

San Juan Fens: Fact Sheet



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San Miguel County

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San Juan Public Lands Center (USFS/BLM)

Grand Mesa, Uncompahgre, and Gunnison National Forest (GMUG)

Durango Mountain Resort



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Old-Growth Wetlands

Fens are groundwater-fed wetlands that support high biodiversity and unique plant communities. The soil in a fen is saturated with water, which creates a low-oxygen environment that slows decomposition and accumulates organic peat over time. Fens in the San Juan Mountains have up to three meters of peat and most are thousands of years old. They are abundant in the San Juans because of the combination of snowmelt and summer monsoon rains. In addition to historic impacts from mining and drainage ditches, these local fens face threats from poorly planned development and from climate change. Both can alter the amount of water that reaches the fen and can cause the wetland to dry out.

Conclusions from San Juan Fen Mapping, Classification, and Assessment Project

During an extensive mapping and assessment effort MSI and the USFS:

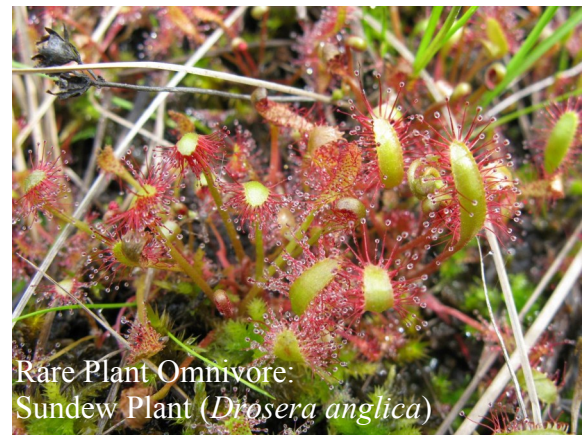
- Mapped 624 fens in 37 watersheds
- Collected field data on 182 fens, 309 stands sampled
- Estimated approx. 2,000 fens in the San Juan Mountain study area
- Found most fens in subalpine zone, average elevation of 3,288 m
- Found Fens averaged 1.2 hectare in size
- Measured peat thickness averaged 3.9 feet (1.2 m)
- Surface slope ranged from 0–21%.
- Counted 190 vascular plants and 68 bryophyte taxa in the 182 fens
- Classified 20 plant communities
- Majority of fens were in excellent condition; 10% of our sample highly disturbed

What are the Functions of Fens?

- * Regulate movement of sediment, nutrients and water in watersheds
- * Support a high proportion of regional biodiversity
- * Critical for amphibians
- * Key scenic components of mountain lands

Global Functions of Fens

- * Comprise approximately 2% of earth's surface
- * 20 to 25% of all terrestrial carbon is stored in peatlands like fens
- * Help Regulate Carbon Budgets
- * Influence global water, nitrogen, and sulfur budgets
- * Support species that survive in perennially saturated soils: plants, waterfowl, invertebrates



Rare Plant Omnivore:
Sundew Plant (*Drosera anglica*)

Intensive Fen Assessment for the San Juans

Fifty-five fens in San Miguel and Western Ouray Counties and 182 fens from across the San Juan Mountains were intensively surveyed during 2005-2007. These fens were randomly selected from a larger set of potential fens suggested by aerial photography.

From this random survey, it was estimated that about 2,000 fens exist in the San Juan Mountains occupying an area of about 2,400 hectares (~6,000 acres). Twenty distinct plant communities were identified as associated with different geologic conditions.

The majority of fens that were assessed were in good to excellent condition. Fifteen percent of the fens were in fair to poor condition, however, with 10% ranked as having high to very

high restoration priority. Therefore the random sample design indicates that upwards of 200 fens in the San Juan Mountains are in need of restoration.

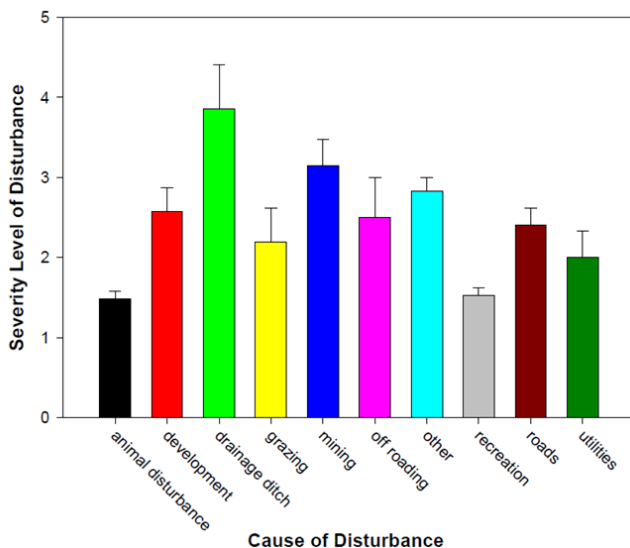
A variety of disturbances with varying levels of severity were identified in fens (see chart to below). Fens in excellent and good condition had no or few low severity impacts. Fens in fair condition had moderate to high severity disturbances and fens in poor condition all had high severity disturbances. The most common disturbances encountered were impacts from adjacent roads, recreation, animal disturbances, development, mining, grazing, and drainage.

The Fen Assessment was led by Dr. David Cooper and Joanna Lemly (CSU) and Dr. Rod

Chimner (MTU). It was funded mainly by two grants awarded to MSI from the US EPA.

Both San Juan Public Lands Center (SJPLC) and Grand Mesa, Uncompahgre, and Gunnison National Forest (GMUG) initiated fen inventories of their own. These inventories, while less intensive than those conducted by the CSU-MTU-MSI Fen Team, provided information on a greater number of fens.

From 2005-2008, the SJPLC visited 800 of about 2000 potential fens suggested from aerial photos, and identified 505 fens. Most fens occurred in the 10,000-11,000 ft elevation. The SJPLC Fen Assessment offered an important tool for preparing the Forest Plan.



Threats to Fen Functions

Fens are affected directly and indirectly by human related activities. Direct effects include infilling, draining, soil compaction, or damage to plants. Indirect effects are imposed on wetlands without directly touching the fens. Building roads, parking lots, and excavation activities can change surface and/or groundwater. Groundwater alteration, changes in land use, nutrient enrichment, and the introduction of exotic species can all result in diminished function of fens.

Even slight changes to groundwater sources can alter the functionality of a fen. Once the water table is lowered, peat layers are exposed to more oxygen and begin to decompose. This results in a reduction of peat depth, changes in hydrological patterns, and overall changes in the nature of vegetation that a fen can sustain.

In addition to altering hydrological regimes, changes in land use practice can have direct

impacts to the soils and vegetation of fens. Grazing, recreation, timber and energy development can result in compacting peat layers, destroying hummocks, reducing the ability of peat mats to float, and causing areas of bare ground.

Increased nutrient levels associated with land use changes can result in changes to species composition in fens and wetlands. Higher nutrient levels often allow the establishment of more aggressive, invasive species into an area.

Exotics often out compete native species, particularly when establishing in disturbed areas (i.e. areas impacted by mining, construction, and frequent recreation). Exotic plants are known to reduce bio-diversity, and may alter decomposition rates in a wet area. This may translate into changes in the functional contributions that a wet area offers the ecosystem, including changes in animal life that it can support.

Useful Protection Tools

- 1) **Identification/ Mapping**—It is difficult to protect resources that are not known to exist. Documenting resources during platting goes a long way.
- 2) **Buffers**—Buffers can go a long way to protecting the primary components of fens by preventing activity within fens. Effective buffer size for fens is still unknown. Most research recommends a minimum of 100 feet.
- 3) **Protect Isolated Wetlands**—Fens may not show characteristics necessary to fall under Army Corps Jurisdiction. Identifying isolated wetlands in county land use codes may protect key resources.
- 4) **Encourage Preservation**—It takes thousands of years for the soils of fens to develop. It can be difficult and expensive to mitigate disturbance to fens.
- 5) **Water Source Protection**—It is important to understand the hydrology of a fen. Preventing the alteration of groundwater movement is necessary to maintaining fen characteristics.

Fen Conservation Opportunities

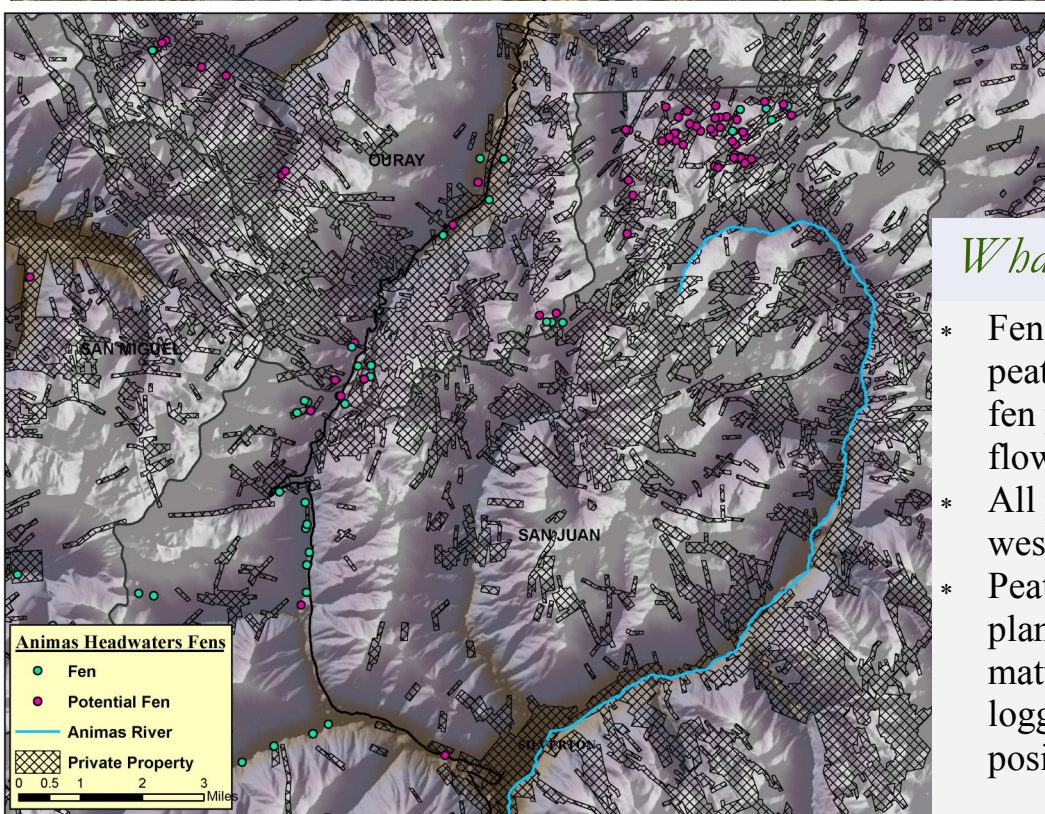
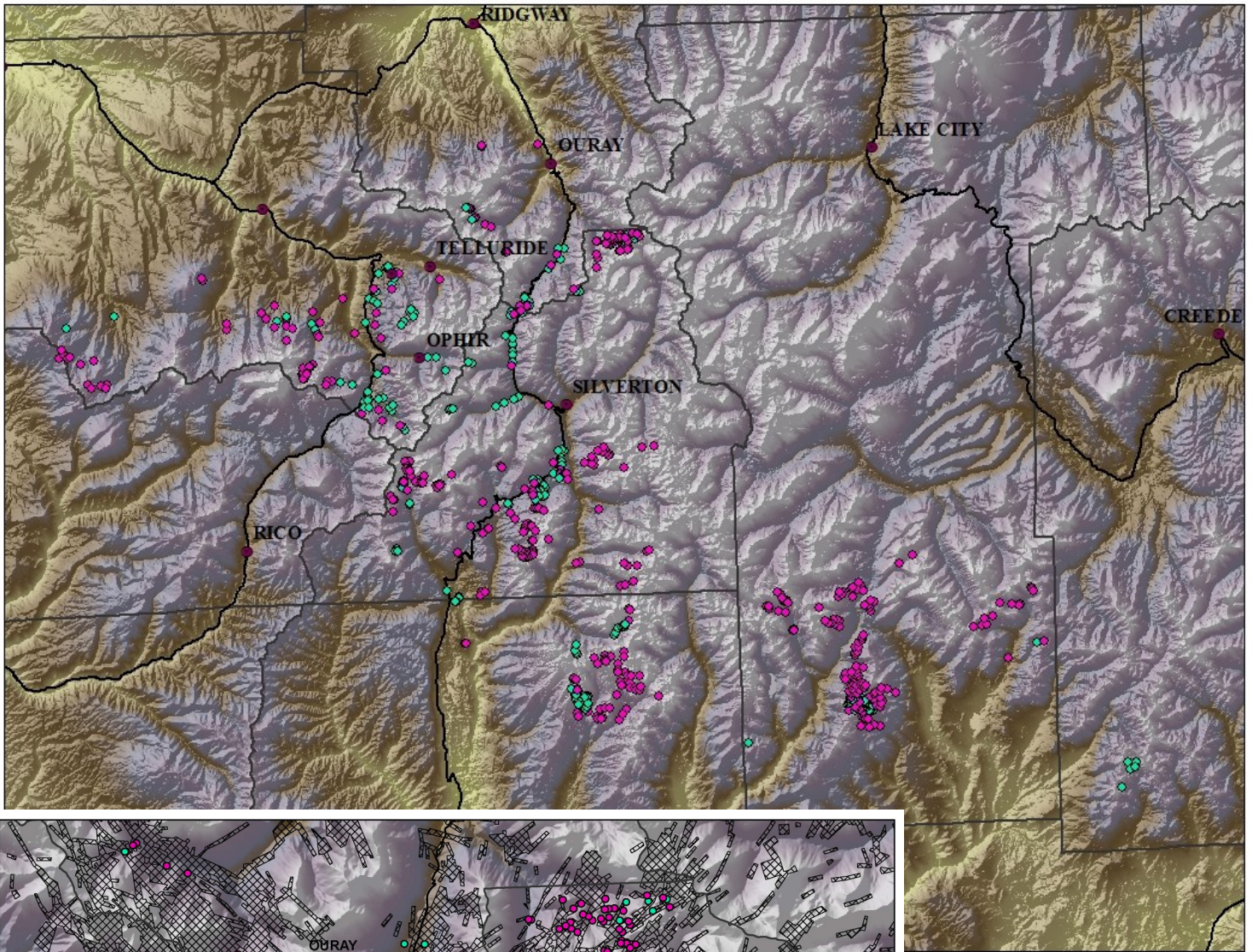
Fens rarely have specific protection measures put in place to maintain key environmental components. They are most frequently considered, or valued as, wetlands. Often they are not protected by the Army Corps of Engineers (Corps) permitting process because they do not demonstrate the connectivity to rivers and streams, or meet minimum size requirements that allow them to fall under the Corps jurisdiction. If fens are determined to be of importance to regional communities, it may become the responsibility of those communities to establish protective measures.

Local and regional governments have the opportunity to identify and protect the characteristics of the landscape that make their community unique and healthy. In the case of protecting fens, local governments have an expanded opportunity to fill voids in protections offered by the State and Federal government. Counties and Municipalities have explored a variety of tools to encourage the protection of high elevation wetlands and fens. The tools are included in zoning codes and comprehensive plans, subdivision regulations, floodplain management plans, and storm-water management practices (See the chart below). These tools can include conventional regulatory codes, incentive programs encouraging wetland protections, and prioritizing habitat conservation.

Local Government Wetland Management Practices

Tools	La Plata County	San Miguel	Archuleta	Summit	Eagle	Boulder County	Pitkin	City of Boulder	Town of Telluride	San Juan County	Mountain Village Telluride
Identification/ Mapping	LUC	LUC	LUC	LUC	LUC	LUC	LUC		MP	LUC	WMP
Buffers/ Setbacks	LUC-50 feet	LUC-100 feet	LUC- Riparian buffers fifty (50) feet	LUC- 25 feet Recommend to increase to 50 to 300 in future	LUC- points for 100 feet and Points for 200 feet		LUC- 100 feet with 25 feet for isolated- Variance to 150 or 50 feet	LUC- 25 to 50 feet	LUC- 25 feet		
Protection Corridors	LUC	CP		MP	CP/ MP						
No Net Loss Initiatives	LUC- W/in River Corridor		LUC	LUC				LUC			
Mitigation/ Restoration/ Off set Damage	LUC- W/in River Corridor	LUC		LUC	LUC		LUC	LUC	LUC		WMP
Thresholds/ Performance Standards	LUC										
Flood Zones/ Floodplains	LUC- W/in River Corridor	CP	LUC	LUC	LUC	LUC	LUC	LUC			
Reference to Army Corps	LUC	CP	LUC	LUC			LUC	LUC			WMP/SQI
Preservation Encouraged	LUC	LUC		CP/ MP		CP			MP	LUC	
Comprehensive Plan		X	X	X	X		X				
Drainage Protection		LUC			LUC		LUC				
Erosion Prevention		LUC		LUC	LUC		LUC				
Protect High Country Resources		LUC									
Special Use Permit		LUC					LUC	LUC			
Memorandum of Understanding		With EPA, Army Corps									
Watershed Protection		LUC	LUC	CP/ MP	CP					LUC	
Water Source Protection		LUC			CP		LUC			LUC	SQI
Water Quality Protection		LUC		LUC			LUC			LUC	WMP/SQI
Conservation Easements				CP	LUC	LUC					WMP
Incentives				LUC			LUC				
Financial Guarantee				LUC				LUC	LUC		
Work Cooperatively				LUC	CP	CP			MP		
Discuss isolated wetlands				LUC			LUC	LUC			
Variable width setbacks				CP							
Wildlife habitat				CP					MP	LUC	
Incorporated Best Management Practices								LUC			WMP/SQI
Soils Protections									LUC		
Open Space Purchases									MP		

Key: LUC—Land Use Code; CP—Comprehensive Plan; MP—Master Plan; WMP— Watershed Management Plan; SQI—Stormwater Quality Initiative



What Makes a Fen a Fen?

- * Fens are groundwater driven peatlands; waterlogging in a fen produced by ground water flow
- * All peatlands in mountainous western US are fens
- * Peatlands accumulate dead plant litter (Carbon or organic matter storage) due to waterlogged soils that limits decomposition