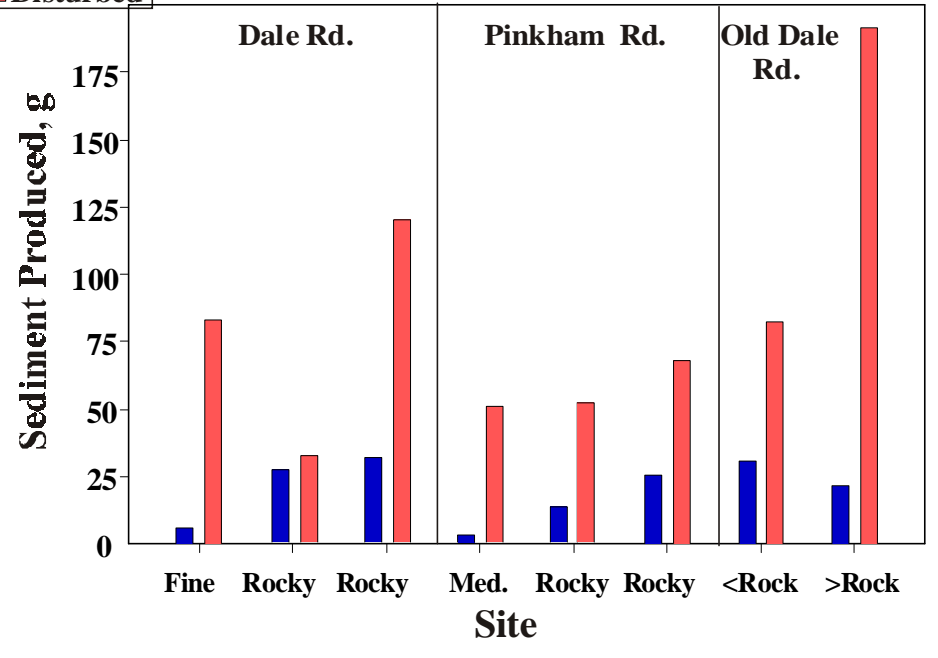
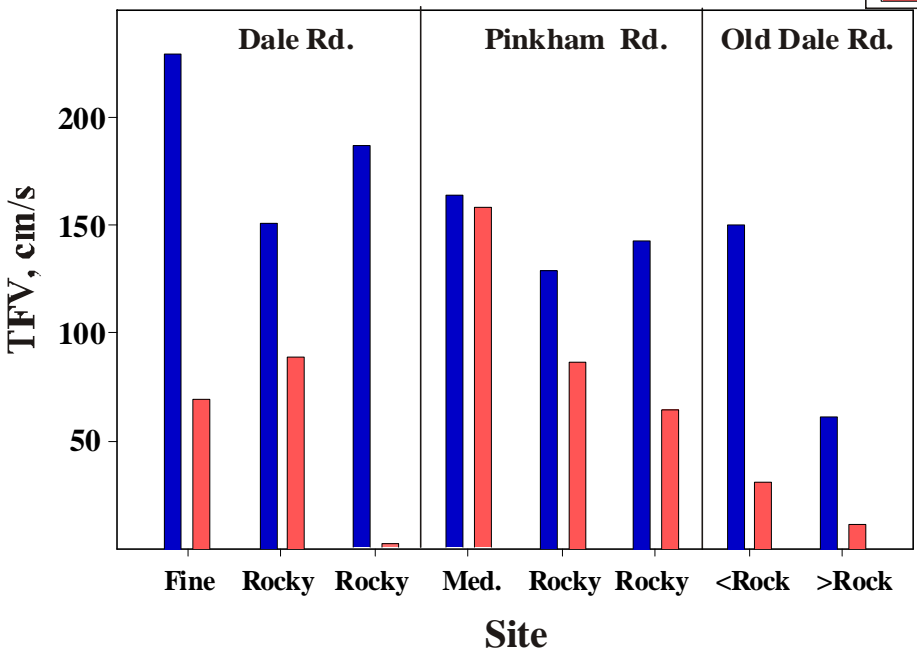
Valjean Pavement



Mojave Ghost Towns, 1998

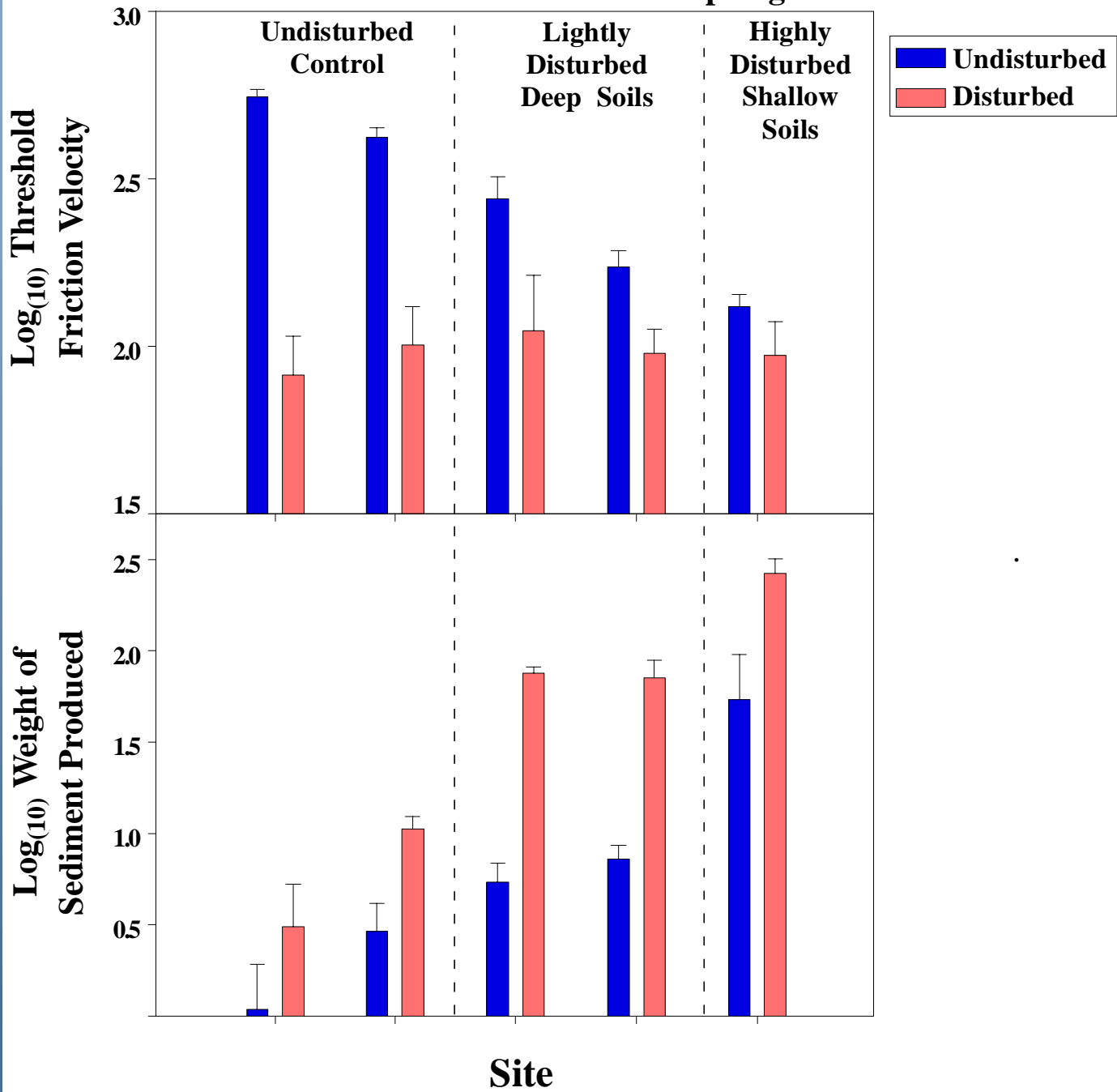


Joshua Tree National Park



Ft. Irwin

Spring 2000



Wind Erosion Vulnerability

Location

Altitude

Slope

Aspect

Quaternary Unit

Parent Material

Chemical Weathering Rate

Pavement Formation

Aeolian Sand Inputs

Rockiness Index

Roughness

% Disturbance

Rock Cover (3 Rock Size Classes)

Litter Cover (2 Litter Classes)

Lichen & Moss Cover (by Species)

Lichen & Moss Species Richness

Cyanobacterial Cover

Cyanobacterial Biomass

Shrub Cover

Annual Grass Cover

Perennial Grass Cover

Soil Surface & Subsurface

Chemistry (P, K, Zn,

Fe, Mn, Cu, Ca, Mg,

Na, N, CaCO₃)

Soil Texture

Sand Size Fractions

Average Annual Precipitation

Average Annual ET

Vulnerability to wind erosion

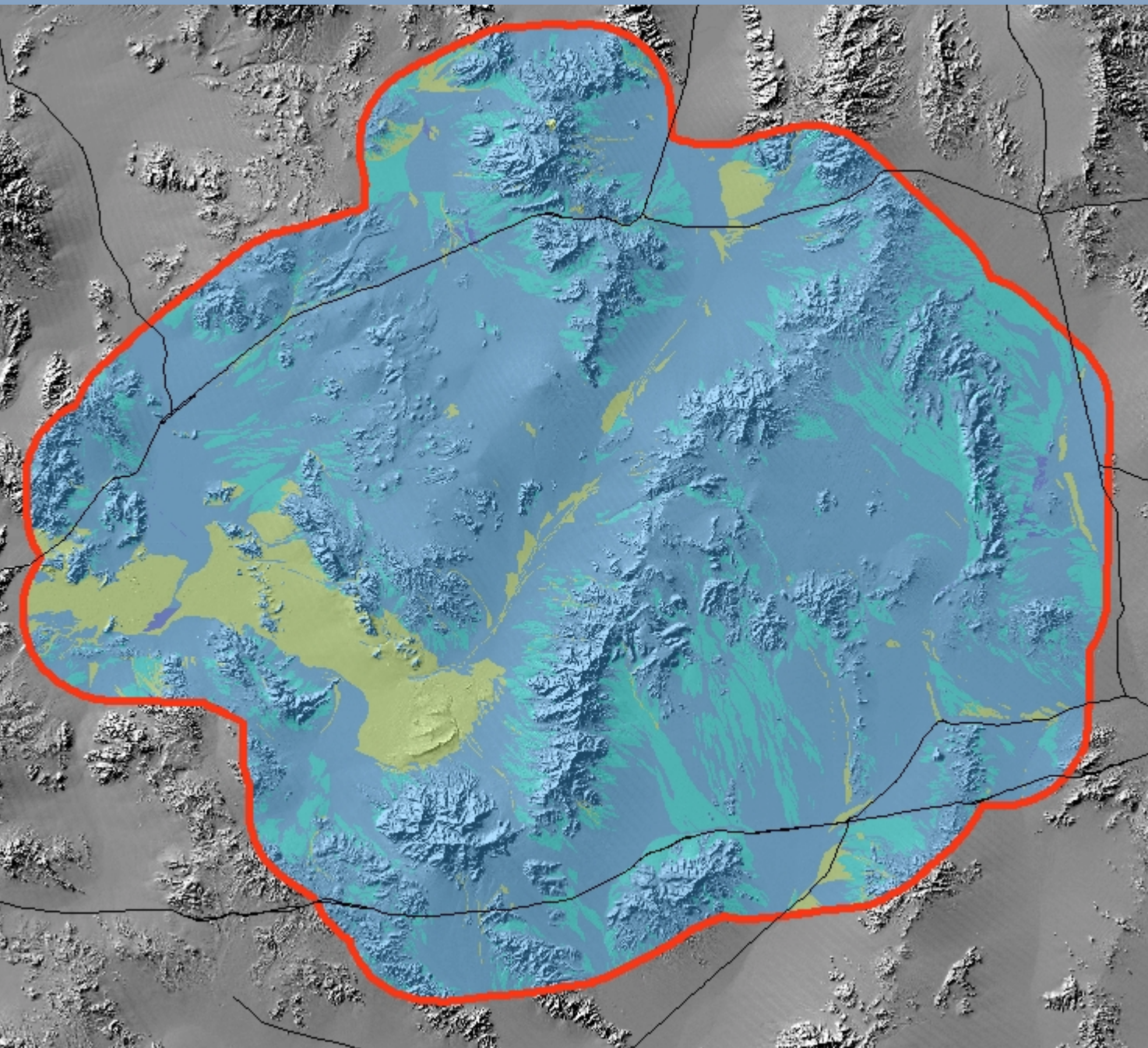
Soil Surface Characteristics

- Disturbance
- Particle size distributions (**med.+fine/silt**)
- Surface rockiness
- Salt
- Biological and physical crusts

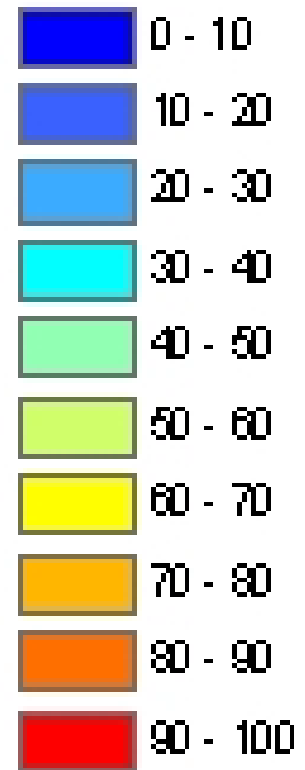
Climate

- Hours when soils are dry and winds exceed
TFV

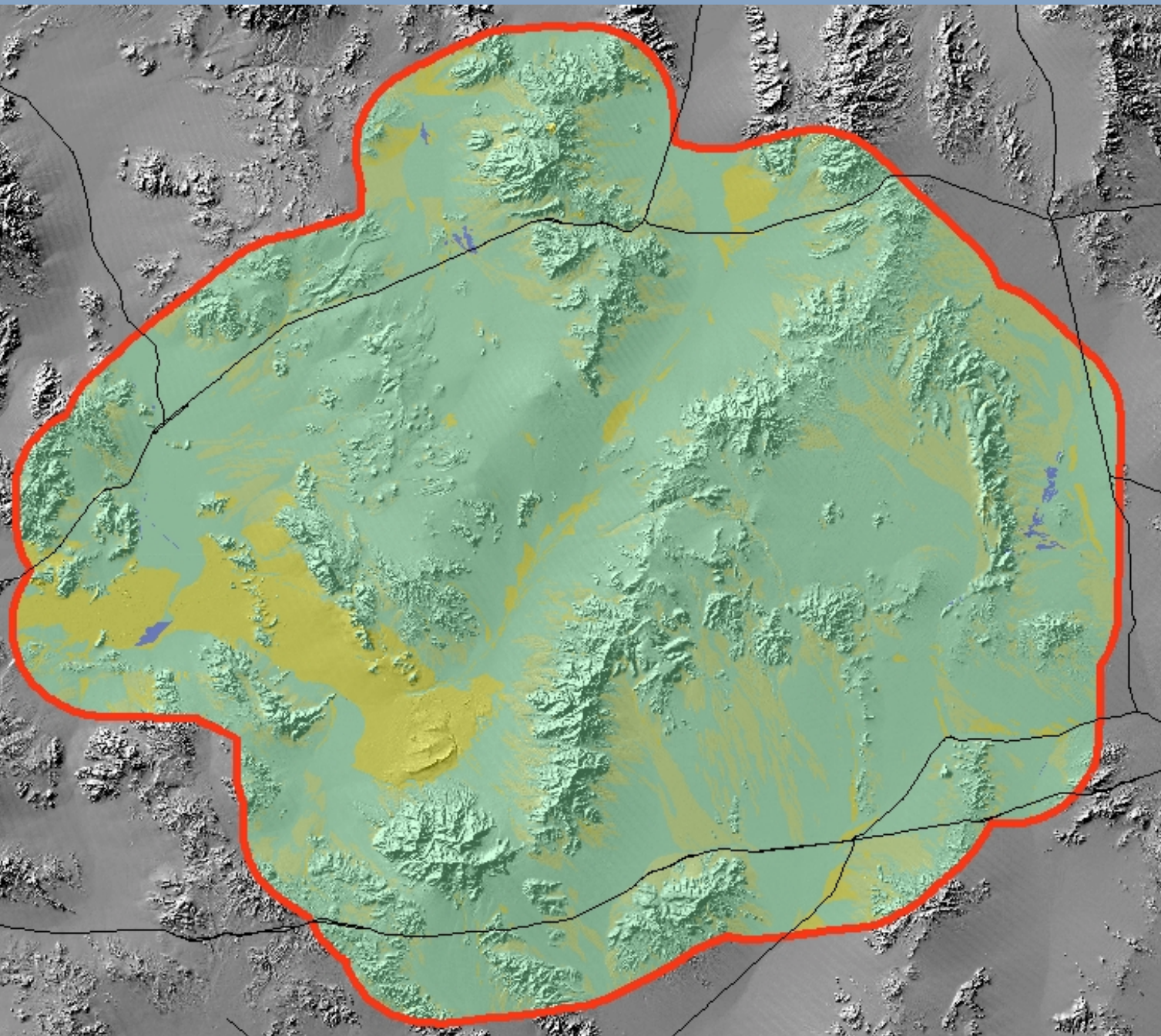
% time per month that a Threshold Friction Velocity is exceeded



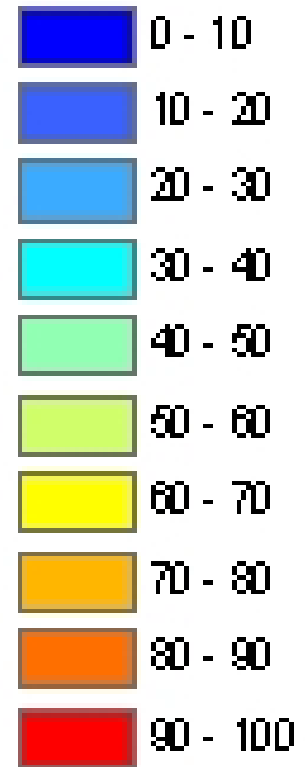
Jan



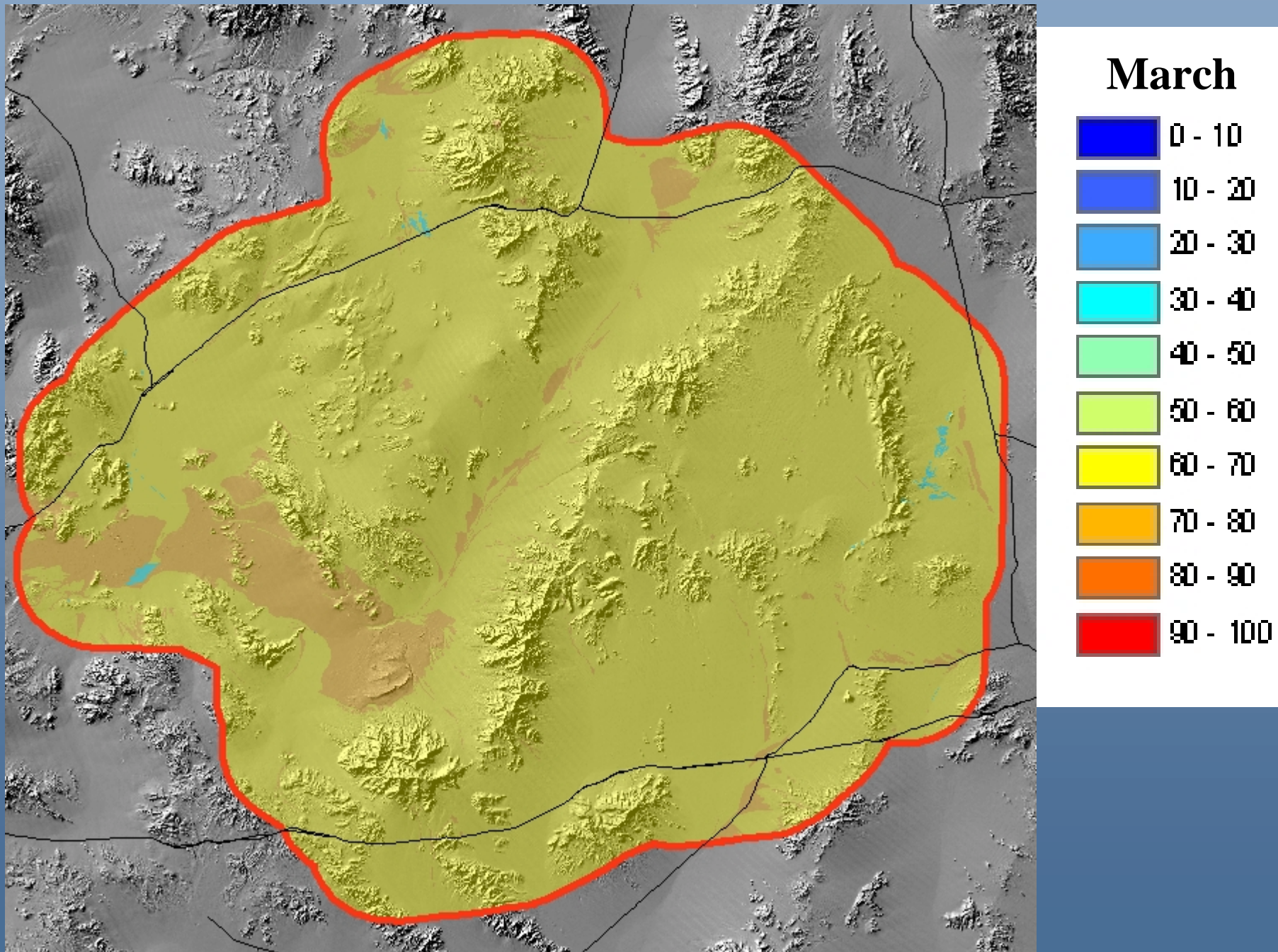
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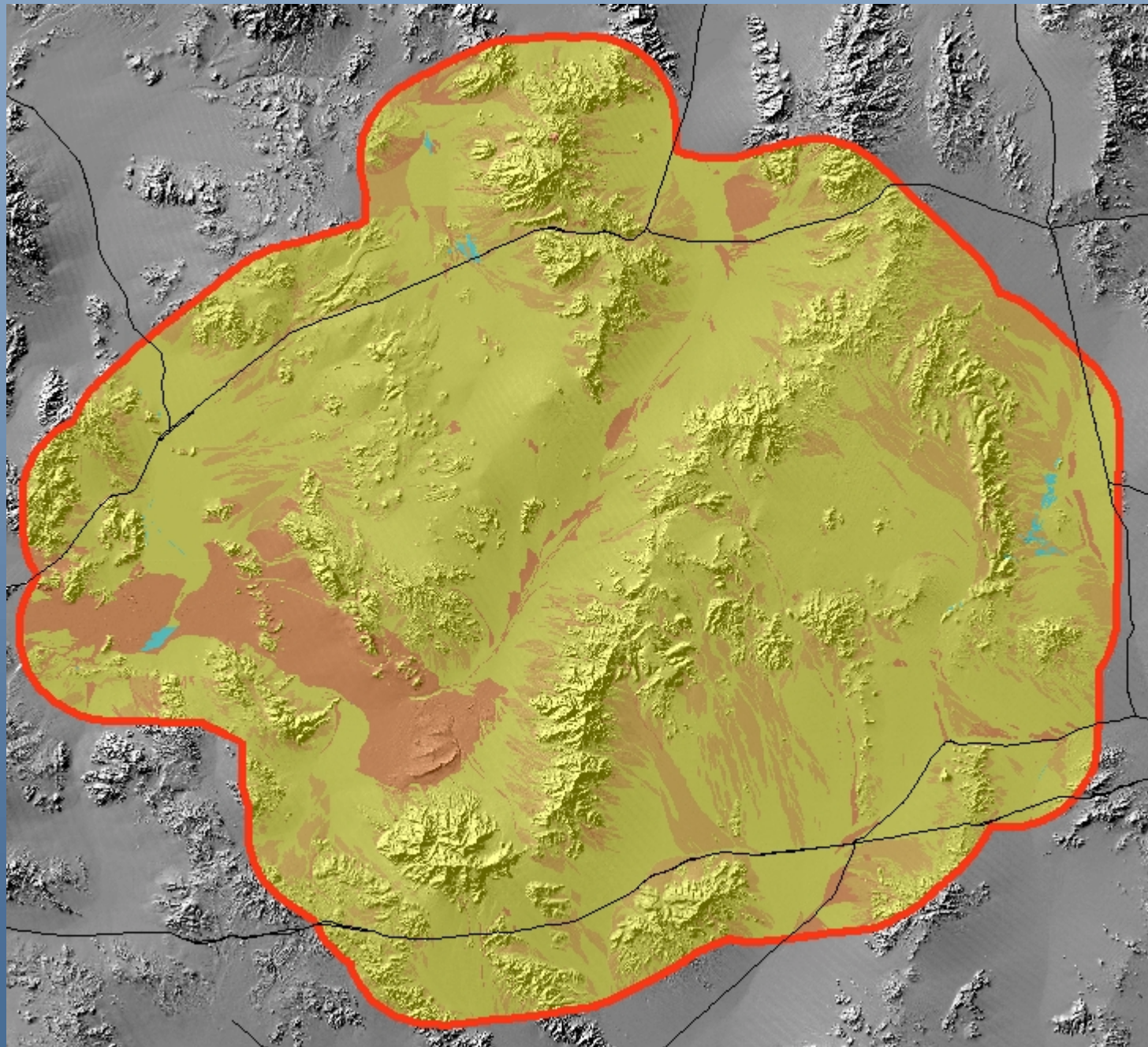
Feb



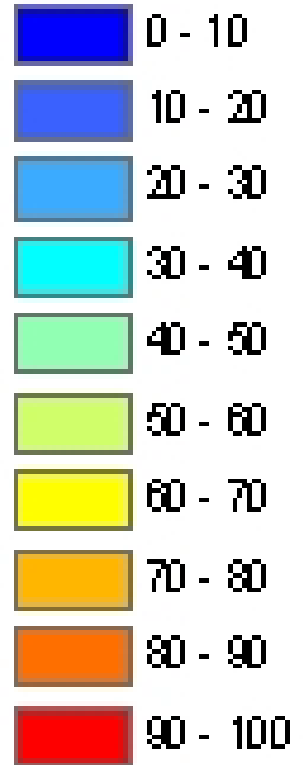
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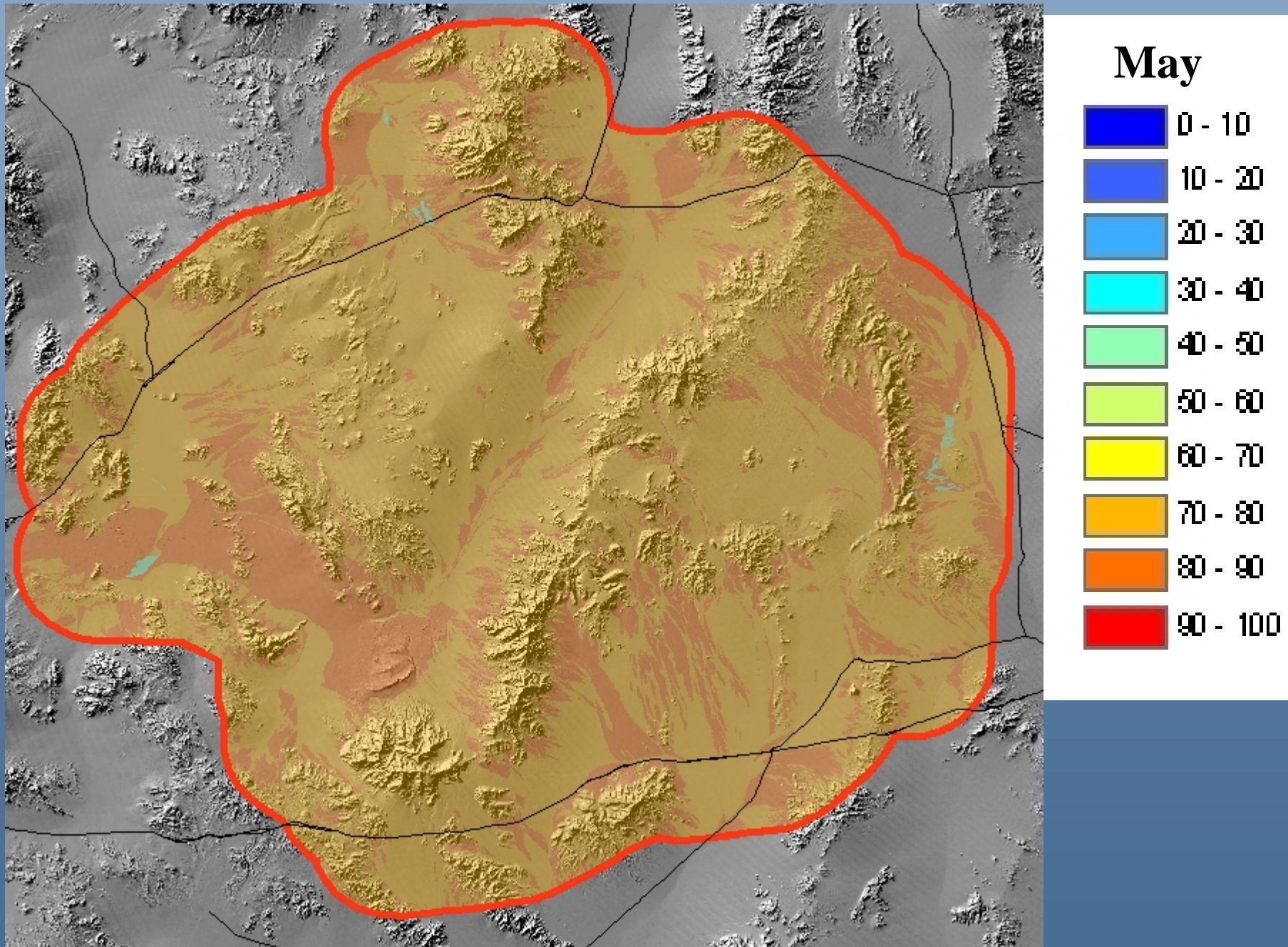
% time per month that a Threshold Friction Velocity is exceeded



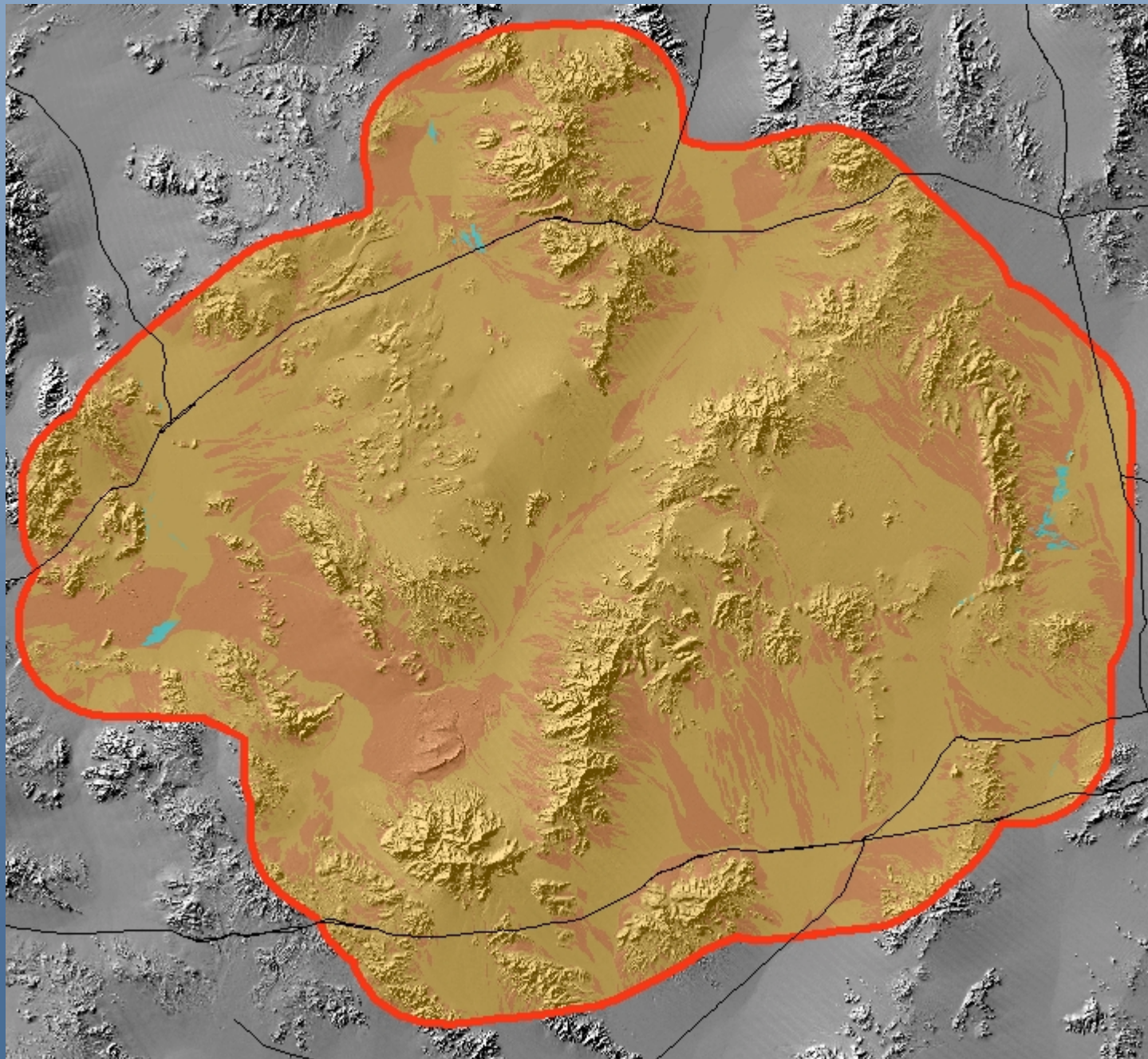
April



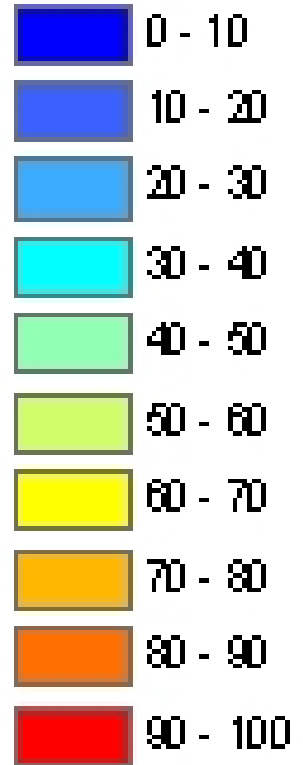
% time per month that a Threshold Friction Velocity is exceeded



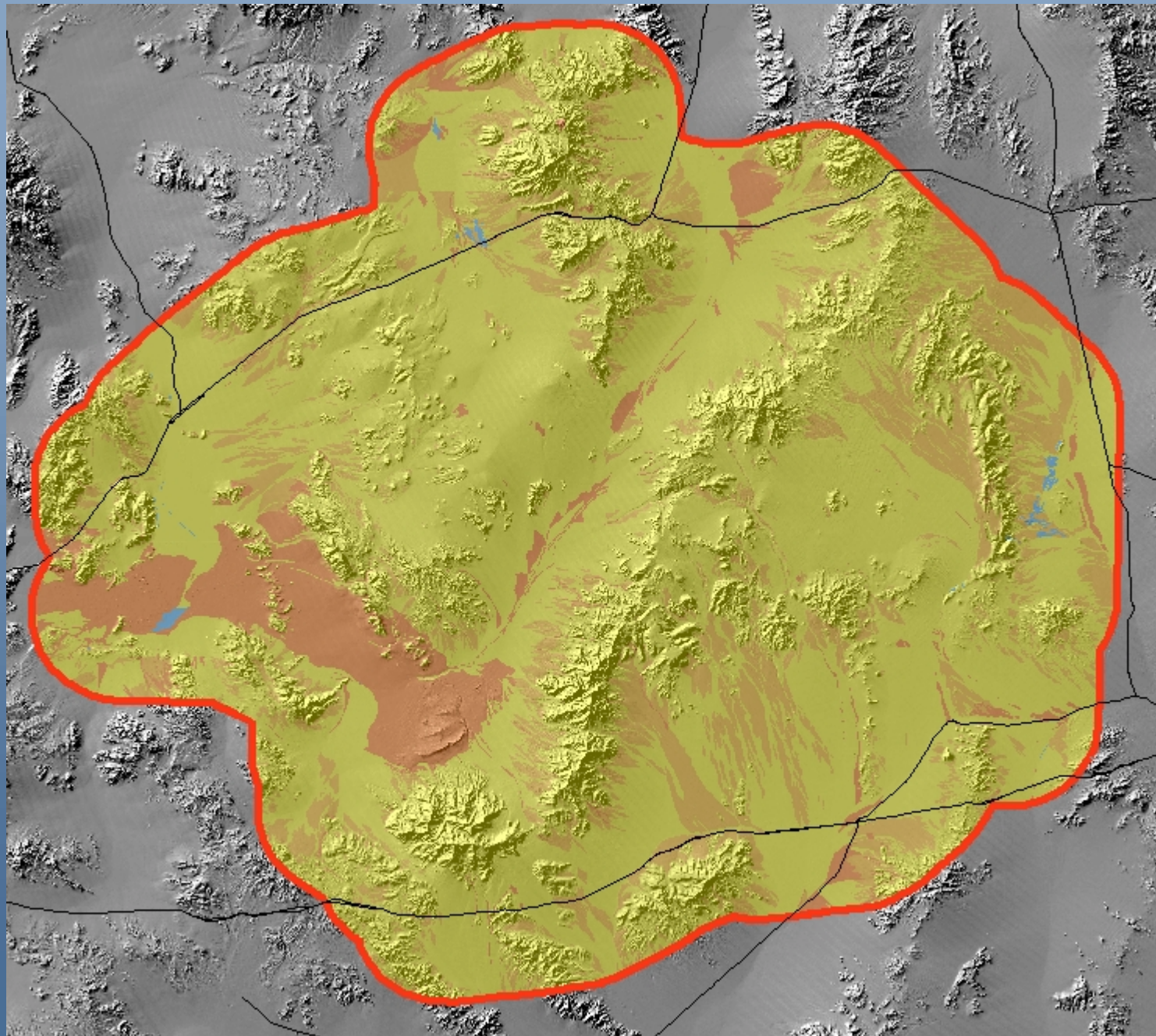
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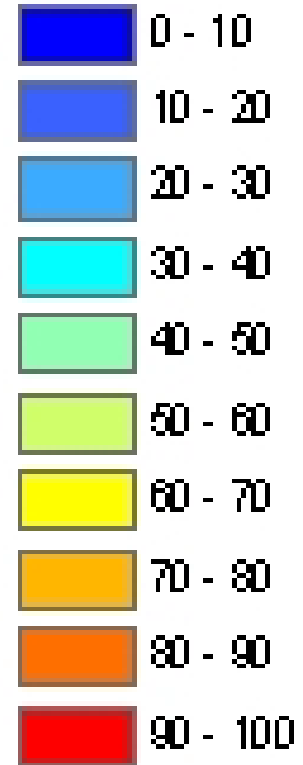
June



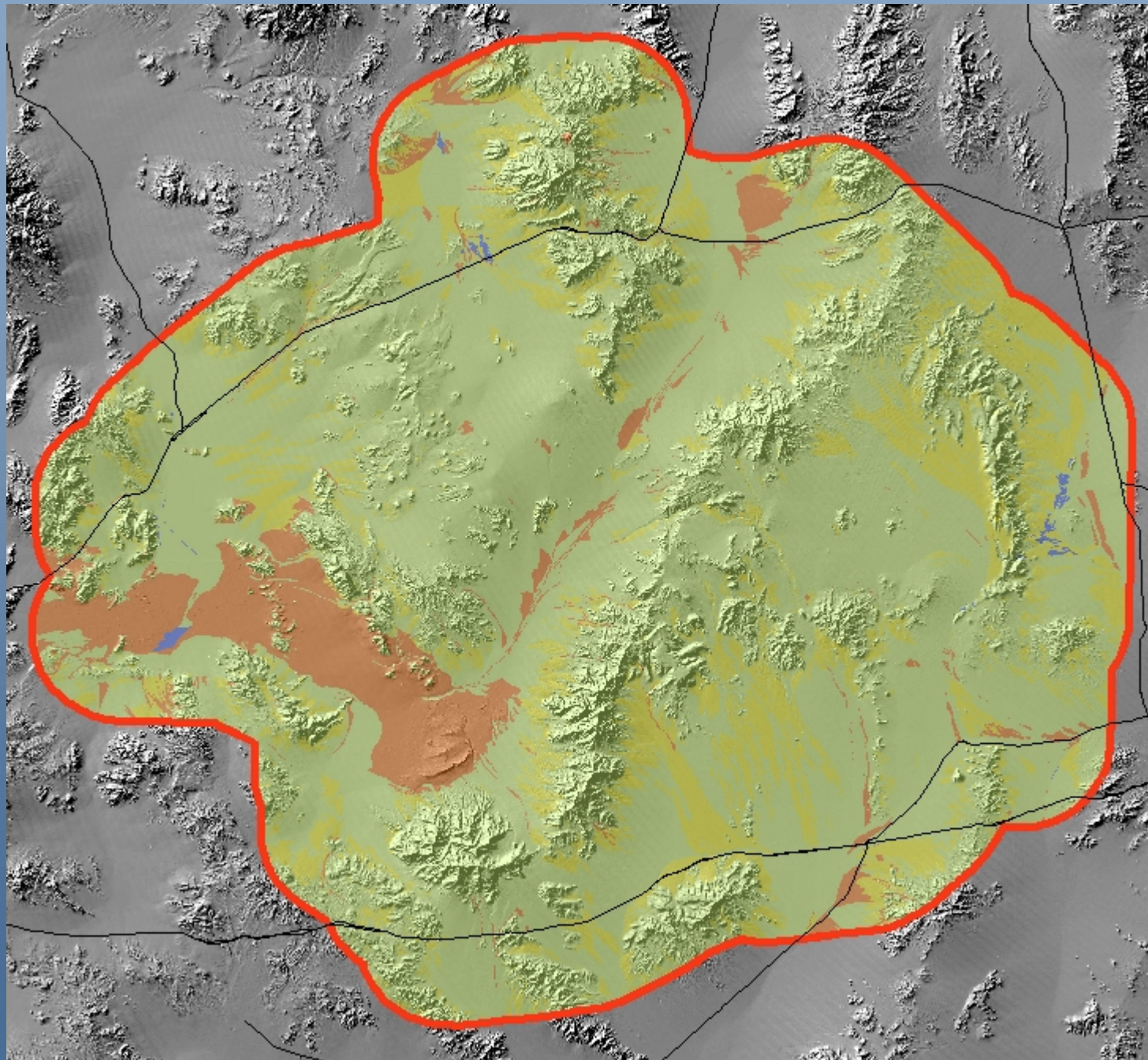
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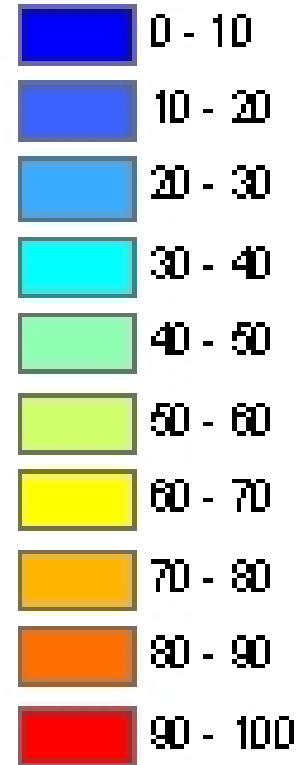
July



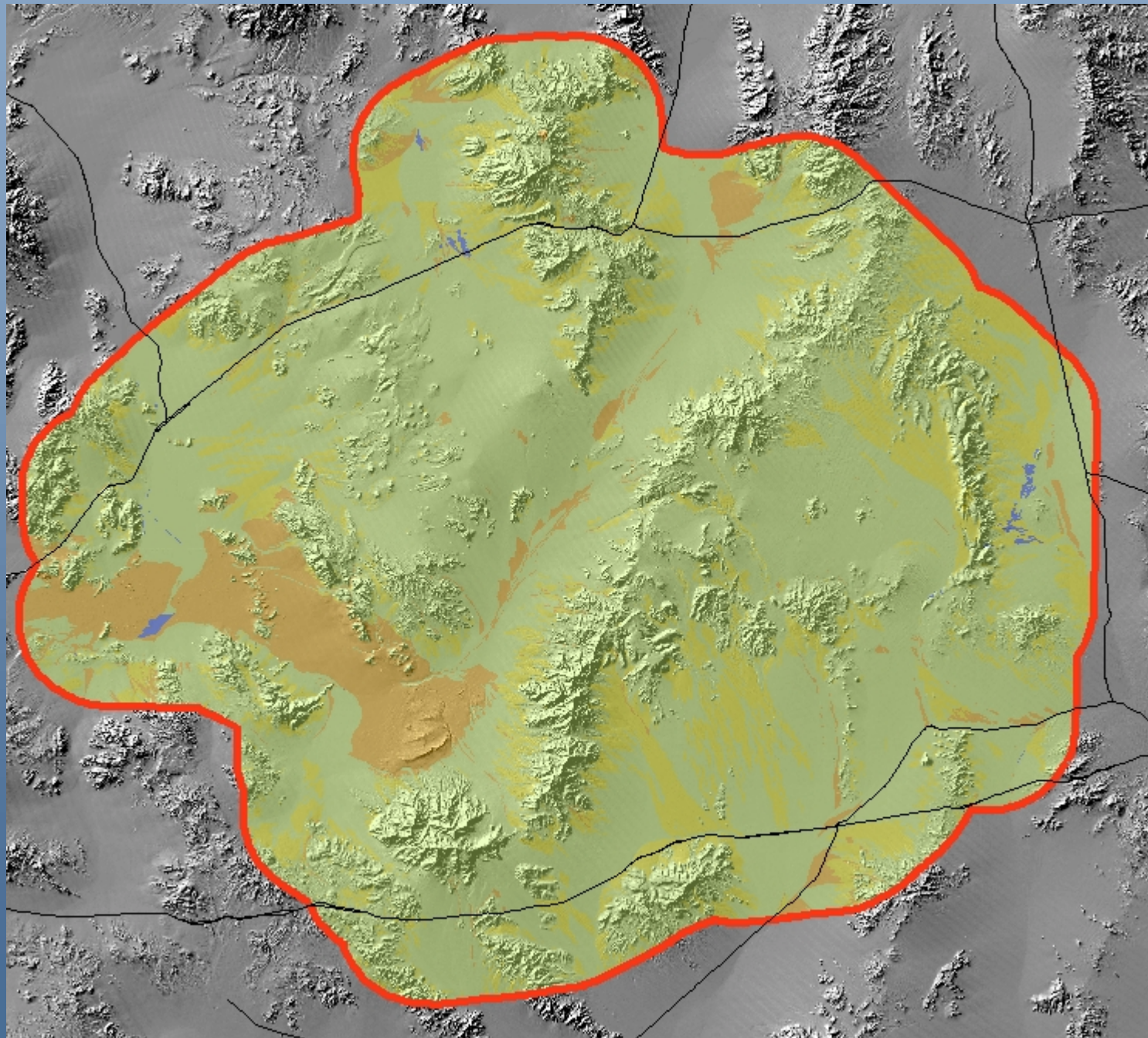
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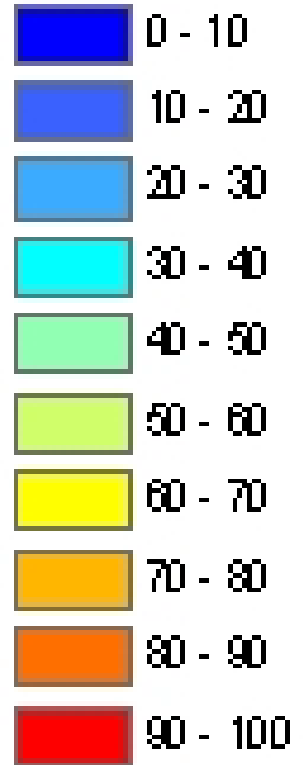
August



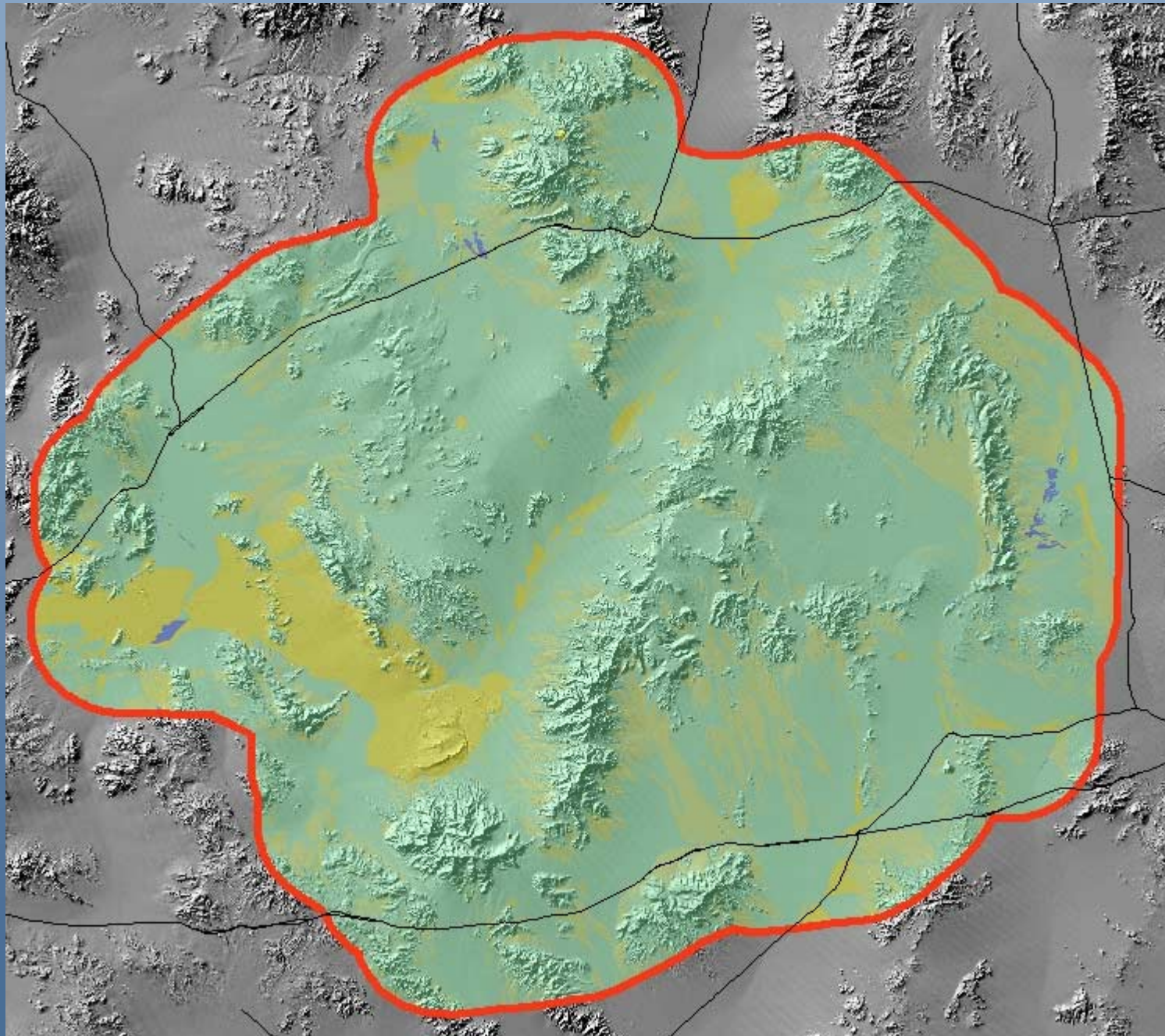
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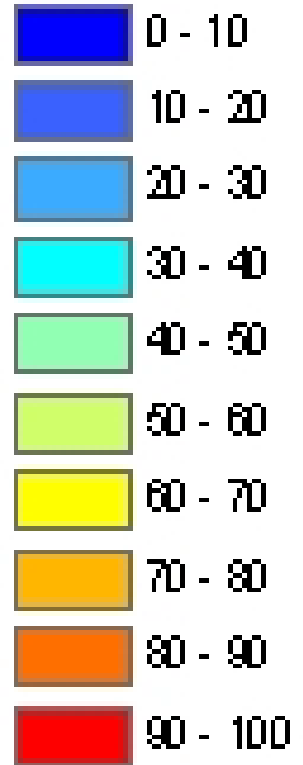
Sept.



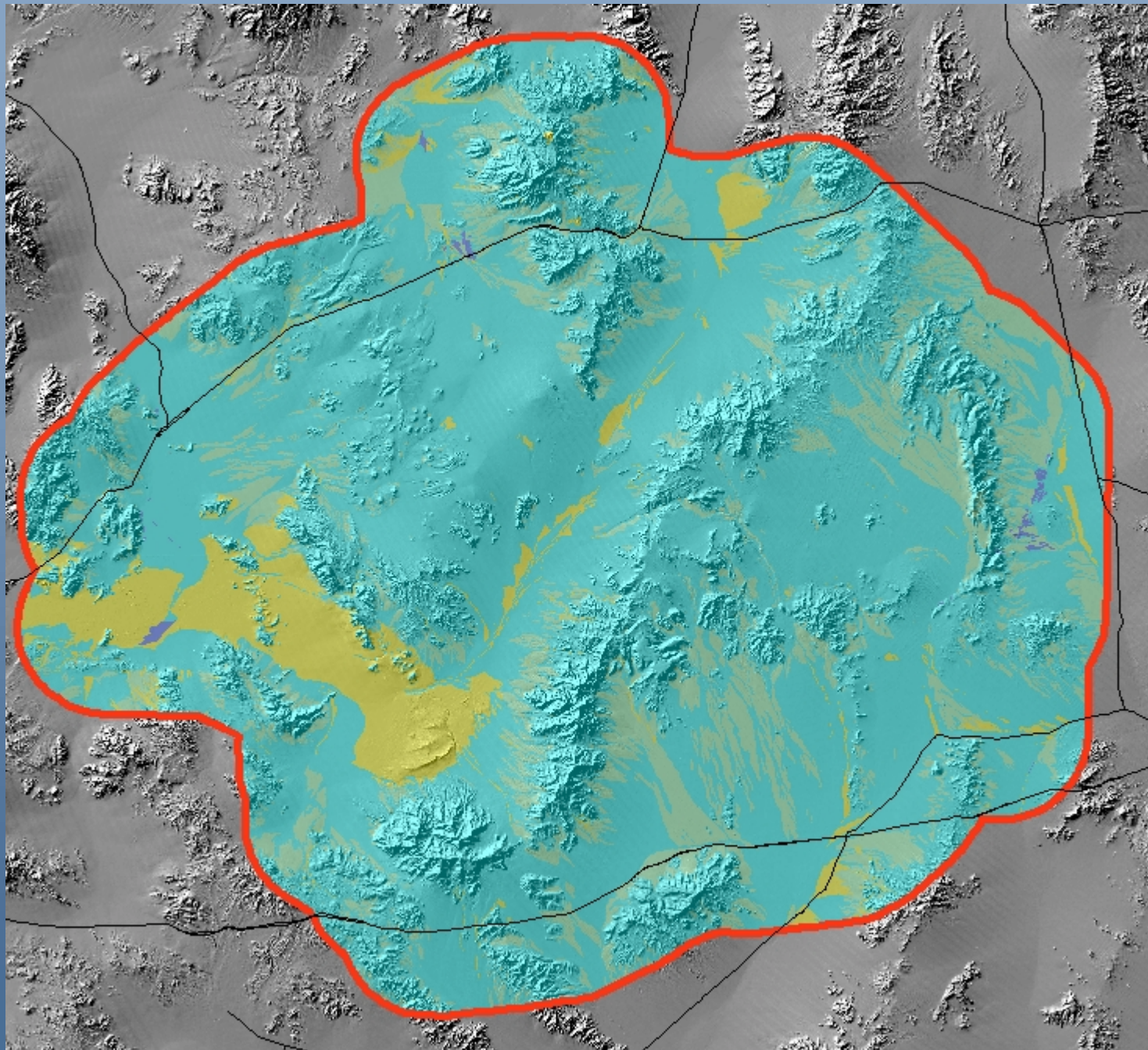
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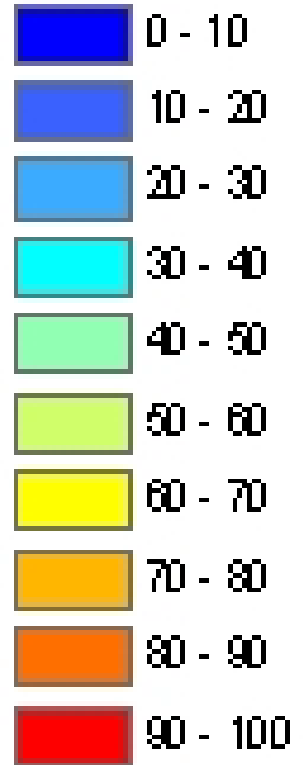
Oct.



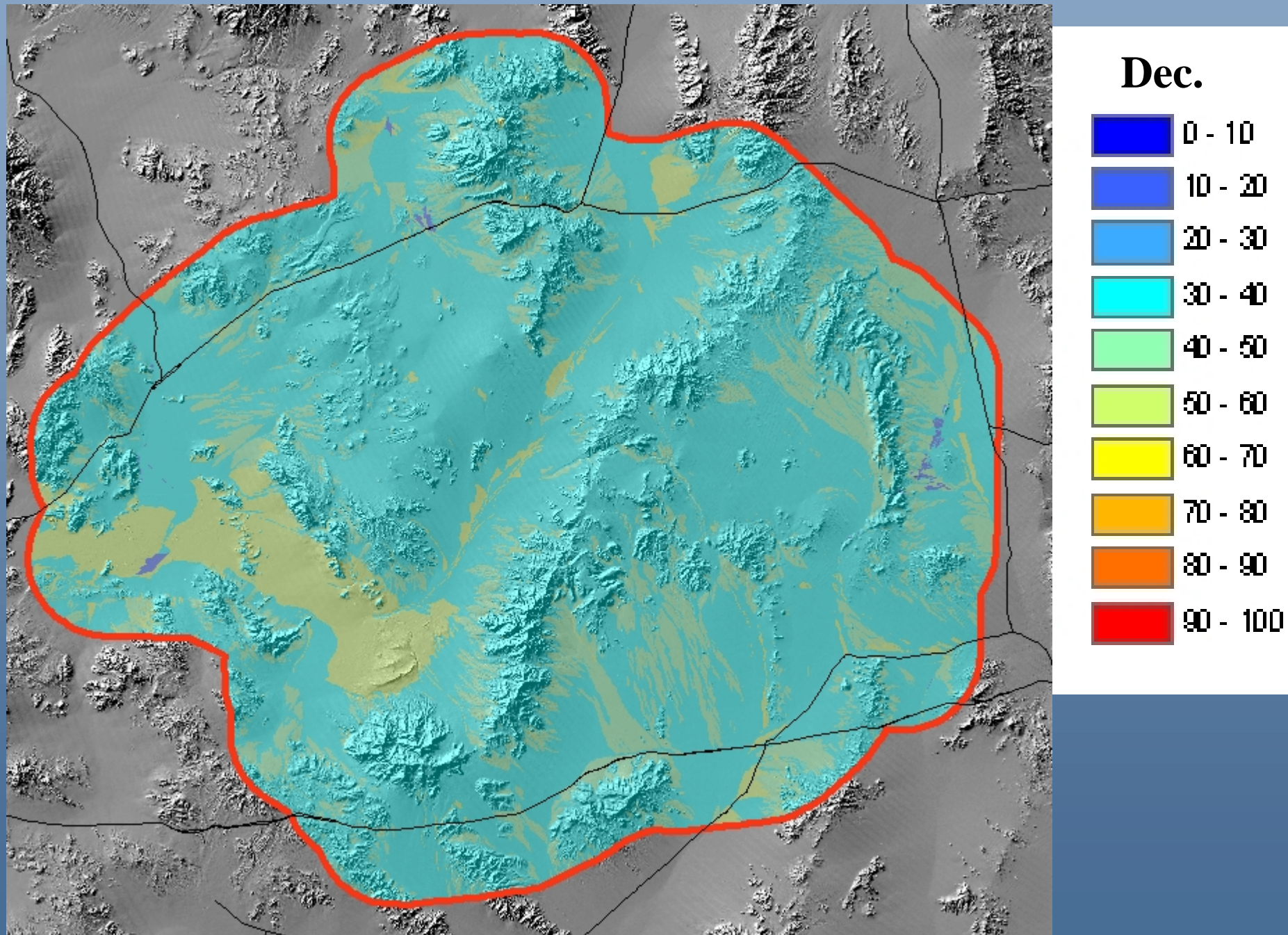
% time per month that a Threshold Friction Velocity is exceeded



Nov.



% time per month that a Threshold Friction Velocity is exceeded



Preliminary Wind Sediment Production Map for Disturbed Soils in the Mojave Nat'l Preserve

Legend

- Main Road
- MOJA border, buffer

Sediment g/m^2

Low



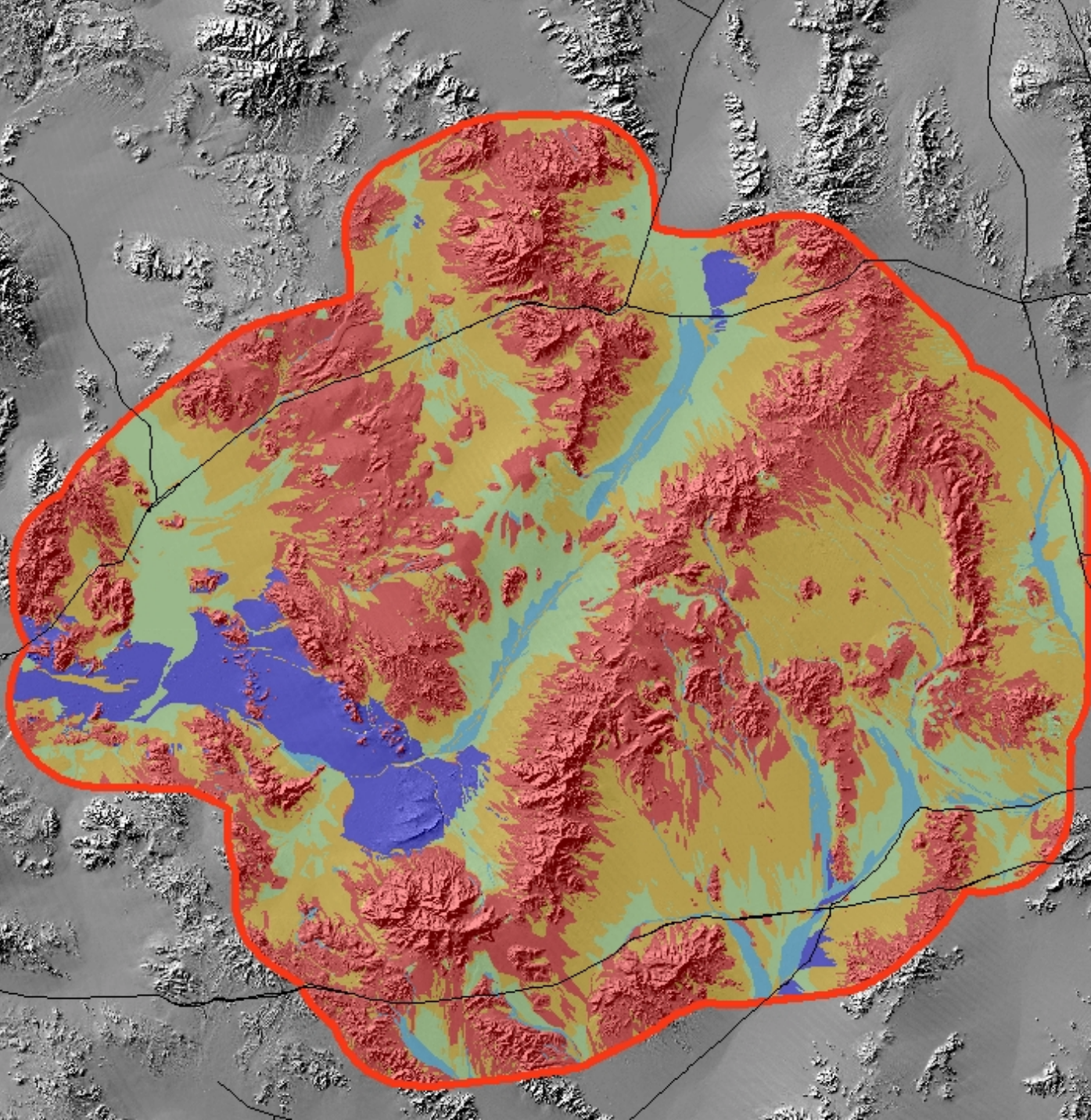
Low



Medium



High



Where from here for Mojave Wind Vulnerability?

- **Anemometers**
- **Repeated disturbances**

A desert landscape at sunset. The sun is low on the horizon, casting a warm, golden glow over the scene. In the foreground, several Joshua trees are silhouetted against the bright sky. In the background, a range of mountains is visible under the hazy light of the setting sun.

CONCLUSIONS

- **Potential crust distribution can be predicted and mapped. We need to understand processes behind distribution for greater predictive power.**
- **Recovery appears to follow a general model, but we need many more dated disturbances**
- **Explore ways to hasten recovery**
- **Vulnerability to wind erosion can be predicted and mapped. We need to include repeated disturbance.**
- **Vulnerability to water erosion has not been tested.**