Final Report:

Technical Support for Trail Restoration and Maintenance for Arches and Canyonlands National Parks

DECISION SUPPORT MODEL ONLY

By

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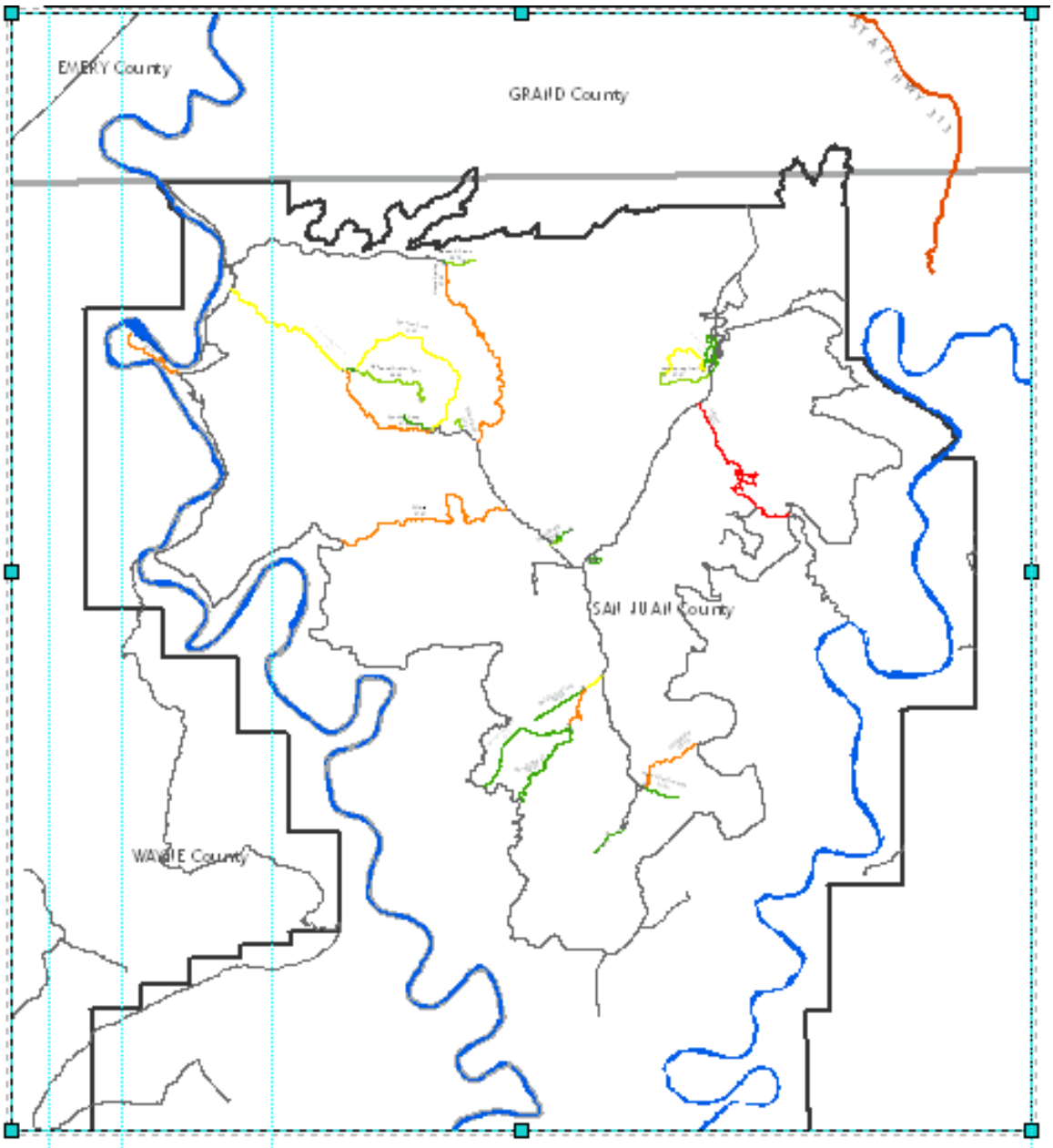
Canyonlands National Park Decision Support Systems: Giving Structure to Decision Making

This section presents a conceptual way of structuring decision making for trail management. It can help prioritize potential trouble areas and support structured use of information in decision making. The system is made up of two parts: Spatial presentation of interpretations on a comprehensive basis, rating all trails for physical sensitivity to erosion; and secondly a way of integrating those interpretations with management decision factors to rate all trails for management priority.

The Island in the Sky District of Canyonlands National Park was use as an example. Since the San Juan Soil Survey was not particularly accurate for soils or interpretations, a physical model was developed on more reliable data. In this case, field data and existing spatial data were used to determine what factors are important, and then to apply those factors across the landscape. A trail spatial layer was attributed from the following spatial query. Sensitive trails were defined as:

- Not bedrock and
  - Slope > 20 or
  - Geology = Moenkopi, and Veg = barren, and slope > 10 or
  - Eolian deposits

Spatial representations came from the geology layer, a 5m slope layer, and the recently-completed draft vegetation layer.



Spatial representation of Trail Sensitivity for Island in the Sky District, Canyonlands National Park

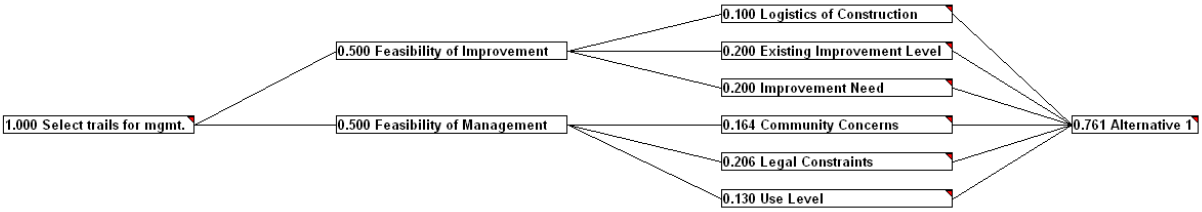
Though this is a useful product on its own, it does not reflect feasibility criteria that Management uses to prioritize actions, such as resource allocations, political considerations, legal constraints, logistical considerations, and use levels. These criteria are captured in the second part of the the decision making system. This part was developed from EMDS (Ecosystem Management Decision Support) , created by the Forest Service and used by many agencies. The modification made here retains the integration of spatial factors, the documentation system, the systematic decision-making process, but replaces the complex physical factor model with a simpler, more usable one.

The software used for this is based on DECISION PLUS (© Criterium Software), and a spatial linkage (PRIORITY ANALYST) developed by that company used in ARCGIS. It includes a structured way of developing criteria, a method of rating those criteria for importance to management, and a spatial linkage to both obtain spatial data and to output results. For this example 40 trail segments were rated, making manual calculations difficult, but easily handled by this software.

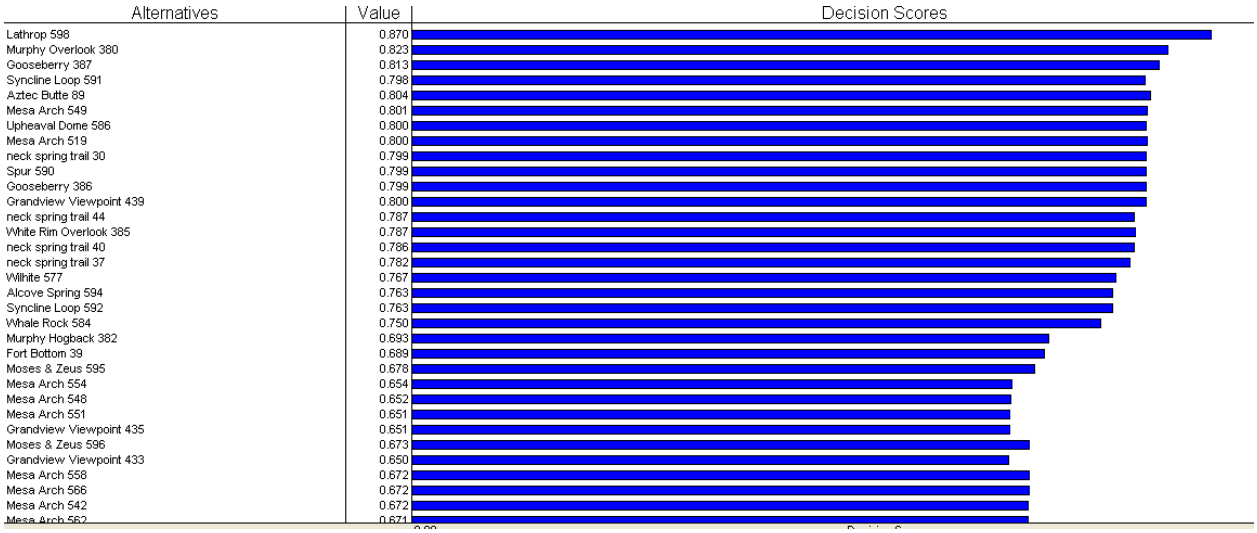
The decision factors used in this example include:

- Feasibility of improvement
  - Logistics of construction (trail length)
  - Existing improvement level (present trail surface)
  - Need for improvement (Sensitivity)
- Feasibility of management
  - Community Concerns
  - Legal Constraints
  - Level of Use (Distance to paved road)

Though legal and community concerns are all rated identically in this example, they could easily be changed in actual applications. The decision model is shown below. Note the numbers next to criteria are weights developed by Management to show relative importance of factors.

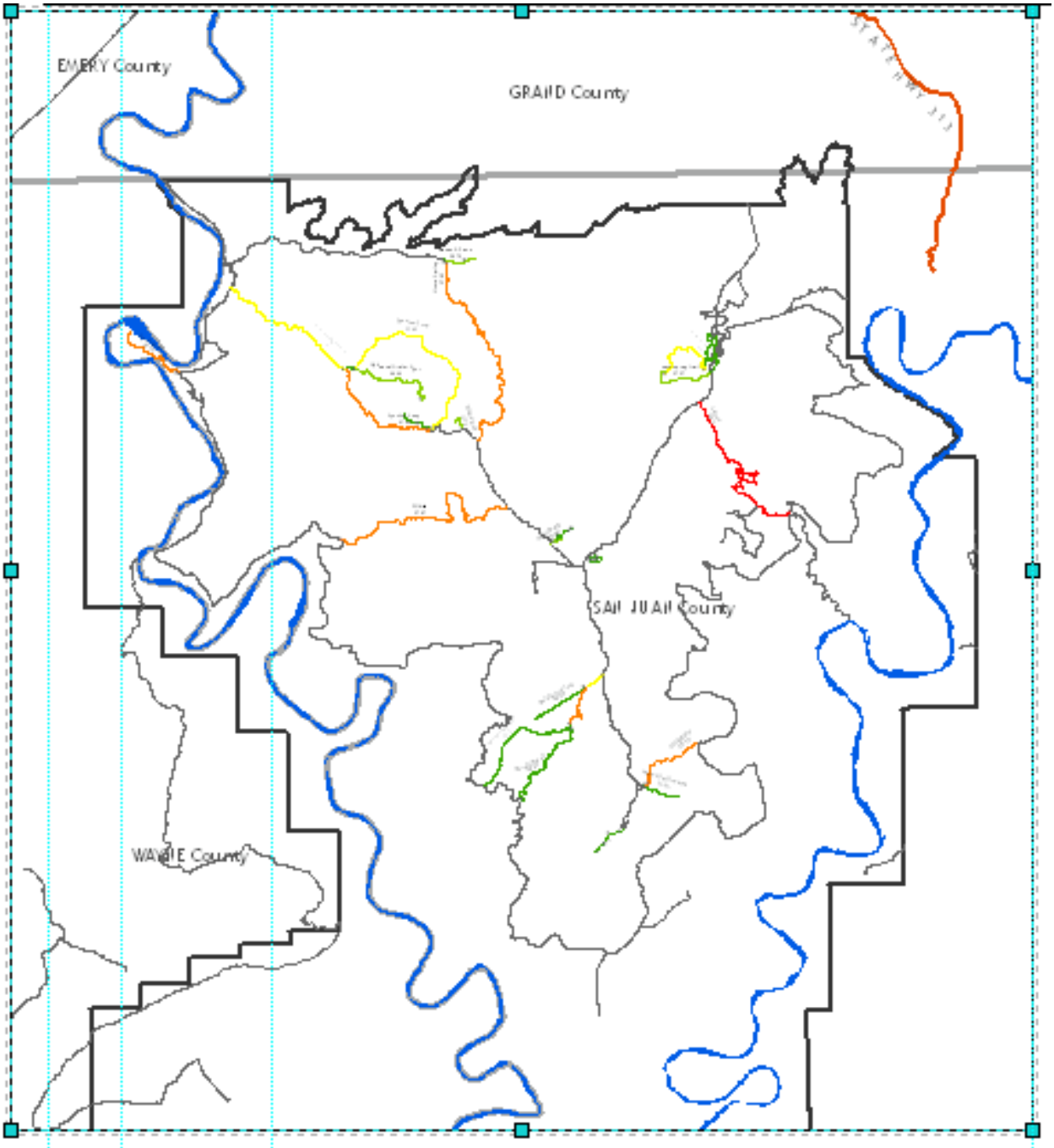


Results can be shown in many graphical and tabular forms.



Alternatives	Value
Lathrop 598	0.870
Murphy Overlook 380	0.823
Gooseberry 387	0.813
Syncline Loop 591	0.798
Aztec Butte 89	0.804
Mesa Arch 549	0.801
Upheaval Dome 586	0.800
Mesa Arch 519	0.800
neck spring trail 30	0.799
Spur 590	0.799
Gooseberry 386	0.799
Grandview Viewpoint 439	0.800
neck spring trail 44	0.787
White Rim Overlook 385	0.787
neck spring trail 40	0.786
neck spring trail 37	0.782
Wilhite 577	0.767
Alcove Spring 594	0.763
Syncline Loop 592	0.763
Whale Rock 584	0.750
Murphy Hogback 382	0.693
Fort Bottom 39	0.689
Moses & Zeus 595	0.678
Mesa Arch 554	0.654
Mesa Arch 548	0.652
Mesa Arch 551	0.651
Grandview Viewpoint 435	0.651
Moses & Zeus 596	0.673
Grandview Viewpoint 433	0.650
Mesa Arch 558	0.672
Mesa Arch 566	0.672
Mesa Arch 542	0.672
Mesa Arch 562	0.671

Spatial results are shown below. Note colors refer not to trail sensitivity as shown above, but to the total score of the ratings for all the factors, giving Management a tool for structured decision support, documentation, and the ability to run scenarios of many different weightings and factor ratings. Compare this with the trail sensitivity shown above.


EMERY County
GRAND County
SAN JUAN County
WAYNE County

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