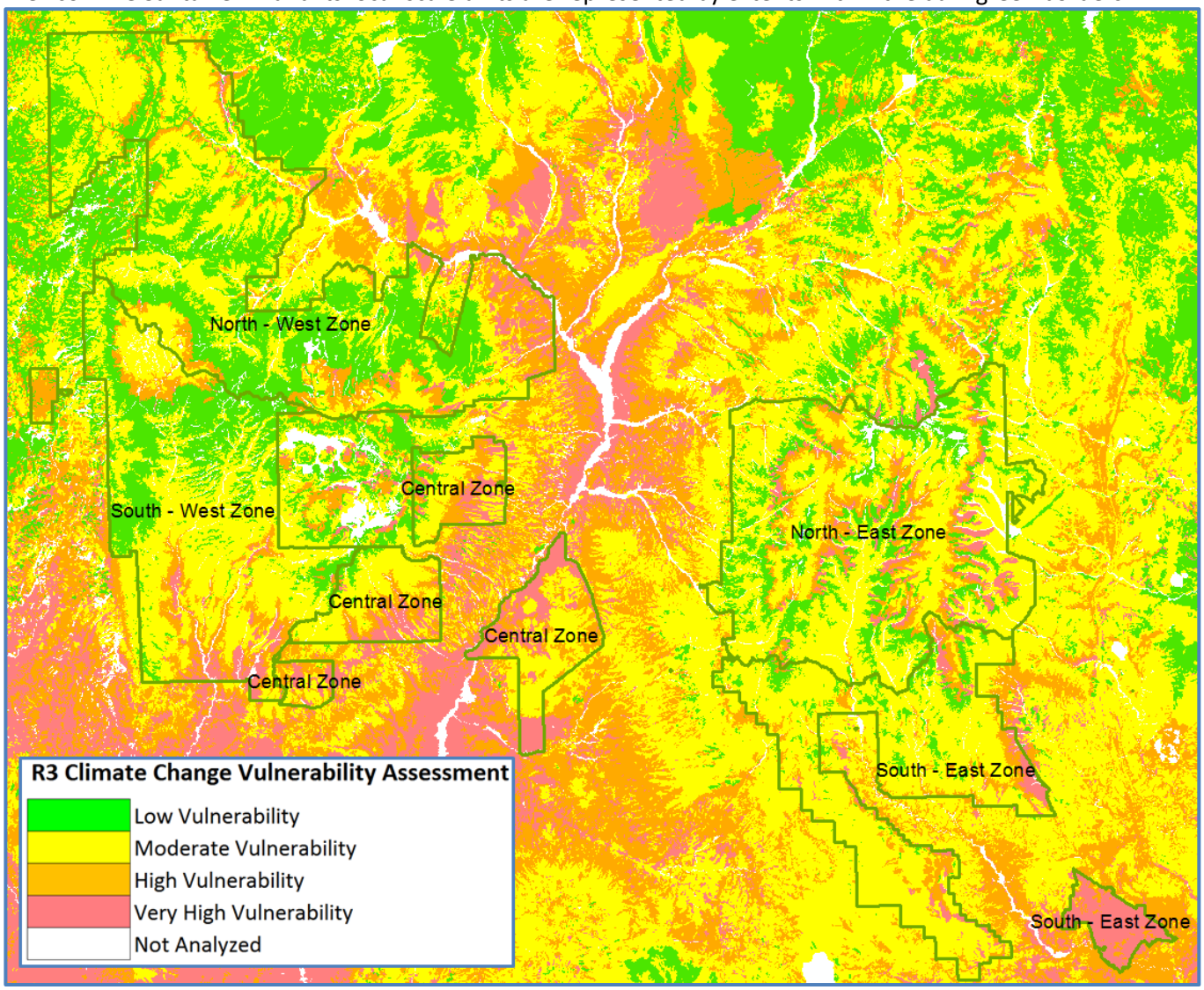
Climate Change Vulnerability Assessment
Santa Fe National Forest

April 2015

The Climate Change Vulnerability Assessment project (CCVA) was developed as an ecosystem-based evaluation of the potential vulnerability of Southwest ecosystems to the projected climate of late 21st-century. This report provides tabular summaries for each major upland Ecological Response Unit (ERU) of the Santa Fe NF. An overview of the project is given in the accompanying CCVA executive summary (USDA Forest Service 2013).

Figure 1. Patterns of vulnerability to climate change on the Santa Fe NF and surrounding lands of northern New Mexico. The Santa Fe NF and its local-scale units are represented by extents within the dark green borders.



Ecological Response Units of the Santa Fe National Forest

Table 1 lists the major ERUs of the Santa Fe NF along with the relative contribution to the reporting area. A total of 11 major upland Ecological Response Units (ERUs) were identified for the Santa Fe NF. Riparian ERUs collectively represent almost 3% of the Forest. The Mixed Conifer—Frequent Fire makes up the largest portion of the Santa Fe, at over 25%, with the remaining upland ERUs representing between 1 and 24%.

Table 1. Major Ecological Response Units of the Santa Fe NF.

ERU	ERU Code	Approximate Percentage of the Forest
Colorado Plateau / Great Basin Grassland	CPGB	2%
Juniper Grass	JUG	6%
Mixed Conifer - Frequent Fire	MCD	26%
Mixed Conifer w/ Aspen	MCW	2%
Montane / Subalpine Grassland	MSG	1%
PJ Grass	PJG	3%
PJ Woodland	PJO	14%
PJ Sagebrush	PJS	2%
Ponderosa Pine Forest	PPF	24%
Sagebrush Shrubland	SAGE	2%
Spruce-Fir Forest	SFF	15%
Minor, riparian, other	various	3%

Reporting Units

This assessment provides three scales of reporting for vulnerability:

- Plan Unit Scale – Includes all land within the administrative boundary of the Santa Fe NF
- Local scale (geographic areas) – Includes all lands within the administrative boundaries of the five Santa Fe local scale units, each made up of clusters of 6th-level watersheds
- Subwatershed – Includes all lands within 6th-level watersheds that intersect the Santa Fe NF

Summary of Tabular Reporting

Reporting at each of the three scales provides useful insights for interpretation of climate change vulnerability results for the reporting area. In the tables to follow, vulnerability and uncertainty are reported for each scale and for all ecosystems collectively. In all cases the reporting reflects an all-lands summary, regardless of ownership. For the Plan unit and local scales, reporting is also broken out by ERU. The CCVA results for the subwatershed scale are shown as one vulnerability category for each watershed, representing a composite scoring of vulnerability for all lands.

Interpretation of Results

The CCVA results infer vulnerability based on the projected climate departure from the historic climate envelope for a given ERU and location. In broad terms it may be helpful to think of future climate simply as a potential stressor of significant change (i.e., on structure, composition, function), with the vulnerability rating on par with risk or probability of stress – either low, moderate, high, or very high. In more specific terms, vulnerability can be considered the 'relative probability of type conversion'. Vulnerability is a consequence of at least three factors:

- Breadth of the envelope for a given ERU
- Current status of a given location relative to its ERU envelope
- Magnitude of projected climate change at that location

The thematic resolution of most ERUs is similar, and the ERU framework was modified to ensure normal distributions for key climate variables. As a result, the breadth of the climate envelopes is fairly similar among ERUs. That said, an ERU with a relatively broad envelope is inherently less vulnerable, keeping in mind that climate departure also depends on the projected climate for a given location, and on whether a given plant community currently falls relative to the envelope. Also, though riparian ERUs were not specifically analyzed for CCVA, some inference of the vulnerability of these systems can be taken from the watershed-scale results in the final set of tables to follow.

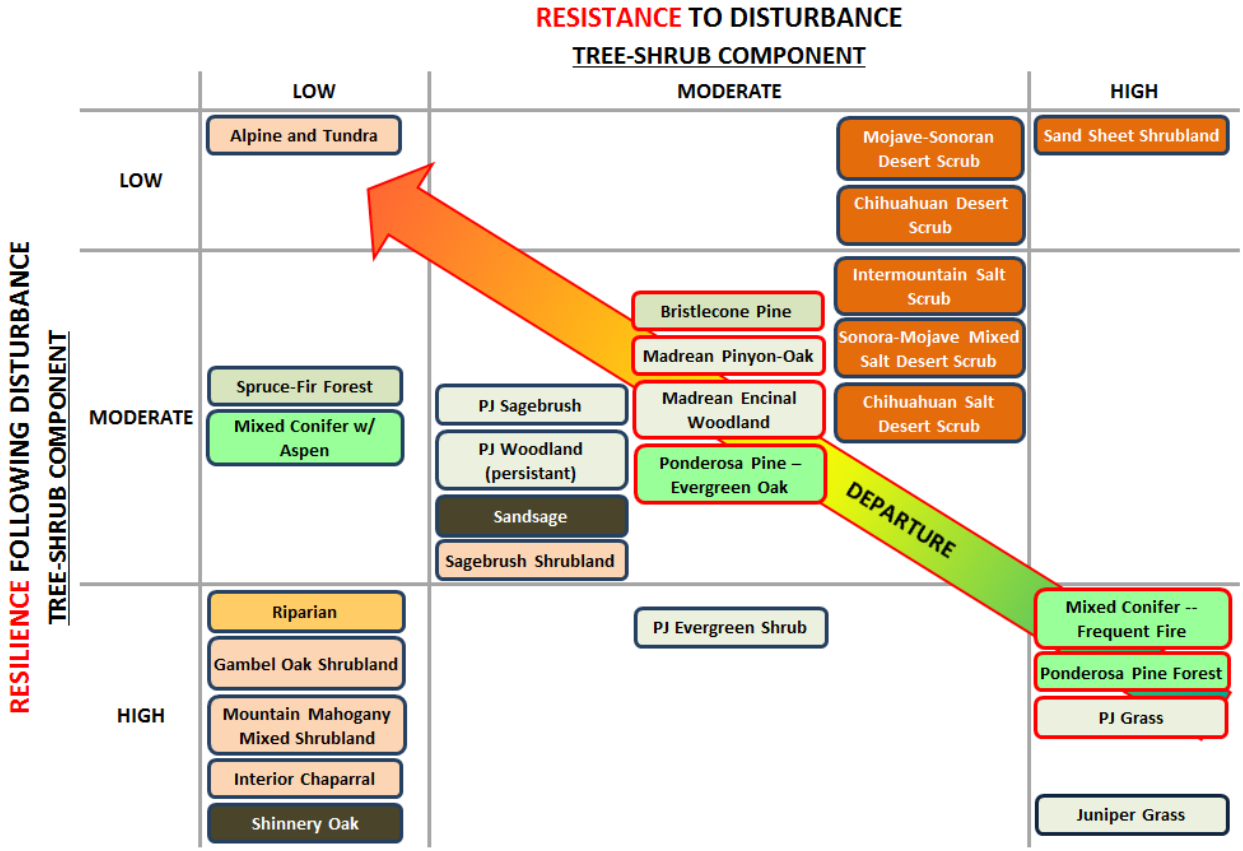
Finally, the current resilience and resistance of ecosystems may be interacting factors in climate change vulnerability, to be expressed in the risk assessment. Figure 2 on the following page offers perspectives on resistance and resilience when considering the significance of climate change vulnerability.

References

Guida, R.J., S.R. Abella, W.J. Smith Jr., H. Stephen, and C.L. Roberts. 2014. Climatic change and desert vegetation distribution: Assessing thirty years of change in southern Nevada's Mojave Desert. The Professional Geographer 66: 311-322.

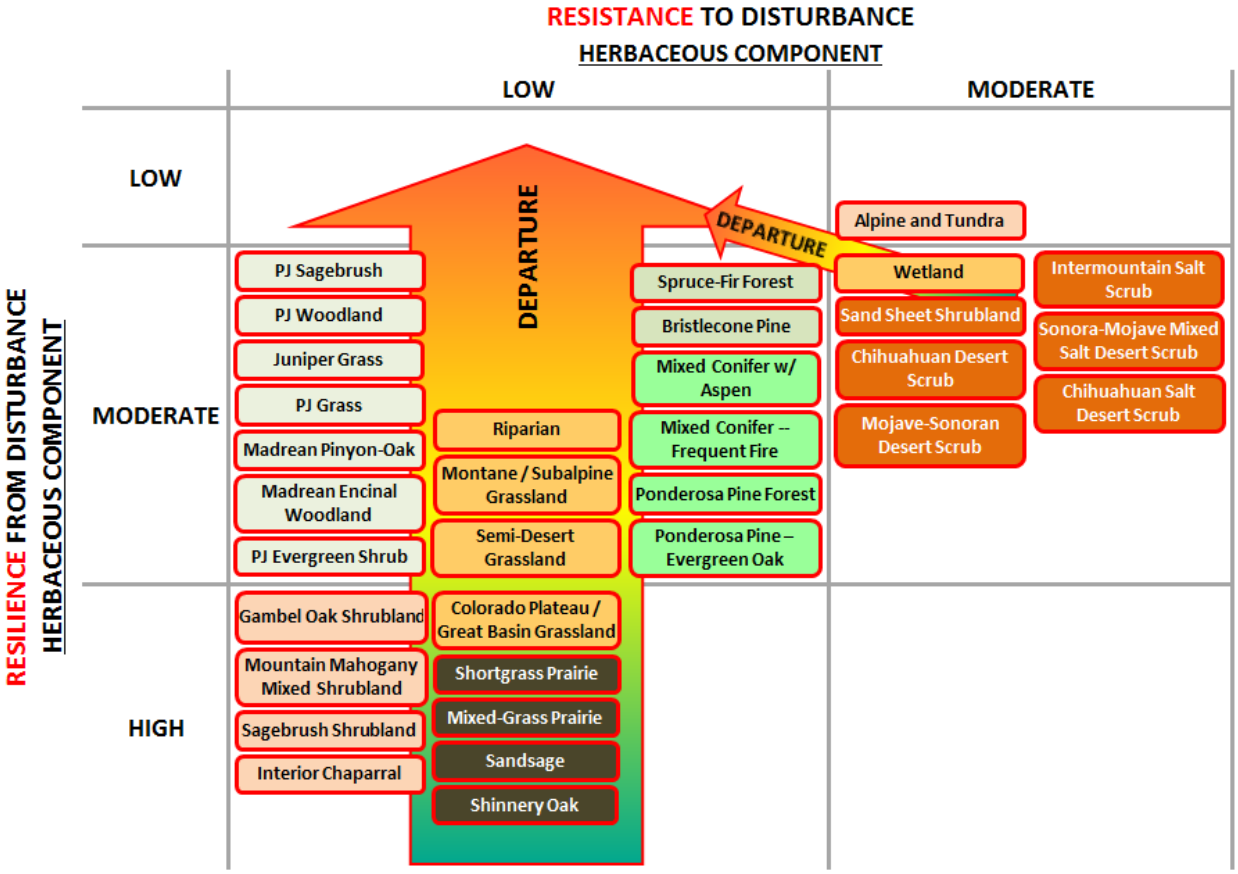
USDA Forest Service. 2013. Climate change vulnerability assessment – Executive summary. Southwestern Region and Rocky Mountain Research Station briefing paper, on file. Regional Office, Albuquerque NM. 4 pp.

Figure 2. Matrices for tree-shrub and herb components of ecosystems showing conceptual relationships among resistance, resilience, and ecosystem departure. Note that *ecosystem departure* here is a separate concept from future *climate departure* represented in the summary tables to follow.



Resistance - The ability of an ecosystem to endure disturbance and maintain the structure, composition, and function that are characteristic of the system. Resistance may be reduced as departure (FRCC) increases, especially for some ecosystems (e.g., BP, MPO, MEW, PPE, MCD, PPF, PJG).

Resilience - The ability of an ecosystem, following disturbance, to regain the structure, composition, and function that are characteristic of the system on a time span consistent with its successional patterns. Resilience may be reduced as departure (FRCC) increases especially, for some ecosystems (e.g., BP, MPO, MEW, PPE, MCD, PPF, PJG).


RESISTANCE TO DISTURBANCE
HERBACEOUS COMPONENT
LOW
MODERATE
RESILIENCE FROM DISTURBANCE
HERBACEOUS COMPONENT
LOW
MODERATE
HIGH
DEPARTURE
DEPARTURE
Alpine and Tundra
PJ Sagebrush
PJ Woodland
Juniper Grass
PJ Grass
Madrean Pinyon-Oak
Madrean Encinal Woodland
PJ Evergreen Shrub
Riparian
Montane / Subalpine Grassland
Semi-Desert Grassland
Spruce-Fir Forest
Bristlecone Pine
Mixed Conifer w/ Aspen
Mixed Conifer -- Frequent Fire
Ponderosa Pine Forest
Ponderosa Pine – Evergreen Oak
Wetland
Sand Sheet Shrubland
Chihuahuan Desert Scrub
Mojave-Sonoran Desert Scrub
Intermountain Salt Scrub
Sonora-Mojave Mixed Salt Desert Scrub
Chihuahuan Salt Desert Scrub
Gambel Oak Shrubland
Mountain Mahogany Mixed Shrubland
Sagebrush Shrubland
Interior Chaparral
Colorado Plateau / Great Basin Grassland
Shortgrass Prairie
Mixed-Grass Prairie
Sandsage
Shinnery Oak

Vulnerability at the Plan Unit Scale

All Ecosystems

		Uncertainty Category			
Forest	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
Santa Fe National Forest	Low Vulnerability	12%	12%	0%	24%
	Moderate Vulnerability	2%	40%	13%	54%
	High Vulnerability	6%	8%	0%	14%
	Very High Vulnerability	8%	0%	0%	8%
Grand Total		**27%**	**60%**	**13%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
CPGB	Low Vulnerability	12%	3%	0%	15%
	Moderate Vulnerability	0%	39%	22%	61%
	High Vulnerability	1%	1%	0%	3%
	Very High Vulnerability	22%	0%	0%	22%
CPGB Total		**36%**	**43%**	**22%**	
JUG	Low Vulnerability	20%	9%	0%	29%
	Moderate Vulnerability	6%	42%	5%	54%
	High Vulnerability	2%	13%	0%	15%
	Very High Vulnerability	2%	0%	0%	2%
JUG Total		**31%**	**64%**	**5%**	
MCD	Low Vulnerability	16%	22%	0%	38%
	Moderate Vulnerability	0%	47%	12%	59%
	High Vulnerability	1%	2%	0%	3%
	Very High Vulnerability	1%	0%	0%	1%
MCD Total		**17%**	**71%**	**12%**	
MCW	Low Vulnerability	0%	1%	0%	1%
	Moderate Vulnerability	0%	49%	48%	97%
	High Vulnerability	0%	2%	0%	2%
	Very High Vulnerability	0%	0%	0%	0%
MCW Total		**0%**	**52%**	**48%**	

MSG	Low Vulnerability	32%	59%	0%	91%
	Moderate Vulnerability	0%	8%	0%	8%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**32%**	**67%**	**0%**	
PJG	Low Vulnerability	0%	1%	0%	1%
	Moderate Vulnerability	0%	18%	9%	27%
	High Vulnerability	7%	15%	0%	22%
	Very High Vulnerability	50%	0%	0%	50%
PJG Total		**57%**	**33%**	**9%**	
PJO	Low Vulnerability	20%	6%	0%	26%
	Moderate Vulnerability	7%	44%	7%	57%
	High Vulnerability	3%	9%	0%	12%
	Very High Vulnerability	5%	0%	0%	5%
PJO Total		**35%**	**58%**	**7%**	
PJS	Low Vulnerability	2%	2%	0%	4%
	Moderate Vulnerability	0%	6%	4%	10%
	High Vulnerability	14%	3%	0%	17%
	Very High Vulnerability	68%	0%	0%	68%
PJS Total		**85%**	**11%**	**4%**	
PPF	Low Vulnerability	5%	8%	0%	13%
	Moderate Vulnerability	0%	41%	22%	62%
	High Vulnerability	6%	10%	0%	16%
	Very High Vulnerability	8%	0%	0%	8%
PPF Total		**20%**	**59%**	**22%**	
SAGE	Low Vulnerability	48%	47%	0%	96%
	Moderate Vulnerability	4%	0%	0%	4%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
SAGE Total		**53%**	**47%**	**0%**	
SFF	Low Vulnerability	0%	7%	0%	7%
	Moderate Vulnerability	0%	38%	11%	49%
	High Vulnerability	20%	13%	0%	33%
	Very High Vulnerability	11%	0%	0%	11%
SFF Total		**31%**	**58%**	**11%**	

Vulnerability at the Local Scale

Central Zone

All Ecosystems

		Uncertainty Category			
Local Unit	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
Central Zone	Low Vulnerability	2%	3%	0%	5%
	Moderate Vulnerability	2%	37%	9%	48%
	High Vulnerability	10%	13%	0%	23%
	Very High Vulnerability	24%	0%	0%	24%
Grand Total		**38%**	**53%**	**9%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
CPGB	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	6%	2%	0%	8%
	Very High Vulnerability	92%	0%	0%	92%
CPGB Total		**98%**	**2%**	**0%**	
JUG	Low Vulnerability	1%	0%	0%	1%
	Moderate Vulnerability	19%	75%	0%	94%
	High Vulnerability	0%	5%	0%	5%
	Very High Vulnerability	0%	0%	0%	0%
JUG Total		**20%**	**80%**	**0%**	
MCD	Low Vulnerability	6%	10%	0%	15%
	Moderate Vulnerability	0%	46%	20%	66%
	High Vulnerability	4%	11%	0%	15%
	Very High Vulnerability	5%	0%	0%	5%
MCD Total		**14%**	**66%**	**20%**	
MSG	Low Vulnerability	29%	69%	0%	99%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**30%**	**70%**	**0%**	

PJG	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	42%	9%	51%
	High Vulnerability	16%	25%	0%	42%
	Very High Vulnerability	7%	0%	0%	7%
PJG Total		**24%**	**67%**	**9%**	
PJO	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	66%	6%	73%
	High Vulnerability	2%	24%	0%	26%
	Very High Vulnerability	1%	0%	0%	1%
PJO Total		**4%**	**90%**	**6%**	
PJS	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	16%	1%	0%	17%
	Very High Vulnerability	83%	0%	0%	83%
PJS Total		**99%**	**1%**	**0%**	
PPF	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	17%	11%	27%
	High Vulnerability	22%	15%	0%	37%
	Very High Vulnerability	36%	0%	0%	36%
PPF Total		**58%**	**32%**	**11%**	
SFF	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	16%	2%	18%
	High Vulnerability	36%	13%	0%	49%
	Very High Vulnerability	33%	0%	0%	33%
SFF Total		**69%**	**29%**	**2%**	

NE Zone

All Ecosystems

		Uncertainty Category			
Local Unit	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
NE Zone	Low Vulnerability	9%	13%	0%	22%
	Moderate Vulnerability	1%	46%	12%	60%
	High Vulnerability	8%	5%	0%	13%
	Very High Vulnerability	6%	0%	0%	6%
Grand Total		**24%**	**64%**	**12%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
CPGB	Low Vulnerability	0%	16%	0%	16%
	Moderate Vulnerability	0%	51%	33%	84%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
CPGB Total		**0%**	**67%**	**33%**	
MCD	Low Vulnerability	14%	18%	0%	32%
	Moderate Vulnerability	0%	57%	11%	68%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MCD Total		**15%**	**75%**	**11%**	
MSG	Low Vulnerability	44%	56%	0%	100%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**44%**	**56%**	**0%**	
PJO	Low Vulnerability	39%	5%	0%	44%
	Moderate Vulnerability	20%	33%	3%	56%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
PJO Total		**59%**	**38%**	**3%**	
PPF	Low Vulnerability	7%	7%	0%	14%
	Moderate Vulnerability	1%	58%	22%	81%
	High Vulnerability	1%	4%	0%	5%
	Very High Vulnerability	0%	0%	0%	0%
PPF Total		**9%**	**68%**	**22%**	
SFF	Low Vulnerability	1%	10%	0%	10%
	Moderate Vulnerability	0%	37%	13%	50%
	High Vulnerability	19%	9%	0%	28%
	Very High Vulnerability	12%	0%	0%	12%
SFF Total		**31%**	**56%**	**13%**	

NW Zone

All Ecosystems

		Uncertainty Category			
Local Unit	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
NW Zone	Low Vulnerability	21%	19%	0%	40%
	Moderate Vulnerability	1%	30%	14%	45%
	High Vulnerability	3%	8%	0%	11%
	Very High Vulnerability	3%	0%	0%	3%
Grand Total		**29%**	**57%**	**14%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
CPGB	Low Vulnerability	80%	15%	0%	94%
	Moderate Vulnerability	0%	4%	0%	4%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	1%	0%	0%	1%
CPGB Total		**81%**	**18%**	**0%**	
JUG	Low Vulnerability	32%	15%	0%	47%
	Moderate Vulnerability	1%	32%	8%	41%
	High Vulnerability	0%	12%	0%	12%
	Very High Vulnerability	0%	0%	0%	0%
JUG Total		**33%**	**59%**	**8%**	
MCD	Low Vulnerability	26%	29%	0%	55%
	Moderate Vulnerability	0%	32%	11%	43%
	High Vulnerability	0%	2%	0%	2%
	Very High Vulnerability	0%	0%	0%	0%
MCD Total		**26%**	**63%**	**11%**	
MCW	Low Vulnerability	0%	1%	0%	1%
	Moderate Vulnerability	0%	57%	41%	99%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MCW Total		**1%**	**58%**	**41%**	

MSG	Low Vulnerability	20%	74%	0%	94%
	Moderate Vulnerability	0%	5%	0%	5%
	High Vulnerability	0%	0%	0%	1%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**20%**	**80%**	**0%**	
PJG	Low Vulnerability	0%	4%	0%	4%
	Moderate Vulnerability	0%	10%	9%	19%
	High Vulnerability	8%	22%	0%	30%
	Very High Vulnerability	47%	0%	0%	47%
PJG Total		**56%**	**36%**	**9%**	
PJO	Low Vulnerability	40%	14%	0%	54%
	Moderate Vulnerability	2%	18%	4%	25%
	High Vulnerability	7%	10%	0%	17%
	Very High Vulnerability	4%	0%	0%	4%
PJO Total		**53%**	**42%**	**4%**	
PJS	Low Vulnerability	10%	7%	0%	17%
	Moderate Vulnerability	0%	25%	16%	41%
	High Vulnerability	7%	12%	0%	18%
	Very High Vulnerability	24%	0%	0%	24%
PJS Total		**41%**	**43%**	**16%**	
PPF	Low Vulnerability	7%	12%	0%	19%
	Moderate Vulnerability	0%	42%	29%	70%
	High Vulnerability	1%	7%	0%	8%
	Very High Vulnerability	3%	0%	0%	3%
PPF Total		**10%**	**61%**	**29%**	
SAGE	Low Vulnerability	48%	47%	0%	96%
	Moderate Vulnerability	4%	0%	0%	4%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
SAGE Total		**53%**	**47%**	**0%**	
SFF	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	41%	12%	53%
	High Vulnerability	20%	23%	0%	43%
	Very High Vulnerability	4%	0%	0%	4%
SFF Total		**24%**	**64%**	**12%**	

SE Zone

All Ecosystems

		Uncertainty Category			
Local Unit	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
SE Zone	Low Vulnerability	6%	5%	0%	11%
	Moderate Vulnerability	4%	49%	14%	66%
	High Vulnerability	5%	6%	0%	11%
	Very High Vulnerability	11%	0%	0%	11%
Grand Total		**26%**	**60%**	**14%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
CPGB	Low Vulnerability	1%	0%	0%	1%
	Moderate Vulnerability	0%	52%	29%	81%
	High Vulnerability	1%	2%	0%	3%
	Very High Vulnerability	15%	0%	0%	15%
CPGB Total		**17%**	**54%**	**29%**	
JUG	Low Vulnerability	12%	2%	0%	14%
	Moderate Vulnerability	11%	40%	8%	59%
	High Vulnerability	6%	8%	0%	14%
	Very High Vulnerability	13%	0%	0%	13%
JUG Total		**42%**	**50%**	**8%**	
MCD	Low Vulnerability	11%	13%	0%	25%
	Moderate Vulnerability	0%	59%	14%	73%
	High Vulnerability	0%	2%	0%	2%
	Very High Vulnerability	0%	0%	0%	0%
MCD Total		**12%**	**74%**	**14%**	
MSG	Low Vulnerability	30%	70%	0%	100%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**30%**	**70%**	**0%**	

PJG	Low Vulnerability	0%	0%	0%	1%
	Moderate Vulnerability	0%	23%	12%	35%
	High Vulnerability	1%	9%	0%	10%
	Very High Vulnerability	54%	0%	0%	54%
PJG Total		**56%**	**33%**	**12%**	
PJO	Low Vulnerability	9%	1%	0%	10%
	Moderate Vulnerability	13%	57%	9%	80%
	High Vulnerability	1%	2%	0%	3%
	Very High Vulnerability	7%	0%	0%	7%
PJO Total		**31%**	**60%**	**9%**	
PPF	Low Vulnerability	2%	4%	0%	6%
	Moderate Vulnerability	0%	44%	16%	61%
	High Vulnerability	10%	12%	0%	22%
	Very High Vulnerability	12%	0%	0%	12%
PPF Total		**24%**	**59%**	**16%**	
SFF	Low Vulnerability	0%	2%	0%	2%
	Moderate Vulnerability	0%	31%	9%	40%
	High Vulnerability	27%	12%	0%	39%
	Very High Vulnerability	19%	0%	0%	19%
SFF Total		**45%**	**45%**	**9%**	

SW Zone

All Ecosystems

		Uncertainty Category			
Local Unit	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
SW Zone	Low Vulnerability	14%	16%	0%	30%
	Moderate Vulnerability	1%	40%	11%	52%
	High Vulnerability	5%	9%	0%	13%
	Very High Vulnerability	4%	0%	0%	4%
Grand Total		**23%**	**66%**	**11%**	

Major Ecological Response Units

		Uncertainty Category			
ERU	***Vulnerability Category***	***Low***	***Mod***	***High***	***Total***
JUG	Low Vulnerability	11%	6%	0%	17%
	Moderate Vulnerability	8%	48%	0%	56%
	High Vulnerability	6%	19%	0%	25%
	Very High Vulnerability	3%	0%	0%	3%
JUG Total		**27%**	**72%**	**0%**	
MCD	Low Vulnerability	21%	29%	0%	50%
	Moderate Vulnerability	0%	40%	8%	47%
	High Vulnerability	0%	2%	0%	2%
	Very High Vulnerability	0%	0%	0%	0%
MCD Total		**22%**	**71%**	**8%**	
MCW	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	50%	48%	98%
	High Vulnerability	0%	2%	0%	2%
	Very High Vulnerability	0%	0%	0%	0%
MCW Total		**0%**	**52%**	**48%**	
MSG	Low Vulnerability	22%	52%	0%	74%
	Moderate Vulnerability	1%	23%	1%	26%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
MSG Total		**23%**	**75%**	**1%**	
PJG	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	8%	5%	13%
	High Vulnerability	18%	15%	0%	33%
	Very High Vulnerability	54%	0%	0%	54%
PJG Total		**72%**	**23%**	**5%**	
PJO	Low Vulnerability	22%	9%	0%	31%
	Moderate Vulnerability	2%	43%	5%	49%
	High Vulnerability	4%	8%	0%	12%
	Very High Vulnerability	8%	0%	0%	8%
PJO Total		**36%**	**59%**	**5%**	
PPF	Low Vulnerability	6%	9%	0%	16%
	Moderate Vulnerability	0%	40%	20%	60%
	High Vulnerability	7%	11%	0%	19%
	Very High Vulnerability	6%	0%	0%	6%
PPF Total		**19%**	**61%**	**20%**	

SAGE	Low Vulnerability	79%	21%	0%	100%
	Moderate Vulnerability	0%	0%	0%	0%
	High Vulnerability	0%	0%	0%	0%
	Very High Vulnerability	0%	0%	0%	0%
SAGE Total		**79%**	**21%**	**0%**	
SFF	Low Vulnerability	0%	0%	0%	0%
	Moderate Vulnerability	0%	52%	9%	61%
	High Vulnerability	13%	25%	0%	38%
	Very High Vulnerability	1%	0%	0%	1%
SFF Total		**14%**	**77%**	**9%**	

Vulnerability at the Subwatershed Scale – All Ecosystems

The following table gives composite vulnerability scores for each 6th-level watershed that intersects the Santa Fe NF. As with the previous tables, these results represent all lands regardless of ownership.

6th-Level HUC	*HUC Name*	*Composite Vulnerability Category*
110800040201	Rito San Jose	Moderate Vulnerability
110800040202	Headwaters Manuelitas Creek	Moderate Vulnerability
110800040204	Manuelitas Creek-Sapello River	Moderate Vulnerability
110800040303	Vigil Creek-Mora River	Moderate Vulnerability
110800040304	Rio La Casa	Moderate Vulnerability
110800040305	Rio La Casa-Mora River	Moderate Vulnerability
110800040306	Santiago Creek	Moderate Vulnerability
110800040307	Rito Cebollla	Moderate Vulnerability
130201010902	La Junta Canyon-Rio Pueblo	Moderate Vulnerability
130201010904	Headwaters Rio Santa Barbara	Very High Vulnerability
130201010908	Canada del Oso Sarco-Embudo Creek	Moderate Vulnerability
130201011001	Rio Frijoles	Moderate Vulnerability
130201011002	Rio Medio	Moderate Vulnerability
130201011003	Rio Quemado	Moderate Vulnerability
130201011103	Rio Truchas	Moderate Vulnerability
130201011106	Arroyo de la Plaza Larga	Moderate Vulnerability
130201011201	Rio Nambe	Moderate Vulnerability
130201011202	Headwaters Rio Tesuque	Moderate Vulnerability
130201011204	Rio Tesuque-Pojoaque Creek	Moderate Vulnerability
130201011301	Santa Clara Creek	Moderate Vulnerability
130201011303	Los Alamos Canyon	High Vulnerability
130201011304	Los Alamos Canyon-Rio Grande	High Vulnerability
130201020404	Stock Driveway Canyon	Moderate Vulnerability
130201020503	Outlet Rio Cebolla	High Vulnerability
130201020601	Rio Capulin	Moderate Vulnerability
130201020602	Almagre Arroyo	Moderate Vulnerability
130201020603	Upper Rio Gallina	Moderate Vulnerability

6th-Level HUC	*HUC Name*	*Composite Vulnerability Category*
130201020604	Arroyo Blanco	Moderate Vulnerability
130201020605	Middle Rio Gallina	Moderate Vulnerability
130201020606	Headwaters Canoncito de las Lleguas	Moderate Vulnerability
130201020607	Outlet Canoncito de las Lleguas	Moderate Vulnerability
130201020608	Lower Rio Gallina	Moderate Vulnerability
130201020705	Headwaters Arroyo del Puerto Chiquito	Moderate Vulnerability
130201020706	Outlet Arroyo del Puerto Chiquito	Moderate Vulnerability
130201020708	Huckbay Canyon-Rio Chama	Moderate Vulnerability
130201020801	Poleo Creek	Moderate Vulnerability
130201020802	Coyote Creek	Moderate Vulnerability
130201020803	Headwaters Rio Puerco	Moderate Vulnerability
130201020804	Outlet Rio Puerco	Moderate Vulnerability
130201021001	Ojitos Canyon	Moderate Vulnerability
130201021002	Ojito Canyon-Abiquiu Reservoir	Moderate Vulnerability
130201021003	Rio Puerco-Abiquiu Reservoir	Moderate Vulnerability
130201021004	Polvadero Creek	Moderate Vulnerability
130201021005	Canones Creek	Moderate Vulnerability
130201021006	Canones Creek-Abiquiu Reservoir	Moderate Vulnerability
130201021202	Abiquiu Creek	Moderate Vulnerability
130201021203	Arroyo del Cobre-Rio Chama	Moderate Vulnerability
130201021205	El Rito-Rio Chama	High Vulnerability
130201021601	Canada de Tio Alfonso-Rio Chama	High Vulnerability
130201021602	Rio del Oso	Moderate Vulnerability
130201021603	Rio del Oso-Rio Chama	High Vulnerability
130201021604	Rio Ojo Caliente-Rio Chama	High Vulnerability
130202010101	Arroyo Calabasas	Moderate Vulnerability
130202010102	Headwaters Santa Fe River	Moderate Vulnerability
130202010103	Arroyo de Los Chamisos	Moderate Vulnerability
130202010104	Arroyo Hondo	Moderate Vulnerability
130202010107	Outlet Santa Fe River	Very High Vulnerability
130202010201	Headwaters Canada Ancha	High Vulnerability
130202010202	Outlet Canada Ancha	Very High Vulnerability
130202010203	Canada Ancha-Rio Grande	High Vulnerability
130202010204	Water Canyon-Rio Grande	High Vulnerability
130202010205	Alamo Canyon-Rio Grande	High Vulnerability
130202010206	Rio Chiquito	High Vulnerability
130202010207	Capulin Canyon-Rio Grande	High Vulnerability
130202010208	Canada de Cochita	Moderate Vulnerability
130202010209	Canada de Cochita-Rio Grande	Very High Vulnerability
130202010301	Bobcat Canyon	Moderate Vulnerability
130202010302	Arroyo Salado	Moderate Vulnerability
130202010305	San Cristobal Arroyo	Moderate Vulnerability
130202010306	San Cristobal Arroyo-Galisteo Creek	Moderate Vulnerability
130202010403	San Marcos Arroyo	Moderate Vulnerability
130202010601	Peralta Canyon	High Vulnerability
130202010602	Canon Santo Domingo	Moderate Vulnerability
130202010603	130202010603	Very High Vulnerability
130202010605	Headwaters Borrego Canon	Moderate Vulnerability

6th-Level HUC	*HUC Name*	*Composite Vulnerability Category*
130202010606	Outlet Borrego Canyon	High Vulnerability
130202020101	Rito Penas Negras	Moderate Vulnerability
130202020102	Headwaters Rio de Las Vacas	Moderate Vulnerability
130202020103	Headwaters Rio Cebolla	Moderate Vulnerability
130202020104	Outlet Rio Cebolla	Moderate Vulnerability
130202020105	Outlet Rio de Las Vacas	Moderate Vulnerability
130202020106	Virgin Canyon	Moderate Vulnerability
130202020107	Rio Guadalupe	Moderate Vulnerability
130202020201	Headwaters San Antonio Creek	Moderate Vulnerability
130202020202	Sulphur Creek	Moderate Vulnerability
130202020203	East Fork Jemez River	Moderate Vulnerability
130202020204	Outlet San Antonio Creek	Moderate Vulnerability
130202020205	Church Canyon-Jemez River	Moderate Vulnerability
130202020301	Arroyo Lopez	Moderate Vulnerability
130202020302	Upper Rio Salado	Moderate Vulnerability
130202020307	Middle Rio Salado	Moderate Vulnerability
130202020308	Lower Rio Salado	Moderate Vulnerability
130202020401	Canon de La Canada	Moderate Vulnerability
130202020402	Vallecita Creek	Moderate Vulnerability
130202020403	Vallecita Creek-Jemez River	High Vulnerability
130202020503	Arroyo Chamisa	Moderate Vulnerability
130202040101	Headwaters Arroyo San Jose	Moderate Vulnerability
130202040102	Outlet Arroyo San Jose	Moderate Vulnerability
130202040103	Headwaters Arroyo Chijuilla	High Vulnerability
130202040104	Outlet Arroyo Chijuilla	Moderate Vulnerability
130202040105	San Pablo Canyon	Moderate Vulnerability
130202040106	Arroyo San Jose-Rio Puerco	Moderate Vulnerability
130202040201	Arroyo de Los Pinos-Rio Puerco	Moderate Vulnerability
130202040202	Rincon de Los Viejos-Rio Puerco	Moderate Vulnerability
130600010101	Headwaters Cow Creek	Moderate Vulnerability
130600010102	Bull Creek	Moderate Vulnerability
130600010103	Apache Creek	Moderate Vulnerability
130600010104	Outlet Cow Creek	Moderate Vulnerability
130600010201	Panchuela Creek	Moderate Vulnerability
130600010202	Rio Mora	Moderate Vulnerability
130600010203	Rio Mora-Pecos River	Moderate Vulnerability
130600010204	Indian Creek-Pecos River	Moderate Vulnerability
130600010205	Dry Gulch-Pecos River	Moderate Vulnerability
130600010206	Glorieta Creek	Moderate Vulnerability
130600010207	Glorieta Creek-Pecos River	Moderate Vulnerability
130600010208	Tortolita Canyon-Pecos River	Moderate Vulnerability
130600010301	Cabo Lucero Creek-Tecolote Creek	Moderate Vulnerability
130600010302	Canon Mesteno-Tecolote Creek	Moderate Vulnerability
130600010303	Ojitos Frios Creek-Tecolote Creek	High Vulnerability
130600010305	Tres Hermanos Creek	High Vulnerability
130600010306	Tres Hermanos Creek-Tecolote Creek	High Vulnerability
130600010307	Arroyo Leguino	Very High Vulnerability
130600010308	Arroyo Leguino-Tecolote Creek	Very High Vulnerability

6th-Level HUC	*HUC Name*	*Composite Vulnerability Category*
130600010401	El Rito	Moderate Vulnerability
130600010402	Manzanarez Canyon-Pecos River	Moderate Vulnerability
130600010403	Arroyo del Vegoso-Pecos River	High Vulnerability
130600010404	El Canon de Pena	Very High Vulnerability
130600010405	El Canon de Pena-Pecos River	Moderate Vulnerability
130600010406	El Fileto Canon	High Vulnerability
130600010407	El Fileto Canon-Pecos River	Very High Vulnerability
130600010501	Valle de La Cabra	Moderate Vulnerability
130600010502	Barbero Canyon	Moderate Vulnerability
130600010503	Valle Chimal	Moderate Vulnerability
130600010601	Arroyo de Los Diegos	Moderate Vulnerability
130600010801	Porvenir Canyon	Moderate Vulnerability
130600010802	Porvenir Canyon-Gallinas Creek	Moderate Vulnerability
130600010804	Arroyo Pecos	Moderate Vulnerability
130600010805	Arroyo Pecos-Gallinas River	Moderate Vulnerability
140801030201	Canada Jaquez-Canada Larga	Moderate Vulnerability
140801030202	Oso Canyon	Moderate Vulnerability
140801030203	Gavilan Canyon	Moderate Vulnerability
140801030301	Bear Canyon-Tapicito Creek	Moderate Vulnerability