



National Park Service

Fire Ecology Annual Report

2010 Southern Plains Fire Group

2011 Southern Plains, Permian & Southwest Texas Fire Groups

2010 Southern Plains Fire Group

A. Summary

This is a report of the Southern Plains Fire Management Group (SPFG), Southwest Texas and Permian Fire effects monitoring that occurred over the 2010-2011 field seasons. Southwest Texas and Permian will be included in the 2011 section of the report. The work conducted over these two seasons mark a significant improvement over that which occurred in the previous two field seasons. This is due largely to affective field leadership provided by Tyler Engle and the crews that was recruited by the lead monitor Natalie Robison. The failure of producing the 2010 and 2011 reports falls on the Fire Ecologist Richard Gatewood who is seeking to bring the program in to compliance.

2010 Field Season

This field season the program successfully conducted field monitoring, cooperatively with the Southern Plains Inventory and Monitoring Program (SOPN). The collaboration consists of integrating SOPN Long-term (LT) vegetation monitoring protocols with some of SPFG's existing fire effects (Fx) plots and establishing additional plots that will serve primarily for LT monitoring purposes. We will evaluate SOPN's ocular estimates of cover and nested frequency data with point-intercept cover data collected by the fire effects program. A determination will be made as to whether or not SOPN's protocol is an acceptable alternative to the point-intercept for fire effects monitoring in terms of the number of species observed, the robustness of detecting change, and the amount of sample effort required. About 90% of the sampling effort in 2010 was in establishing LT plots and collecting the initial baseline data and about 10% collecting data for fire effects purposes. Fire effects data was collected at CHIC (4 plots), LAMR (2 Plots), WABA (1 Plot) and at one non-SPFG park Fort Larned (4 plots).

Although fire effects data was collected no analysis was conducted this year and the data collected from the LT plots was for initial characterization establishing an initial reference point for determining trends in subsequent years.

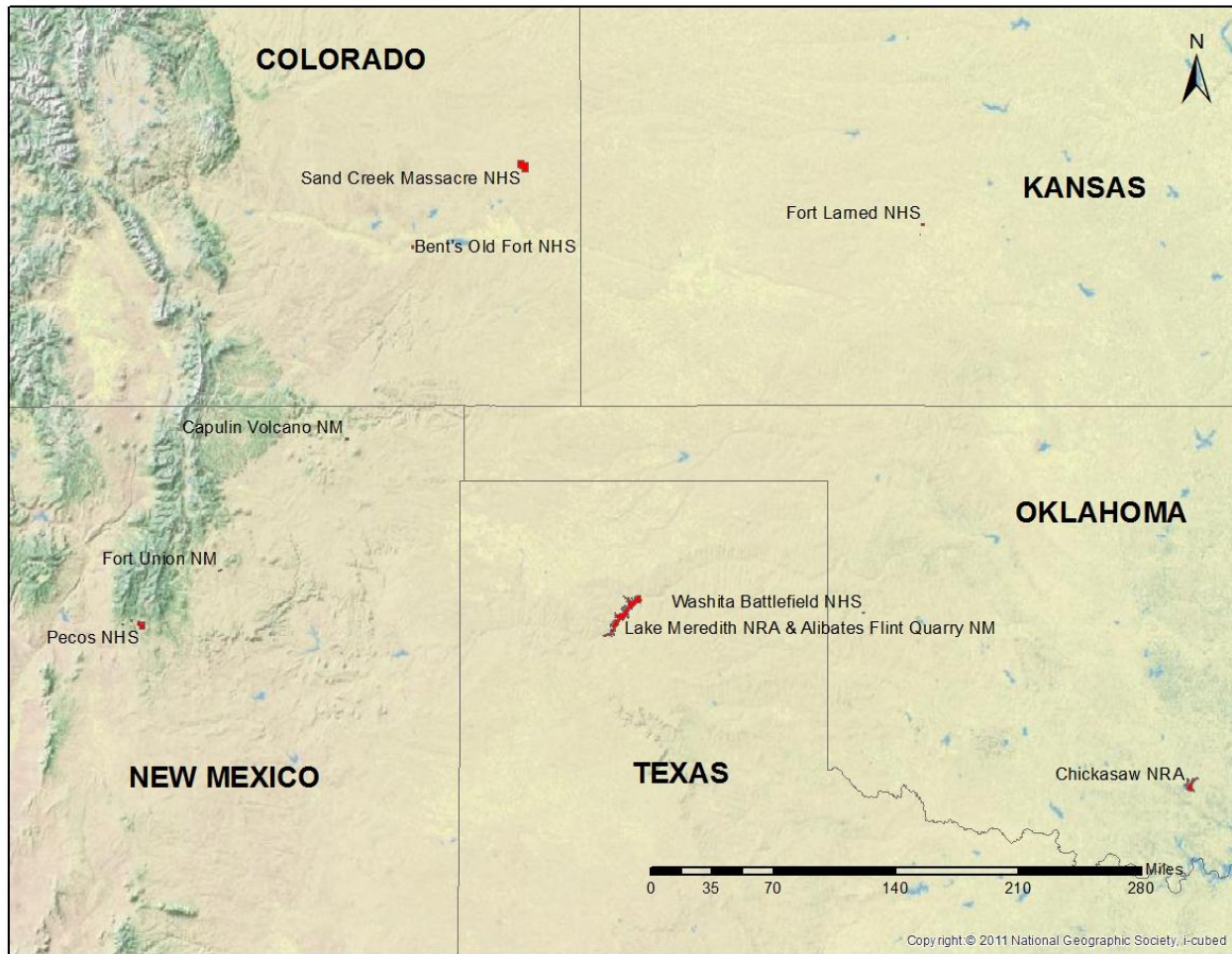


Figure 1. The Southern Plains Fire Management Group's Fire Effects crew conducted both fire effects (Fx) and long-term (LT) monitoring at eight of the parks. One of the parks, Fort Larned NHS, is located in the Midwest Region. Only LT monitoring was conducted at Pecos NHS and Fort Union NM.

Table 1. Fire Effects Plot Workload (2010) and Total Plots Installed.

Complete the following table. In the "Pre" and "Postburn" columns, fill in the number of plots visited this year only. In the "Total Plots" column, fill in the total number of plots installed in the Monitoring Unit to date, not only those visited this year. The number of plots visited Pre-burn, Immed. Post, and Postburn (1-20 yrs) in 2010 for a Monitoring Unit likely will NOT add up to the Total Plots installed to date. Denote any pilot sampling plots with a symbol, such as an asterisk. Northern Great Plains parks are used as a fictitious example in the table.

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn 2010	Immed. Post 2010	Postburn (1-20 yrs) 2010	Total Plots
SPFG Parks						
Bent's Old Fort NHS	Upland grass	Long-Term	6			6
	Restoration	Long-Term	3			3

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn 2010	Immed. Post 2010	Postburn (1-20 yrs) 2010	Total Plots
	Cottonwood	Long-Term	4			4
Capulin Volcano NM	Shortgrass steppe	Long-term	3			3
	Piñon Juniper	Long-term	3			3
Chickasaw NRA	Upland grass	Long-Term	7			7
	Restoration Oldfield	Long-Term	2			2
	FJUPVIR	FMH	4			4
Lake Meredith NRA & Alibates Flint Quarries NM	Bottomland 3	Long-Term	3			3
	Cottonwood	Long-Term	4			4
	Honey Mesquite	Long-Term	11			11
	Upland grass	Long-Term	7			7
	LD Mesquite	FMH			2	13
Sand Creek Massacre NHS	Cottonwood	Long-Term	3			12
	Restoration		2			2
	Upland grassland		5			5
	Upland sage		2			2
Washita Battle Field NHS	Disturbed Land	Long-Term	1			1
	Restoration	Long-Term	4			4
Washita Battle Field NHS (cont'd)	Upland grass	Long-Term	4			4
	Oldfield grassland	FMH			1	1
Non-SPFG Parks *						
Fort Larned NHS (MWR)	Oldfield grassland	Long-Term	8			
Fort Union NM (IMR non-fire)	Shortgrass Steppe	Long-Term	6			
Pecos NHP (IMR)	PJ grassland	Long-Term	8			

*The data collected for these parks is not managed by the SPFG Fire Ecology Program.

Table 2 Fire Ecology Staffing

Complete the staffing and personnel development table for fire ecologist and monitors. Include fire training (e.g. S-290, RX-310), NPS training, distance learning or on-campus college credit, technology training, NWCG taskbooks initiated or completed, conferences attended, etc.

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Natalie Robison	1-Mar	19-Nov	20	No	FFI
Tyler Engle	24-May	19-Nov	13	No	Second season first season as a GS-5 seasonal.
Jonathan Dunbar	6-June	20-Aug	6	No	
Jill Breaden (SCA Intern)	17-May	9 -Aug	6	No	
Mark Relson (SCA Intern)	17-May	9 -Aug	6	No	
Jason Sandwald (SCA Intern)	17-May	9 -Aug	6	No	
Chris Traft (SCA Intern)	17-May	9 -Aug	6	No	

Table 3. Management Objectives & Monitoring Results (No analysis was conducted this year.)

Complete the following Summary table for each monitoring units for which analysis is available. Monitoring results should include time frame, confidence interval, and sample size. An example from Sequoia-Kings Canyon is provided to illustrate how to complete the table. Note the new column indicating the year the analysis was last completed.

No analysis was conducted

B. Fire ecologist accomplishments and areas of focus

This section deals with roles and functions of the ecologist. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below). This includes planning documents produced or reviewed (e.g. fire management plans, monitoring plans, prescribed fire or mechanical treatment plans, etc.), presentations given and audience, meetings and task groups attended, contracts reviewed, interagency collaboration efforts, volunteer hours managed, and scientific or research publications produced.

Table 4. Fire Ecologist Accomplishments/Focus Areas

This table includes all the work the Fire Ecologist carries out in the Southern Plains, Permian and Southwest Texas Fire Groups.

Category	Percent Time	Accomplishments and/or areas of activities
Planning	25	• FMP : Updated NEPA compliance • Chisos Wildland Fire Use (BIBE) : Project description draft identified treatment units • River Corridor Restoration (BIBE) : Draft Plan & identified treatment units • Chisos Fire Surrogate Project Rx treatment (BIBE): Drafted Plan and reviewed component submissioncomponent • Chisos Fire Surrogate Project Thinning component (BIBE) : Develop plan and prescription for thinning treatment • Five Lakes & Point Rx (CHIC) Reviewed Burn • Field work planning for SPFG and SWTX Fire Groups
Presentations	<5	BIBE Science and Resource Management
NPS Meetings/ task groups	<5	• Park ○ Resource Management Staff ○ Chief of Visitor and Resource Protection ○ Park Superintendents • Intermountain Region ○ Wildland Fire Specialist
Interagency work	10	• FPA.
Wildfire assignments	5	• The Castolon Farms Wildland Fire Use • Numerous IA fires in North Brewster County TX
Prescribed fire projects	5	Chisos Fire Surrogate Rx
Non-fire fuels projects	5	• Estimated amount of time spent assisting with non-fire fuels projects; include READ activities
Research	10	• Chisos Fire Surrogate Project
Data collection	0	
Data entry	<5	• Entered data collected from the thinning treatments of the Chisos Fire surrogate Project.

Category	Percent Time	Accomplishments and/or areas of activities
Data analysis	<5	Went through a con.
Supervision/Admin	10	Hiring, supervision, payroll, travel authorization/vouchers, purchasing, etc.
Training	<5	• Fire Refresher • PT • Instructor for fire effects seasonals.
Miscellaneous	10	Project Administration • Drafting and modifying Task Agreements (SCA, RGI, SCC) Acting FMO • Cooperative Agreement Administration (RGI, SCA, SCC)

C. Fire effects crew accomplishments and areas of focus

This section deals with roles and functions of the fire effects crew. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below).

Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	10	Estimated amount of time spent collecting plot data; includes any preparation time.
WUI plots	0	
CBI plots	0	
Other plot work	75	Most of the work this year focused on installing I&M Long-term monitoring plots as part of our collaboration in vegetation monitoring.
Wildfire assignments	0	Identify types of assignments; include READ (Resource Advisor) activities
Prescribed fire projects	0	Estimated amount of time spent assisting with prescribed fire projects; include project preparation, fire assignments (e.g. FEMO, FFT1) and READ activities
Non-fire fuels projects	0	Estimated amount of time spent assisting with non-fire fuels projects; include READ activities
Data entry	<5	Estimated amount of time spent entering data from paper to PC
Data analysis	0	This is expected to be very low number or zero for fire effects crew/lead monitor

Category	Percent Time	Notes
Supervision/Admin	<5	Payroll, travel authorization/voucher, etc.
Training	<5	List all training courses attended including in-park, NPS/interagency, and non-government
Miscellaneous	<5	Data processing this involved processing the clipped standing biomass

D. Additional Information

Table 6. Data Entry and Projects Monitored

The monitoring effort for this year was to establish Long-term monitoring plots so few fire plots where monitored plots

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Bent's Old Fort NHS	100%	100%	0	0	0	0
Capulin Volcano NM	100%	100%	0	0	0	0
Chickasaw NRA	100%	100%	1	0	0	0
Lake Meredith NRA & Alibates Flint Quarries NM	100%	100%	0	0	0	0
Sand Creek Massacre NHS	100%	100%	0	0	0	0
Washita Battlefield NHS	100%	100%	0	0	0	0

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

2011 Field Season: Permian, Southern Plains & Southwest Texas Fire Groups

A. Summary

The 2011 Field Season carried out during the most extreme rainfall deficit in region since the 1950's. No Long-Term monitoring plots were read by the Fire Monitoring Crew. Field work began the first week of June, because of the drought fire plots were read only at Chickasaw and Lake Meredith. In mid-June the crew was dispatched to assist with burn severity for the Loop Fire and immediate post-burn monitoring at Carlsbad Caverns (CAVE) NP for the remainder of the field season. As Natalie Robison, the Lead Fire Effects Monitor departed in early June for a position with the Fish & Wildlife Service, Tyler Engle in his second year as a GS-5 Seasonal filled the crew leader position. In addition to Tyler, the crew was comprised by three twelve week SCA interns. In addition we began collaborating with the Chihuahuan Desert Inventory and Monitoring Network (CHDN) where Tyler Engle served as the crew lead following his work at CAVE. Plot initial installation of Upland Long-Term monitoring plots occurred at Big Bend (BIBE) and Guadalupe Mountains (GUMO) NPs, White Sands (WHSA) NM and Fort Davis (FODA) NHS.

Table 4. Fire Effects Plot Workload (2010) and Total Plots Installed.

Complete the following table. In the "Pre" and "Postburn" columns, fill in the number of plots visited this year only. In the "Total Plots" column, fill in the total number of plots installed in the Monitoring Unit to date, not only those visited this year. The number of plots visited Pre-burn, Immed. Post, and Postburn (1-20 yrs) in 2010 for a Monitoring Unit likely will NOT add up to the Total Plots installed to date. Denote any pilot sampling plots with a symbol, such as an asterisk. Northern Great Plains parks are used as a fictitious example in the table.

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn 2011	Immed. Post 2011	Postburn (1-20 yrs) 2011	Total Plots
SPFG Parks						
Chickasaw NRA	QUESTE	FMH			2	2
	JUNVIR	FMH			7	19
	QUEJUN	FMH			1	1
Lake Meredith NRA & Alibates Flint Quarries NM	HD Mesquite	FMH			10	20
	LD Mesquite	FMH			13	13
Permian Parks						
Carlsbad Caverns NP	MUHL	CBI		17		17
	JUNPIN	CBI		11		11
	MUHL	FMH		10		35
	JUNPIN	FMH		4		4
Guadalupe Mountains NP	Upland	Long-Term	12			6

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn 2011	Immed. Post 2011	Postburn (1-20 yrs) 2011	Total Plots
White Sands NM	Upland	Long-Term	12			12
Southwest Texas Parks						
Big Bend NP	Upland	Long-Term	10			10
	HE Pinyon-Juniper-Oak	Other		16		16
	ME Pinyon-Juniper-Oak	Other		16		16
	LE Pinyon-Juniper-Oak	Other		16		16
Fort Davis NHS	Upland	Long-Term	6			6

Table 5 Fire Ecology Staffing

Complete the staffing and personnel development table for fire ecologist and monitors. Include fire training (e.g. S-290, RX-310), NPS training, distance learning or on-campus college credit, technology training, NWCG taskbooks initiated or completed, conferences attended, etc.

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Fuels Funded Positions					
Natalie Robison	28- Feb	10-June	20	No	Departed for FWS position
Tyler Engle (Crew Leader)	24-May	19-Nov	13	No	Third season; second as a GS-5 seasonal.
Jessica Evens (SCA Intern*)	30 - May	11 - Aug	6	Na	
Jeffrey Havey (SCA Intern*)	30 - May	11 - Aug	6	Na	
Eva Salinas (SCA Intern*)	30 - May	11 - Aug	6	Na	
Non Fuels Funded Positions					
Sam Robinson (SCA Intern*)					
Ryan Lima (SCA Intern)*					
Jose Garcia (SCA Intern)*					

*SCA funded through Chihuahuan Desert I & M Network.

Table 6. Management Objectives & Monitoring Results (No analysis was conducted this year.)

Complete the following Summary table for each monitoring units for which analysis is available. Monitoring results should include time frame, confidence interval, and sample size. An example from Sequoia-Kings Canyon is provided to illustrate how to complete the table. Note the new column indicating the year the analysis was last completed.

No analysis was conducted for 2011.

B. Fire ecologist accomplishments and areas of focus

This section deals with roles and functions of the ecologist. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below). This includes planning documents produced or reviewed (e.g. fire management plans, monitoring plans, prescribed fire or mechanical treatment plans, etc.), presentations given and audience, meetings and task groups attended, contracts reviewed, interagency collaboration efforts, volunteer hours managed, and scientific or research publications produced.

Table 4. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	10%	Update BIBE FMP Reviewed PAAL Vegetation Management Plan Amended LOOP BAER Plan
Presentations	<5%	Southwest Fuels Management Conference Flagstaff, AZ (March 8-9): <i>Grassland Recovery of the Eastern Chihuahuan Desert: Precipitation Patterns & Fire Occurrence</i> Loop Fire BAER Plan presentation to Carlsbad Caverns Superintendent and staff. Closeout LOOP BAER Incident Fuels and climate for Fire Refresher at BIBE.
NPS Meetings/ task groups	<5%	Southwest Fuels Management Conference Ecology (Steering committee co-chair)
Interagency work	<5%	Coordinated emergence flood response between Eddy Count, NM Emergency Services and CAVE.

Category	Percent Time	Accomplishments and/or areas of activities
Wildfire assignments	<10%	Quasi IC Shackelford Fire Agency liason Loop Fire
Prescribed fire projects	0	Estimated amount of time spent assisting with prescribed fire projects; include project preparation, fire assignments and READ activities
Non-fire fuels projects	0	Estimated amount of time spent assisting with non-fire fuels projects; include READ activities
Research	5%	NPS Reserve Fund Research Request GUMO and TNC Fire Surrogate
Data collection	5%	Assisted with field work at CAVE
Data entry and processing	<%5	Estimated amount of time spent entering data from paper to PC
Data analysis	5%	Estimated amount of time spent performing analyses, including data summaries and statistical tests. Mostly for Fuels Presentation
Supervision/Admin	10%	Draft budget request for Southern Plain and Permian and Southwest Texas Parks Drafted Task Agreements and Budget for SCA Field Interns.
Training	<5%	Trained SCA in CBI date collection; use of GPS equipment. Trained SCA's FFI data entry, plant ID
Miscellaneous	5%	LOOP Fire BAER Team Leader.

C. Fire effects crew accomplishments and areas of focus

This section deals with roles and functions of the fire effects crew. Identify accomplishments and/or focus areas along with a rough estimate of the amount of time spent in these areas (see table format and example below).

Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	35	Estimated amount of time spent collecting plot data; includes any preparation time.
WUI plots	0	
CBI plots	5	
Other plot work	50	Most of the work this year focused on installing I&M Long-term monitoring plots as part of our collaboration in vegetation monitoring.
Wildfire assignments	0	Identify types of assignments; include READ (Resource Advisor) activities
Prescribed fire projects	0	Estimated amount of time spent assisting with prescribed fire projects; include project preparation, fire assignments (e.g. FEMO, FFT1) and READ activities
Non-fire fuels projects	0	Estimated amount of time spent assisting with non-fire fuels projects; include READ activities
Data entry	<5	Estimated amount of time spent entering data from paper to PC
Data analysis	0	This is expected to be very low number or zero for fire effects crew/lead monitor
Supervision/Admin	<5	Payroll, travel authorization/voucher, etc.
Training	<5	List all training courses attended including in-park, NPS/interagency, and non-government
Miscellaneous	<5	Data processing this involved processing the clipped standing biomass

Table 6. Data Entry and Projects Monitored

The monitoring effort for this year included the establishment of Long-Term monitoring plots as well as Fire Effects monitoring and Burn Severity (CBI). Fire Effects monitoring, took place at Carlsbad Caverns (CAVE) NP, and Chickasaw (CHIC) and Lake Meredith (LAMR) NRA's and CBI at CAVE. Prescribed Fire took place at CHIC and LAMR and Wildfire at CAVE. The remaining plot installs were independent of any fuels treatment and was carried out at Big Bend and Guadalupe Mountains NPs, Fort Davis NHS and White Sands NM.

Park	% 2011 Data Entered	% 2011 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Southern Plains Fire Group						
Bent's Old Fort NHS	0	0%	0	0	0	0
Capulin Volcano NM	0	0%	0	0	0	0
Chickasaw NRA	100%	0%	7	0	0	0
Lake Meredith NRA & Alibates Flint Quarries NM	100%	100%	5	0	0	0
Sand Creek Massacre NHS	0	0%	0	0	0	0
Washita Battlefield NHS	0%	0%	0	0	0	0
Permian Fire Group						
Carlsbad Cavern NP	50	50	4		1	0
Guadalupe Mtns. NP	100	100	0	0	0	0
White Sands NM	100	100	0	0	0	0
Southwest Texas Fire Group						
Big Bend NP	100%	100%	1	1		0
Fort Davis NHS	100%	100%				

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

E. Optional Information

An assessment of precipitation for 2010 and 2011 for Southern Plains Fire Group Parks: BEOL, CAVO, CHIC, LAMR, SAND & WABA .

Precipitation is the primary determinant of vegetation accumulation on the the landscape, both before and after fire. It contributes to determining fire behavior and the extent of fire spread. In the aftermath, precipitation determines how quickly the ecosystem recovers. Therefore fire effects should be evaluated in the context of precipitation that occurred prior to and following the the fire and in the context of longterm trends. Is the site becoming drier or wetter and is the trend persistent or ephemeral, how precipitation has varied historically and how does the current precipitation fit in that variability.

This report will begin to place the fire effects observed at all the SPFG parks in the context of climate trends and recent annual precipitation totals for the current year as compared to the current climate or departure(s) from normal as well as historic claimate variability. The current climate is generally defined as the most most recent 30 year period ending at the start of the current decade, this the current climate for 2010 to 2019 is the period 1981 to 2010 (<http://www.cpc.ncep.noaa.gov/products/outreach/glossary.shtml>). Data has been obtained from the nearest NOAA Cooperative Climate Station (<http://www.wrcc.dri.edu/climatedata/climsum/> or <http://climod.srcc.lsu.edu/climod/timeSeries/>) having the longest most complete record assuming to be representative of the general climate of the surrounding area and is current. This was problematic for a number of parks in that after reviewing the nearest station(s) the data was not current, collected sporadiacly or the record was short. This was specifically problematic for CAVO. Therefore only data for five of the parks; BEOL, CHIC, LAMR, SAND and WABA will be analyzed and discussed. Further assessment will be required before identifying stations suitable to represent the long-term climate for CAVO.

2010 Prescribed Fire and Precipitation

Chickasaw National Recreational Area (CHIC).

2009 - 2010

Begining in the fall of 2009 and proceeding through to December of 2010 CHIC manually thinned some 4072 acres dominated by the Eastern Red Cedar. Five seperated units where treated ranging in size from 35 to 1027 acres. Cumulative precipitation received in 2009 leading up to project was consistantly above normal beginning in May and persisting to the end of the year with October accounting for most the fall precipitation being 133% of normal. Total precipitation for 2009 was about 8 inches or 19% above normal. This contributed to favorable soil moisture conditions for post-thin plant growth the following spring. Moistures conditions for the two years prior to 2009 were mixed with conditions slightly above normal in 2007 and very dry in 2008. The current precipitation trend as observed at the Chickasaw NRA COOP Station is falling by a rate of 0.08 inches per decade however over the entire 96 year period precipitaion increased at a rate of 0.006 in decade⁻¹.

Precipitation for 2010, in contrast to 2009, was drier throughout the year with precipitation never exceeding the monthly normal at any time. Total precipitation ended up being 89% of normal with the driest period occurring after the growing season. Although a moderate drought conditions developed in August it occurred after much of the plant growth had occurred for the season suggesting that the precipitation deficit was not a significant factor limiting plant growth for the year.

2010 -2011

In mid to late winter of 2011, CHIC broadcast burned about 1923 acres mostly as follow up treatments to consume slash from the manual thinning that had been carried out the previous year and mitigate the wildfire hazard it posed. Seven separate units were burned ranging in size from about 68 to 683 acres. These burns were preceded by a relatively dry fall in 2009 with little precipitation in January followed by a wet February where two and half times it's the normal moisture fell reducing the deficit to within 4% of normal (Figure 2). However little moisture was received in March by which time the moisture deficit was such that a moderate drought developed. Even though significant moisture fell in May the drought further intensified to severe and by June to extreme. Very little moisture fell during the growing season and by October only 67% of the normal rainfall had been received. However enough precipitation fell in November to moderate the drought from extreme to severe where it remained to the end of the year. Total precipitation for the year was 83% of normal. Conditions favorable for plant growth following the late winter burns never materialized this impacting plant response post burn. The ecological consequences as a result of extreme drought following the burns may not manifest until moisture conditions return to normal.

Lake Meredith National Recreation Area (LAMR)

2009 - 2010

In January of 2010 Lake Meredith broadcast burned 962 acres in two separate units of 537 and 425 acres and the addition of a 100 acre wildfire that occurred in July. Additionally 10 acres were masticated over the course of the spring. Of note is that 2010 marks the first year since the record year of 2004 when 37.06 inches was received that was not drier than the previous year (Figure 3). The record rainfall in 2004 and the relatively moist 2005 contributed significantly to abundant fine fuel accumulation in the Texas Panhandle setting stage for the massive wildfires in March of 2006. Precipitation for 2006 through 2009, were each below normal ranging from 5% to 13% leading into the first part of 2010 (Figure 3). To what extent these conditions may have limited fine fuel accumulation, or reduced fine fuel loading and in turn affected fire behavior is unknown. However standing biomass was collected, pre- and post-burn, beginning in 2006 thus data is available that may address this question at least in part. The current 30 year precipitation trend at Lake Meredith is almost zero, with a drying rate of $0.004 \text{ decade}^{-1}$, much less than that observed at CHIC. However the overall trend for the record is increasing at $0.01 \text{ in. decade}^{-1}$ ($0.11 \text{ in. century}^{-1}$).

The year 2010 was wetter than the preceding two years. For the first third of the year precipitation was at or just above normal however beginning in May it was persistently below with the greatest departure occurring in August, deep in the growing season (Figure 3). Thus 2010 was the fifth year with less than optimal moisture conditions for plant growth that would enhance fine fuel conditions for prescribed burning. This may be a factor to consider when planning prescribed burning treatments in the future.

2010 - 2011

Because of the prospects of a developing drought coupled with fire activity in January and February no prescribed burning was undertaken in 2011. However four wildfires did occur; a 10 acre fire in mid-January, a 70 acre fire followed by another 10 acre fire in February and a 234 acre fire in mid-March. In addition to the 324 acres that burned, 300 acres were masticated which was completed by the end of September. Following the fires a drought rapidly developed beginning mid-spring and intensifying to extreme by June and never moderated through the rest of the year (Figure 4). Precipitation for 15 of the 16 months, August 2010 through November 2011 was persistently below normal (Figure 3). This culminated in 2011 being the driest year of the 63 year record of the Borger Climate Station. The previous record was set in 1970 at 10.18 in. and the new record was slightly less at 9.72 in. However precipitation measured at the park was lower; the Samford Dam COOP Station (ID: 418040) reported 8.18 in. and the CEDAR RAWS 7.97 in. Thus 2011

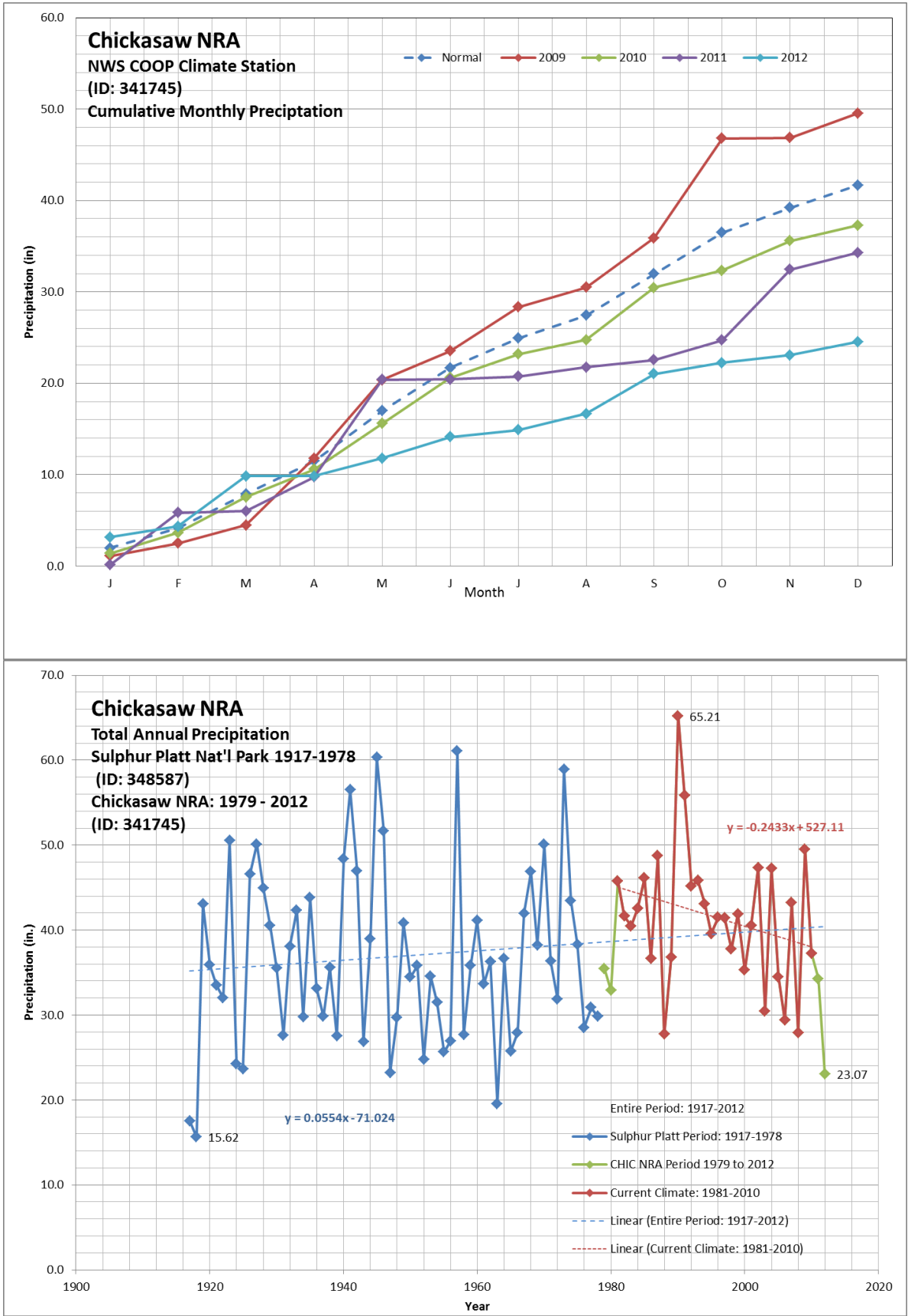


Figure 2. Cumulative Monthly Precipitation for the years 2009 through 2012 (top graph) and the Total Annual Precipitation from 1979 to 2012 (bottom graph). Data from the Sulphur Platt National Park (ID: [348587](#)) and Chickasaw NRA (ID: [341745](#)) NWS Cooperative Climate Stations.

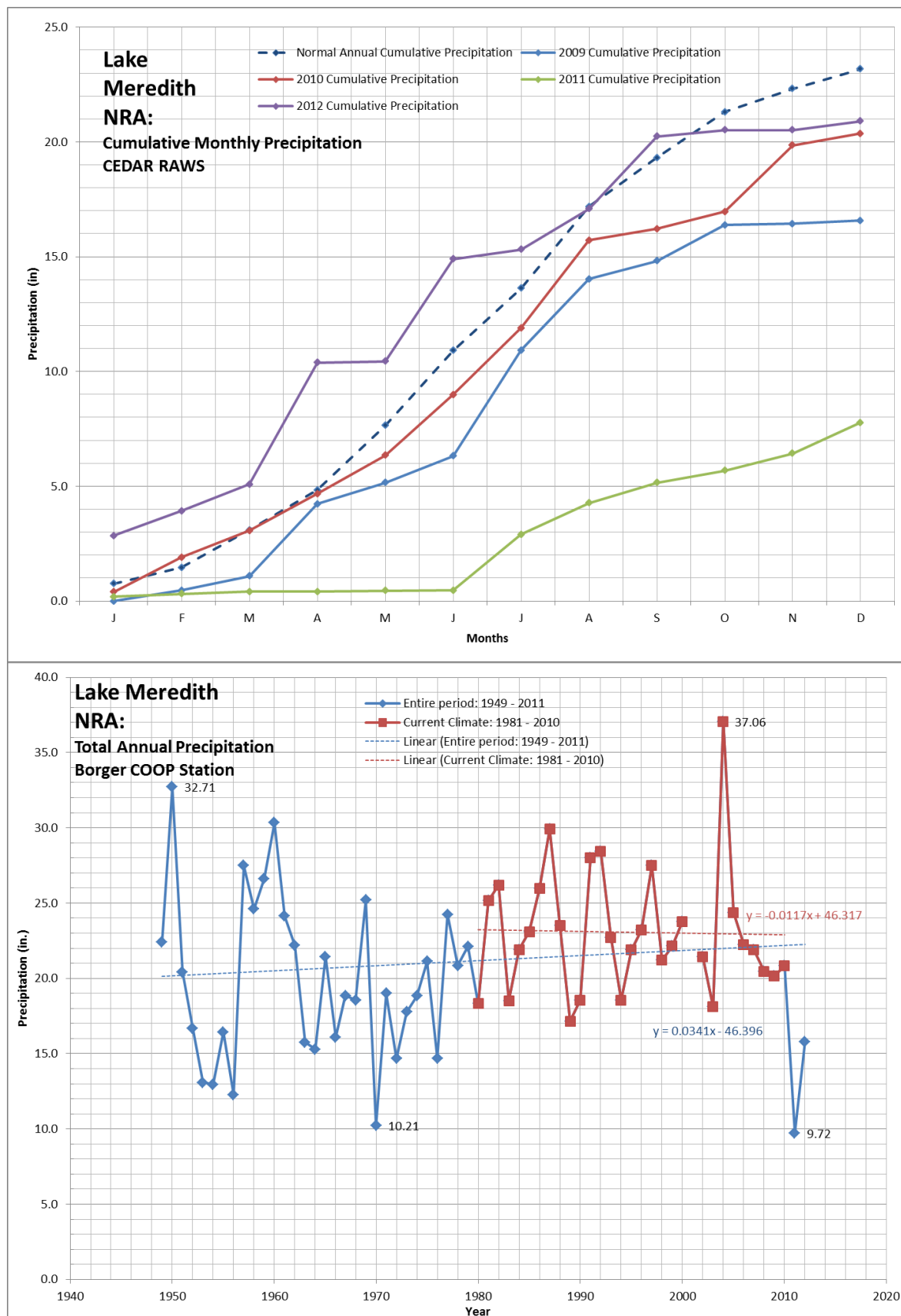


Figure 3. Cumulative Monthly Precipitation for the years 2009 through 2012 (top graph) and the Total Annual Precipitation from 1949 to 2012 (bottom graph). The top graph is from data collected at the [CEDAR Raws](#) at Lake Meredith National Recreation Area (Source: [NOAA Western Regional Climate Center](#)). The bottom graph is data from the [Borger](#) NWS COOP Climate Station (Station ID 410958); Source: [NOAA Southern Regional Climate Center](#). Normals are plotted from the Borger climate station.

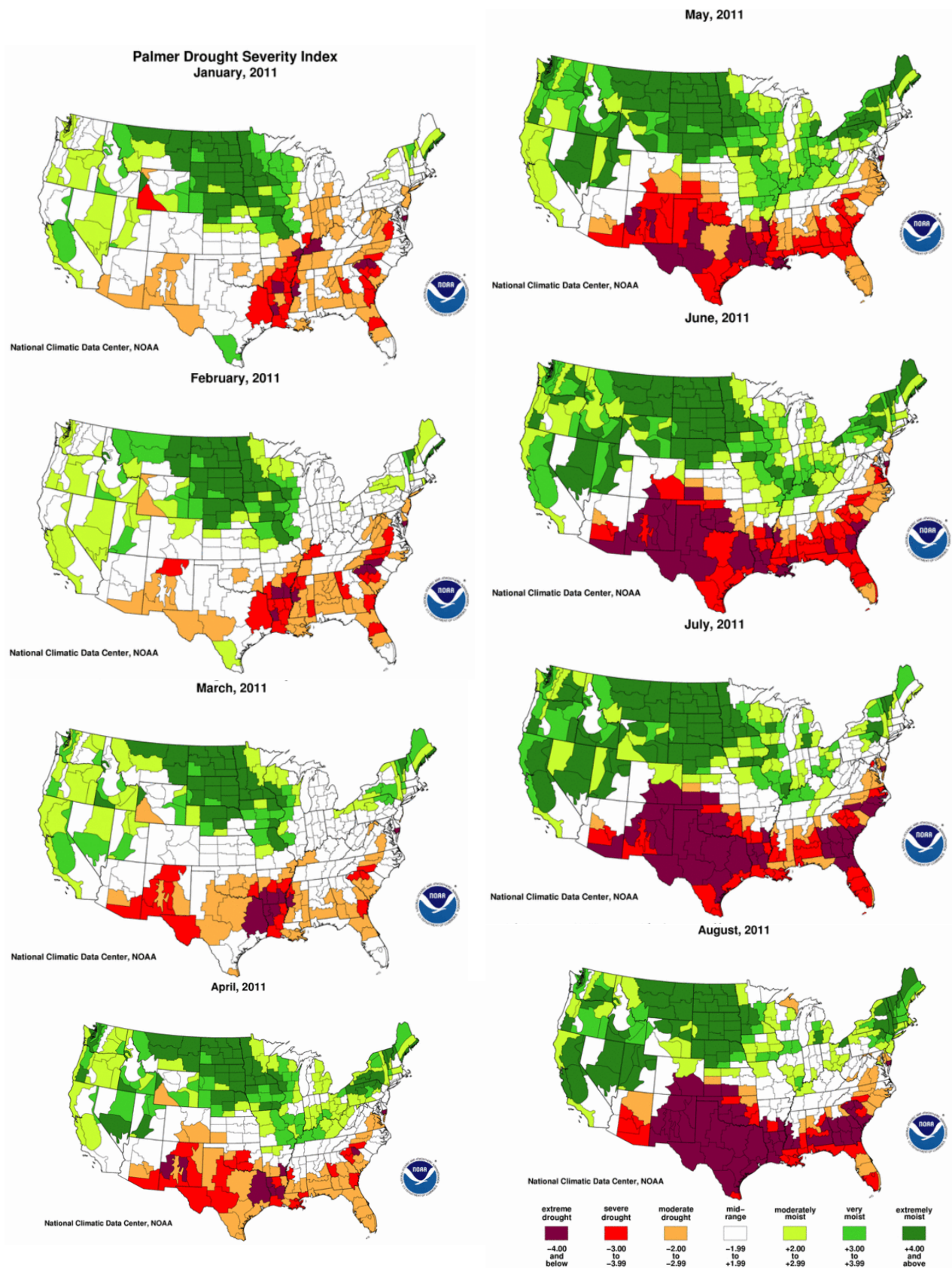


Figure 4. Development and [progression](#) of the 2011 drought from January through August 2011 as indexed by the Palmer Drought Severity Index (PDSI). Source: Data from the [National Climate Data Center](#).

marks in a dramatic way the sixth year in a row that precipitation has been less than optimal for plant growth and may have had significant implications on fire behavior and in turn fire effects for fuels management during this period.

Bent's Old Fort (BEOL) NHS

2009 - 2010

No prescribed burning took place at BEOL in 2010 however 50 acres was masticated in the spring. Total precipitation received in 2009 at Las Animas (11 miles to the east) was 126% of normal with the fall being very moist (223% of normal) as well as the first 5 months of 2010 (107% of normal) (Figure 5). Consequently soil moisture conditions for plant growth were very favorable for the mastication that occurred in the spring. Precipitation received in 2006 was a near record amount exceeded by the 1941 record of 21.19 by a mere 0.1 in. The following two years were much closer to normal with 2007 being dry and 2008 being wet. Following the wet winter and spring, 2010 continued to receive moisture until September after which very little moisture was received however total precipitation for the year was 13% above normal. The current precipitation trend for BEOL is increasing at a rate of $0.045 \text{ decade}^{-1}$ ($0.45 \text{ century}^{-1}$). However from 1893 to 2012 precipitation at Las Animas increased at a much slower rate of $0.001 \text{ in decade}^{-1}$.

2010 -2011

In 2011 BEOL did not undertake any fuel treatments nor did they experience any wildfires, therefore the only disturbance was drought. Because there were no fuel treatments undertaken during the year no monitoring was conducted at BEOL, SAND or CAVO. The fire effects crew was shifted to support fire effects work for wildfires at parks in the Chihuahuan Desert. Although the previous year was above norm (7%), precipitation for the last four months was almost two thirds of normal (Figure 5). The monthly deficit persisted into 2011 and by April a moderate drought had developed which intensified to severe by June and then rapidly to extreme the following month (Figure 4). Extreme conditions persisted through the rest of the summer moderating to severe in October and to moderate by December, aided in by the above normal precipitation in November and December. Being on the northern edge of the drought impacted region the drought started later and abated sooner than parks further south which experience severe to extreme drought to the end of the year. Total precipitation for the year was not atypical for a dry year.

Sand Creek Massacre (SAND) NHS

2009 - 2010

As with BEOL, fuel management activities at SAND were limited to mastication in which 120 acres were treated in the spring of 2010. Because SAND had just recently become a COOP climate station in 2009, available data is limited to 2010 and after. Precipitation prior to 2010 will come from the Cheyenne Wells COOP Station 20 miles to the north northeast for a general sense of the precipitation in the area. The year 2009 was a wet year, at 33% above normal precipitation received at Cheyenne Wells, which was similar to that received at Las Animas 51 miles to the southwest (see above Bent's Old Fort) (Figure 5). Most of the moisture came during the month of July and the rest after the growing season, primarily during the month of October establishing favorable soil moisture conditions that carried into 2010. Monthly precipitation in the first 5 months of 2010 was at or slightly above normal therefore soil moisture conditions were not limiting to plant growth for the masticated areas at the start of the growing season. From May through August precipitation was slightly above normal with the exception of June. Beginning in September onto the end of the year little precipitation occurred with total precipitation for the year ending 93% of normal. The current climate precipitation trend observed at Cheyenne Wells is negative or drying at a rate of $0.004 \text{ in. decade}^{-1}$ ($0.04 \text{ in. century}^{-1}$). In contrast to BEOL where the current precipitation trend is positive, however the long-term trend (1897 to 2012) for both Cheyenne Wells and Las Animas is the same a positive rate of $0.001 \text{ in decade}^{-1}$ ($0.01 \text{ in century}^{-1}$).

2010 – 2011

No fuels management activities occurred at SAND in 2011, thus drought was the primary ecological disturbance to vegetation at the park. Precipitation for previous year was 93% of normal however the last four months were only 31% of normal and thus established a significant moisture deficit going into 2011 (Figure 6). This deficit continued to increase as 2011 progressed and by April a moderate drought had developed and by June it had intensified to severe and then to extreme the following month where it persisted through the remainder of the growing season (Figure 4). In October conditions had moderated to severe by moisture received previous month. However this was precipitation received at Cheyenne Wells and other stations in the area to ameliorate the dry conditions. SAND monthly precipitation continued below normal through December and thus the drought remained extreme at worst or severe at best through the rest of the year. Although dry, total precipitation for the year was not unusually dry for the record.

Capulin Volcano (CAVO) National Monument

2009 - 2010

In 2010 no prescribed fire activity took place at however a 60 acres were thinned. The current precipitation data available at the two closest site is incomplete and the record is short, therefore no analysis will be attempted for this report.

2010 – 2011

No fuels activity have been undertaken for 2011. Since the local NWS Coop Station data has some problem to resolve not assessment will be made.

Washita Battle Field (WABA) National Historic Site

2009 – 2010

WABA did not undertake any fuels treatments in 2010, however analysis of current and recent years precipitation will be presented that may have implications for any future fuels management actions. Total precipitation in 2009 was 71% of normal with the rainfall deficit persistent through the entire year (Figure 6). However conditions improved in 2010 where precipitation was near normal through April. Beginning in May a precipitation deficit developed that persisted through the growing and through to the end of the year. Total precipitation for year ending up at 91% of normal, not as severe as the previous year but the second year that plant growth (fine fuel accumulation) may have been moisture limiting. The current and long-term trend in precipitation as observed at Sayer Oklahoma were increasing at a rate of 0.023 in. decade⁻¹ (0.23 in. century⁻¹).

2010 – 2011

As with 2010 no fuels management treatments were undertaken in 2011 however an assessment will be provided with consideration of future fuels activity in 2012. The moisture deficit that ended 2010 continued into 2011 and progressively increased so that by May a moderate drought had developed (Figure 4). Monthly precipitation continued to be significantly below normal and the drought further intensified to extreme by July. The monthly precipitation deficit continued through September and extreme drought through October. However above normal precipitation was received beginning in October and continued through to the end of the year, which was enough to moderate the drought to severe in November and then to moderate in December ([NCDC 2011](#)). By the end of the year the total moisture deficit was 48% of normal. The last time the moisture deficit exceeded that of this year, 2012, in terms of absolute moisture received, was during the drought years of the 1950s. Less moisture was received in 1956 and 1954 but only by a negligible amount. Time will tell whether or not the current drought will persist to become equivalent to or exceed the

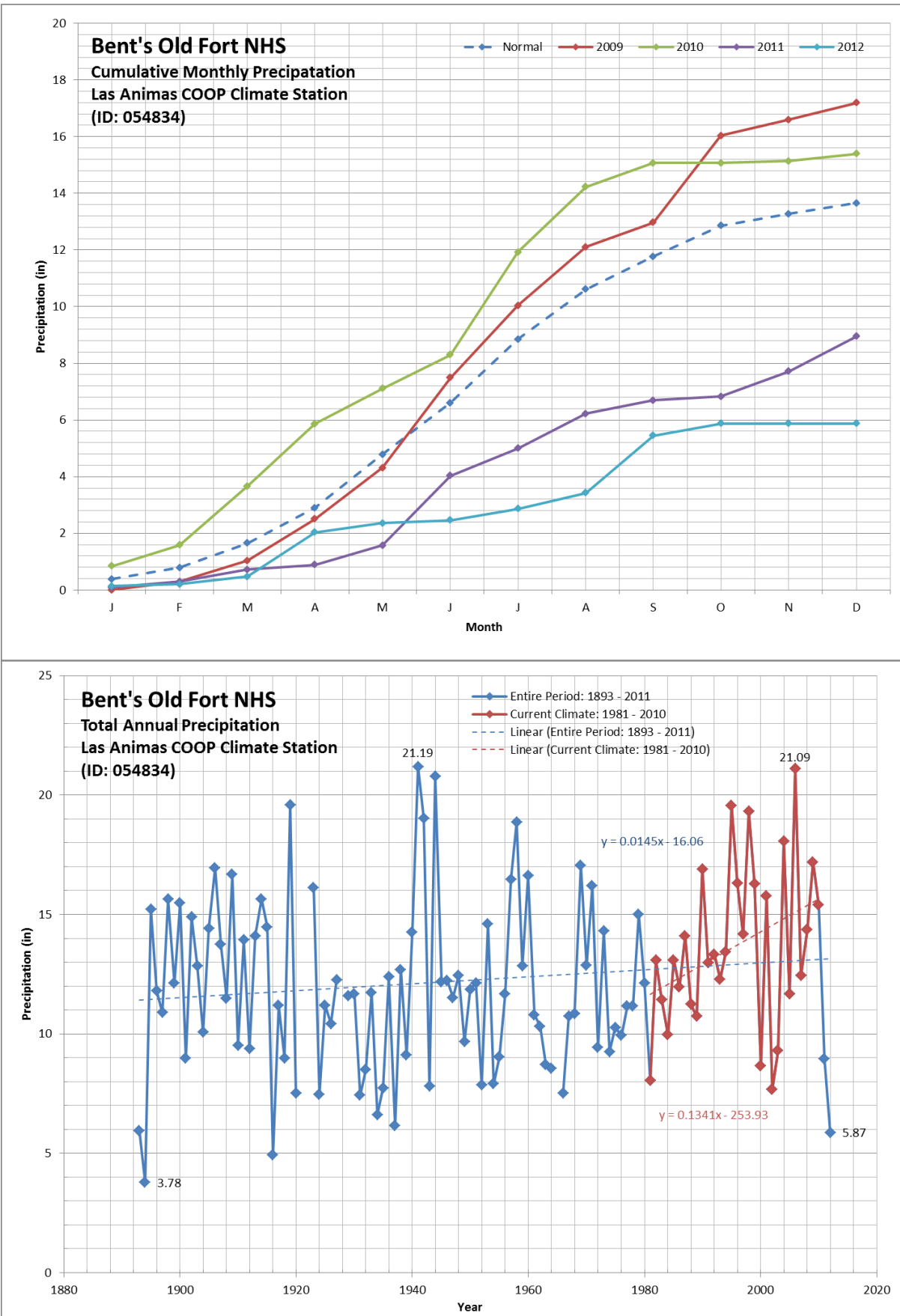


Figure 5. Cumulative Monthly Precipitation for the years 2009 through 2012 (top graph) and the Total Annual Precipitation from 1893 to 2012 (bottom graph). Data is from the from the [Las Animas](#) NWS COOP Climate Station (Station ID 054834).

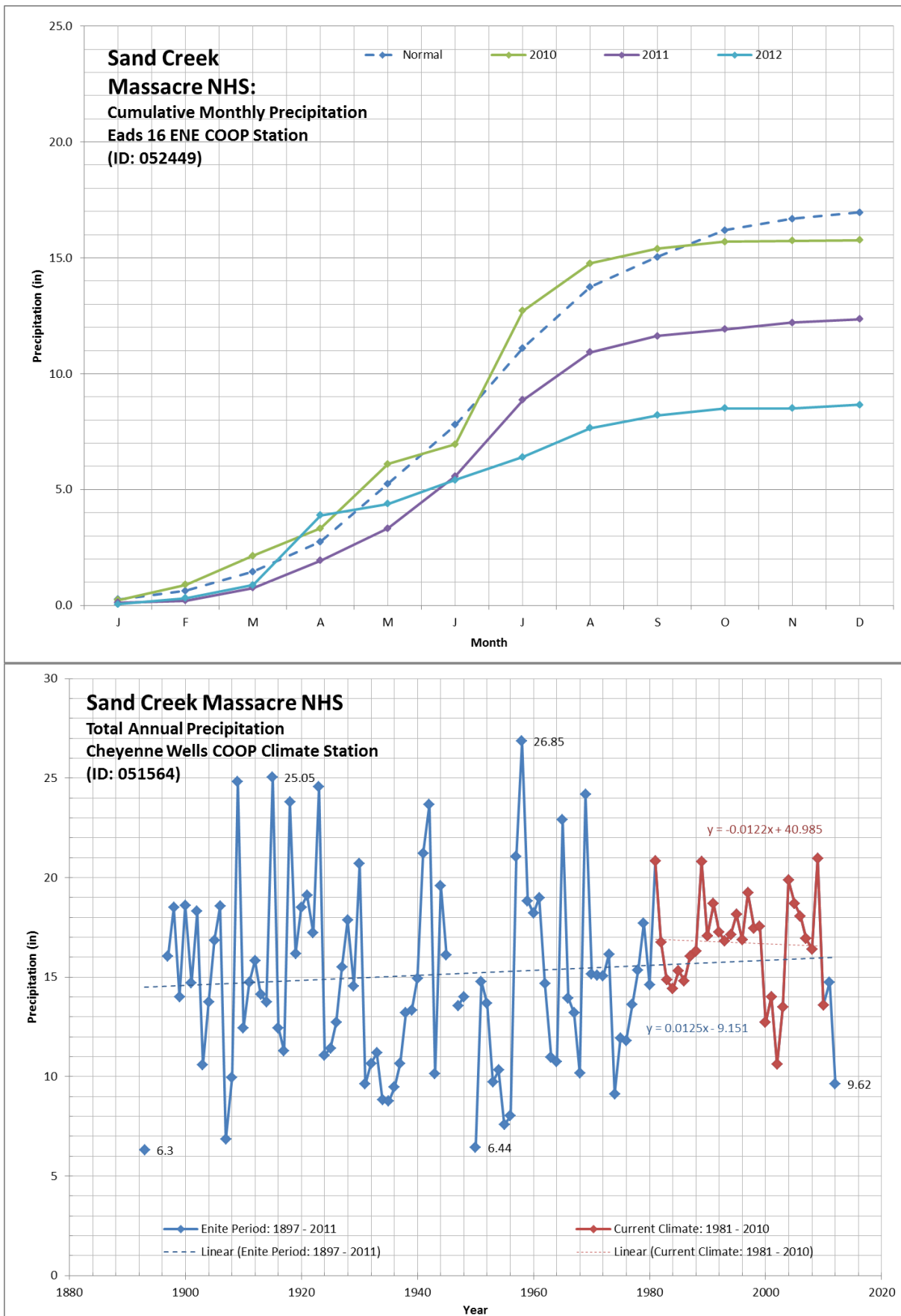


Figure 6. Cumulative monthly precipitation and total annual precipitation for Sand Creek Massacre (SAND) NHS. The normal values are plotted from the Cheyenne COOP Climate Station. The upper chart is from the [Eads 16ENE](#) (ID: 052449). COOP Climate Station located at SAND and the lower chart from [Cheyenne Wells](#) COOP Climate Station (ID: 051564). Normal monthly precipitation is plotted from Cheyenne Wells data in the chart.

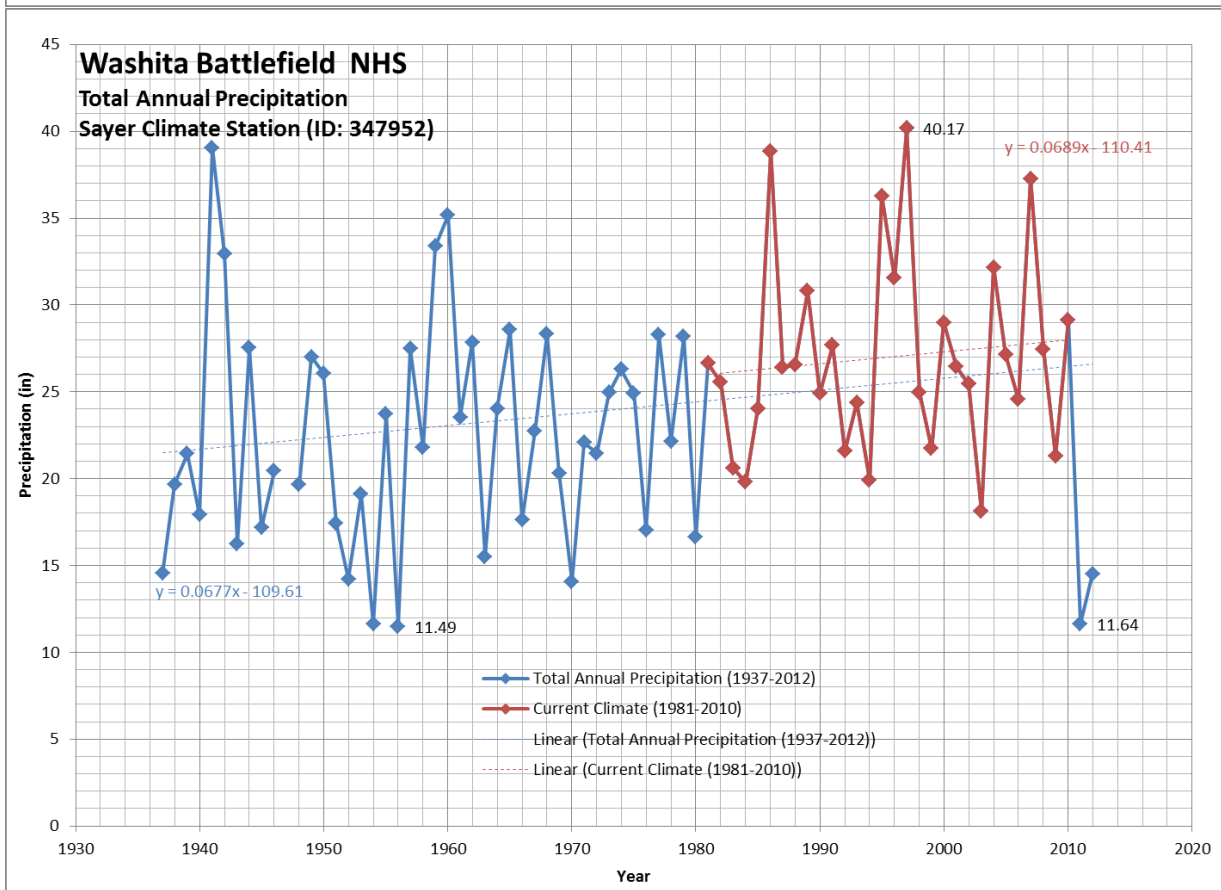
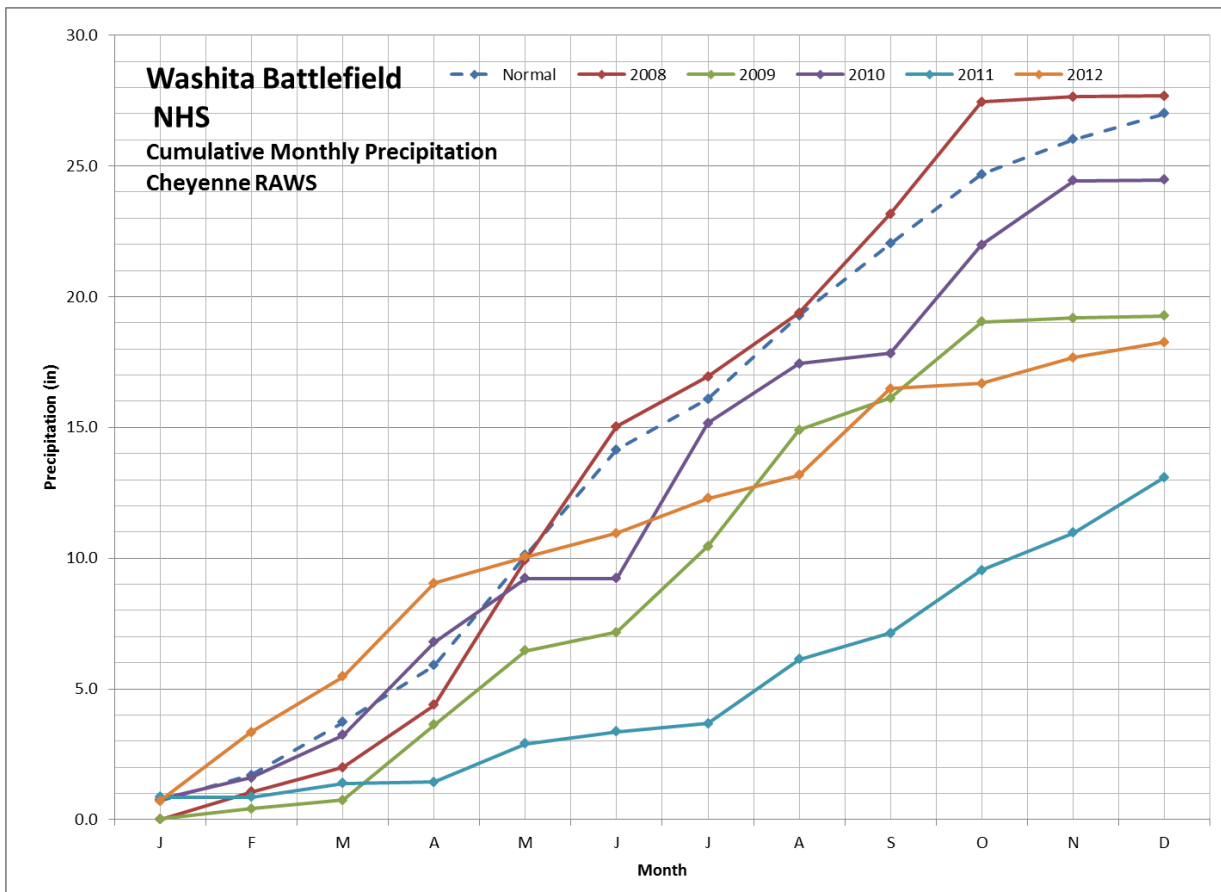


Figure 7. Cumulative Monthly Precipitation for 2009 through 2012 observed at the [Cheyenne](#) RAWS and Total Annual Precipitation from 1936 to 2012 observed at the [Sayer](#) NWS Cooperative Climate Station (ID 347952). Monthly normal precipitation plotted from the Sayer precipitation data.

drought of the 1950s. Unfortunately data from the 1930's is from the last three years so local precipitation comparisons cannot be made to the Dust Bowl of the 1930's.

Notes regarding location of precipitation observations

In 2010 precipitation was slightly below normal for the five parks for which data was analyzed, with the exception of BOEL which was about 3 inches above normal (124% of normal). However for two other station near the park, La Junta was 0.39 inches above normal (103% of normal) and John Martin Dam was 2.53 inches below normal (83% of normal), demonstrating precipitation in a single year can vary significantly within an 30 mile radius from being 17% below normal to 24% above for this region of SE Colorado. Thus relying on a nearby station such as a RAWS or COOP station to provide proxy onsite precipitation data on an annual basis can introduce uncertainty in correlating fire effects to precipitation at least in the short term. This analysis for BOEL was allowed because of the close proximity of complete data sets. Analysis for other parks will be complicated by the problems that commonly plague COOP climate stations which was discussed earlier.

For the High Plains Climate Region of Texas, in which LAMR is situated, the PDHI ranged from moderately moist in May and June to very moist in July and returning to moderately moist again in August. However observations at the Borger COOP climate station near LAMR reported precipitation 90% of normal and CEDAR Raws was even less by about half an inch indicating much drier conditions locally than reflected at the Regional scale. This again highlights the need to obtain local data when ever possible as regional scale observations can mask local conditions at least in the short-term.

Conclusions

All parks in 2010 implemented some form of fuels management and only two implemented prescribed fire. Moisture conditions in 2010 were not excessively dry at the time of implementation, however post treatment moisture conditions were not optimal for plant response during the growing season (Table 4). So any fire (fuel) effects may have been masked by the moisture deficit, which is defined as the cumulative precipitation below normal, especially through the growing season. As the year transitioned from 2010 to 2011 moisture conditions deteriorated at all the parks to the point that prescribed fires were suspended at LAMR. CHIC carried out broadcast burns during the winter months. None of the other parks carried out any fuels management activities Although LAMR suspended fuels activities it did experience wildland fire. Without exception all parks experience extreme drought during the growing season with the drought relenting to moderate for only three parks by the end of the year. Thus with two back to back years where plant growth was limited, the last severely so, may have implication for prescribed fire or other fuels management activities at least in the near term, especially if 1950's conditions develop.

Table 7. Total annual precipitation for 2010 and 2011 for four of the Southern Plains Fire Group's six parks listed west to east, BOEL, SAND, LAMR, WABA and CHIC, and their associated departures from normal and the current trend as observed at the nearest suitable NWS Cooperative Climate Stations. (Sources: <http://climod.srcc.lsu.edu/climod/timeSeries/>; <http://www.wrcc.dri.edu/climatedata/climsum/>)

	2010		2011		
Park	Total Annual Precipitation (in)	Departure from Normal* (% of Normal)	Total Annual Precipitation (in)	Departure from Normal* (% of Normal)	Trend per decade (in) 1981 – 2010
BOEL	15.39	2.99 (124%)	8.95	-4.7 (66%)	0.45
SAND	14.71	-0.59 (96%)	12.22	-3.69 (77%)	0.13
LAMR	20.82	-2.42 (90%)	9.72	-13.62 (42%)	-0.04
WABA	24.46	-2.55 (91)	13.09	-13.92 (52%)	.023
CHIC	37.28	-4.83 (89%)	34.27	-7.84 (81%)	-0.07

Southwest Fuels Conference Presentation:

March 8 -9, Flagstaff Az.

Presentation entitled: *Grassland Recovery of the Eastern Chihuahuan Desert:
Precipitation Patterns & Fire Occurrence* Two graphs:

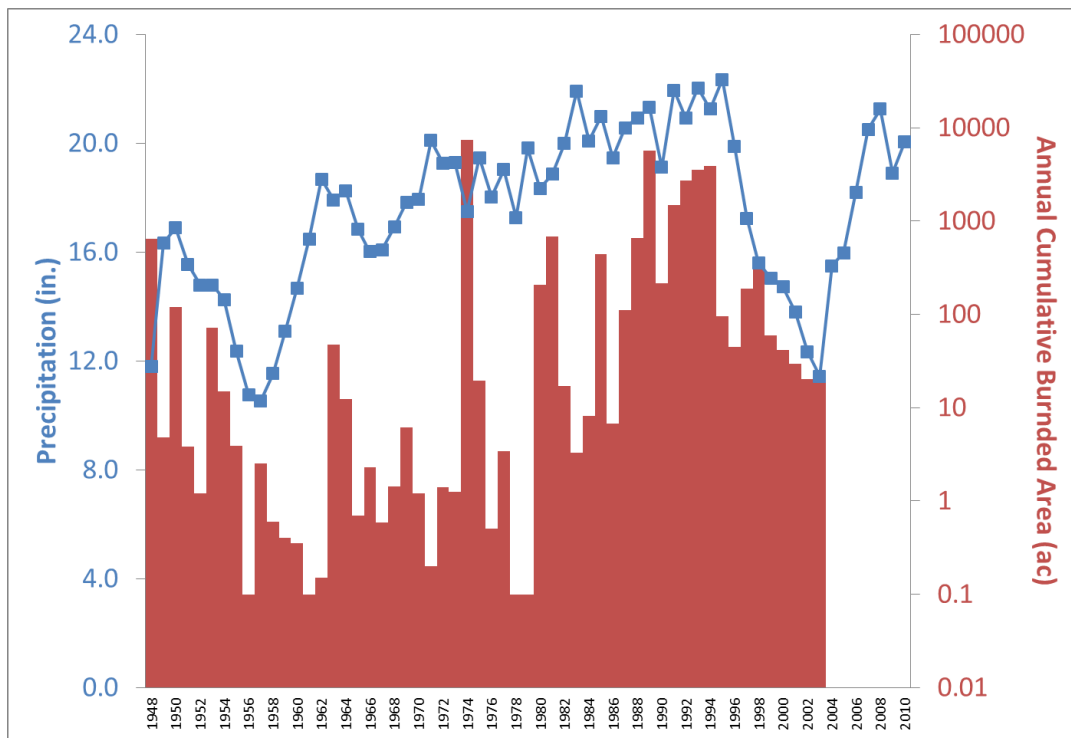


Figure 8. Annual precipitation and total annual cumulative burned area at Big Bend National Park 1948 to 2010.

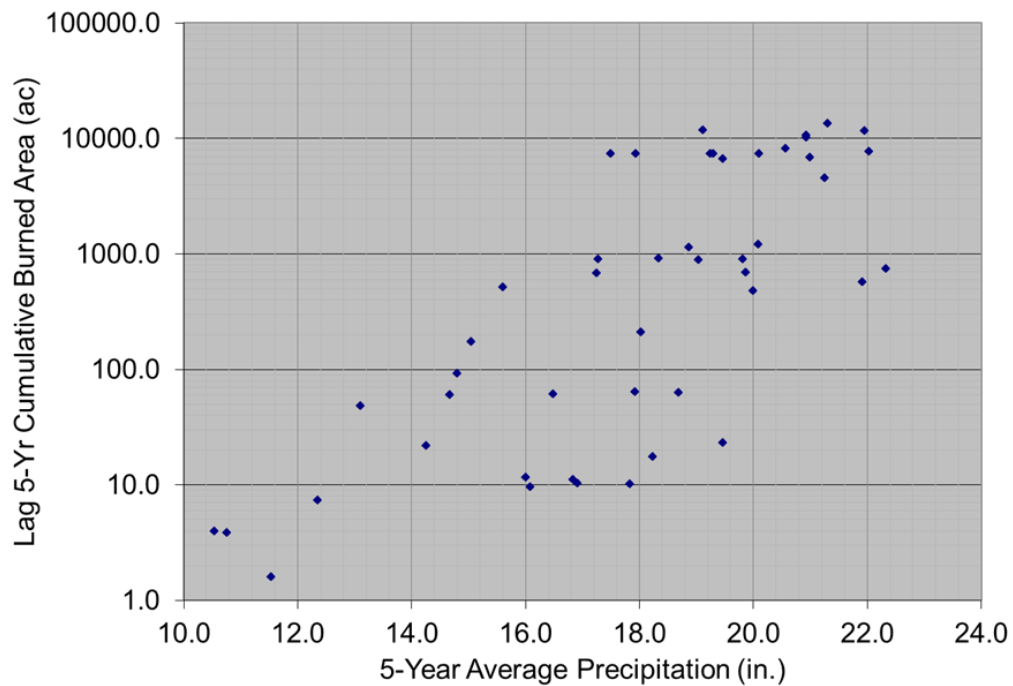


Figure 9 Five year average precipitation and the subsequent five year cumulative burned area at Big Bend National Park, TX. This plot demonstrates that as the five year average precipitation increases total cumulative burned area also increases.