

# Basic Prescribed Burning South Dakota NRCS Policy

Stan Boltz

State Range Management Specialist

## South Dakota Supplement to Appendix A of the National Range and Pasture Handbook Natural Resources Conservation Service (NRCS) Policy on Prescribed Burning on Grazing Lands

### Training, Certification, and Authority

All NRCS employees, in South Dakota (SD), are prohibited from providing any and all technical assistance dealing with prescribed burning unless they have met the minimum training requirements.

**Minimum Training Requirements** – The National Wildfire Coordinating Group (NWCG) S-190 (Introduction to Wildland Fire Behavior) on-line course will be completed. In addition, a 8-hour Basic Prescribed Burning (in-state) will be completed. This is the minimum training requirement to obtain job approval authority (JAA) for a period of five years. In order to maintain JAA beyond the five-year period, the above mentioned training, equivalent experience and/or more advanced training (e.g., the National Employee Development Center Prescribed Burning Training) must be completed.

Job approval authority should be granted to employees meeting these minimum training requirements for the following burn complexity:

- Fuel Type – Herbaceous, non-volatile fuels only
- Slope – Average slopes less than six percent
- Acreage – Less than 320 acres

Job approval is for conservation planning purposes. If granted, the employee for the above burn complexity, can:

- recommend the prescribed burning practice.
- include prescribed burning in a conservation plan.
- provide clients with a template or example burn plan (job sheet or specification).
- certify that site-specific prescribed burn plans meet the specifications as set forth in the SD Conservation Practice Standard Prescribed Burning (338).

- recommend the prescribed burning practice.
- include prescribed burning in a conservation plan.
- provide clients with a template or example burn plan (job sheet or specification).
- certify that site-specific prescribed burn plans meet the specifications as set forth in the SD Conservation Practice Standard Prescribed Burning (338).

Conservation planning situations involving greater burn complexity than described above should be referred through the field support office to the state resource conservationist.

**Prescribed Burn Plan Development** – SD NRCS employees, with JAA, will direct interested clients to other government agencies, nongovernment organizations, and private consultants who provide that service. Clients may also be directed to these same groups for application assistance. Clients may also develop their own prescribed burn plan.

#### **Technical Application Assistance**

SD NRCS employees are prohibited from activities such as performing the duties of a designated burn boss or directly assisting with ignition on a prescribed burn.

# Online training web site entry page:

Learning and Performance Login - Windows Internet Explorer

File Edit View Favorites Tools Help

https://nfa.plateau.com/learning/user/login.jsp

Live Search

Learning and Performance Login

U.S. Fire Administration | Homeland Security

NFA Online

Learning and Performance

## Welcome



Our help desk is available **7 days a week from 8am to 8pm EST** at [NFAhelp@gpstrategies.com](mailto:NFAhelp@gpstrategies.com) or **1-888-834-6976**

**NEW STUDENTS**, click the "New Students Click Here To Register Now!" link below the login box.

**RETURNING STUDENTS**, enter your User ID and Password.

**FORGOT USER ID OR PASSWORD**, use the links below the login box for immediate assistance! Click the job aid for additional assistance.



### Reminders:

- User IDs and Passwords are case sensitive.
- After 3 unsuccessful login attempts your account will be *locked*.
- Please use the Forgot Password/Forgot ID links for immediate assistance.

Welcome! Please Sign In

User ID:

Password:

Sign In

[Forgot Password?](#)

[Forgot ID?](#)

[New students click here to register now!](#)

# STANLEY C BOLTZ

## To-Do-List

Search To-Do-List

Show: Everything

### No due date

 **S-130 (version 5) Firefighter Training (Q901)**

In progress

Search for a Course

[Click to Browse Catalog](#)

### Easy Links

- [Fire Exercise Day Review](#)
- [Transcript w/ ACE & CEUs](#)
- [News](#)
- [User Settings](#)
- [NWCG Website](#)
- [USFA Website](#)
- [Reports](#)

### Learning Status

#### Completed Work



No completions in the last 30 days.

#### Discussion Forums



See what's happening in the forums

# 2016 Spring CRP / Grassland Prescribed Fire Landowner Workshops

8:30	Registration
9:00	Introductions
9:15	USDA Fire Policy
9:30	USDA CRP Fire Rules
9:45	SD Fire Laws and Regulations
10:15	Uses and Benefits of Prescribed Fire for Grassland Management
10:45	Firebreak Preparation and Fire Behavior
11:30	Interior/Exterior Hazards and Mitigation
Noon	Lunch (on your own)
1:00	Fire Weather Patterns and Planning
2:30	Fire Tools and Resources
2:45	Using the SD USDA Burn Plan
3:30	Optional Sessions
	Sand table demonstration
	Individual advisory sessions (bring your maps!!)
	Equipment demonstration
4:00	Adjourn

**Watertown:** March 23<sup>rd</sup>, SDSU Regional Extension Center  
(Entrance B)

**Huron:** March 24<sup>th</sup>, NRCS Meeting Room 300, Federal Building

**RSVP:** Jan Rounds, SDSU Extension, 882-5140 or [janice.rounds@sdstate.edu](mailto:janice.rounds@sdstate.edu)  
**Seating is limited at both locations so please RSVP**

## FREE WORKSHOP

Expert advice on **YOUR** burn projects.....**bring your maps!!!!!!**  
Producers planning to burn CRP or pastures in spring 2016 are encouraged to attend.





**PRAIRIE COTEAU HABITAT**  
PARTNERSHIP



# CRP Rules and Regulations

FSA / NRCS staff





## PRAIRIE COTEAU HABITAT PARTNERSHIP



# Rules

- Rx Fire Must be in Conservation Plan
  - Can request change to other management if desired
- FSA Burn requirements:
  - Qualified burn plan
  - Reviewed by qualified reviewer
- Completion of this course
  - NRCS staff can certify that a written plan meets NRCS standards and can be submitted to local FSA County Committee.



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## Rx Fire Eligible Practices

- CP1
- CP2
- CP4D
- CP8A
- CP18B
- CP18C
- CP21
- CP25
- CP23
- CP23A
- CP27&28 (FWP)
- CP29
- CP30
- CP37
- CP38E (SAFE)
- CP42



## PRAIRIE COTEAU HABITAT PARTNERSHIP



# Rules

- Mid-contract management (MCM)
  - 10 year contract:
    - yrs. 4,5,6
  - 15 year contract:
    - yrs. 4,5,6 AND
    - yrs. 10,11,12
  - Burn Options:
    - All, 1/2, 1/3, 1/4 (allows for rotation, flexibility over time/space)
    - Must complete MCM on all acres in 3 yr. window
  - Burn Dates:
    - **March 1 - April 30<sup>th</sup> spring burn cutoff date**
      - Primary Nesting Season (PNS) (May 1 – August 1) – cannot burn



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## Rules

- Cost share and contractor reimbursements
  - FSA reimbursement policy
    - Actual costs up to \$48 (with 50% cost share up to \$24 returned to landowner)
    - Example: if VFD charges \$50/acre, FSA will reimburse \$24 max
  - Supporting documentation is necessary
    - Invoices, cancelled checks, receipts, analysis tags, other acceptable evidence
    - Landowner cost receipts (itemized expenses: labor, equipment, dates, costs/hr., etc.).
    - Reasonable and customary



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# Rules

- If the producer performed the practice with the producer's own labor, equipment, or materials, the producer shall submit signed, itemized statements.
- Statements shall include:
  - dates of work performed
  - cost per hour charged for labor\*\*
  - type of equipment used
  - charge for equipment
  - type and cost of materials used
  - other applicable information

\*\*Costs for personal labor and personal equipment should be less than that charged by contractors who are entitled to make a profit for their efforts.



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## CRP Wetland acres

- Can manage with fire.
- Cannot manage with Haying, Disking, or Grazing.





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# Communicate early and often!

- Install firebreaks in fall (if possible)
- Make Contact With burn providers. VFD's and/or other (especially if you want them to burn it for you)

- Necessary with plan updates or modifications
- Reseed Firebreaks (disked)



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## Reseeding Firebreaks

- Plant it back to preexisting seed plan
- Plant it back to a permanent firebreak

NRCS standard allows for 100% legume/forb

*OR*

a combination of grass/legume/forb

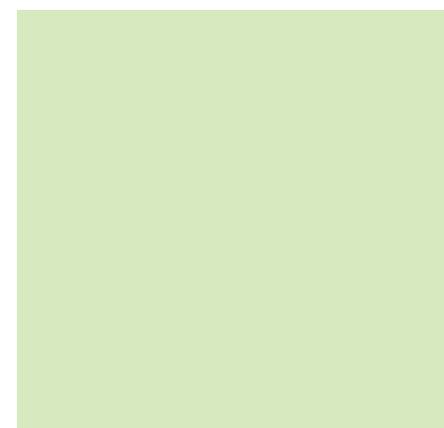


# *PRAIRIE COTEAU HABITAT* PARTNERSHIP



- Questions?

# Private Lands Prescribed Fire in South Dakota: Needs, Opportunities, and Barriers



Pete Bauman  
SDSU Range Field Specialist

Watertown Regional Office

If we know all these  
great things about  
fire.....



Why aren't more  
people using it?

# Who's using prescribed fire in SD



- n US Fish and Wildlife Service
- n National Park Service
- n US Forest Service
- n Bureau of Land Management
- n NRCS  
(planning/participation)
- n Native American Tribes
- n Bureau of Indian Affairs
- n SD Dept. of Ag – Division of Wildland Fire
- n SD Dept. of Game, Fish, and Parks: Divisions of Parks, Custer State Park, and Wildlife
- n South Dakota State University
- n The Nature Conservancy
- n Pheasants Forever
- n Private Landowners

# Barriers to private lands fire in SD



- n Legalities
- n Public perceptions
- n Neighborhood relations
- n Lack of experience, equipment, and skills
- n Inappropriate timing
- n Lack of training and services
- n Competing land uses

**Solvable**



Are fire and grazing  
compatible today?

A photograph of a field of dry, brown grass under a cloudy sky. The text is overlaid on the image.

*Fuel* and *timing* must  
be appropriate to  
accomplish  
management goals

*Were objectives met?*



# Patch Burn-Grazing





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## NRCS / PCHP Fire Planning Training Attendance

Year	Location	Attendees
2013	Yankton	
	Sisseton	
	Leola	
	Huron	
	Watertown	
	<b>TOTAL</b>	<b>128</b>
2014	Winner	31
	Rapid City	23
	Lemmon	15
	<b>TOTAL</b>	<b>69</b>
2015 spring	Mitchell	41
	Redfield	26
	Milbank	36
	<b>TOTAL</b>	<b>103</b>
2015 fall	Aberdeen	10
	Platte	2
	Selby	12
	Kennebec	13
	<b>TOTAL</b>	<b>37</b>
	<b>TO DATE</b>	<b>337</b>



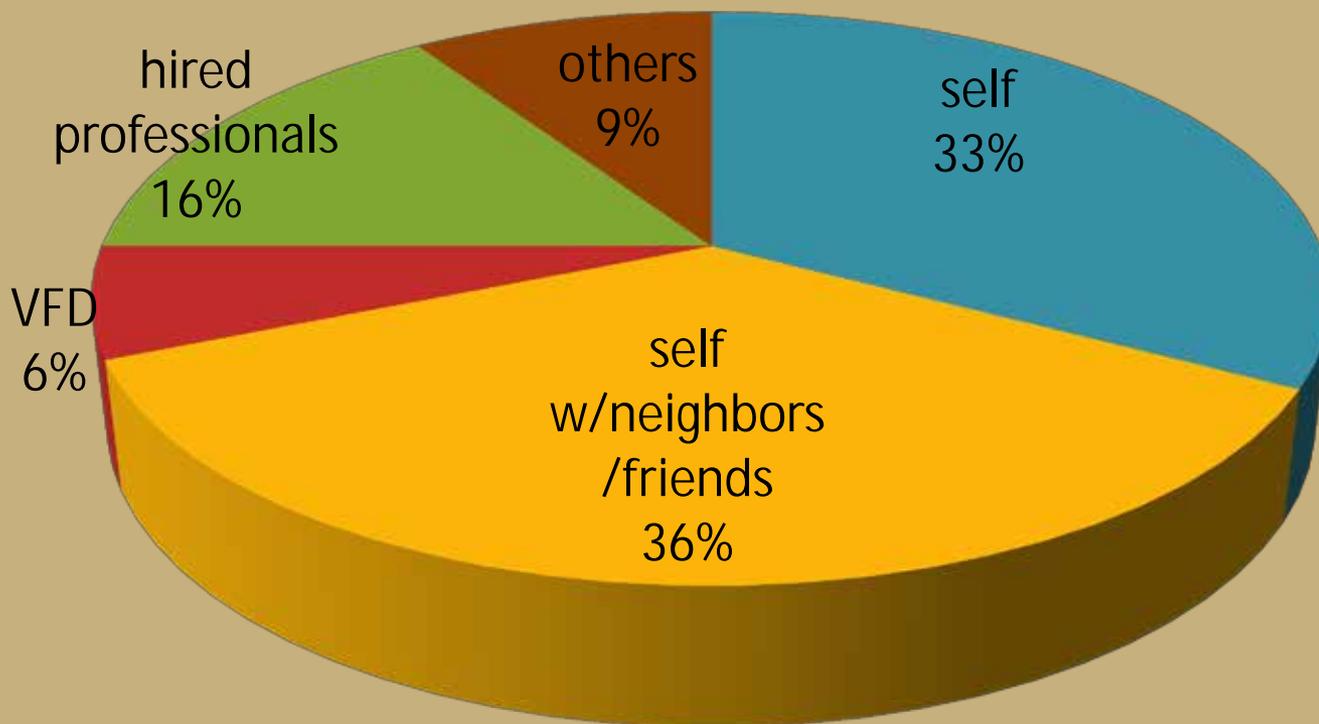


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## 2014-2016 NRCS Planning Training Survey Results (153 of 210, 73%)

### Human Resources Currently Utilized

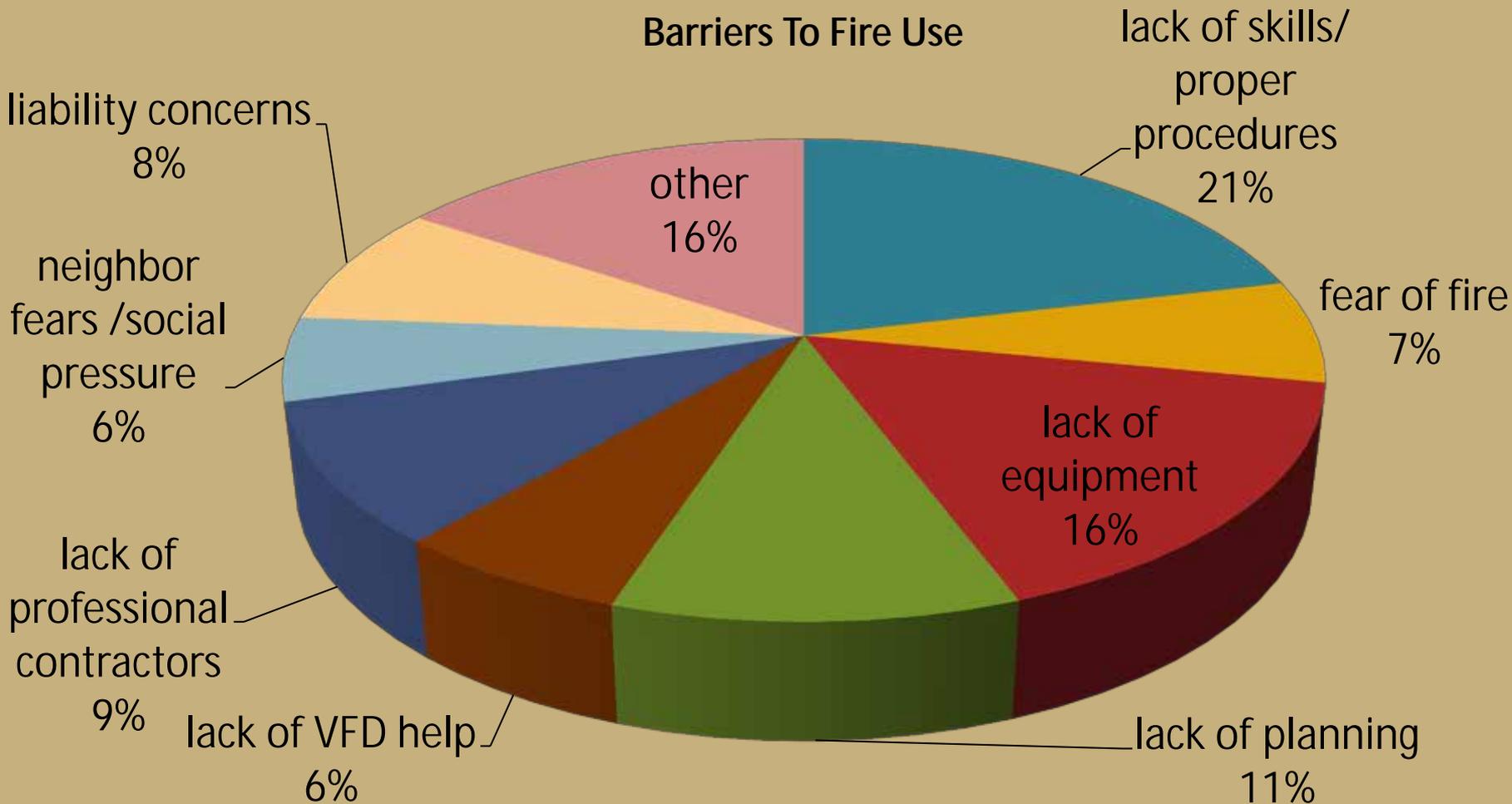




# PRAIRIE COTEAU HABITAT PARTNERSHIP



## 2014-2016 NRCS Planning Training Survey Results (153 of 210, 73%)



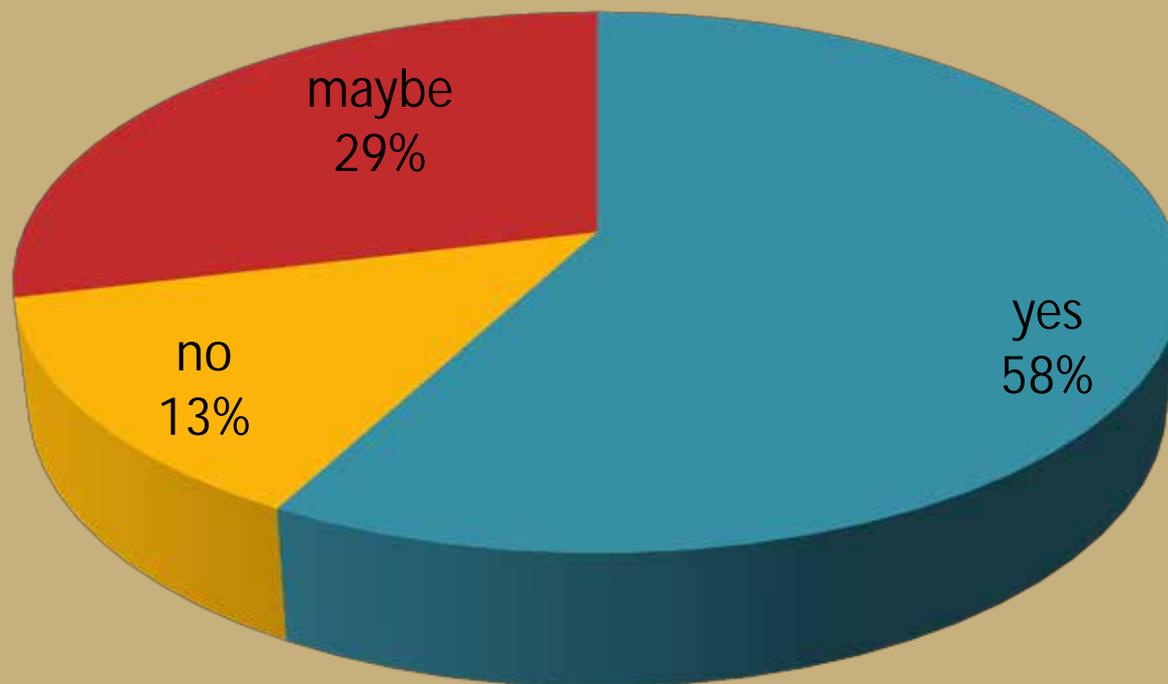


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## 2014-2016 NRCS Planning Training Survey Results (153 of 210, 73%)

Would Students Attend A 2-3 Day Hands-On Fire Training Event







State and Federal Agencies can help, but they are limited to classroom training and advising.

National Wildfire Coordinating Group (NWCG) rules govern agency involvement in prescribed fire.

EVERYONE on the fire must adhere to basic NWCG training standards

- wildfire, prescribed, or training



NWCG requires: Basic classes and annual refreshers



# NWCG requires: CPR and First Aid



# NWCG requires: Fire shelter deployment



ood  
Things  
re  
Popping  
p In 4-H!

4H  
PULLS  
TOGETHER  
NOT APART

# NWCG requires: Physical fitness certification



NWCG rules are not compatible with landowners:

Until something changes, this is about

You Want me to  
do WHAT?  
Get the &^%\$#  
out, and no you  
cannot finish your  
pie first!!



# Barriers to private lands fire in SD



- n Legalities
- n Public perceptions
- n Neighborhood relations
- n Lack of experience, equipment, and skills
- n Inappropriate timing
- n Lack of training and services
- n Competing land uses



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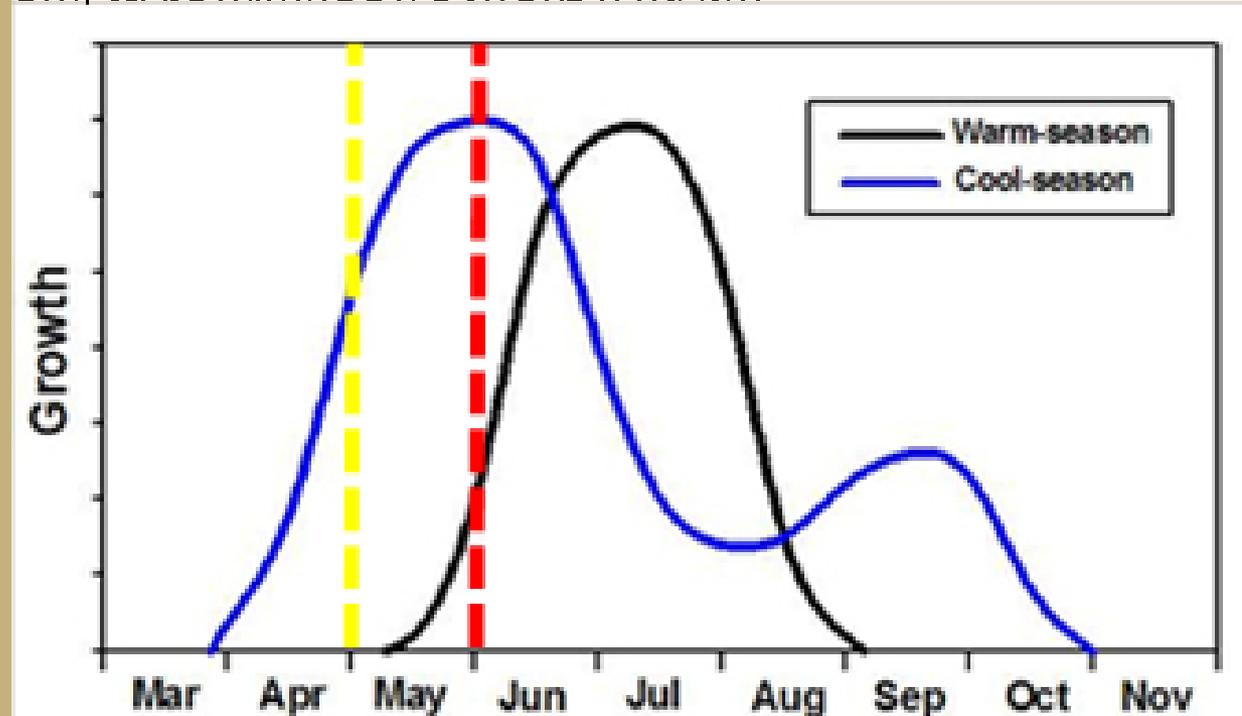


# Fire Control of Exotic Grasses

**FIGURE 9. WARM AND COOL SEASON GRASS GROWTH CHARTS.**

SOURCE: THE NATIONAL DROUGHT MITIGATION CENTER

[HTTP://DROUGHT.MT.UNL.EDU/RANCHPLAN/DROUGHTBASICS/GRASSES DROUGHT/SEASONALWINGSOFPANTGROWTH.ASPX](http://drought.mt.unl.edu/ranchplan/droughtbasics/grassesdrought/seasonalwingsofplantgrowth.aspx)





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# Grassland Establishment Burn Timing

**Primary Nesting Season**

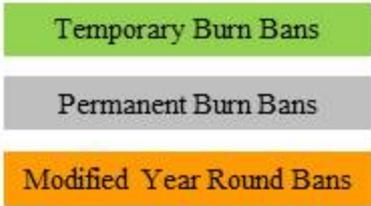
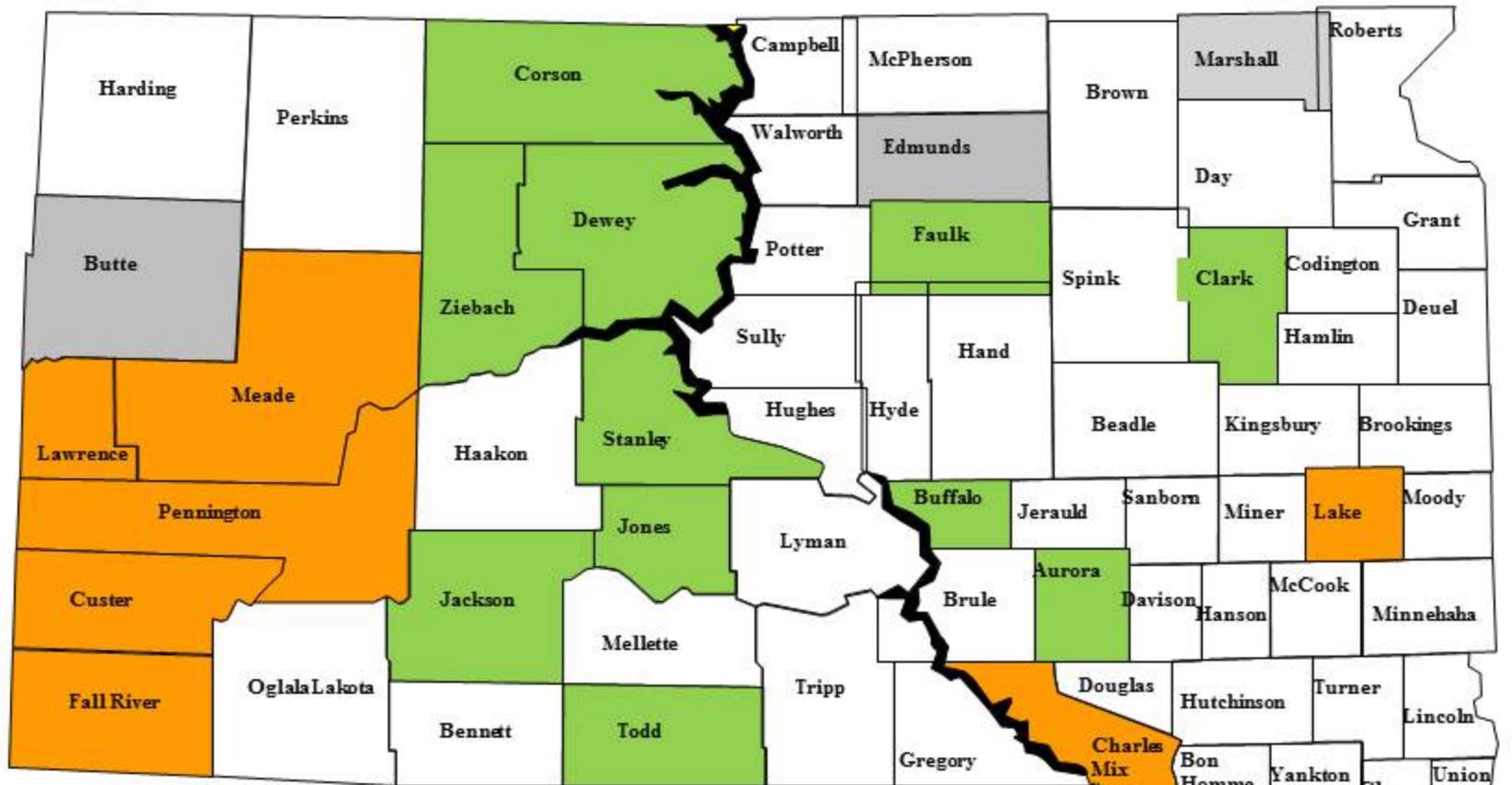
		Target Burn Dates for the First Five Years of Establishment of Native Warm Season Grass Stands												
Year		1-Apr	5-Apr	10-Apr	15-Apr	20-Apr	25-Apr	30-Apr	5-May	10-May	15-May	20-May	25-May	30-May
Establishment	no burn													
Est. plus 1		Red												
Est. plus 2		Red												
Est. plus 3				Red					Red					
Est. plus 4							Red			Red				
Est. plus 5									Red					
Maintenance					Green				Green					

Information above derived from practices by TNC in the tallgrass prairie regions of the Norther Great Plains



# South Dakota Burn Bans

May 26, 2015





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# Keeping VFDs Happy in SD

**Primary Nesting Season**

**Distribution of VFD fire response 2002-2012 (n=2,991)**

Burn Dates	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Burns	74	83	230	378	187	234	560	347	284	313	211	90
Percent	2%	3%	8%	13%	6%	8%	19%	12%	9%	10%	7%	3%

# Barriers to private lands fire in SD



- n Legalities
  - n Public perceptions
  - n Neighborhood relations
  - n Lack of experience, equipment, and skills
  - n Inappropriate timing
  - n Lack of training and services
- WEDS**
- n Competing land uses



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## Integrating VFDs in Rx Fire

- SD Fire Departments
  - Majority are volunteer
  - ~365 "certified"
- Fundraising
- Community Service





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# Why VFDs should be interested

- CRP cost share
- Grants
  - SD VFA Grants
  - Equipment
- Training opportunities
  - 90% of VFD training is on structural fire
  - 90% of VFD responses are wildland fire





# Barriers to private lands fire in SD



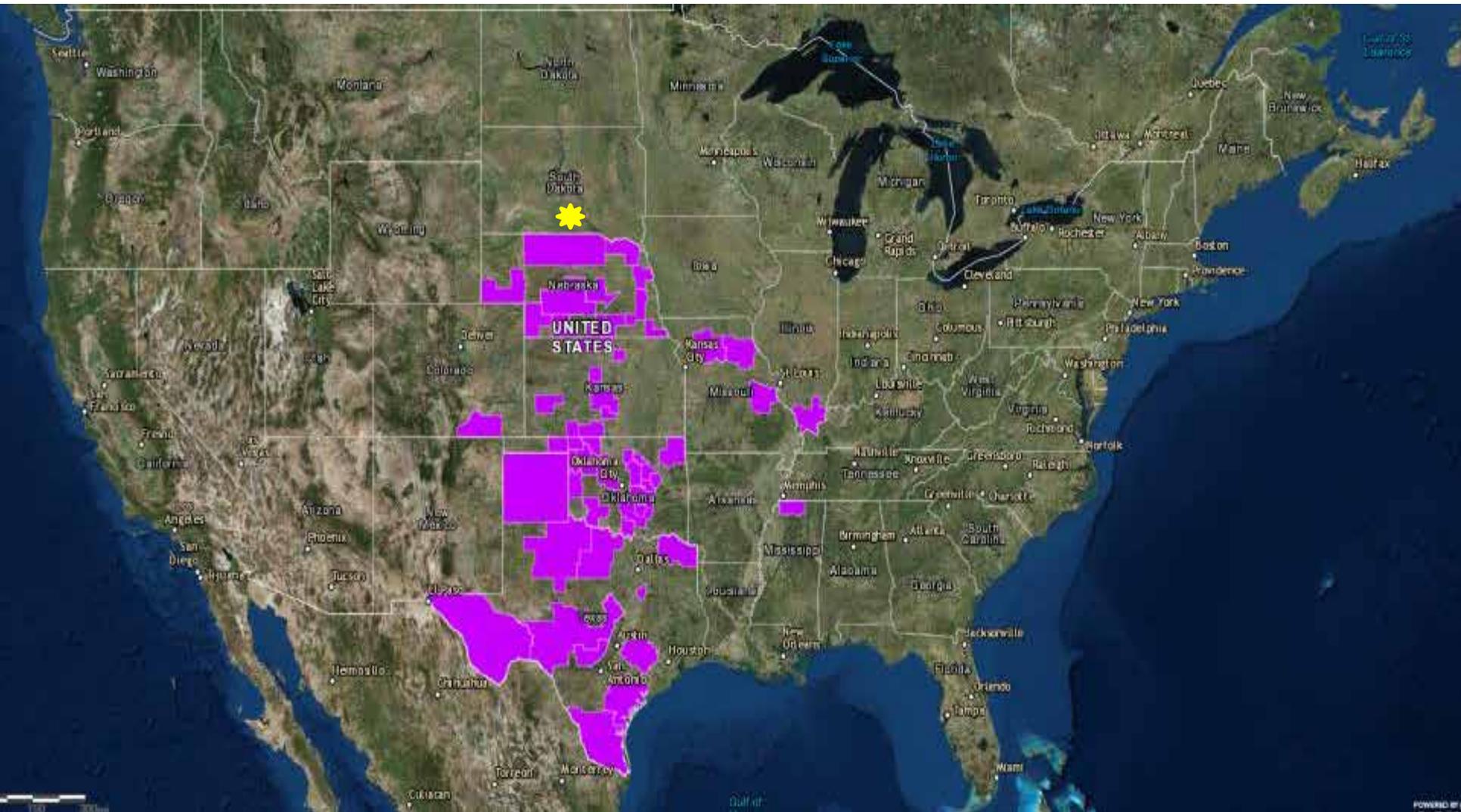
- n Legalities
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- n Competing land uses

**Prescribed  
Burn  
Associations**

# Prescribed Burn Associations



# Prescribed Burn Associations in the Great Plains: ~ 50



## Prescribed Burn Associations in The Great Plains

# History

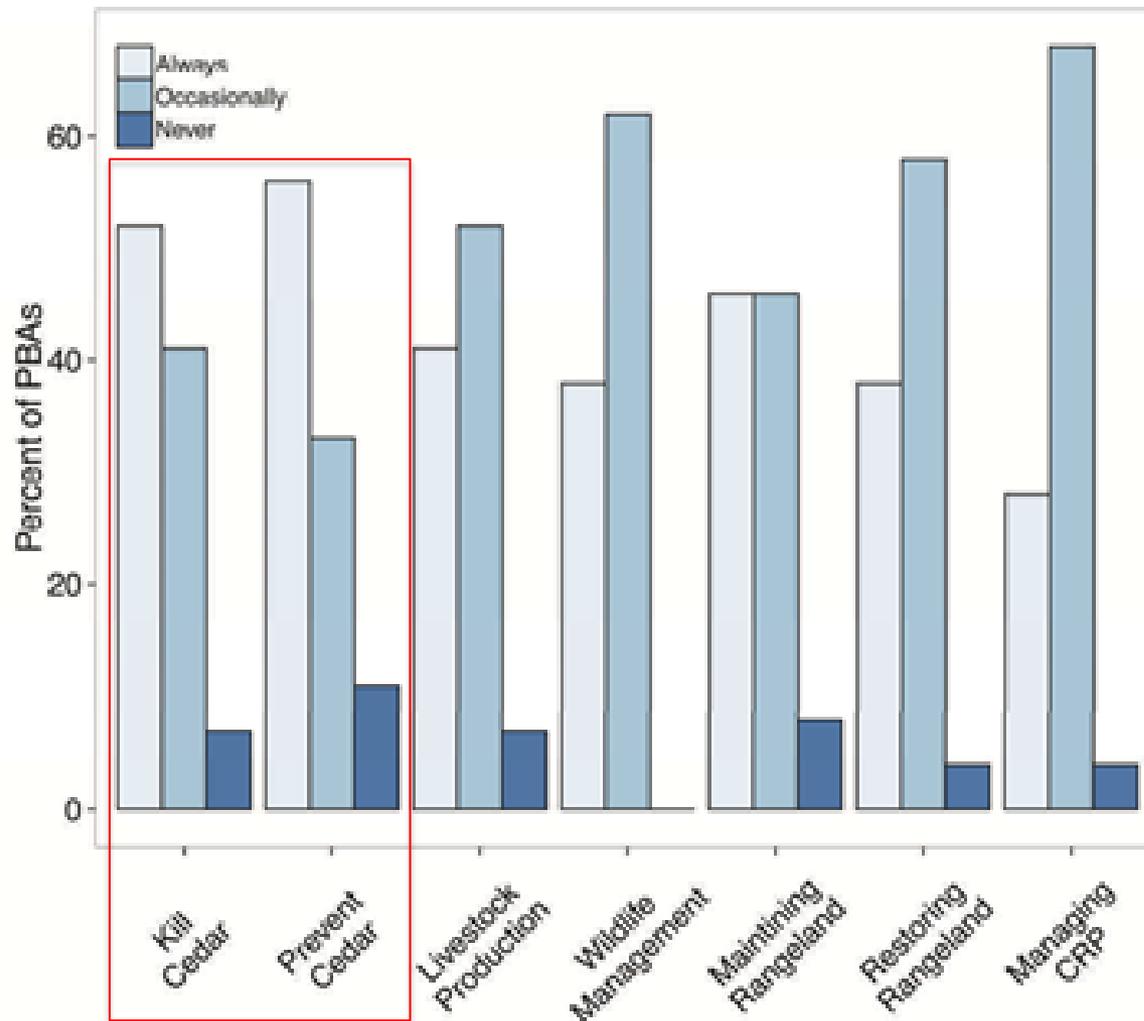
<b>State</b>	<b># PBAs known in 2012</b>	<b># PBAs responding</b>	<b>Average Date PBA Formed</b>	<b>Oldest PBA Formed</b>	<b>Newest PBA Formed</b>
Oklahoma	15	11	2006	2002	2012
Nebraska	15	10	2008	1995	2011
Texas	12	4	2004	1997	2011
Kansas	7	2	2009	2001	2007
Great Plains	50	27	2007	1995	2012

## Prescribed Burn Associations in The Great Plains

# Performance

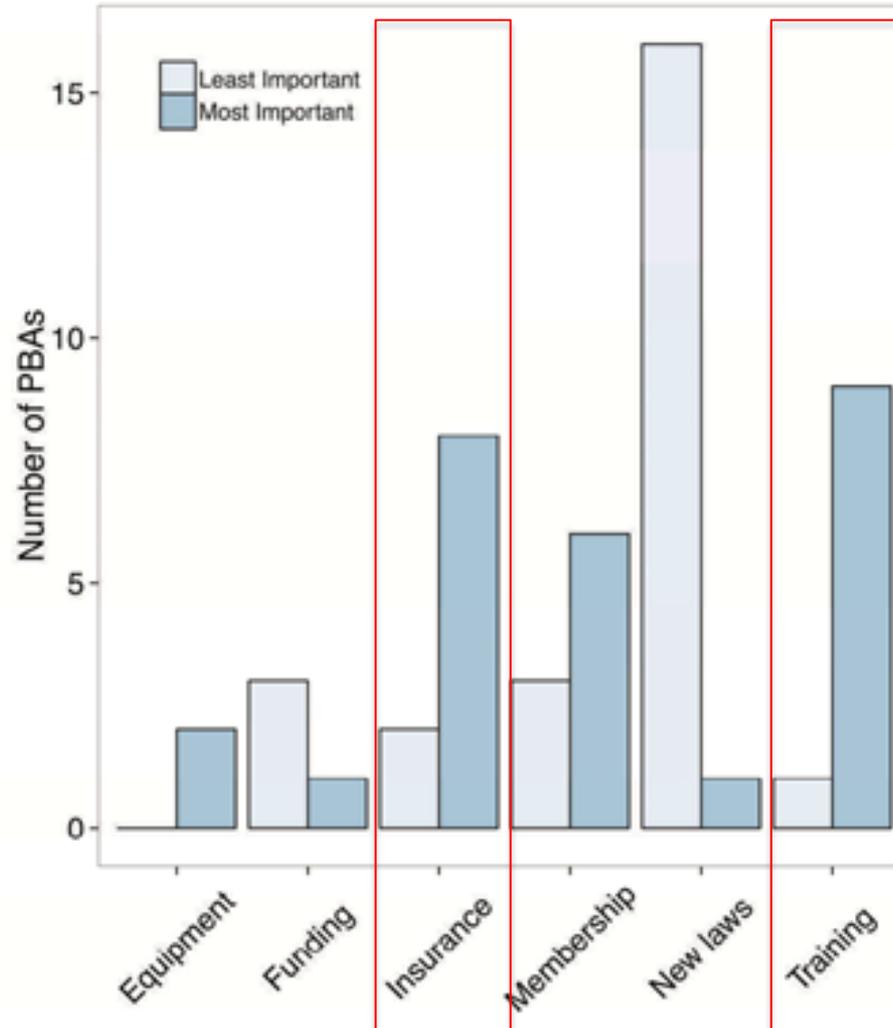
Survey category	Oklahoma	Texas	Kansas	Nebraska
Number of PBAs responding	11	4	2	10
Known # of PBAs	15	12	7	15
Total number of burns conducted	303	348	21	422
Total acres burned	168,334	188,515	23,970	91,416
Avg. burns conducted/year	30.3	23.2	4.2	24.8
Avg. acres burned/year	16,833	12,568	4,794	5,377
Avg. acres burned/PBA	16,833	47,129	11,985	9,142
(range)	(0-100,000)	(152-150,000)	(0-23,970)	(500-60,000)
Avg. acres/burn	556	542	1,141	217

# Objectives



## Prescribed Burn Associations in The Great Plains

# Needs

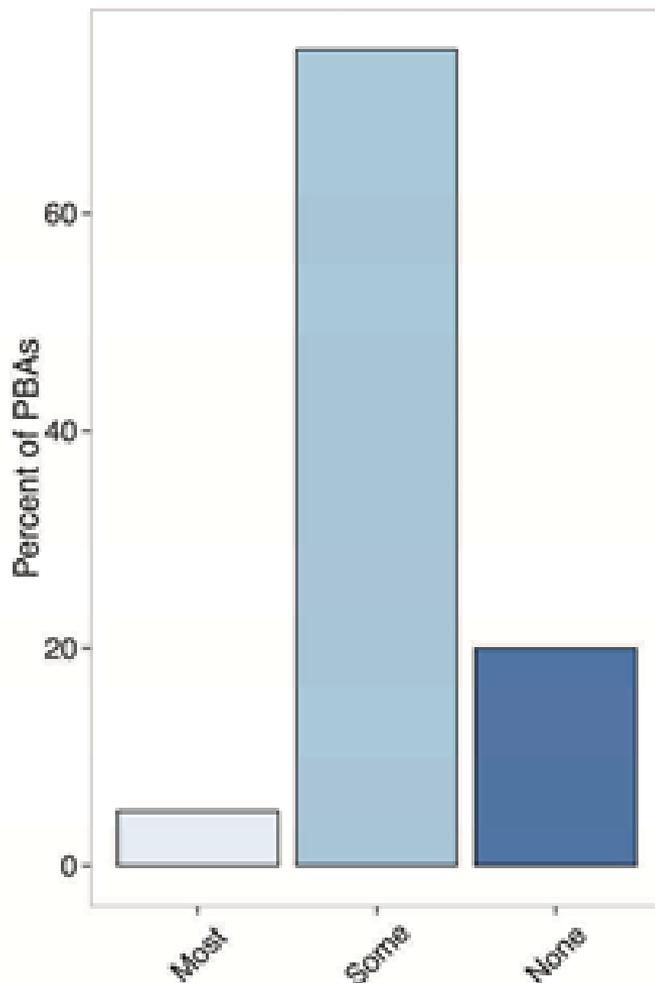


Prescribed Burn Association Activity, Needs, and Safety Record: a survey of the Great Plains

Authors: : John Weir<sup>1</sup>, Dirac Twidwell<sup>2</sup>, and Carissa L. Wonkka<sup>3</sup>

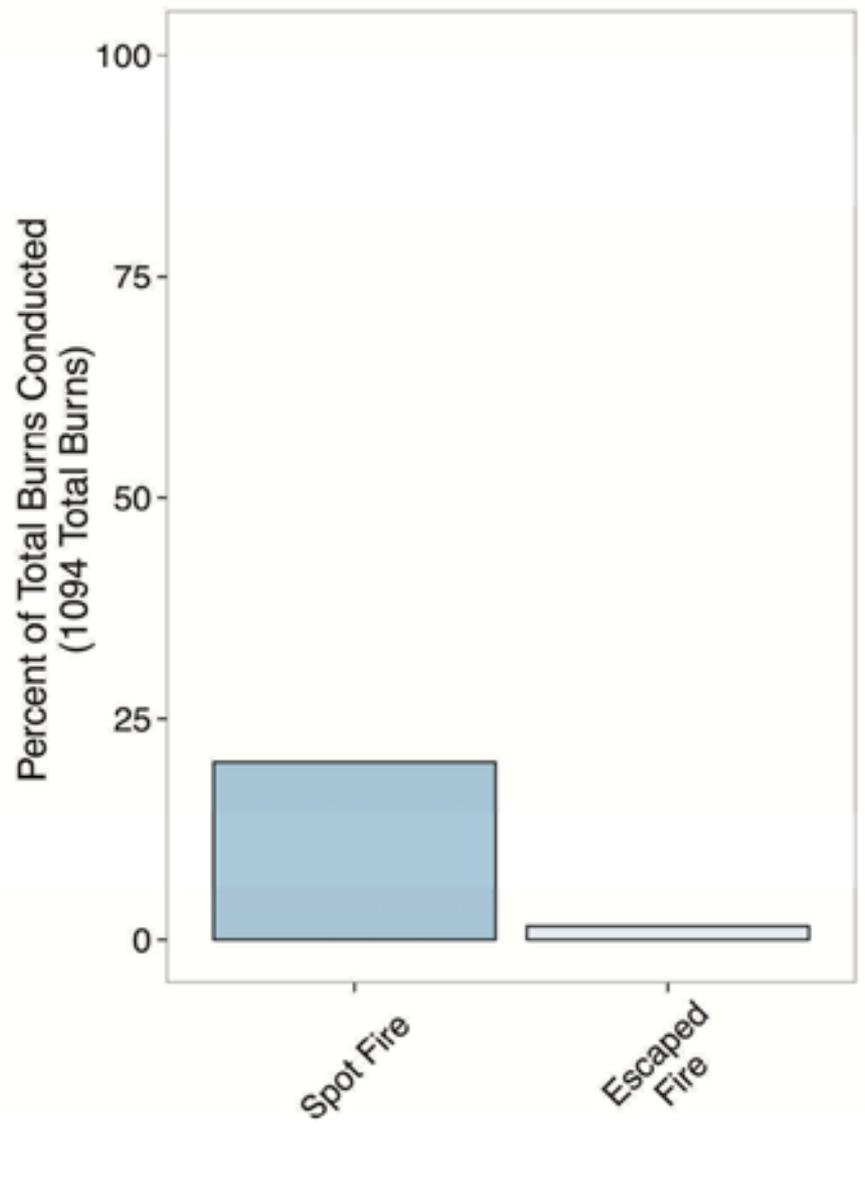
# Member Experience

Prior to joining



## Prescribed Burn Associations in The Great Plains

# Safety



Prescribed Burn Association Activity, Needs, and Safety Record: a survey of the Great Plains

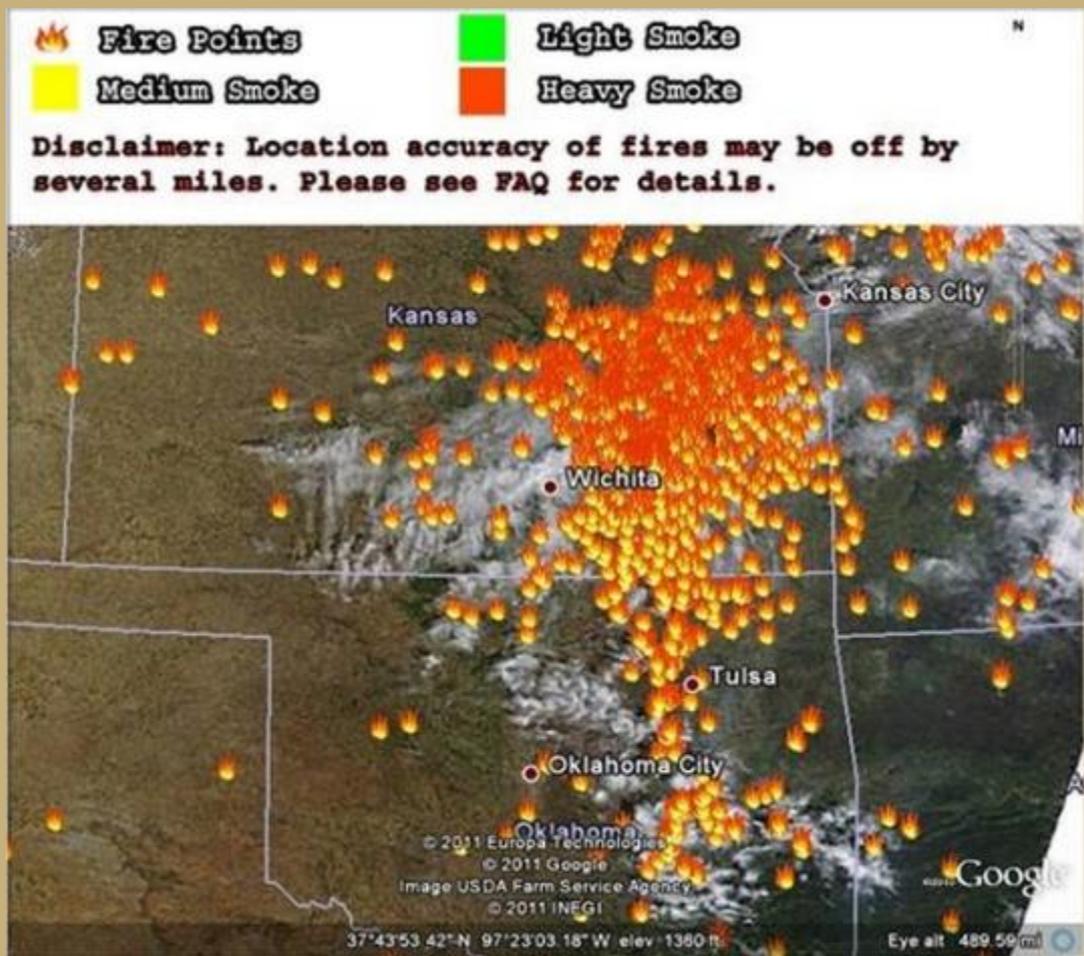
Authors: : John Weir<sup>1</sup>, Dirac Twidwell<sup>2</sup>, and Carissa L. Wonkka<sup>3</sup>



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## Flint Hills of KS & OK 4/6/11



# Mid-Missouri River Prescribed Burn Association: Est. 2016

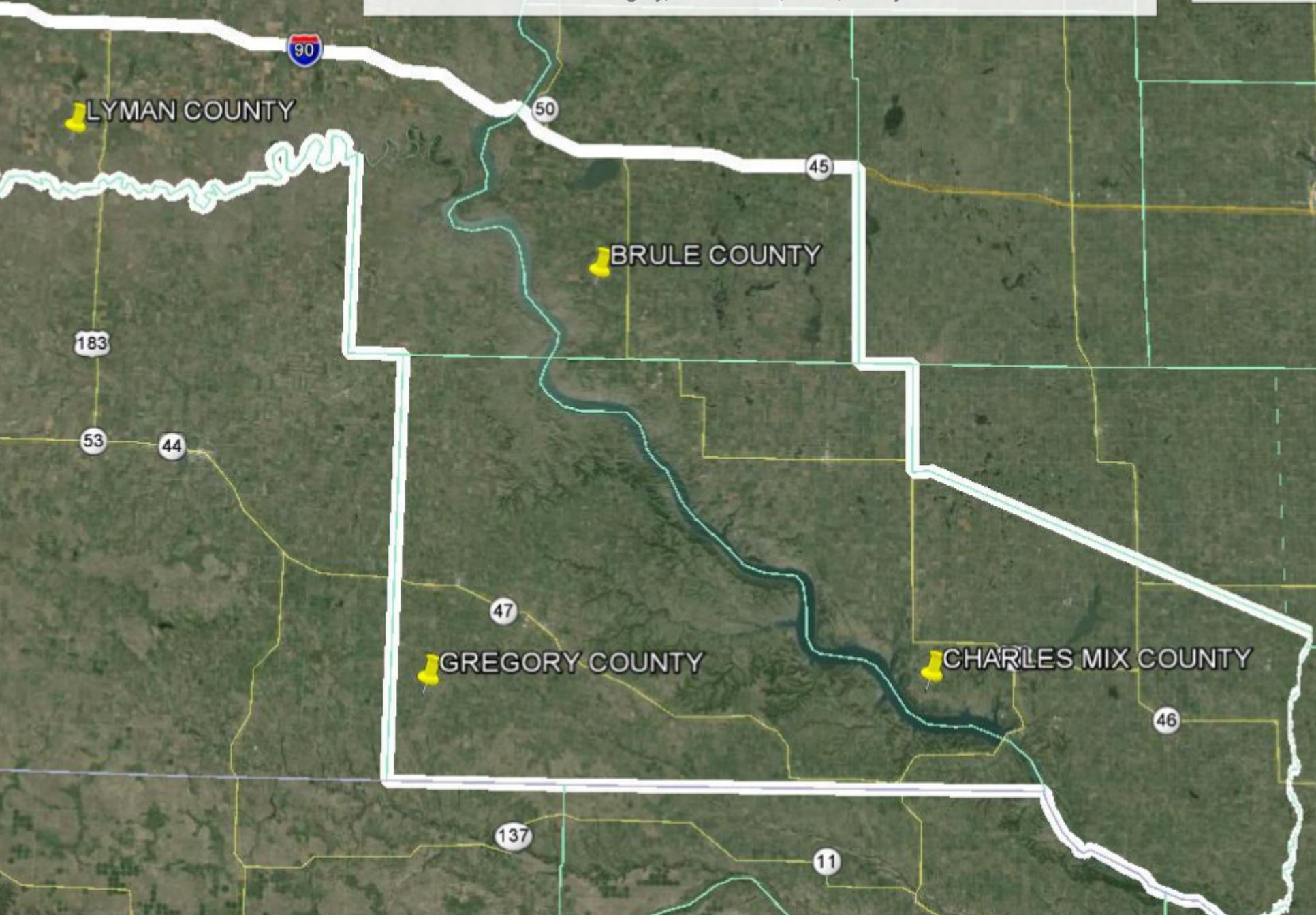


South Dakota

Initial Focus Area: February 2016

South Dakota Counties: Gregory, Charles Mix, Brule, and Lyman south of Interstate 90

Mid-Mis



# Motivation Drives Action



Ranchers are losing rangeland.  
We are *all* losing grasslands.  
Not just a Missouri River issue.

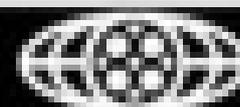
**The “GREEN GLACIER”**

# Solutions are graphic



**R**

**RESTRICTED**



UNDER 17 REQUIRES ACCOMPANYING  
PARENT OR ADULT GUARDIAN

VIOLENCE, GRISLY IMAGES, LANGUAGE,  
SOME NUDITY AND SEXUALITY





































**So much hate!!!!**



Is there a better way?



# Chivalry in The Age of Eastern Redcedar

Kill the  
women and  
children first

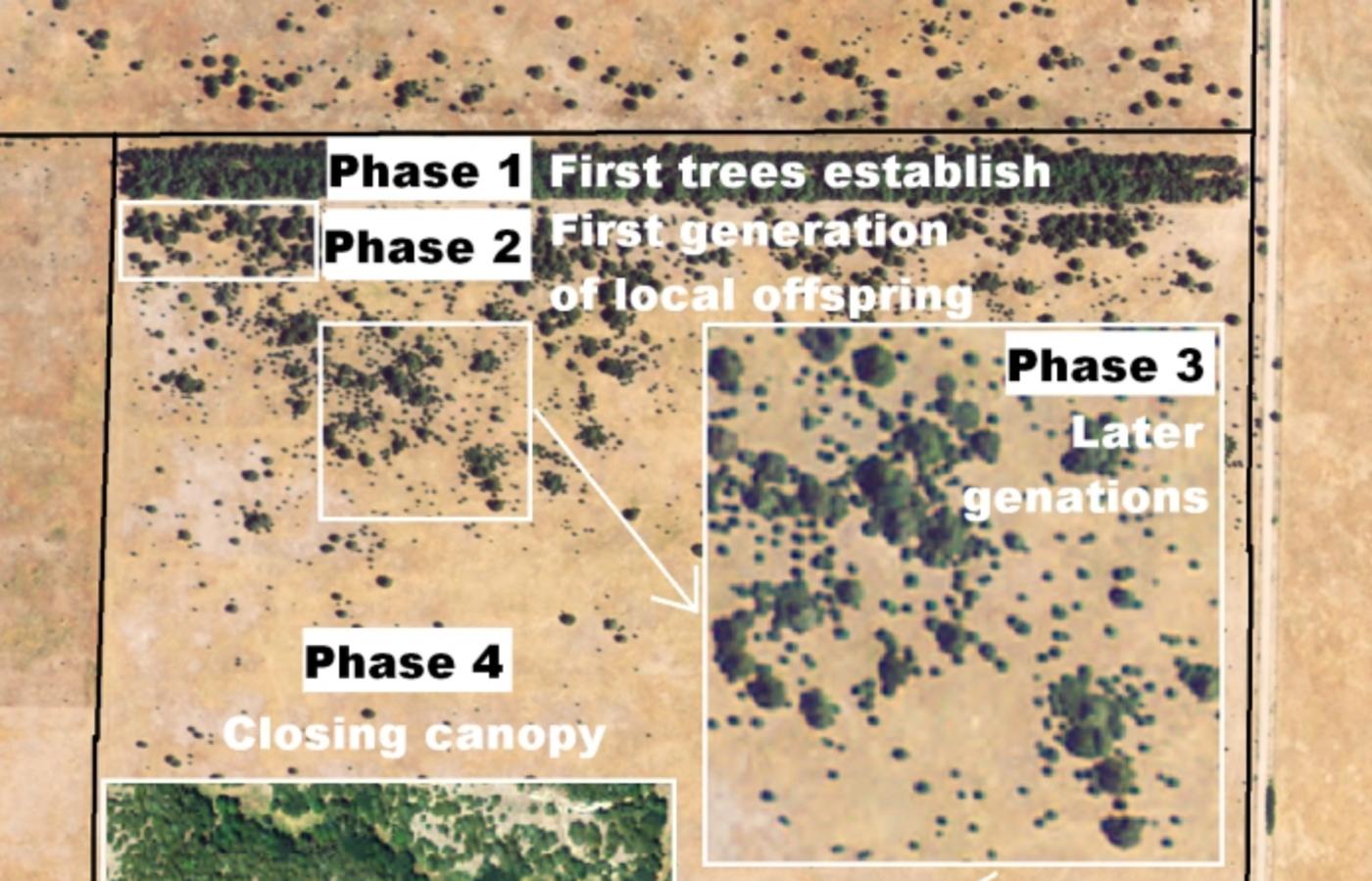
**Dr. John Ortman**

Prescribed Burn Coordinator  
Lower Loup Natural Resources District  
Ord, Nebraska

Private-Lands Burn Workshop  
March 7, 2013 – Yankton, SD



4 phases  
windbreak  
as seed  
source

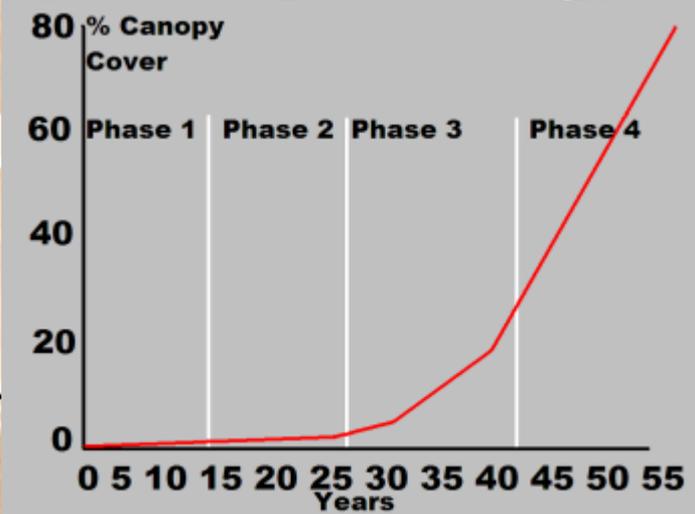


**Phase 1** First trees establish

**Phase 2** First generation of local offspring

**Phase 3**  
Later generations

**Phase 4**  
Closing canopy



**2012**





ATTACK!!!



ATTACK!!!



# Occasional low intensity fire ■



Should have attacked yesterday



# Mediocre fuels



# Mediocre fuels





Without ground fuel, crown fire  
is the only option





-John Ortman



-John Ortman

General Guidelines  
Burn as warm and dry as you dare

Can SD landowners build a fire culture? Mid-Missouri example.



To: MMRPBA Members

Here is a list of the burns we have plans for this spring season.

Please let Sara know as soon as possible if you would like to attend and help with any of these burns.

We will keep you updated on the scheduled day(s) of each burn as the weather conditions forecast.

***MMRPBA Scheduled Burns / 2016***

<b><i>Name</i></b>	<b><i>acres</i></b>	<b><i>property description</i></b>	<b><i>desired wind direction</i></b>	<b><i>date completed</i></b>	<b><i>burn results</i></b>
Bruce Finzen	10	S. Dallas (Emde bee place) CRP grass	NW		
Dave Steffen	40	6 mi SW Burke - grass	SE		
Tom Hausmann	200	N edge Bonesteel	SW		
Rich & Sara Grim	1100	8 mi N Whetstone Bay	NW		
Jo Ann Sully	3	W. Lake Andes, CRP grass	E	cancelled	FSA changed requirements
Doug Feltman	63	S. Chamberlain	SE		





Also, let us know what equipment you have available to bring to the burn you plan to attend.

For example here is a list from Dave Steffen:

- ATV with 12 gal. sprayer
- UTV with 60 gal sprayer
- Weather kit
- 8 walkie talkies
- 2 fire flappers
- 4 drip torches
- 1 leaf blower
- 7 gal drip torch fuel (60/40 diesel/gas)
- ¾ ton 4wd pickup with 250 gal tank & pump
- 2 sections of harrow for mop up on grass
- 5 gal drinking water
- Personal gear (leather boots, gloves, goggles, FR shirt, pants, matches)
- First aid kit

We would like to have all members attend at least one burn this year just for the experience and find out what to expect when you conduct a burn on your own land. We will team you up with experienced people, and give you a chance to do as many jobs as you want to do. The objective is to be safe and keep a control on fire.



# The Future: Tools & Resources



[www.gpfirescience.org](http://www.gpfirescience.org)



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# You and Fire in South Dakota

Info compiled by Steve Harford  
Deputy State Fire Marshal 2011  
Format modified fall 2016





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## South Dakota Burn Law History

- Territorial Legislature prior to statehood in 1889
  - burning of fields and sloughs
- Burn Authority Today
  - Townships
  - **Counties**
  - Municipalities
  - Fire Districts
  - South Dakota Division of Wildland Fire Suppression
  - SD Fire Marshal's Office

A dramatic sky with a large, billowing white and yellow cloud formation over a dark green field. The clouds are thick and textured, with a bright yellow glow in the center, suggesting a fire or explosion. The sky is a deep blue, and the foreground is a dark, grassy field.

**“Having nothing better  
to do, I set fire to the  
prairie”**

Francis Chadron, Fort Clark, ND - 1839



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## South Dakota Burn Law History

- Most Municipalities
  - heavily restrict or ban open burning in their city limits.
- Most Counties or Townships
  - will ban or restrict open burning only in times of high fire danger. (County Burn Ban)



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## South Dakota Burn Law History

- State Fire Marshal
  - can ban open burning statewide
  - Must consult with the Governor
  - Never been used as of 2011 (last resort option)





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## South Dakota Burn Law History

- SDCL 34-35-9
- Negligence (misdemeanor)
  - allowing a fire to spread
  - Failure to extinguish fire
  - Failure to interference with control efforts





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## South Dakota Burn Law History

- SDCL 34-35-9 con't
- Every person who negligently kindles or causes to be kindled, fire..... in any woods, brush, fields, marshes, or prairies and leaves it unquenched or who negligently or without full precaution to prevent fire spreading permits it to spread beyond his control so as to endanger the property of another, whether the fire is kindled upon his own land or not,



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## South Dakota Burn Law History

- SDCL 34-35-9 con't
- or who, finding any uncontrolled fire burning, fails to give immediate warning and take reasonable attempts to quench it, or who at any fire at any place is guilty of any disobedience to the lawful orders of any public official or fireman attempting to control said fire, or who interferes with any such officer in any such case or refuses to assist in controlling said fire, is guilty of a Class 1 misdemeanor.





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PARTNERSHIP**



## South Dakota Burn Law History

- SDCL 34-35-
- Burning off land or other flammable material (misdemeanor)
  - without firebreak
  - Without considering weather





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- It to gr in w m



*due caution to the prevailing and*

**“Rx” Fire is a prescription, so a plan helps mitigate the above!!!!**

se  
e,  
ear  
or  
!



## PRAIRIE COTEAU HABITAT PARTNERSHIP



### Before you strike a match....

- 1. Plan your burn and take into consideration the weather, fuel and topography.
- 2. Check your jurisdiction for any current burn bans and/or other restrictions that may be in place.
- 3. Statewide Burn Ban map  
*make sure we have your email!!*





## PRAIRIE COTEAU HABITAT PARTNERSHIP



### Before you strike a match...

- 4. Contact local emergency dispatch
  - When
  - Where
  - YOUR callback/contact info





# PRAIRIE COTEAU HABITAT PARTNERSHIP



## AFTER you start with...

- 5. If your contract includes a provision for control of...

- 6. ...burn is "cold" or "hot" and should be unattended.

**PLAN**



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PARTNERSHIP**



## South Dakota Burn Law History

- SD Fire Departments
  - Majority are volunteer
  - ~365 “certified”
- VFD Training (historical)
  - Structural
  - Wet stuff on the red stuff
  - Poor history of using fire to fight fire
    - Lack of training
    - Perceived or real liability issues
- We hope to change this!!!!





# PRAIRIE COTEAU HABITAT PARTNERSHIP



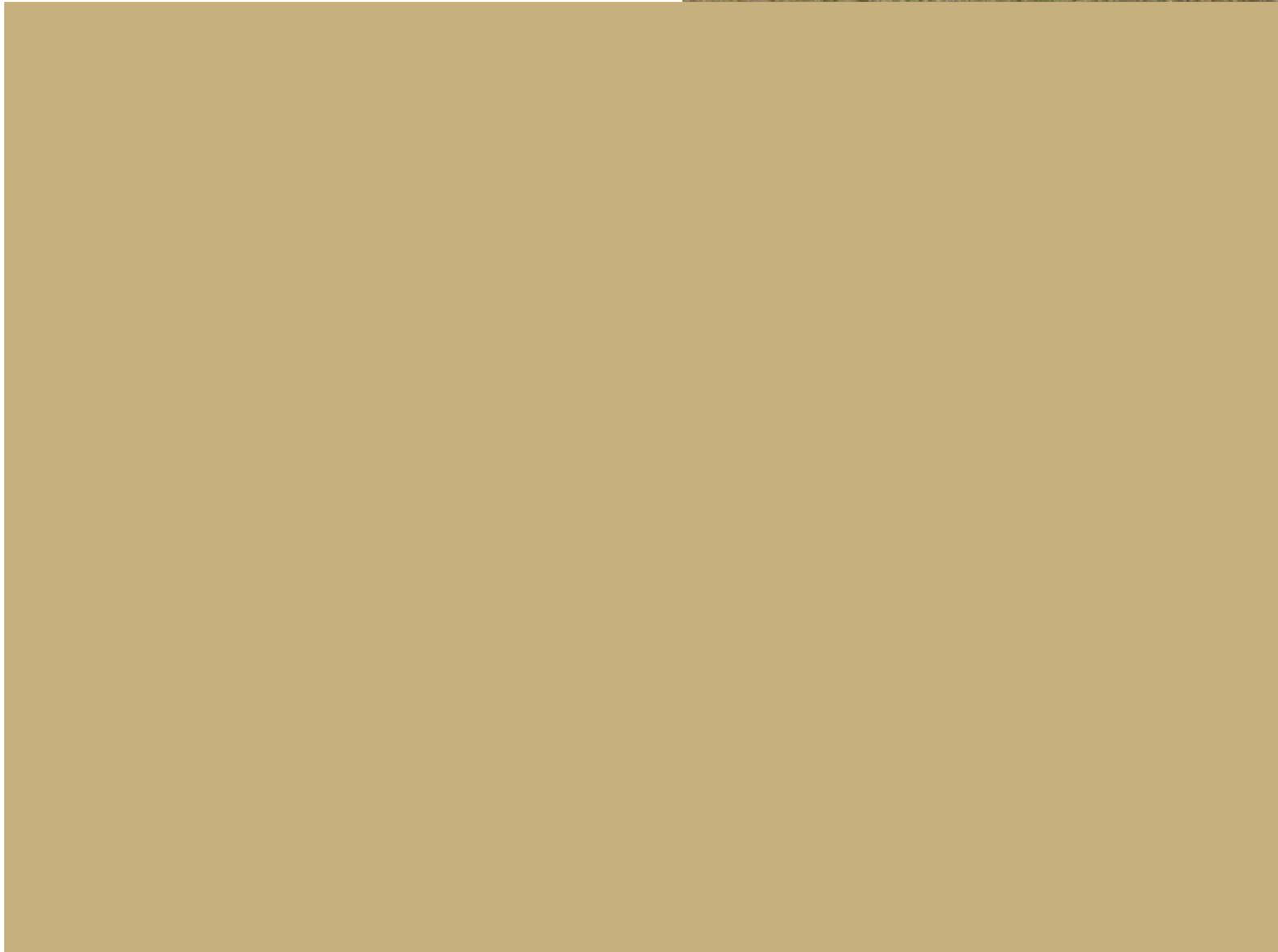
## Questions ????

- Questions ????





# *PRAIRIE COTEAU HABITAT* PARTNERSHIP





**PRAIRIE COTEAU HABITAT  
PARTNERSHIP**



## South Dakota Burn Law History

- Black Hills Fire Protection District
  - 1941
  - Required a permit from the State of South Dakota or the Black Hills National Forest Service before any open fire could be conducted within the district.





**PRAIRIE COTEAU HABITAT  
PARTNERSHIP**



## South Dakota Burn Law History

- VFD Training (historical)
  - Structural
  - Wet stuff on the red stuff.
  - Poor history of using fire to fight fire
    - Lack of training
    - Perceived or real liability issues
- We hope to change this!!!!



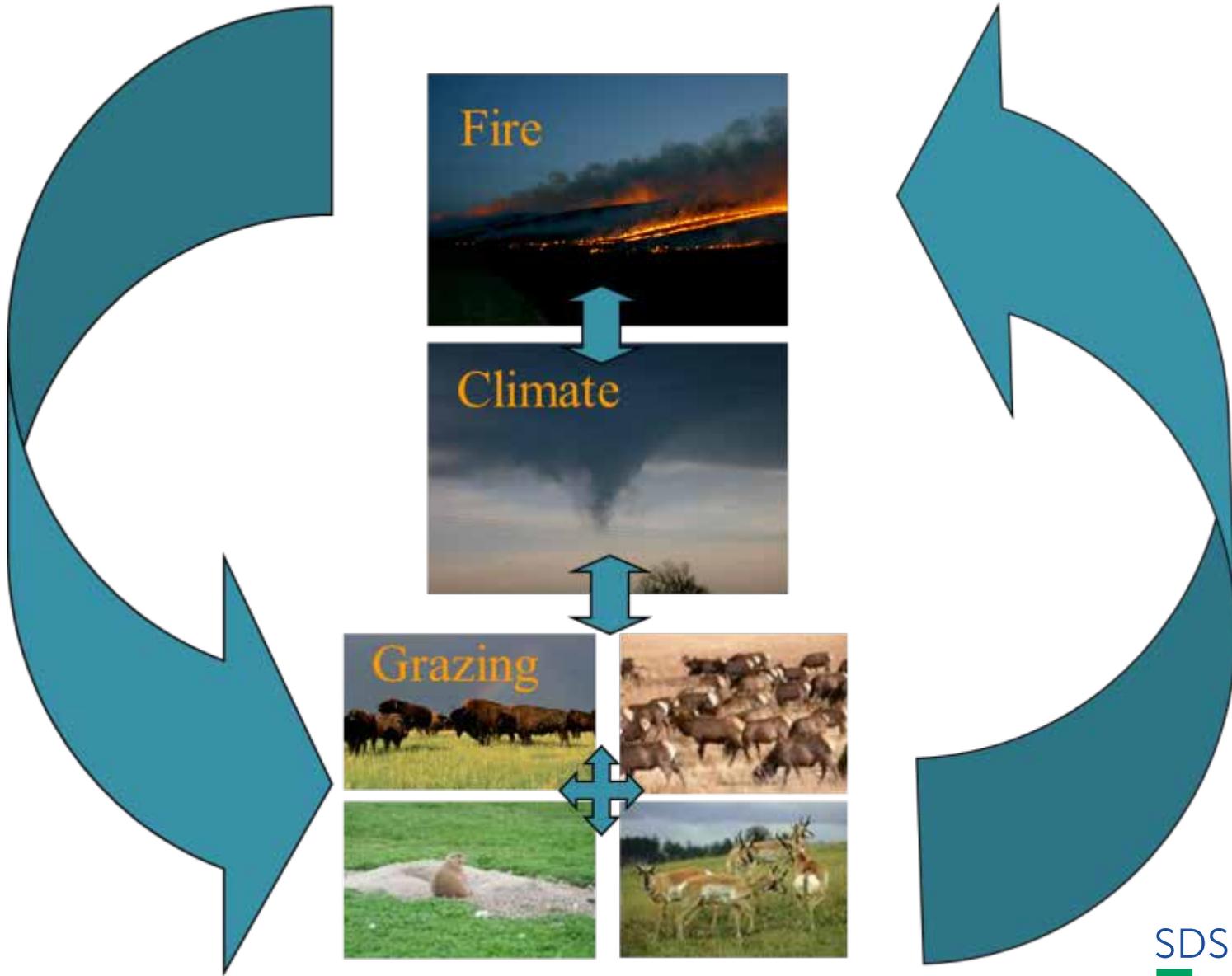


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# Uses and Benefits of Rx Fire







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**PARTNERSHIP**



## Why Burn?

- Grassland Rejuvenation
  - native pastures/prairies/wetland areas
  - Grassland plantings
- Seed Crop
- Litter Removal
  - Site Preparation for seeding/reseeding



# PRAIRIE COTEAU HABITAT PARTNERSHIP



## Benefits of Fire on the Plains

- Native plants
  - Competition
    - Woody Suppression
    - Cool vs. Warm Season
    - Removal of duff or thatch layer
    - Nutrient Cycling
  - Reproduction
    - Seed viability
    - Seed to soil contact





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## Benefits of Fire on the Plains

- Grassland animals
  - Highly mobile
  - Burrow under ground
  - Resilient re-nesters
  - Immobile species
    - Burn 'portions'
    - Recolonization





# PRAIRIE COTEAU HABITAT PARTNERSHIP



## Benefits of prescribed fire

### Habitat and Structure

- Vegetation recovers quickly
- Excellent brooding habitat
- Increases vegetative production/cover
- Nutritious & palatable regrowth
- Habitat “Edge”
- Seed production/viability
- Pollinators







# *PRAIRIE COTEAU HABITAT* PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# *PRAIRIE COTEAU HABITAT* PARTNERSHIP





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**PARTNERSHIP**



## Advantages to Prescribed Fire

- Litter removal – immediate and complete
- Decreases disturbance time
- Target certain species



# **PRAIRIE COTEAU HABITAT** PARTNERSHIP





# **PRAIRIE COTEAU HABITAT** PARTNERSHIP





# **PRAIRIE COTEAU HABITAT** PARTNERSHIP





## PRAIRIE COTEAU HABITAT PARTNERSHIP



# Timing of Fire

- Considerations
  - What type of grass are you managing for
    - Cool Season Grass vs. Warm Season Grass
    - Introduced Grass vs. Native Grass
  - What is your main objective
    - Remove introduced species from a stand
      - Both Grasses and Woody Vegetation
    - Remove litter
- Timing is key!!
  - Use fire to harm undesirable species and to promote desirable species



# Impact on Grasses depends on timing

- Cool Season Grasses
  - Introduced/exotic
    - Smooth Brome
    - Kentucky Bluegrass
    - Quackgrass
- To control
  - burn in May when green and leafy
  - Late fall can be effective (be conscience of weeds)
- Need at least 1 yr. of old grass as fuel
- *Don't graze* in year prior to burn



# Impact on Grasses depends on timing

- Cool Season Grasses
  - Native
    - Canada Wildrye
    - Green Needlegrass
    - Western Wheatgrass
    - Slender Wheatgrass
    - Needle & Thread Grass
- To promote
  - Burn early in season
  - Avoid burning near seed set
  - April and May before 2 – 3 leaf stage, OK to burn when cool season exotic grasses are green
  - Can hurt these if burn too late in spring
- Need about 1 yr. of old grass as fuel
- Don't graze in year prior to burn



# Impact on Grasses depends on timing

- Warm Season Grasses
  - Native
    - Big Bluestem
    - Little Bluestem
    - Switchgrass
    - Indian Grass
    - Sideoats Grama
    - Blue Grama
    - Buffalo Grass
  - To promote
    - burn in April and May before 2 – 3 leaf stage, OK to burn when cool season exotic grasses are green
    - Hard to hurt these with spring burn
- Need about 1 yr. of old grass as fuel
- *Don't graze* in year prior to burn



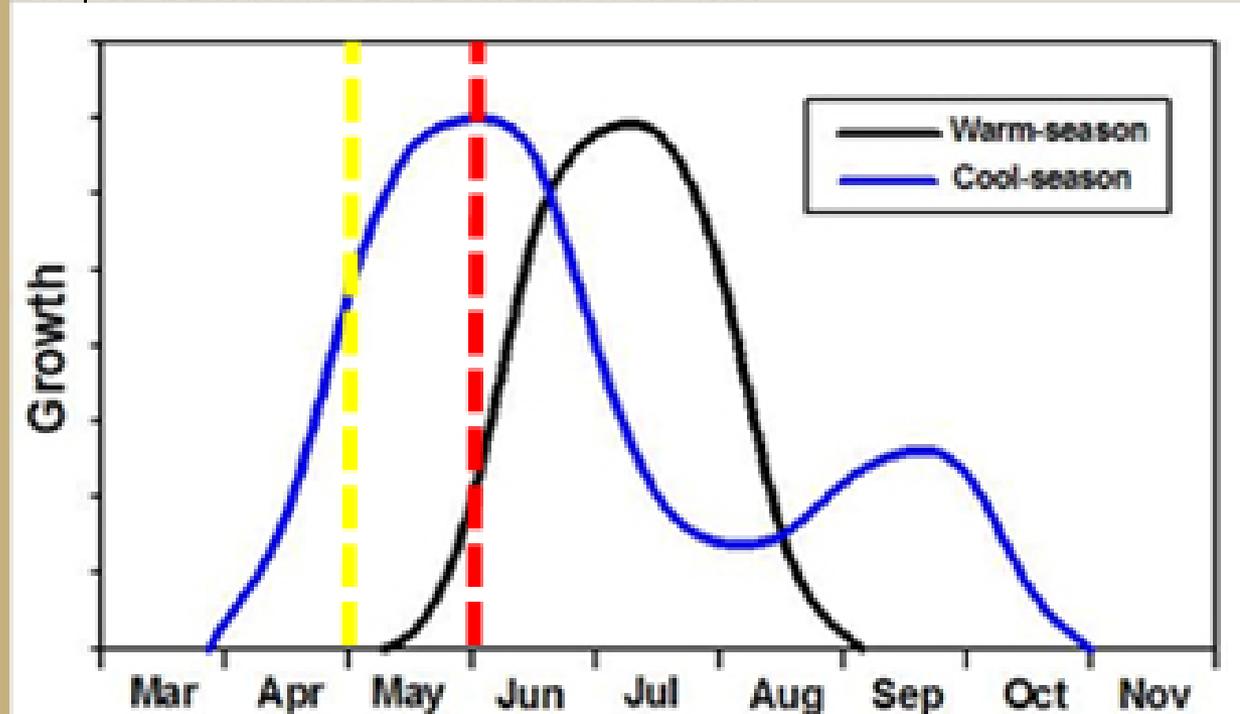
# PRAIRIE COTEAU HABITAT PARTNERSHIP



**FIGURE 9. WARM AND COOL SEASON GRASS GROWTH CHARTS.**

SOURCE: THE NATIONAL DROUGHT MITIGATION CENTER

[HTTP://DROUGHT.MT.UNL.EDU/RANCHPLAN/DROUGHTBASICS/GRASSES DROUGHT/SEASONALWINGSOFPANTGROWTH.ASPX](http://drought.mt.unl.edu/ranchplan/droughtbasics/grassesdrought/seasonalwingsofplantgrowth.aspx)



Often mundane



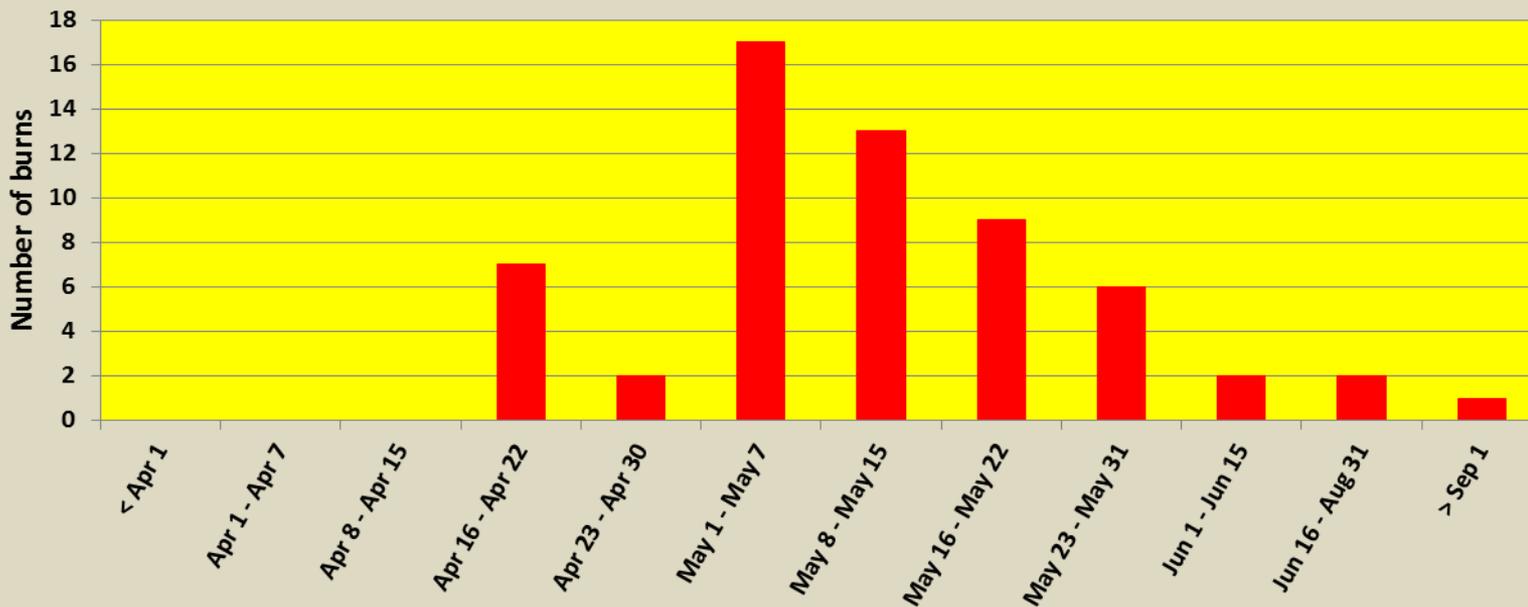


# PRAIRIE COTEAU HABITAT PARTNERSHIP



## Overall Results

**Prairie Coteau Habitat Partnership**  
**Private Lands Prescribed Burning Program**  
All GRASS PLANTINGS (Establishment and Maintenance)  
Northeast South Dakota, 2004 - 2012  
n=59



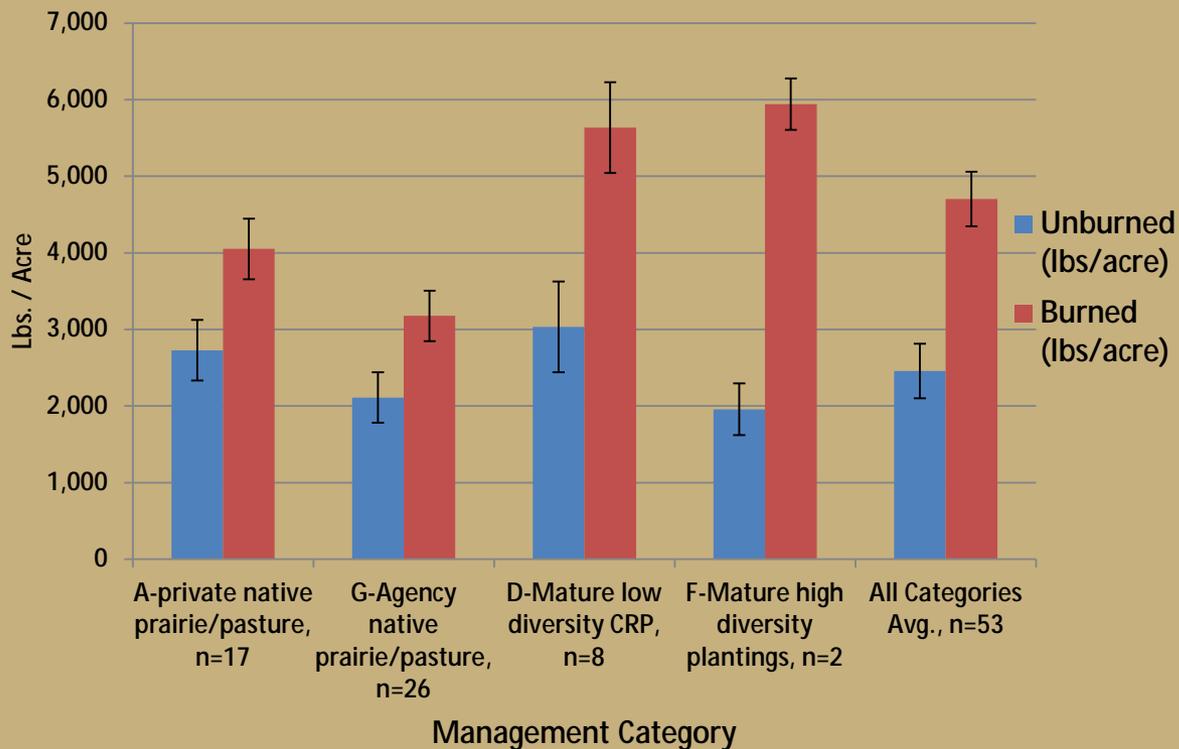


# PRAIRIE COTEAU HABITAT PARTNERSHIP



## Production Results

### 2011 Total Biomass Production



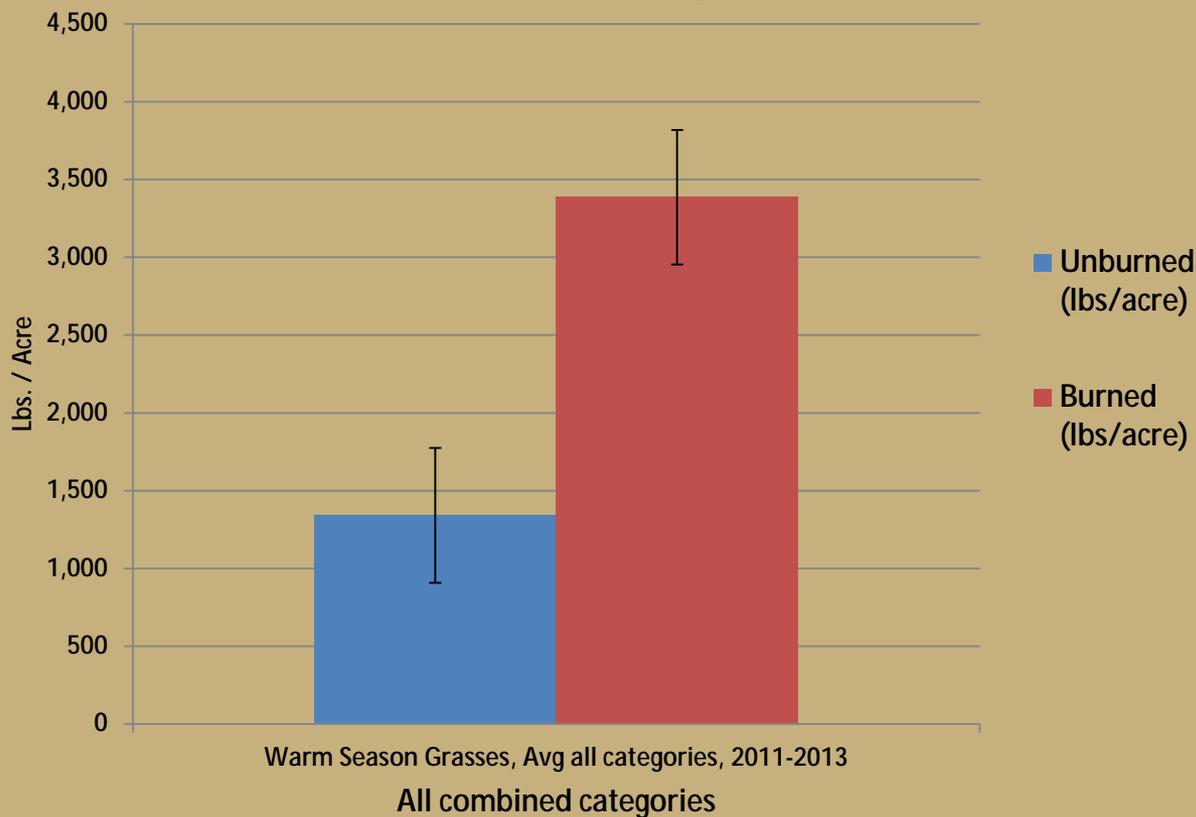


**PRAIRIE COTEAU HABITAT  
PARTNERSHIP**



# Production Results

**Native Warm Season Grass (WSG)  
Biomass Production, 2011-2013**



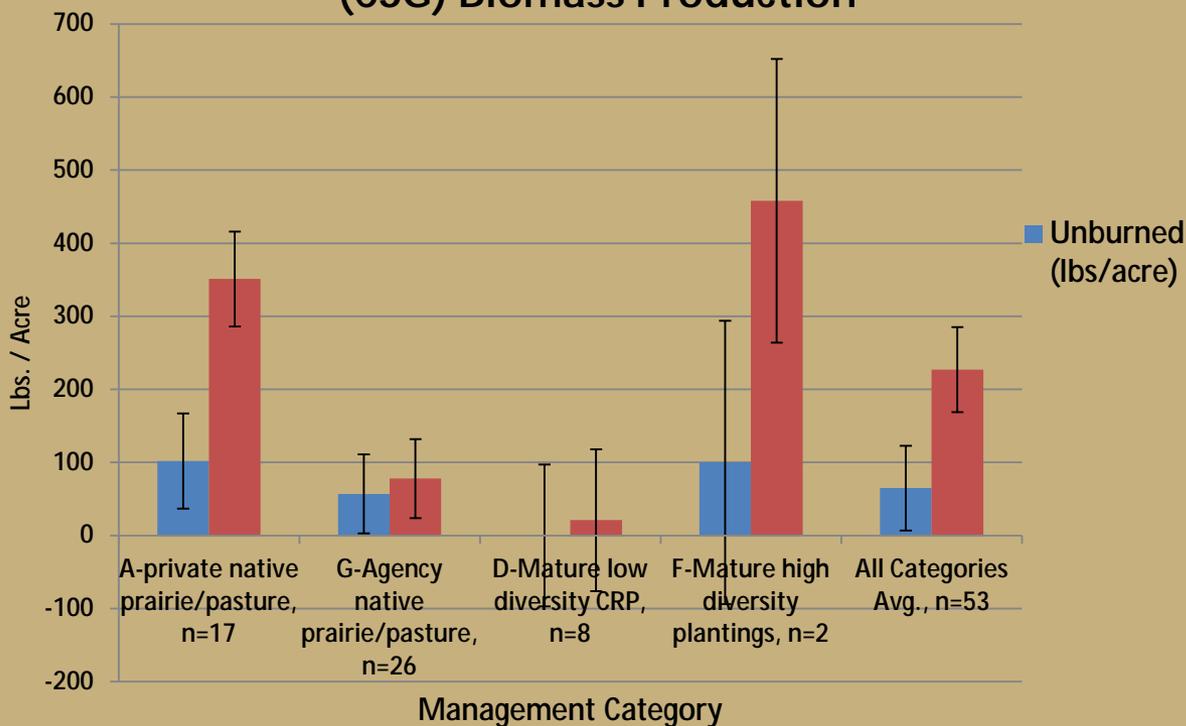


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PARTNERSHIP**



# Production Results

2011 Native Cool Season Grass  
(CSG) Biomass Production



# Cattle Weight Gains / Grassland Health



## Forage Production Lane Tekronev Pasture: 2006 results

<u>Paired Plot</u>	<u>burned</u>	<u>unburned</u>
1	1800	800
2	2500	500
3	2600	800
4	2200	100
5	2400	1100
<b>Avg</b>	<b>2300</b>	<b>660</b>





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PARTNERSHIP

# Invasive Species Encroachment





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**PARTNERSHIP**



## Meeting Your Goals

- Control of Introduced Cool-season Grass in Warm-season CRP
  - Spring fire – Burn as close to the April 30th deadline as possible
- Control of Cool-season Introduced Grass in Cool-season CRP
  - Early Spring fire – Small window of opportunity when intro grass is growing and natives are still dormant
- Control of Invasive Trees in Grasslands (Pasture or CRP)
  - Early spring fire – Burn when trees are just putting on buds



# *PRAIRIE COTEAU HABITAT* PARTNERSHIP



- Questions



# PRAIRIE COTEAU HABITAT PARTNERSHIP





# *PRAIRIE COTEAU HABITAT* PARTNERSHIP



# Typical SD Weather Patterns

SOUTH DAKOTA



SCHOOL OF MINES  
& TECHNOLOGY

*Darren R. Clabo*

SD State Fire Meteorologist

Department of Atmospheric Sciences, SDSM&T

# Outline

- High Pressure Systems, Low Pressure Systems
- Cold Fronts, Warm Fronts

**ANTICIPATE!!!!**

**The Weather**

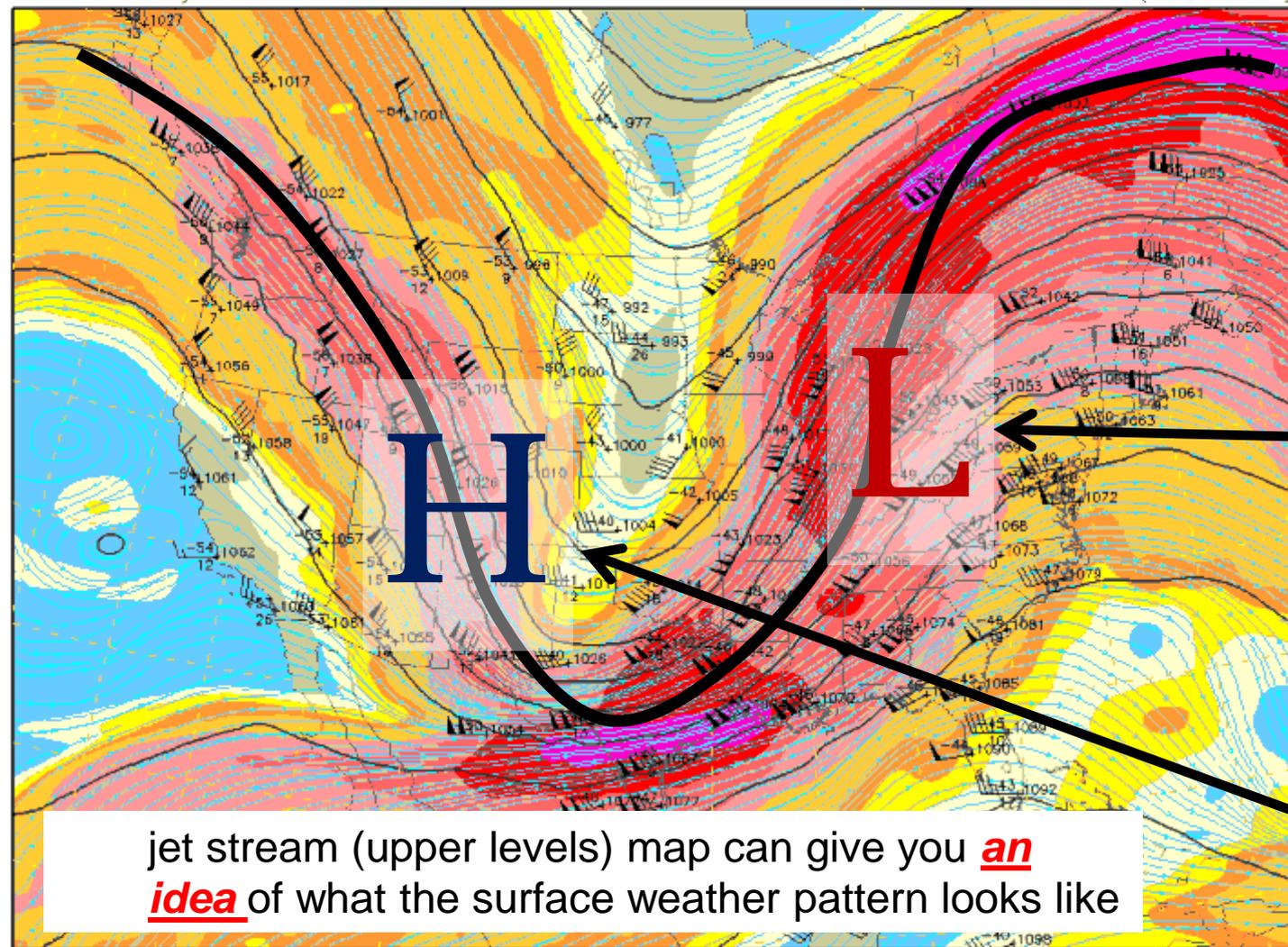
# Pressure Systems

- Surface high and low pressure systems are caused by **disturbances in the upper atmosphere**
  - *Jet Stream* (fast moving current of air **roughly 25,000 – 35,000 ft** above the surface)

# 250 mb Heights (dm) / Isotachs (knots)

0-hour analysis valid 1200 UTC Wed 30 Jan 2013

RAP (12z 30 Jan)

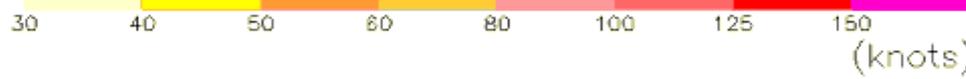


Black line is jet stream pattern

Surface low pressure system location ahead of trough

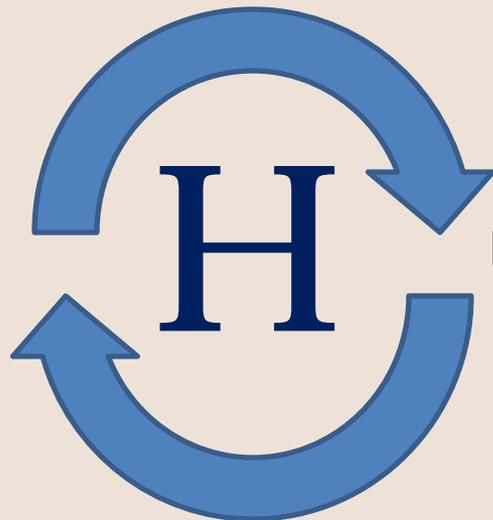
Surface high pressure system location behind trough

jet stream (upper levels) map can give you an idea of what the surface weather pattern looks like

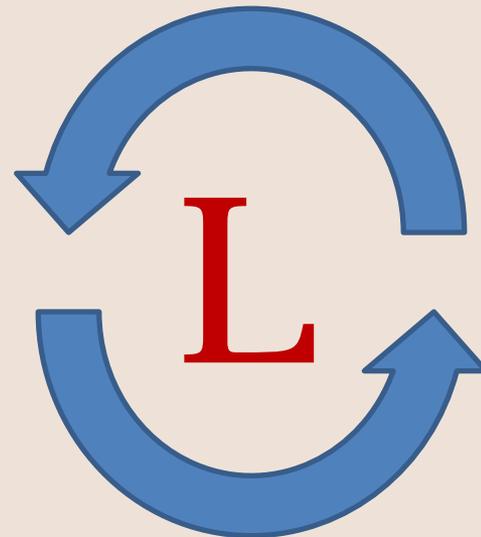


# Surface Pressure Systems and Wind

- Wind blows counterclockwise into (around) low pressure systems
- Wind blows clockwise out of (around) high pressure systems



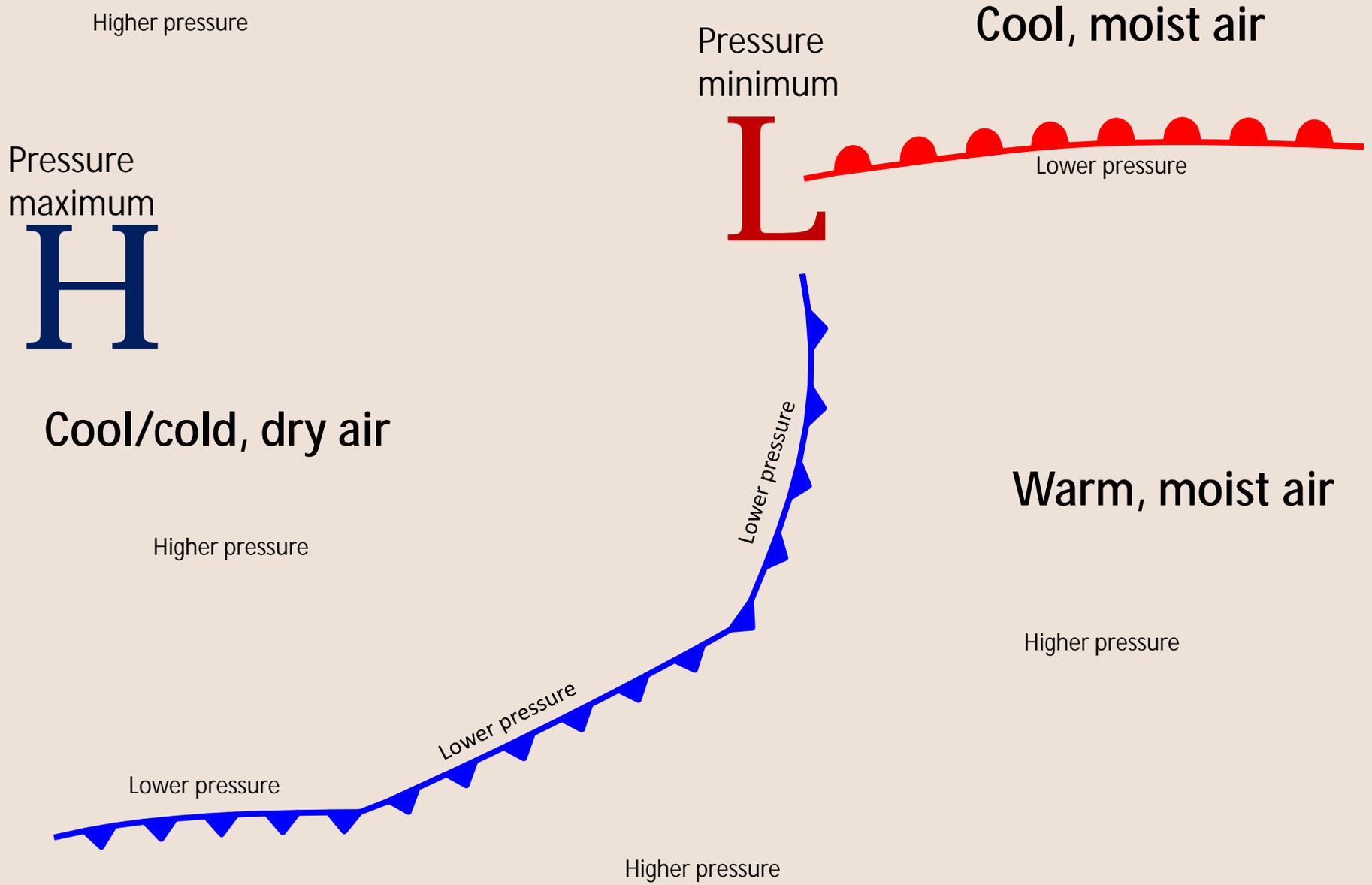
NW wind follows



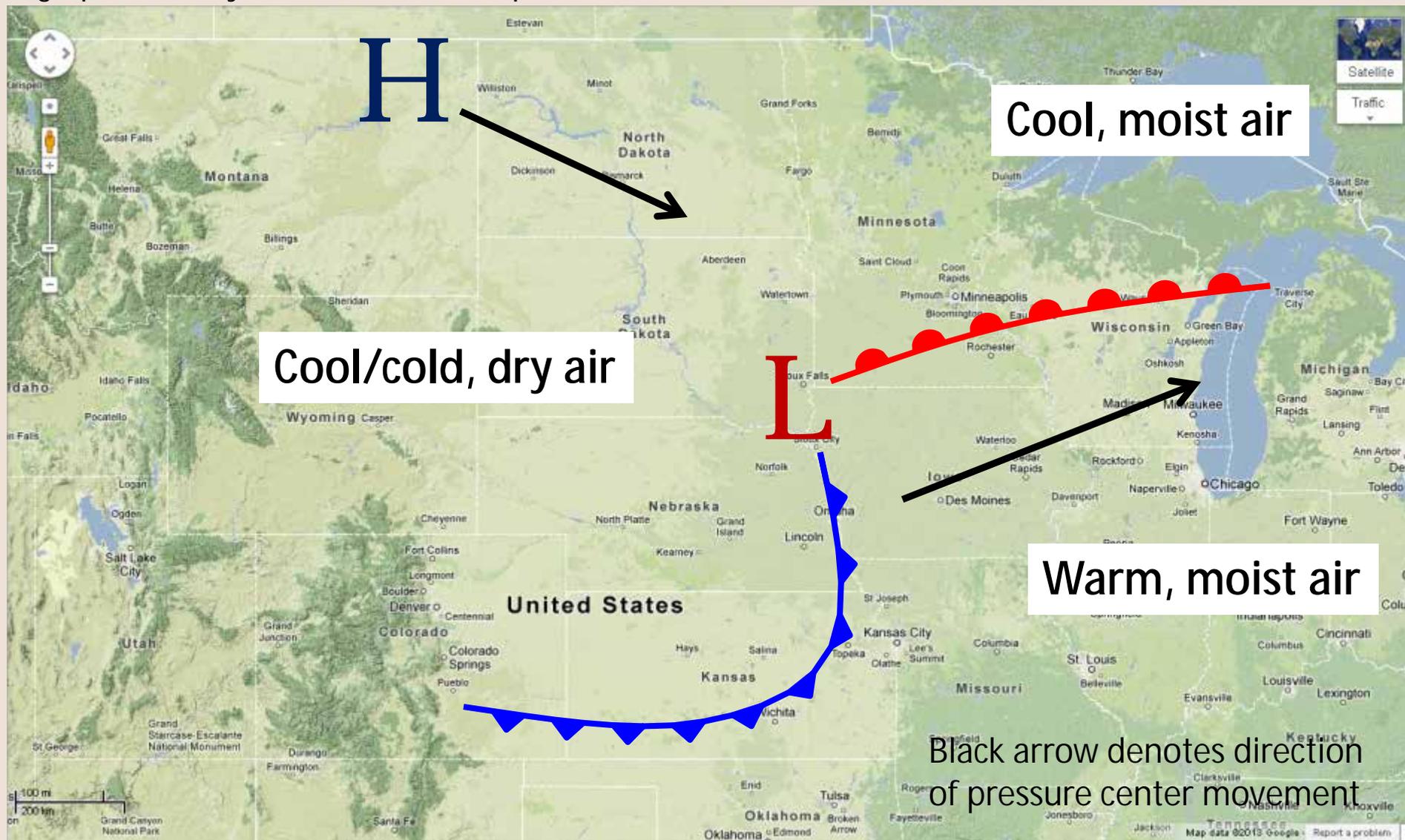
SE wind first

# Frontal Systems

- Fronts are basically the boundary between two air masses of different characteristics
  - *Surface pressure falls before a front passes and rises after a front passes!!!*
  - Frontal movement is directed by movement of high and low pressure systems
  - **Low pressure** systems generally have a warm front, a cold front, and sometimes a dryline
  - **High pressure** systems *do not* have fronts associated with them



Low pressure systems typically form in the lee of the Rockies and move east/northeast while high pressure systems seem to drop in from Alberta/Saskatchewan behind the lows

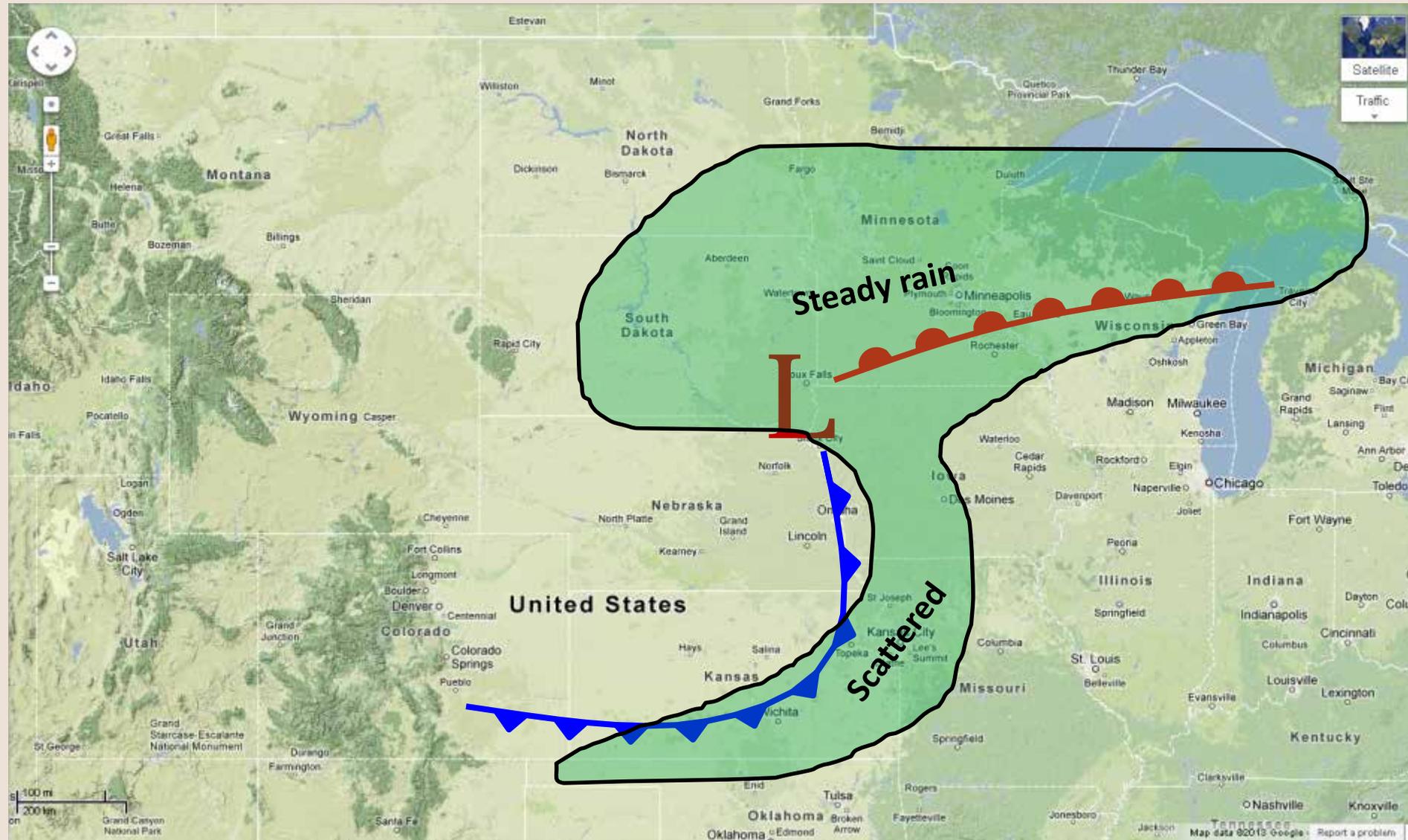


# Fronts and Precipitation

- Frontal boundaries are typically areas of precipitation
  - **Cold fronts**
    - Strong squalls, supercells, thunderstorms
  - **Warm fronts**
    - Typically rain/drizzle events
    - Severe weather may be present south of the warm front in the warm/moist air



Green shaded area denotes typical region of precipitation



# Fronts and the Wind

all descriptions below are examples of *typical* behavior

- **Warm Front**

- Before passage: easterly or northeasterly
- After passage: southerly or southeasterly

- **Cold Front**

- Before passage: southerly or southeasterly, can be gusty, don't always bring moisture
- After passage: gusty northwesterly winds

# Critical SD Fire Weather Patterns

- Pre cold front
  - Strong **southerly** winds may develop
  - If RHs are low enough, may promote large fire growth
- Post cold front
  - Strong **northwesterly** winds bring drier air into region
  - **180 degree wind shift!!!!**
  - Especially dangerous if frontal passage is dry
  - Cooler temperatures may exist but that may not inhibit a wind-driven prairie fire
  - **Dry cold frontal passages are the cause of most Red Flag Warning days across eastern SD**



# Conclusions

- Knowledge of typical frontal behavior can give insight into future (1-2 days) weather
- **If the forecast calls for a front, be ready for change!**



# Conclusions

- Questions?

# Weather and Visual Clues

SOUTH DAKOTA



SCHOOL OF MINES  
& TECHNOLOGY

*Darren R. Clabo*

SD State Fire Meteorologist

Department of Atmospheric Sciences, SDSM&T

# Outline

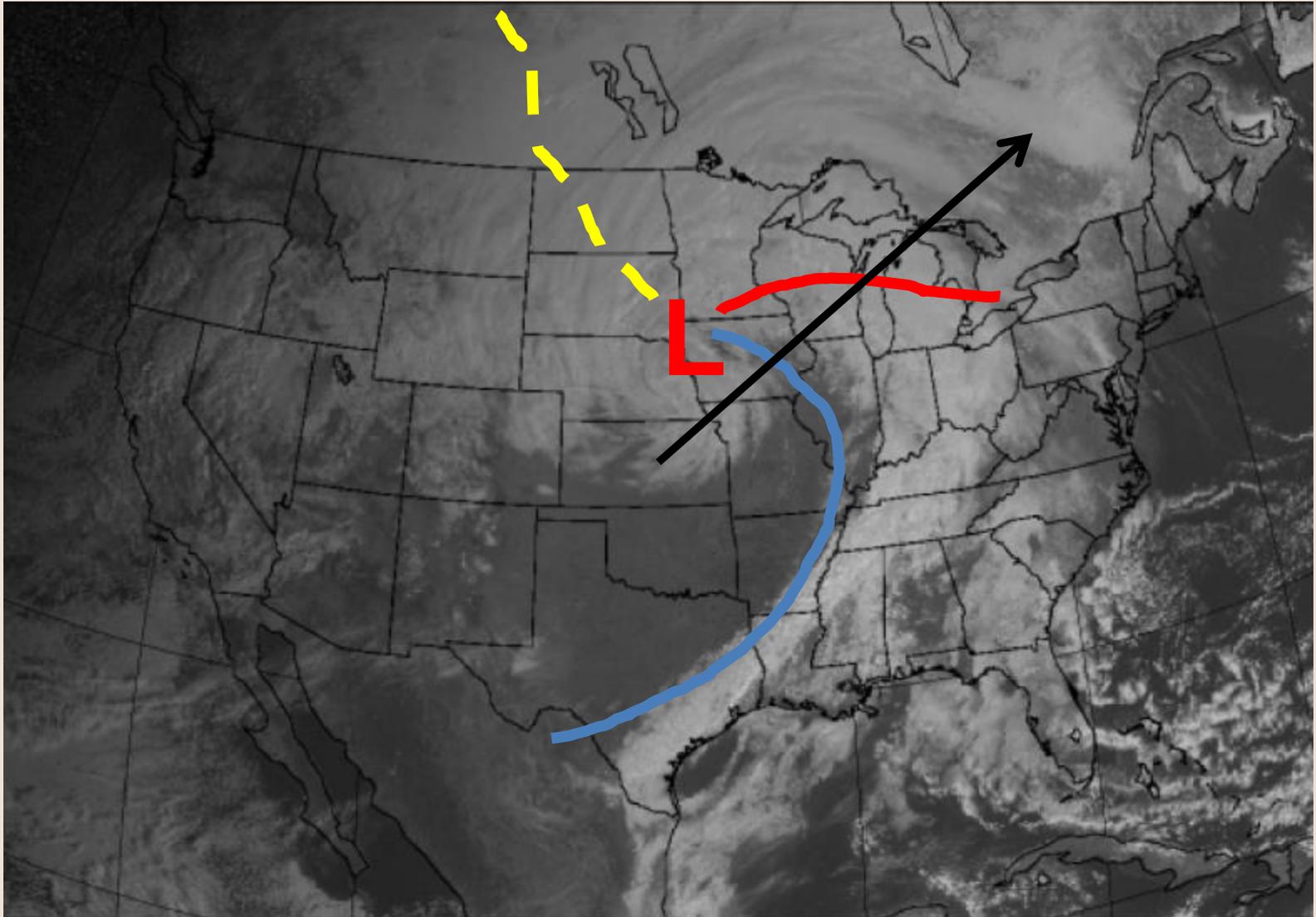
- This section will address how to identify certain weather phenomena and patterns by simply watching the clouds and the smoke column



# Thunderstorms

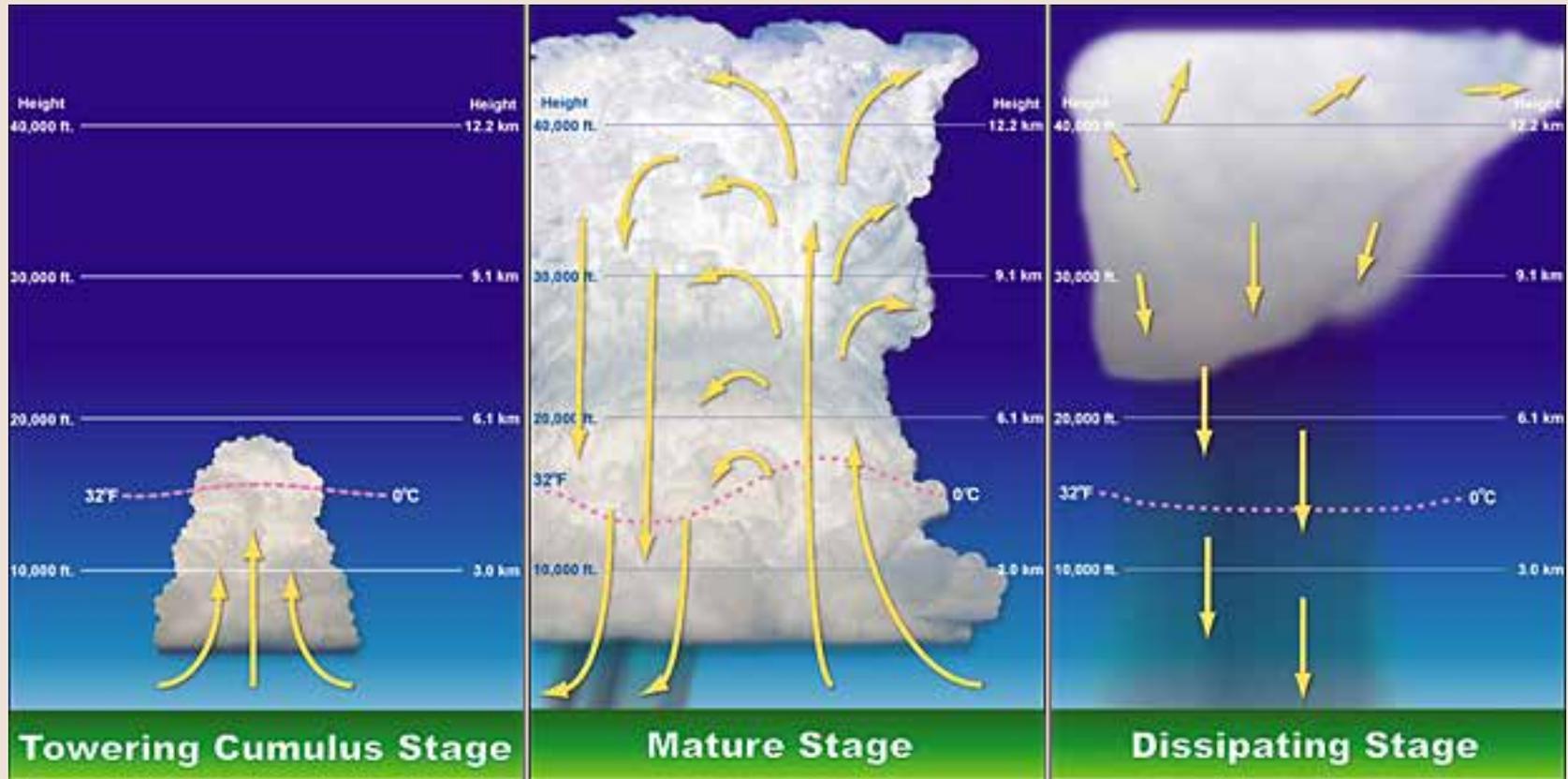
- Thunderstorms form under unstable conditions
  - Hot and humid days. Along or ahead of fronts.
- Thunderstorms exist in one of three stages
  - Towering, mature, and dissipation stages
  - Each present their own unique challenges to fire managers





Courtesy of the Department of Atmospheric Sciences  
University of Illinois at Urbana-Champaign

# Single Cell Storm Life Cycle





Cumulonimbus clouds, hot, moist, winds out of the southeast







Altostratus clouds, somewhat cool, moist, winds out of the east/northeast





**Run Away!!!**

Cumulonimbus clouds, hot, moist, winds out of the south





Clearing skies, cool, dry, breezy west/northwesterly winds



# Smoke Column Attributes

- Watching the smoke column
  - Things to think about
    - Is the smoke column vertical or tilted?
    - Does the smoke blow one direction through one layer, then another direction through a progressively higher layer?
    - Is the smoke rising to great heights or is it having a hard time leaving the ground?
    - Is the smoke flowing downhill into drainages?
- Watch other's smoke before you light!!!**



# Vertically Developed Smoke Column



- Smoke column moving straight up
  - Unstable lower layer
  - Little to no surface winds
  - Note the cirrus clouds in the background, could that imply an impending storm system?



# Tilted Smoke Column



- Little wind near surface with stronger winds aloft
- Good initial lift, good smoke dispersal



# Temperature Inversions



- Good lift initially
- Smoke then hits inversion level and spreads out

<http://www.warren-wilson.edu/~physics/PhysPhotOfWeek/2009PPOW/20091204Inversion/InversionEnhcd.jpg>



# Summary

- The clouds and smoke can give many details about what the atmosphere is doing
- You *must* use these clues to your advantage!



# Summary

- Questions?





Nimbostratus clouds, rainy, cool, moist, winds out of the east





Cirrus clouds, warm, moist, winds out of the east/southeast



# Fire Weather Forecasts

SOUTH DAKOTA



SCHOOL OF MINES  
& TECHNOLOGY

*Darren R. Clabo*

SD State Fire Meteorologist

Department of Atmospheric Sciences, SDSM&T

# Outline

- This section will cover each piece of a typical National Weather Service style fire weather forecast
  - Discussion
  - Sky weather
  - Temperature/Relative Humidity
  - 20-ft Wind
  - PoP / Chance of Wetting Rain
  - Mixing Height
  - Transport Wind
  - Transport winds and Ventilation Index

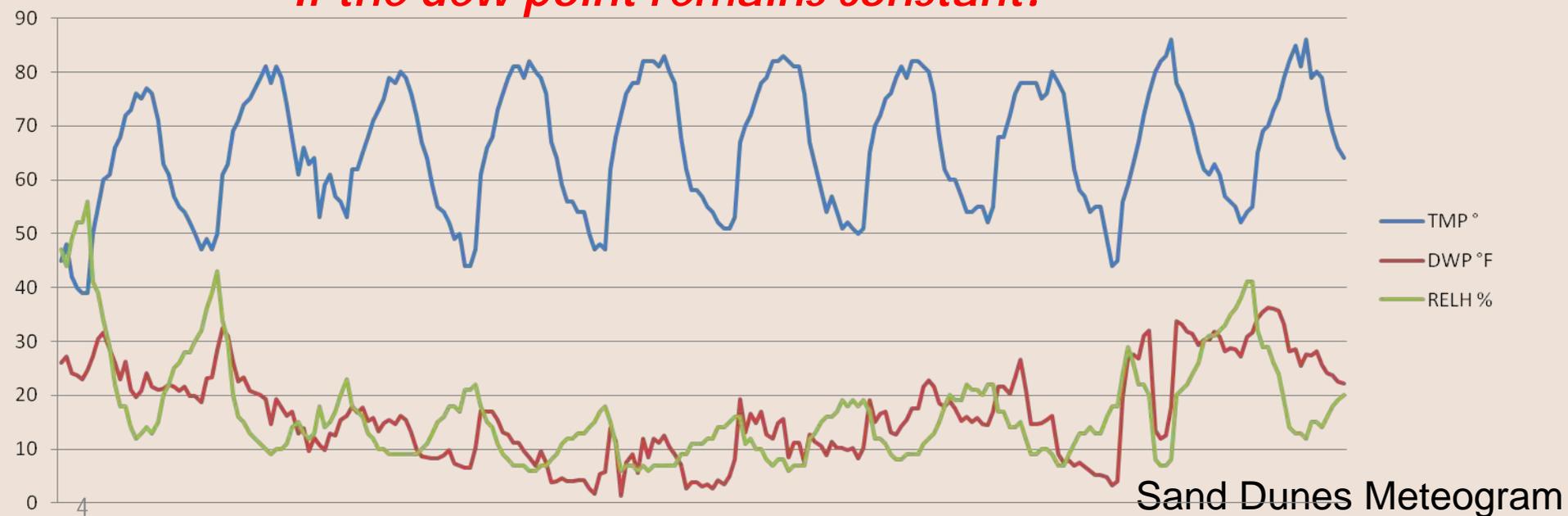
# Temperature/Relative Humidity

- Daytime temperature and relative humidity (RH) are given for the peak burning period
  - Hottest/driest conditions during the day

# Temperature/RH Relationships

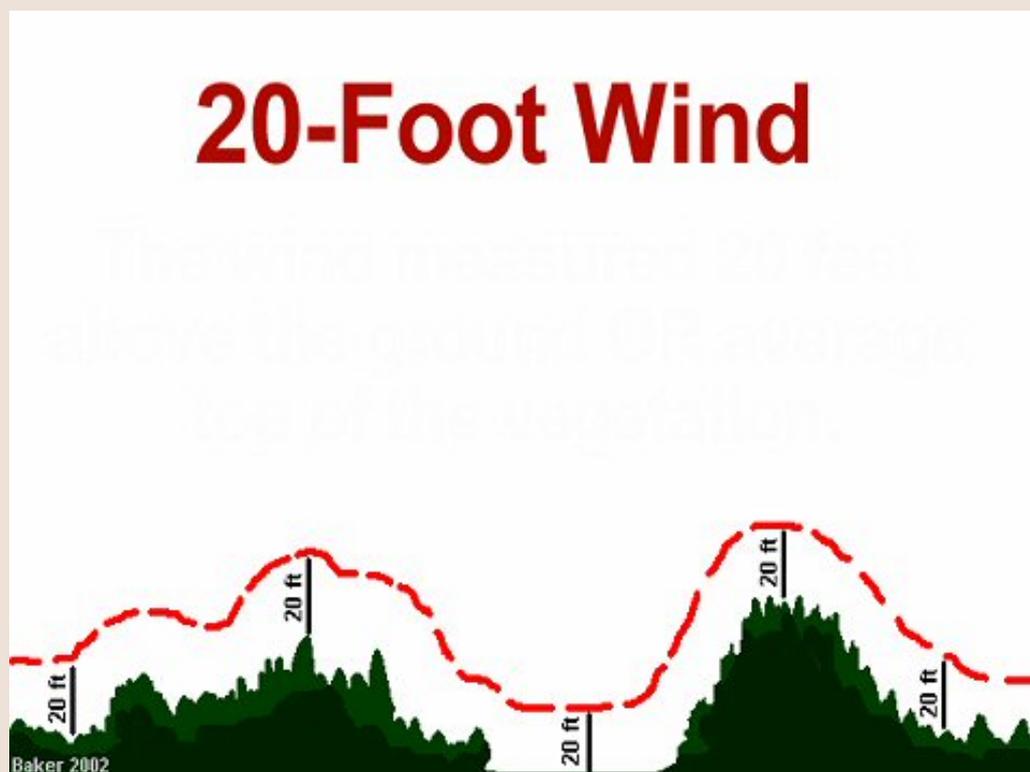
- The basics
  - Temp./RH are inversely related
  - When temperature increases, relative humidity decreases

• *If the dew point remains constant!*



# 20 ft Wind

- The 20-ft wind is the wind speed 20 feet above any vegetation cover
  - 20 feet above 2-ft tall grasses
  - 20 feet above the canopy of 80 feet tall pine trees



# 20 ft Wind

- Wind speed
  - Winds generally increase with height above the surface
    - Due ground frictional effects

# PoP/CWR

- Probability of Precipitation (PoP)
  - A percentage chance of getting precipitation
  - “A 20% chance of rain” is a relatively low probability of rain
- Chance of Wetting Rain (CWR)
  - A wetting rain is defined as 0.10 inch of precipitation
    - A CWR is often given to determine the odds of a fuel-wetting precipitation event
    - “A 50% chance of a wetting rain” implies good odds of rain and a 50/50 chance of getting above 0.10 inch

# Mixing Height

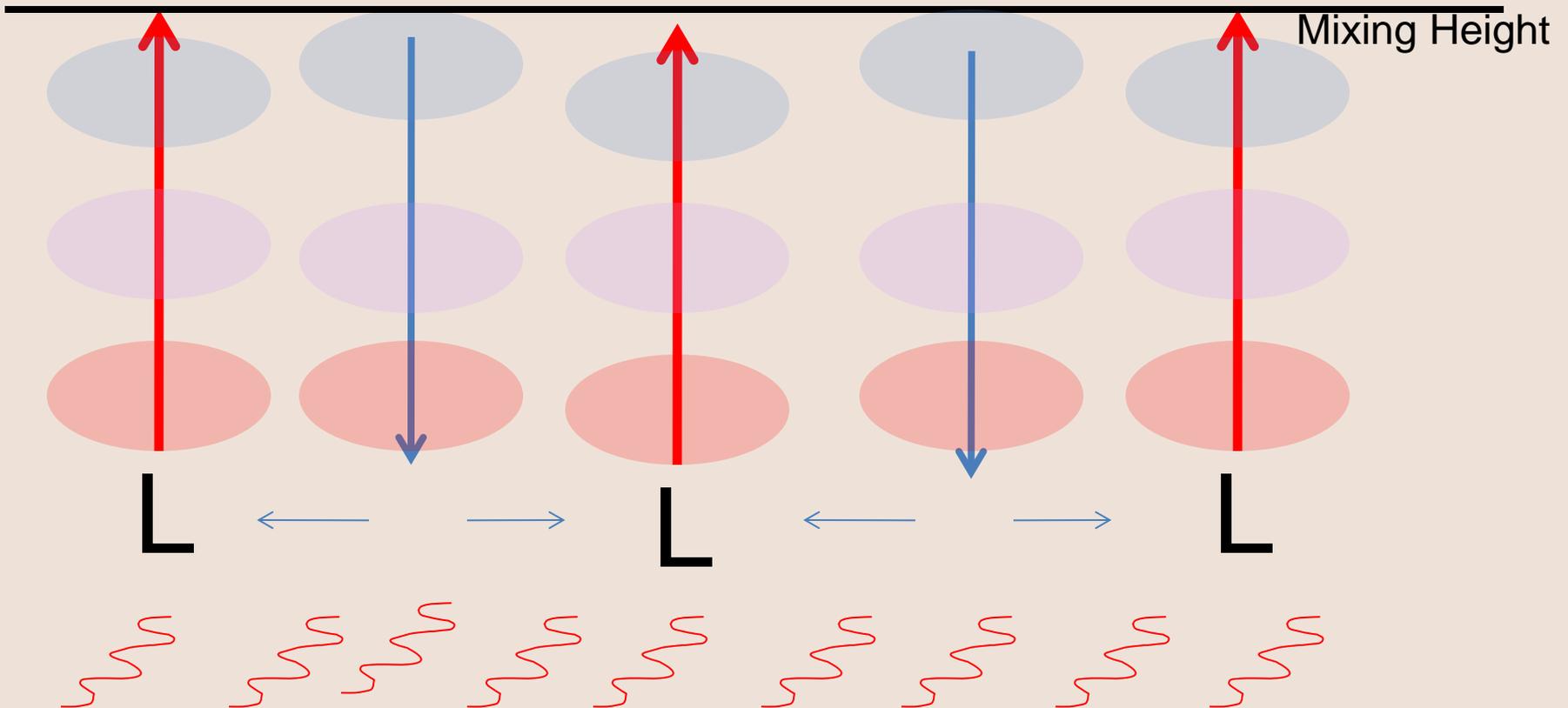
- Important
- The mixing height is *the height at which air is vertical mixed from the surface*
  - Higher mixing heights will result in taller smoke columns (bigger number is better!!)
- Given for **peak burning period**
- Driven by the **sun heating the ground** creating rising warm air



# Mixing Height

- Daytime Mixing
  - If air **rises**, air must **sink** from high up to replace it
  - Sinking air **warms adiabatically** (compressional heating)
  - Sinking air can bring windy conditions aloft to the surface
  - Ground is basically source of moisture
    - Mixing will decrease surface dew point because moisture is being transported upwards
  - Hot days are quite turbulent to low flying aircraft

- Sun warms ground
- Ground warms air
  - Air rises and cools at adiabatic lapse rate
  - Creates 'void' of air near surface
  - Low pressure 'attracts' more air
  - Air from above replaces it
- Sinking parcels warm adiabatically



# Temperature/RH Relationships

- Daytime Mixing- **When does this happen?**
  - Every day
  - Maximized with **stronger** sunlight
  - Highest mixing heights are generally found in late summer *1-4 days ahead of fronts*
  - Higher mixing heights = greater fire danger\*\*
    - Higher temperatures and lower RHs
  - A very high mixing height would be anything over ~ 8,000 ft. A low mixing height would be less than 500 ft.

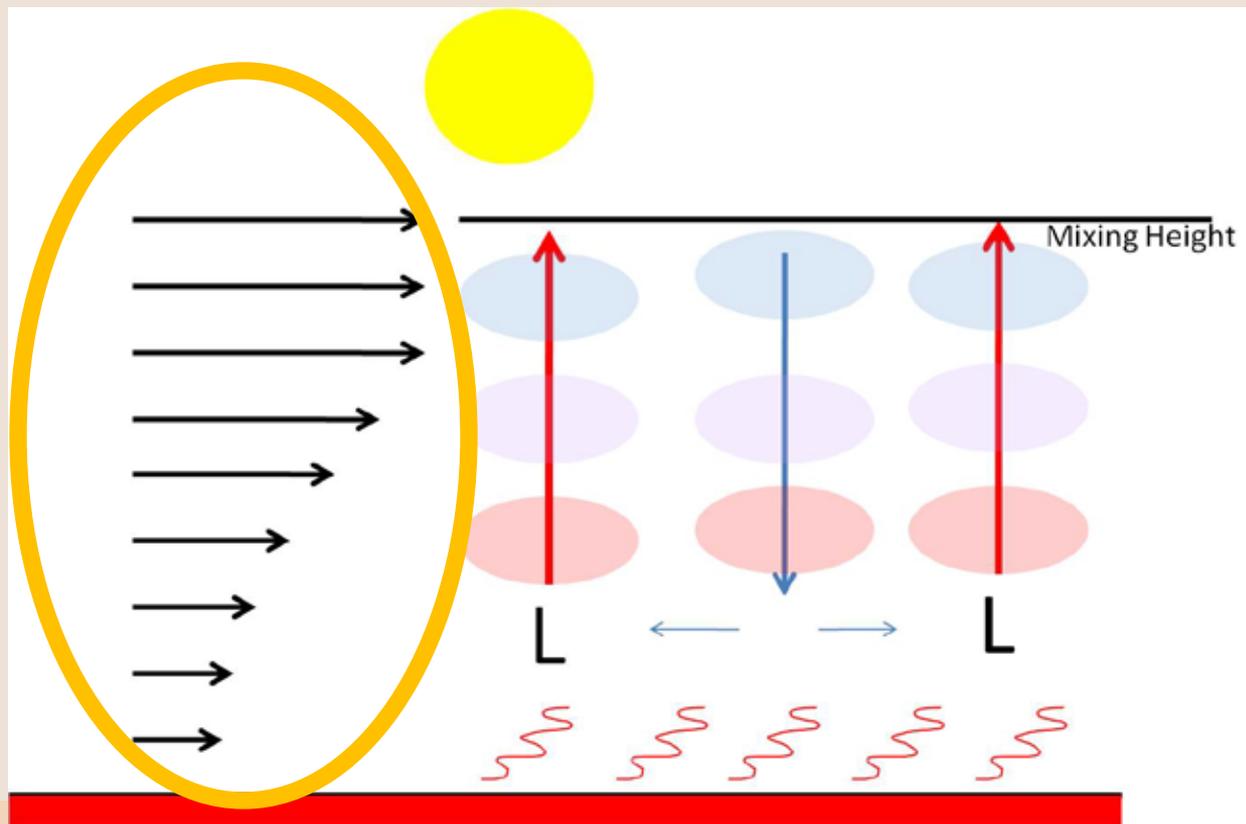
# Mixing Height

- Daytime Mixing- **Visual Indicators**
  - Smoke column stops rising
  - Cumulus cloud base



# Transport Wind

- Transport Winds
  - Average wind speed in mixed layer
  - A good measure of how your smoke will move



# Ventilation Index

- The Ventilation Index (Smoke Dispersion Index) *combines the mixing height with the transport wind*
- A set of smoke dispersion adjectives results:
  - Poor
    - Smoke will spread out horizontally and cover the ground near the fire
  - Marginal
    - Smoke tends to lift but may linger or drift very slowly
  - Fair
    - Smoke lifts but may be removed slowly
  - Good
    - Smoke has no problem being evacuated from the fire area
  - Excellent
    - Smoke rises strongly vertically and is quickly transported away from fire area. Typically happens on days where large fire growth is possible.



## Good Smoke Dispersion



## Poor Smoke Dispersion



<http://www.gov.mb.ca/agriculture/soilwater/soil/fbd09s03.html>





# Summary

- Realize that smoke dispersal is becoming a bigger deal in terms of air quality regulations
- Good neighbors avoid 'smoking' their neighbors!!

# Summary

– Questions?



# Obtaining Weather Data and Forecasts

SOUTH DAKOTA



SCHOOL OF MINES  
& TECHNOLOGY

*Darren R. Clabo*

SD State Fire Meteorologist

Department of Atmospheric Sciences, SDSM&T

# Outline

- This section covers the locations/websites where you can obtain forecasts and weather data

# Good Places to Go

- The National Weather Service is the premier place to get fire weather forecasts
  - [www.weather.gov](http://www.weather.gov)
  - Aberdeen fire weather page  
[http://www.crh.noaa.gov/abr/?n=fire\\_weather.php](http://www.crh.noaa.gov/abr/?n=fire_weather.php)
    - If have internet access, go to [www.weather.gov](http://www.weather.gov) , and walk through steps i – xiv. of section S. 7\_4\_Getting Weather.
    - if no internet, use next series of slides (6–28) to illustrate NWS tools/resources

Local forecast by ZIP, city, or ZIP code

Enter location

[Location Help](#)

### Late Season Winter Storm Impacting the Northeast And Southern New England

A low pressure system off the Northeast Coast will track northeast into Monday. Snow is expected to continue into Monday morning over portions of the Northeast and southern New England. Heavy snow is expected from eastern Long Island to Boston, including Cape Cod and Rhode Island. Travel impacts are likely.

[Read More](#)

#### MY FORECAST

2 Miles SE Watertown Municipal Airport SD



Fair

**46°F**

8°C

[Get Detailed Info](#)

This Afternoon



Mostly Sunny

High: 54°F

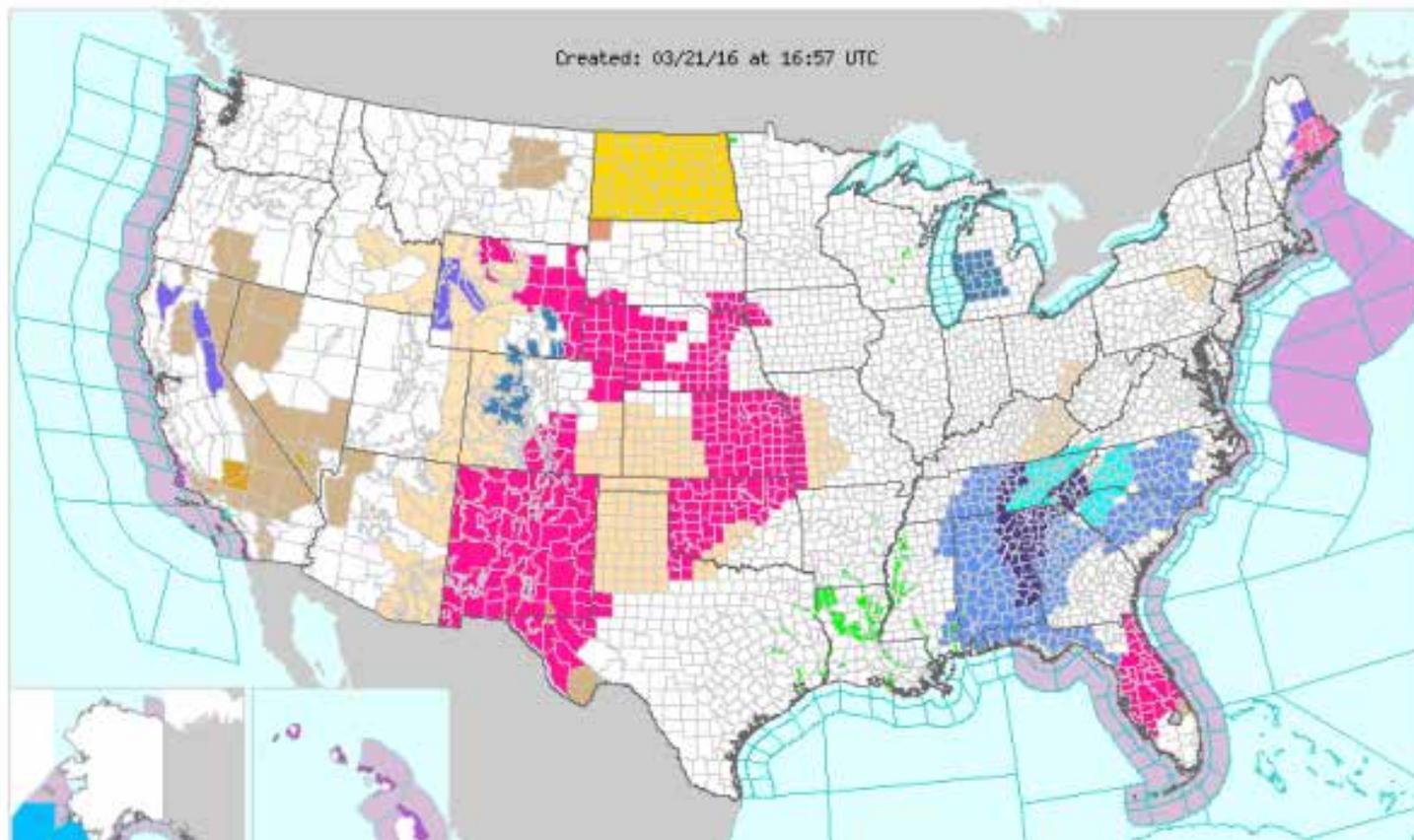
Tonight



Mostly Cloudy

Low: 32°F

[ACTIVE ALERTS](#) [FORECAST MAPS](#) [RADAR](#) [RIVERS, LAKES, RAINFALL](#) [AIR QUALITY](#) [SATELLITE](#) [PAST WEATHER](#)





# NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



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- ABOUT

Local forecast by  
"City, St. or ZIP code"

Watertown, sd

[Location Help](#)

## Late Season Winter Storm Impacting the Northeast And Southern New England

A low pressure system off the Northeast Coast will track northeast into Monday. Snow is expected to continue into Monday morning over portions of the Northeast and southern New England. Heavy snow is expected from eastern Long Island to Boston, including Cape Cod and Rhode Island. Travel impacts are likely.

[Read More...](#)

### MY FORECAST

2 Miles SE Watertown  
Municipal Airport SD



Fair

**46°F**

8°C

[Get Detailed info](#)

This Afternoon

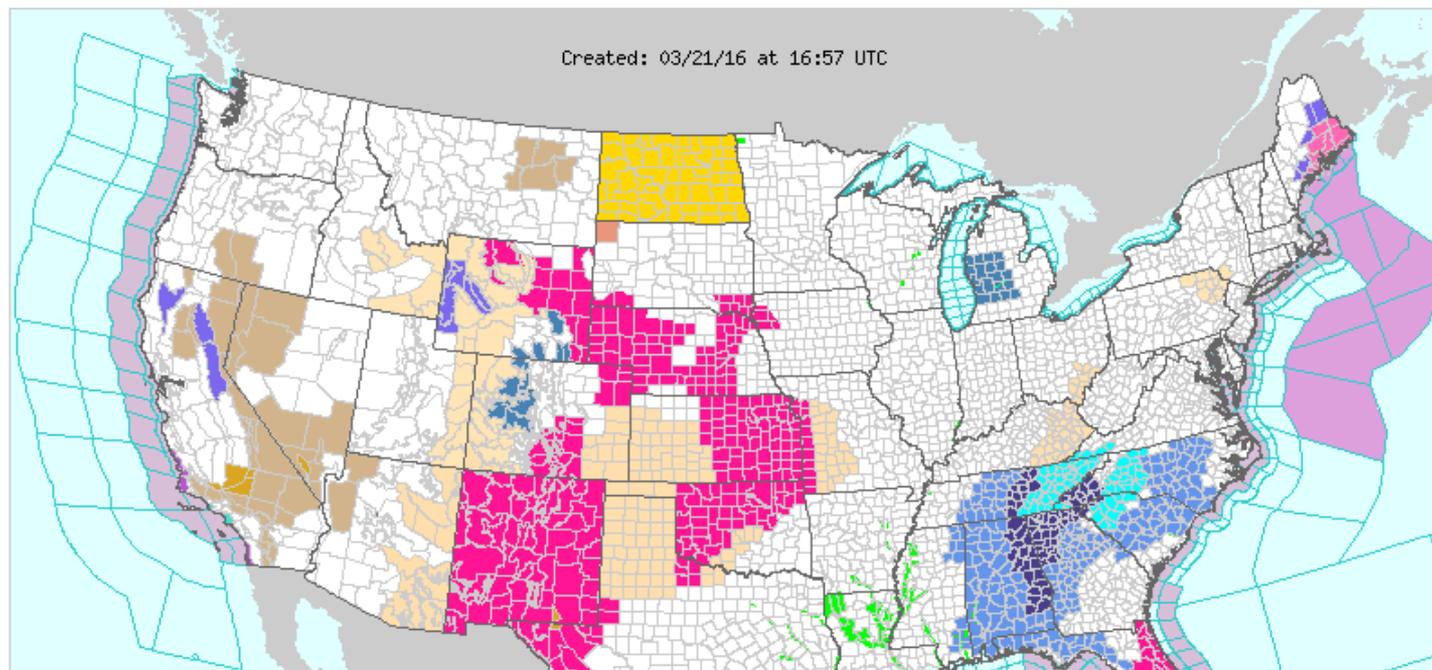


Mostly Sunny

High: 54°F

Tonight

- ACTIVE ALERTS
- FORECAST MAPS
- RADAR
- RIVERS, LAKES, RAINFALL
- AIR QUALITY
- SATELLITE
- PAST WEATHER



forecast.weather.gov/MapClick.php?lat=44.89940652400048&lon=-97.11506877699969#.VvA9INirLIU

**Watertown, Watertown Municipal Airport (KATY)**

Lat: 44.91°N Lon: -97.11°W Elev: 1745ft



Fair  
**46°F**  
8°C

Humidity 46%  
Wind Speed SE 10 mph  
Barometer 29.79 in (1010.1 mb)  
Dewpoint 26°F (-3°C)  
Visibility 10.00 mi  
Wind Chill 41°F (5°C)  
Last update 21 Mar 12:53 pm CDT

**More Information:**  
[Local Forecast Office](#)  
[More Local Wx](#)  
[3 Day History](#)  
[Mobile Weather](#)  
[Hourly Weather Forecast](#)

Extended Forecast for  
**3 Miles ESE Watertown Municipal Airport SD**

This Afternoon	Tonight	Tuesday	Tuesday Night	Wednesday	Wednesday Night	Thursday	Thursday Night	Friday
High: 54 °F	Low: 32 °F	High: 51 °F	Low: 28 °F	High: 34 °F	Low: 18 °F	High: 38 °F	Low: 25 °F	High: 47 °F

**Detailed Forecast**

<b>This Afternoon</b>	Mostly sunny, with a high near 54. South southeast wind 11 to 14 mph.
<b>Tonight</b>	Partly cloudy, with a low around 32. South southeast wind 5 to 10 mph.
<b>Tuesday</b>	Partly sunny, with a high near 51. North northeast wind 6 to 15 mph.

Topographic  
Click Map For Forecast



forecast.weather.gov/MapClick.php?lat=44.89940652400048&lon=-97.11506877699969#.VvA9INlrLIU

Mostly Sunny	Partly Cloudy	Partly Sunny	Slight Chance Rain then Slight Chance Rain/Snow	Chance Snow and Breezy	Chance Snow and Blustery then Partly Cloudy	Sunny	Partly Cloudy	Slight Chance Rain/Snow then Slight Chance Rain
High: 54 °F	Low: 32 °F	High: 51 °F	Low: 28 °F	High: 34 °F	Low: 18 °F	High: 38 °F	Low: 26 °F	High: 47 °F

**Detailed Forecast**

<b>This Afternoon</b>	Mostly sunny, with a high near 54. South southeast wind 11 to 14 mph.
<b>Tonight</b>	Partly cloudy, with a low around 32. South southeast wind 5 to 10 mph.
<b>Tuesday</b>	Partly sunny, with a high near 51. North northeast wind 6 to 15 mph.
<b>Tuesday Night</b>	A slight chance of rain after 8pm, mixing with snow after 3am. Mostly cloudy, with a low around 28. Northeast wind 15 to 18 mph. Chance of precipitation is 20%.
<b>Wednesday</b>	A chance of snow, mainly after 2pm. Cloudy, with a high near 34. Breezy, with a northeast wind 21 to 23 mph, with gusts as high as 32 mph. Chance of precipitation is 30%.
<b>Wednesday Night</b>	A chance of snow before 8pm. Mostly cloudy, with a low around 18. Blustery. Chance of precipitation is 30%.
<b>Thursday</b>	Sunny, with a high near 38.
<b>Thursday Night</b>	Partly cloudy, with a low around 26.
<b>Friday</b>	A slight chance of snow before 11am, then a slight chance of rain and snow between 11am and noon, then a slight chance of rain after noon. Partly sunny, with a high near 47. Chance of precipitation is 20%.
<b>Friday Night</b>	A chance of rain before midnight, then a chance of rain and snow between midnight and 1am, then a chance of snow after 1am. Mostly cloudy, with a low around 27. Chance of precipitation is 30%.
<b>Saturday</b>	A chance of snow. Partly sunny, with a high near 41. Chance of precipitation is 30%.
<b>Saturday Night</b>	Mostly cloudy, with a low around 26.
<b>Sunday</b>	Mostly sunny, with a high near 43.

Topographic  
Click Map For Forecast



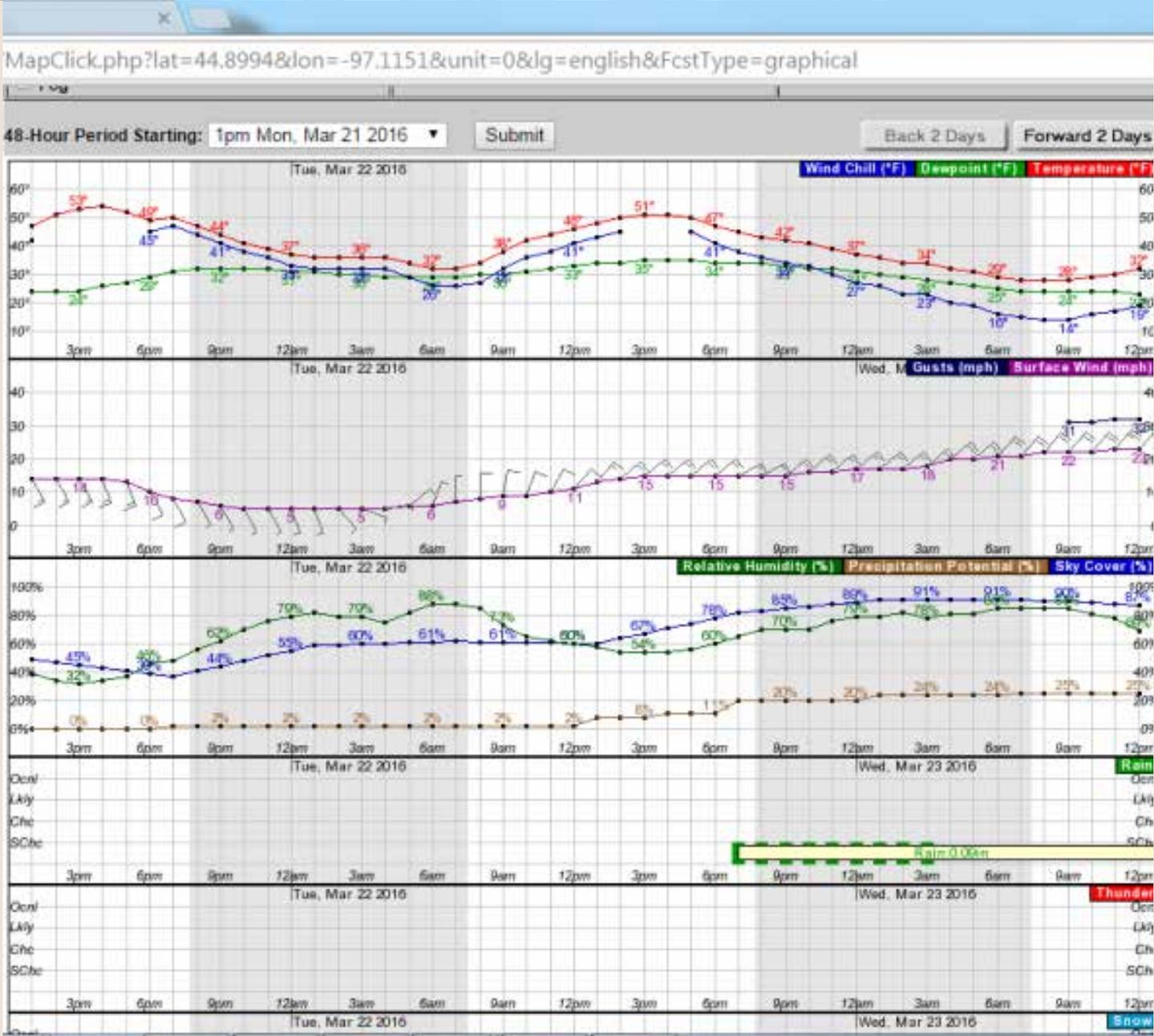
Disclaimer  
Forecast Area

**Point Forecast:** 3 Miles ESE Watertown Municipal Airport SD  
44.91°N 97.11°W (Elev. 1752 ft)

**Last Update:** 11:42 am CDT Mar 21, 2016

**Forecast Valid:** 1pm CDT Mar 21, 2016-6pm CDT Mar 27, 2016

**Additional Forecasts and Information**



Local forecast by "City, St" or ZIP code

Enter location ...

Go

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### Late Season Winter Storm Impacting the Northeast And Southern New England

A low pressure system off the Northeast Coast will track northeast into Monday. Snow is expected to continue into Monday morning over portions of the Northeast and southern New England. Heavy snow is expected from eastern Long Island to Boston, including Cape Cod and Rhode Island. Travel impacts are likely.

[Read More...](#)

#### MY FORECAST

2 Miles SE Watertown Municipal Airport SD



Fair

46°F

8°C

[Get Detailed Info](#)

This Afternoon



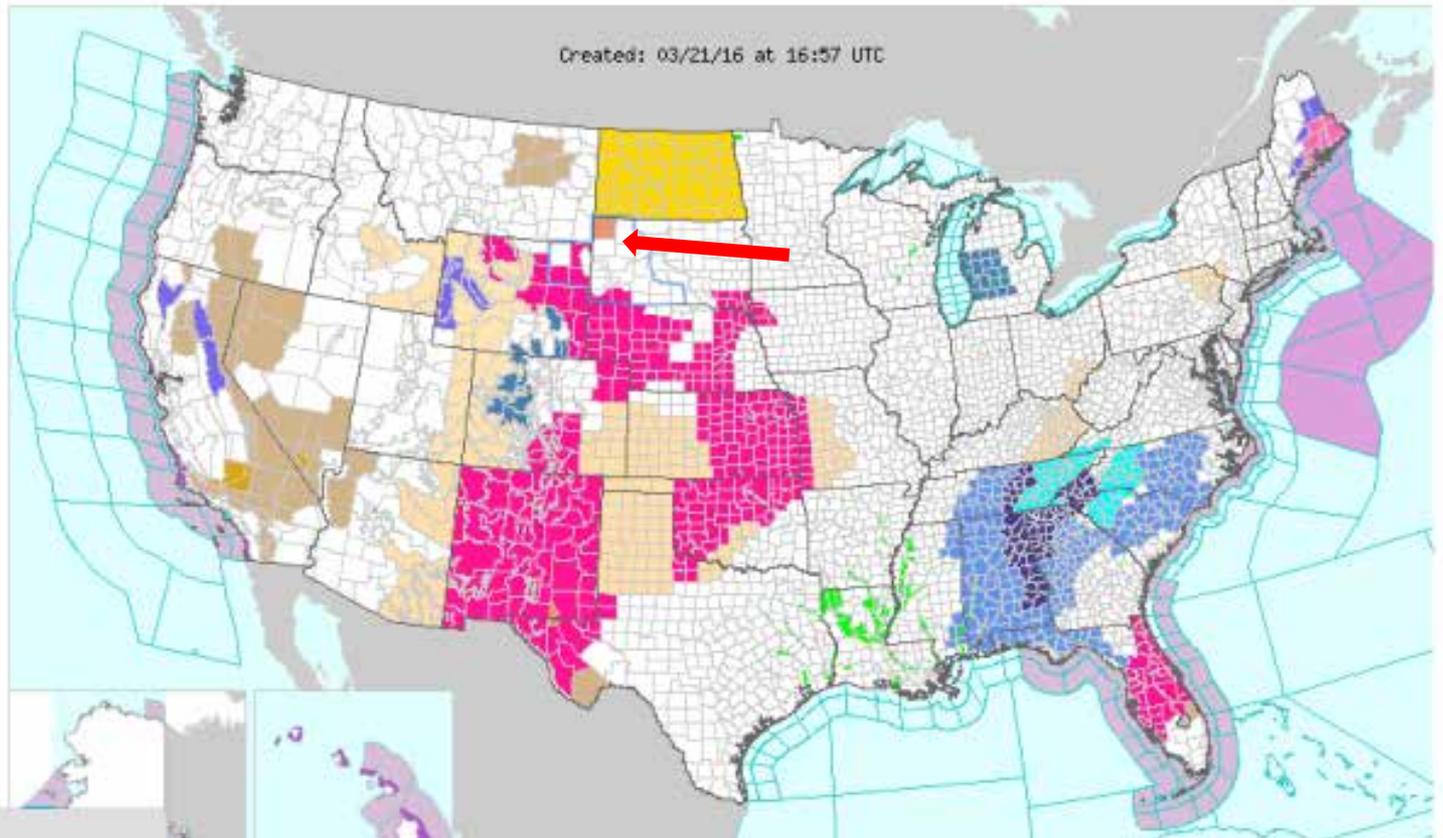
Mostly Sunny

High: 54°F

Tonight



[ACTIVE ALERTS](#) [FORECAST MAPS](#) [RADAR](#) [RIVERS, LAKES, RAINFALL](#) [AIR QUALITY](#) [SATELLITE](#) [PAST WEATHER](#)



2 Miles SE Watertown  
Municipal Airport SD



Fair  
**46°F**  
8°C [Get Detailed info](#)

This Afternoon



Mostly Sunny  
High: 54°F

Tonight



Mostly Cloudy  
Low: 32°F

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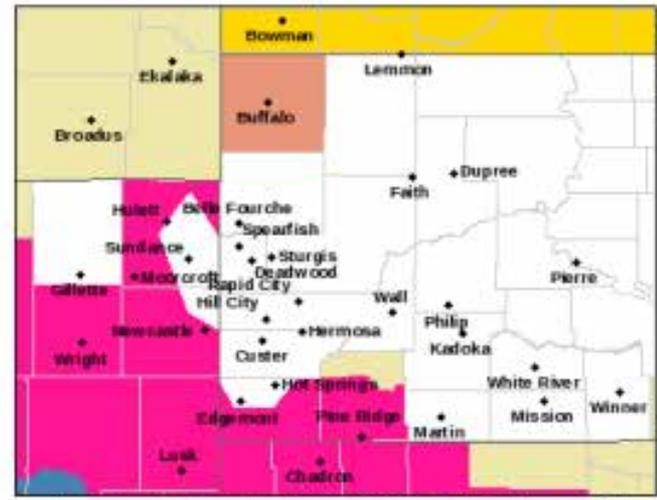
# NWS Forecast Office Rapid City, SD

[Weather.gov](#) > Rapid City, SD

**Rapid City, SD**  
Weather Forecast Office

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Click on the map below to zoom in.



Last Map Update: Mon, Mar. 21, 2016 at 1:30:27 pm CDT

[Watches, Warnings & Advisories](#)

[Red Flag Warning](#) 

[Child Abduction Emergency](#) 

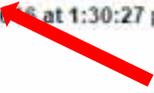
[Winter Storm Watch](#) 

[Extreme Fire Danger](#) 

[Special Weather Statement](#) 

[Hazardous Weather Outlook](#) 

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National Weather Service x New Tab x

forecast.weather.gov/wwamap/wwatxtget.php?cwa=unr&wwa=red%20flag%20

National Weather Service  

**Watches, Warnings & Advisories**


Local weather forecast by "City, St" or zip code

### Red Flag Warning

URGENT - FIRE WEATHER MESSAGE  
 NATIONAL WEATHER SERVICE RAPID CITY SD  
 236 AM MDT MON MAR 21 2016

...RED FLAG WARNING IN EFFECT MONDAY FOR GUSTY WINDS AND LOW RELATIVE HUMIDITY ACROSS PARTS OF NORTHEASTERN WYOMING AND FAR SOUTHWESTERN SOUTH DAKOTA...

.UPPER-LEVEL HIGH PRESSURE WILL BRING VERY WARM AND BREEZY CONDITIONS TO PARTS OF NORTHEASTERN WYOMING AND FAR SOUTHWESTERN SOUTH DAKOTA TODAY. WINDS ARE EXPECTED TO INCREASE BY MID-TO-LATE MORNING AS THE ATMOSPHERE MIXES OUT.

SDZ263-WYZ259-298-220200-  
 /O.CON.KUNR.FW.W.0004.160321T1600Z-160322T0200Z/  
 SOUTHWESTERN SOUTH DAKOTA-SOUTHERN CAMPBELL-  
 CROOK AND WESTON COUNTY PLAINS-  
 236 AM MDT MON MAR 21 2016

...RED FLAG WARNING REMAINS IN EFFECT FROM 10 AM THIS MORNING TO 8 PM MDT THIS EVENING FOR GUSTY WINDS AND LOW RELATIVE HUMIDITY FOR FIRE WEATHER ZONES 259...263 AND 298...

- \* AFFECTED AREA...FIRE WEATHER ZONES 259...263 AND 298.
- \* WINDS...WEST 10 TO 20 MPH WITH GUSTS UP TO 35 MPH.
- \* RELATIVE HUMIDITY...AS LOW AS 13 PERCENT.

# NWS Forecast Office Rapid City, SD

Rapid City, SD  
Weather Forecast Office

2 Miles SE Watertown  
Municipal Airport SD



Fair  
**46°F**  
8°C

[Get Detailed info](#)

This Afternoon



Mostly Sunny  
High: 54°F

Tonight



Mostly Cloudy  
Low: 32°F

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Click on the map below to zoom in.



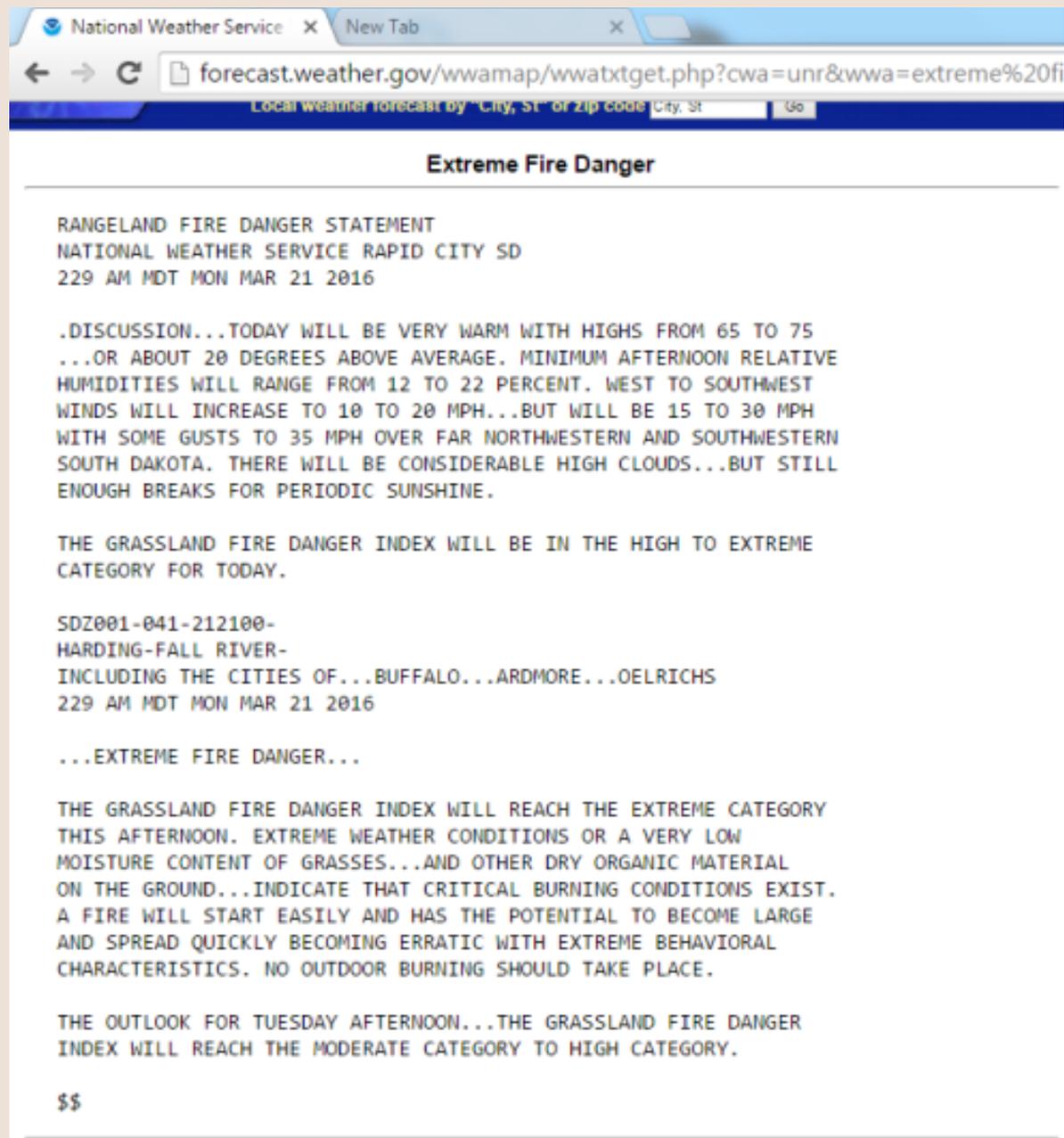
Last Map Update: Mon, Mar. 21, 2016 at 1:30:27 pm CDT

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- [Hazardous Weather Outlook](#)





National Weather Service x New Tab x

forecast.weather.gov/wwamap/wwatxtget.php?cwa=unr&wwa=extreme%20fi

Local weather forecast by "City, St" or zip code City, St Go

### Extreme Fire Danger

RANGELAND FIRE DANGER STATEMENT  
NATIONAL WEATHER SERVICE RAPID CITY SD  
229 AM MDT MON MAR 21 2016

.DISCUSSION...TODAY WILL BE VERY WARM WITH HIGHS FROM 65 TO 75  
...OR ABOUT 20 DEGREES ABOVE AVERAGE. MINIMUM AFTERNOON RELATIVE  
HUMIDITIES WILL RANGE FROM 12 TO 22 PERCENT. WEST TO SOUTHWEST  
WINDS WILL INCREASE TO 10 TO 20 MPH...BUT WILL BE 15 TO 30 MPH  
WITH SOME GUSTS TO 35 MPH OVER FAR NORTHWESTERN AND SOUTHWESTERN  
SOUTH DAKOTA. THERE WILL BE CONSIDERABLE HIGH CLOUDS...BUT STILL  
ENOUGH BREAKS FOR PERIODIC SUNSHINE.

THE GRASSLAND FIRE DANGER INDEX WILL BE IN THE HIGH TO EXTREME  
CATEGORY FOR TODAY.

SDZ001-041-212100-  
HARDING-FALL RIVER-  
INCLUDING THE CITIES OF...BUFFALO...ARDMORE...OELRICHS  
229 AM MDT MON MAR 21 2016

...EXTREME FIRE DANGER...

THE GRASSLAND FIRE DANGER INDEX WILL REACH THE EXTREME CATEGORY  
THIS AFTERNOON. EXTREME WEATHER CONDITIONS OR A VERY LOW  
MOISTURE CONTENT OF GRASSES...AND OTHER DRY ORGANIC MATERIAL  
ON THE GROUND...INDICATE THAT CRITICAL BURNING CONDITIONS EXIST.  
A FIRE WILL START EASILY AND HAS THE POTENTIAL TO BECOME LARGE  
AND SPREAD QUICKLY BECOMING ERRATIC WITH EXTREME BEHAVIORAL  
CHARACTERISTICS. NO OUTDOOR BURNING SHOULD TAKE PLACE.

THE OUTLOOK FOR TUESDAY AFTERNOON...THE GRASSLAND FIRE DANGER  
INDEX WILL REACH THE MODERATE CATEGORY TO HIGH CATEGORY.

\$\$



Fair  
**46°F**  
8°C

[Get Detailed Info](#)

This Afternoon



Mostly Sunny  
High: 54°F

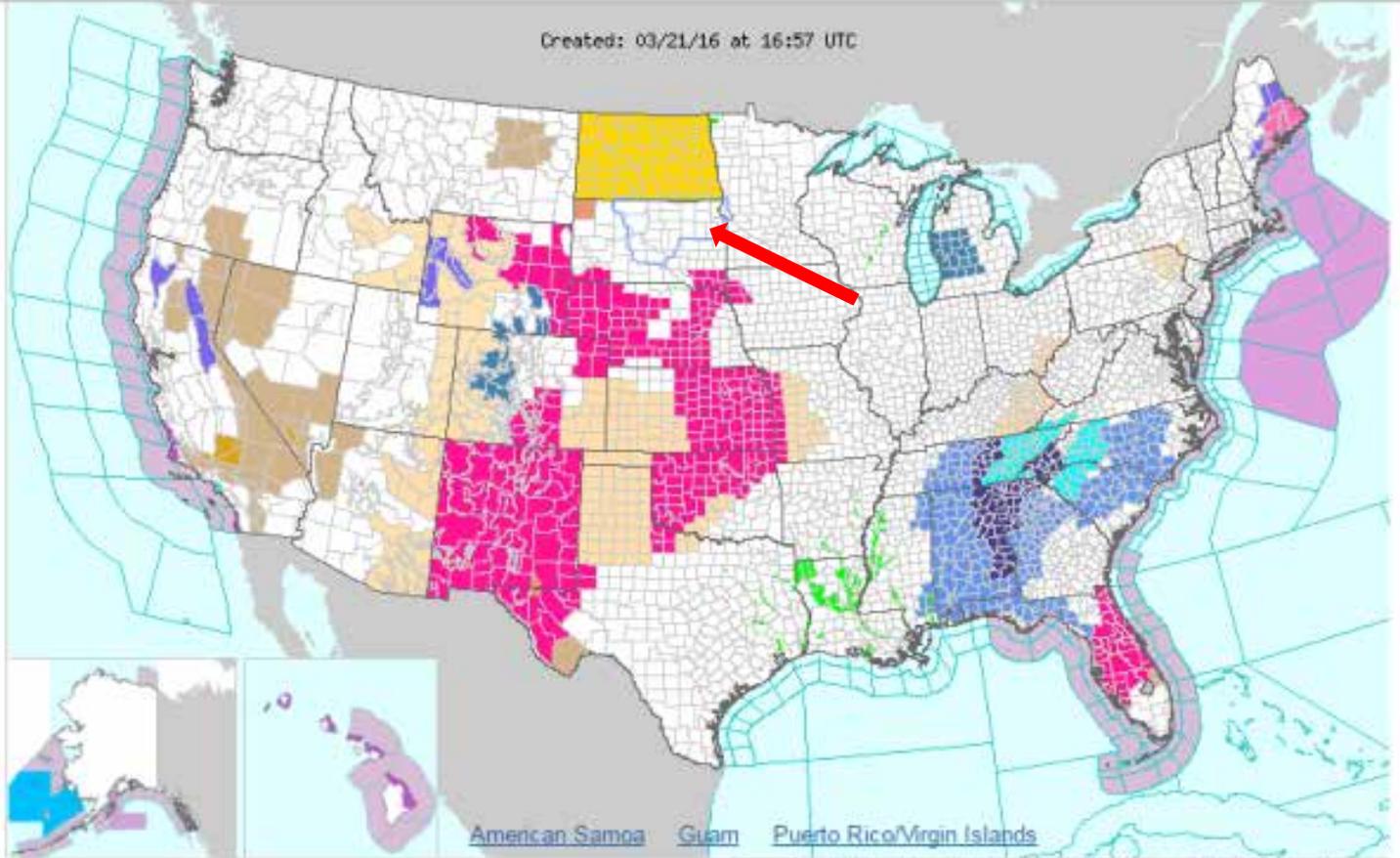
Tonight



Mostly Cloudy  
Low: 32°F

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Created: 03/21/16 at 16:57 UTC



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- Winter Storm Warning
- High Wind Warning
- Flood Warning
- Gale Warning
- Freeze Warning
- Small Craft Advisory For Hazardous Seas
- Small Craft Advisory For Rough Bar

- High Surf Advisory
- Heavy Freezing Spray Warning
- Frost Advisory
- Child Abduction Emergency
- Rip Current Statement

- Lake Wind Advisory
- Wind Advisory
- Frost Advisory
- Child Abduction Emergency
- Rip Current Statement

- High Wind Watch
- Freeze Watch
- Fire Weather Watch
- Extreme Fire Danger
- Special Weather Statement

Local forecast by "City, St" or ZIP code

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News Headlines

- 2016 Skywarn Spotter Calendar
- Stay Safe This Spring!
- This Day in Weather History: March 21st

MY FORECAST

2 Miles SE Watertown Municipal Airport SD



Fair 46°F 8°C

Get Detailed info

This Afternoon



Mostly Sunny High: 54°F

Tonight



Mostly Cloudy Low: 32°F

NWS Forecast Office Aberdeen, SD

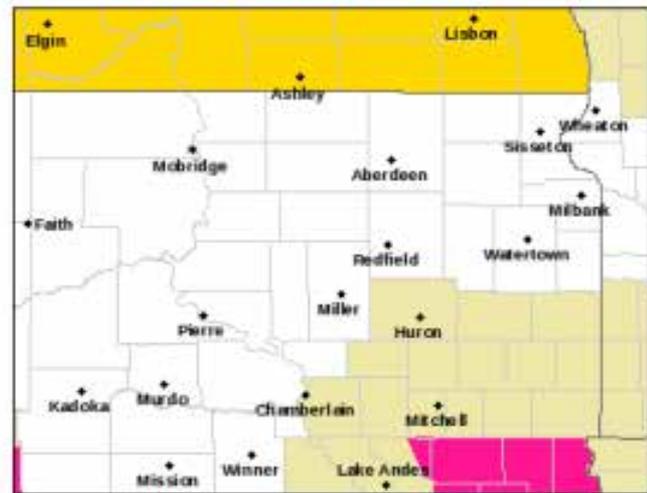
Weather.gov > Aberdeen, SD

Aberdeen, SD

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- Current Conditions
- Radar
- Forecasts
- Rivers and Lakes
- Climate and Past Weather
- Local Information

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Last Map Update: Mon, Mar. 21, 2016 at 1:34:02 pm CDT

Watches, Warnings & Advisories



- Red Flag Warning
- Child Abduction Emergency
- Hazardous Weather Outlook



Mostly Cloudy  
Low: 32°F

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MY FORECAST  
2 Miles SE Watertown  
Municipal Airport SD



Fair  
**46°F**  
8°C [Get Detailed Info](#)

This Afternoon



Mostly Sunny  
High: 54°F

Tonight



Mostly Cloudy  
Low: 32°F

[change location](#)

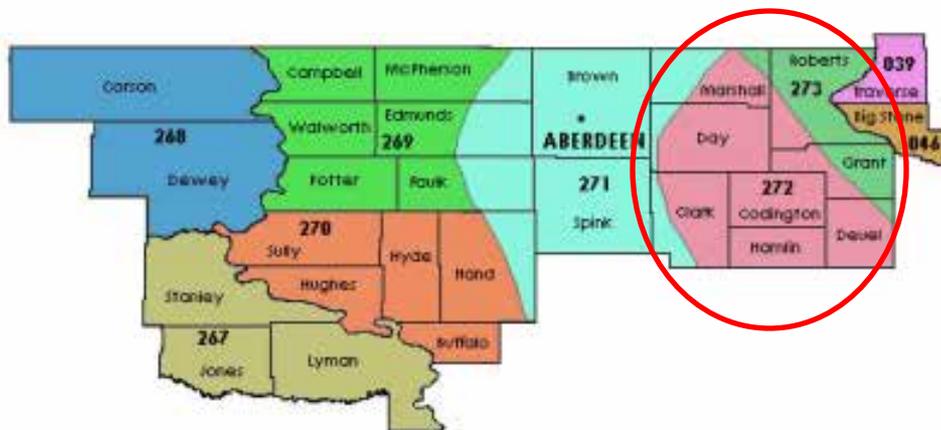
## NWS Aberdeen SD - Fire Weather

[Weather.gov](#) > [Aberdeen, SD](#) > NWS Aberdeen SD - Fire Weather

Aberdeen, SD  
Weather Forecast Office

[Current Hazards](#) [Current Conditions](#) [Radar](#) [Forecasts](#) [Rivers and Lakes](#) [Climate and Past Weather](#) [Local Information](#)

### Fire Weather



Select a zone from the map above to get the Fire Weather Forecast for that zone. Otherwise select a link below.

- [Fire Weather Forecast by Zone](#) for Northeast/Central SD & Extreme West-Central MN
- [Fire Weather Forecast for Southeast SD](#) (NWS Sioux Falls)
- [Fire Weather Forecast for Western SD](#) (NWS Rapid City)

#### Other Fire Weather Forecast Information

- Most recent [Fire Weather Watches/Red Flag Warnings](#) issued by NWS Aberdeen
- [National Fire Weather Forecast](#) from the Storm Prediction Center (SPC)
- [South Dakota Grassland Fire Danger Map](#)

• Issued daily by 5:00 AM during the Fire Weather Season or when when very high or extreme grassland fire danger is forecast

## Routine Fire Wx Fcst (With/Without 6-10 Day Outlook)

Issued by NWS Aberdeen, SD

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Product Version: 3:35:32 AM

997  
FNUS53 KABR 210835  
FWFABR

FIRE WEATHER FORECAST FOR CENTRAL/NE SOUTH DAKOTA WC MN  
NATIONAL WEATHER SERVICE ABERDEEN SD  
335 AM CDT MON MAR 21 2016

.DISCUSSION...

AN AREA OF LOW PRESSURE WEST OF THE REGION WILL DRAW WARMER TEMPERATURES INTO THE DAKOTAS AND MINNESOTA TODAY. THE MUCH ABOVE NORMAL TEMPERATURES AND DRY AIRMASS WILL PRODUCE AFTERNOON HUMIDITY VALUES IN THE TEENS AND 20 PERCENT RANGE WEST OF THE JAMES RIVER VALLEY. THANKFULLY WINDS RANGE BELOW 20 MPH TODAY. STRONGER WINDS ARE POSSIBLE IN EASTERN SOUTH DAKOTA WHERE AFTERNOON HUMIDITY VALUES WILL BE IN THE 40 PERCENT RANGE.

SDZ272-212145-  
PRAIRIE COTEAU-  
335 AM CDT MON MAR 21 2016

.TODAY...

SKY/WEATHER.....MOSTLY SUNNY (40-50 PERCENT CLOUD).  
MAX TEMPERATURE.....50-55.  
MIN HUMIDITY.....35-40 PERCENT.  
20-FOOT WINDS.....SOUTHEAST WINDS 10 TO 15 MPH.  
HAINES INDEX.....5 OR MODERATE.  
MIXING HEIGHT.....AROUND 2700 FT AGL (AFTERNOON MAX).  
TRANSPORT WINDS....SOUTHEAST 18 TO 23 MPH.  
SMOKE DISPERSAL....AROUND 42000 OR FAIR (AVE 12-6 PM).  
LAL.....1.  
CWR.....ZERO.

.TONIGHT...

SKY/WEATHER.....PARTLY CLOUDY (40-50 PERCENT CLOUD) THEN  
BECOMING MOSTLY CLOUDY (50-60 PERCENT CLOUD).  
MIN TEMPERATURE.....30-35.

noaa.gov/maf/version.php?format=txt&product=FWF&site=NWS&issuedby=ABR&ugc=SDZ272

.TONIGHT...

SKY/WEATHER.....PARTLY CLOUDY (40-50 PERCENT CLOUD) THEN  
BECOMING MOSTLY CLOUDY (50-60 PERCENT CLOUD).

MIN TEMPERATURE.....30-35.

MAX HUMIDITY.....91-96 PERCENT.

20-FOOT WINDS.....SOUTHEAST WINDS 5 TO 10 MPH SHIFTING TO THE  
EAST AFTER MIDNIGHT.

HAINES INDEX.....5 OR MODERATE.

LAL.....1.

CWR.....ZERO.

.TUESDAY...

SKY/WEATHER.....PARTLY SUNNY (65-75 PERCENT CLOUD).

MAX TEMPERATURE.....48-53.

MIN HUMIDITY.....55-60 PERCENT.

20-FOOT WINDS.....NORTHEAST WINDS 5 TO 15 MPH.

HAINES INDEX.....5 OR MODERATE.

MIXING HEIGHT.....AROUND 2300 FT AGL (AFTERNOON MAX).

TRANSPORT WINDS.....NORTHEAST 16 TO 21 MPH.

SMOKE DISPERSAL.....AROUND 43000 OR FAIR (AVE 12-6 PM).

LAL.....1.

CWR.....ZERO.

.FORECAST DAYS 3 THROUGH 7...

.WEDNESDAY...CLOUDY WITH A SLIGHT CHANCE OF RAIN OR SNOW. LOWS IN  
THE UPPER 20S. HIGHS IN THE UPPER 30S. NORTHEAST WINDS 10 TO 20 MPH.

.THURSDAY...PARTLY CLOUDY. LOWS AROUND 19. HIGHS IN THE UPPER 30S.  
NORTH WINDS 10 TO 20 MPH.

.FRIDAY...MOSTLY CLOUDY. A SLIGHT CHANCE OF RAIN AND SNOW. LOWS IN  
THE UPPER 20S. HIGHS IN THE MID 40S. SOUTHWEST WINDS 5 TO 15 MPH.

.SATURDAY...MOSTLY CLOUDY. A CHANCE OF SNOW AND RAIN. LOWS IN THE  
UPPER 20S. HIGHS IN THE LOWER 40S. NORTHWEST WINDS 5 TO 10 MPH.

.SUNDAY...PARTLY CLOUDY. LOWS IN THE MID 20S. HIGHS IN THE LOWER  
40S. NORTHWEST WINDS 5 TO 10 MPH.

\$\$

WEATHER.GOV/ABERDEEN

# Understanding the Red Flag Warning System

A graphic for a Red Flag Warning. The words "RED FLAG" are in large, bold, red capital letters, and "WARNING" is in large, bold, white capital letters below it. The background is a dark, smoky orange. In the bottom left corner, a red flag is partially visible, waving.

- Red Flag Warning is based on:
  - Wind Speed
  - Relative Humidity



weather.gov/abr/fire

- [Relative Greenness](#)
- [Experimental Live Moisture](#)
- [Greenness 4-Panel Display](#)

#### Fuel and Soil Moisture

- [10-hour Fuel Moisture](#) - computed for 1/2 inch diameter fuels
- [100-hour Fuel Moisture](#) - computed for 1-3 inch diameter fuels
- [1000-hour Fuel Moisture](#) - computed for 3-8 inch diameter fuels

#### Lower Atmospheric Stability

- [Haines Index across the U.S.](#)

#### Wildland Fire Status

- [NOAA Fire and Smoke Maps](#)
- [Satellite Smoke Text Product](#)
- [South Dakota](#)
- [Minnesota](#)
- [National](#)
- [Minnesota Wildfire Information](#)

#### Miscellaneous Fire Weather Information

- [National Fire Weather Information](#)
- [National Interagency Fire Center \(NIFC\)](#)

#### Coordination Centers

- [Rocky Mountain Area Coordination Center](#)
- [Eastern Area Coordination Center](#)

#### Situation Reports/Fire Dangers

- [Rocky Mountain Area Daily Situation Report](#)
- [Eastern Area Daily Situation Report](#)
- [National Situation Report](#)
- [Rocky Mountain Area Fuel Status](#)

[2015 Rocky Mountain Area Fire Weather Annual Operating Plan](#)

[2016 Minnesota Fire Weather Annual Operating Plan](#)

**NWS Aberdeen SD - Fire Weather**

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**Fire Weather**

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- [Fire Weather Forecast for Southwest SD \(WYS Sioux Falls\)](#)
- [Fire Weather Forecast for Northeast SD \(WYS Rapid City\)](#)

**Other Fire Weather Forecast Information**

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- [South Dakota Unimodal Fire Danger Map](#)

• Issued daily by 3:00 AM during the Fire Weather Season or when when very high or extreme grassland fire danger is forecast





Fair

46°F

8°C

[Get Detailed Info](#)

This Afternoon



Mostly Sunny

High: 54°F

Tonight

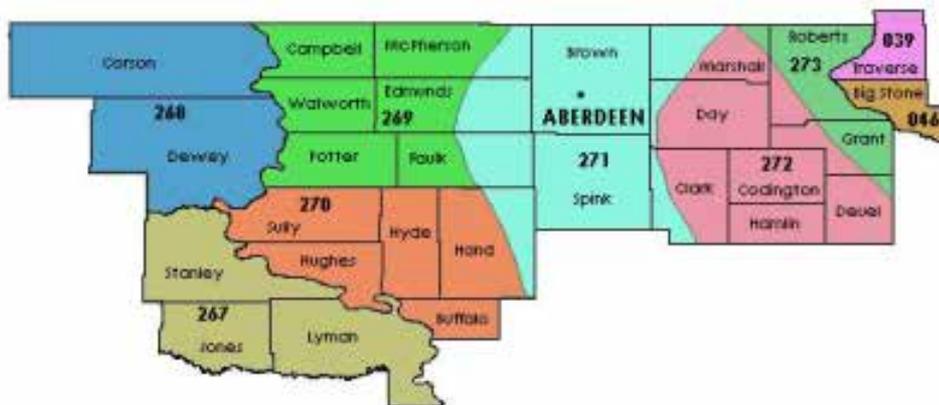


Mostly Cloudy

Low: 32°F

[change location](#)

## Fire Weather



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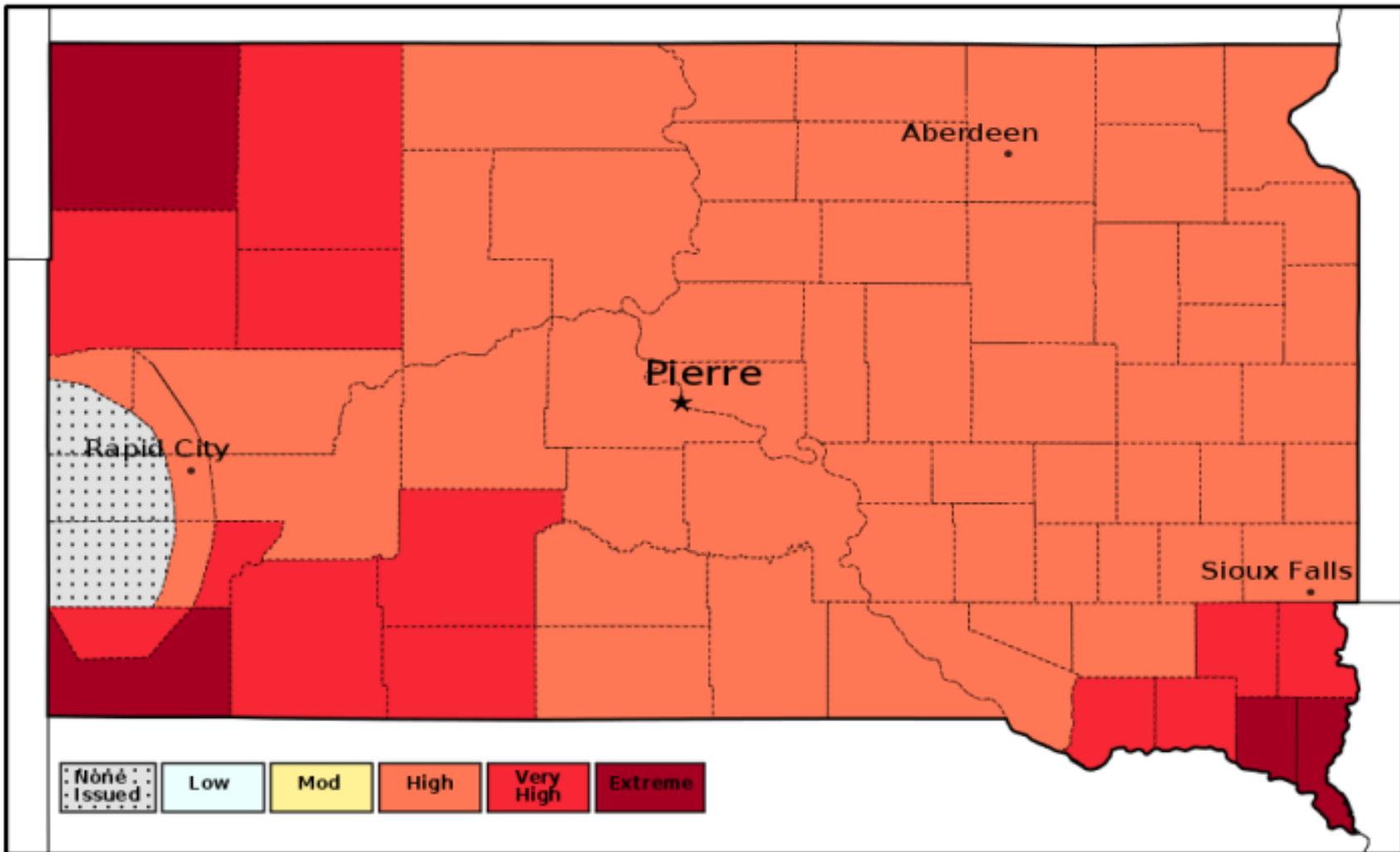
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- [National Fire Weather Forecast](#) from the Storm Prediction Center (SPC)
- [South Dakota Grassland Fire Danger Map](#)
  - Issued daily by 5:00 AM during the Fire Weather Season or when when very high or extreme grassland fire danger is forecast.
- [Graphical Fire Weather Products](#)
- [Interactive Gridpoint Forecasts](#)

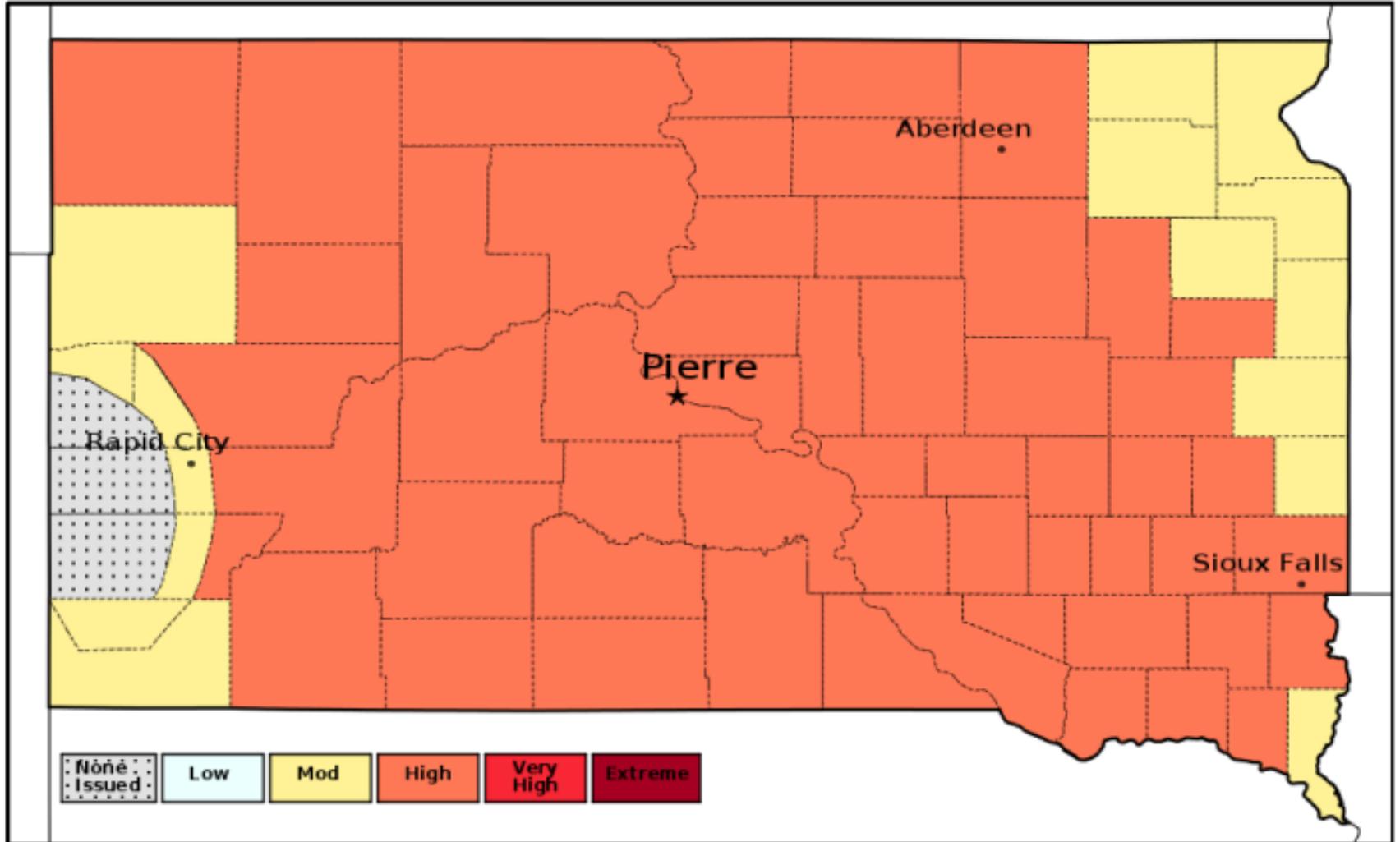
### Observations

Observation Metadata Analysis Network (DOMAN)

# SD Grassland Fire Danger: Mon, Mar 21, 2016



# SD Grassland Fire Danger: Tue, Mar 22, 2016



# Understanding the Grassland Fire Danger Index



- Grassland Fire Danger Index is based on
  - Wind Speed
  - Relative Humidity
  - Temperature
  - Fuel cure
    - (brownness vs. greenness)



# SD Grassland Fire Danger Index Tool

(Darren Clabo South Dakota State Fire Meteorologist)

- Example
  - Moderate conditions

## GFDI Categories

Low	0 to 2
Moderate	3 to 7
High	8 to 19
Very High	20 to 49
Extreme	50+

Grassland Fire Danger Index	Vegetation Cure (%)	Temp (C)	Wind V (km/hr)	RH (%)	Temp (F)	Wind V (mph)
1	60	This is America		30	68	16
1	65			30	68	16
2	70			30	68	16
4	75			30	68	16
5	80			30	68	16
7	85			30	68	16
10	90			30	68	16
12	95			30	68	16
13	100			30	68	16

Unsecure fire unit →

Secure fire unit →

# SD Grassland Fire Danger Index Tool

(Darren Clabo South Dakota State Fire Meteorologist)

- Example
  - Extreme conditions

## GFDI Categories

Low	0 to 2
Moderate	3 to 7
High	8 to 19
Very High	20 to 49
Extreme	50+

Grassland Fire Danger Index	Vegetation Cure (%)	Temp (C)	Wind V (km/hr)	RH (%)	Temp (F)	Wind V (mph)
5	60	This is America		20	81	30
8	65			20	81	30
12	70			20	81	30
19	75			20	81	30
28	80			20	81	30
39	85			20	81	30
52	90			20	81	30
64	95			20	81	30
72	100			20	81	30

Unsecure fire unit →

Secure fire unit →

# South Dakota FSA / NRCS Burn Plan Guidelines

- **PRESCRIBED BURN WEATHER AND TIME PARAMETERS:**
- Listed here are PRACTICAL weather conditions within which are designed to help insure the burn is conducted under safe and manageable circumstances.
- Recommended basic/manageable weather parameters for private lands
- **Air Temperature: 40°-75°F**
- **Relative Humidity: 25%-50%**
- **20 Ft Wind Speed/Forecasted Wind Speed: 20 mph maximum**
- **Ground Level Wind Range: 5-16 mph**



# SD Grassland Fire Danger Index Tool

(Darren Clabo South Dakota State Fire Meteorologist)

- SD Burn Plan
  - Min temp
  - Min wind
  - Max RH

## GFDI Categories

Low	0 to 2
Moderate	3 to 7
High	8 to 19
Very High	20 to 49
Extreme	50+

Grassland Fire Danger Index	Vegetation Cure (%)	Temp (C)	Wind V (km/hr)	RH (%)	Temp (F)	Wind V (mph)
0	60	This is America		50	45	5
0	65			50	45	5
0	70			50	45	5
0	75			50	45	5
1	80			50	45	5
1	85			50	45	5
1	90			50	45	5
1	95			50	45	5
2	100			50	45	5

Unsecure fire unit →

# SD Grassland Fire Danger Index Tool

(Darren Clabo South Dakota State Fire Meteorologist)

- SD Burn Plan
  - Max temp
  - Max wind
  - Min RH

## GFDI Categories

Low	0 to 2
Moderate	3 to 7
High	8 to 19
Very High	20 to 49
Extreme	50+

Do Not recommend burning when all three factors are at prescription extremes

Grassland Fire Danger Index	Vegetation Cure (%)	Temp (C)	Wind V (km/hr)	RH (%)	Temp (F)	Wind V (mph)
2	60	This is America		25	75	20
3	65			25	75	20
4	70			25	75	20
7	75			25	75	20
10	80			25	75	20
14	85			25	75	20
18	90			25	75	20
22	95	25	75	20		
25	100	25	75	20		

Unsecure fire unit →

Secure fire unit →

# Other Places

- The NWS Storm Prediction Center has wildland fire potential outlooks
  - [http://www.spc.noaa.gov/products/fire\\_wx/overview.html](http://www.spc.noaa.gov/products/fire_wx/overview.html)

**Fire Weather Outlooks**

Updated: Tue Feb 12 16:46:04 UTC 2013 (6h 33m ago)

Current Fire Weather Outlooks ([Product Info](#))

**Current Day 1 Fire Weather Outlook**



Forecaster: MOSIER  
Issued: 121645Z  
Valid: 121700Z - 131200Z  
Forecast Risk of Fire Weather: **Critical Risk**  
**Note:** Critical Fire Weather Criteria document in [MS-Word](#) or [PDF](#).

# Other Places

- SD State Fire Meteorologist
  - Has a variety of useful products/links
  - Issues daily state-wide forecasts during fire season
    - <http://www.ias.sdsmt.edu/clabo/index.htm>



**Darren R. Clabo**  
State Fire Meteorologist, South Dakota

Follow @SDFireWeather

Weather Links | Fire Links | Photos/Video | Mobile | Campus Work

Current Conditions at SDSM&T

**Today's Forecasted Conditions (Updated daily at 9:06 MDT, refresh images upon load)**

	Temperature	RH	Wind	Sr Precip.
Noon	☒	☒	☒	☒
1500	☒	☒	☒	☒
1800	☒	☒	☒	☒
2100	☒	☒	☒	☒

**Daily Weather Discussion (updated 12/07/2012 09:49)** (click your refresh button to ensure most recent forecast)

Finally some precipitation...

A weak shortwave trough is moving through the Northern Plains this morning bringing widespread light snow to the region. Temperatures are in the upper 20s and 30s with mainly easterly winds across SD. Not much else to say really.

Strong upper level flow (125 kt+ wind) is expected to continue plunging in the Rocky Mountain region for the next few days. This will bring much cooler temperatures (as compared to what we have been seeing) to the region with highs only in the 30s and lows in the single digits to lower teens through the weekend. A low pressure system will move into the state tomorrow morning bringing breezy southeasterly winds switching to westerly. A cold front will then swing through the area and we can expect quite windy conditions on Sunday with northwesterly winds gusting to over 40 mph. With the dynamic pattern in place, there is a slight chance of snow showers each day through the weekend.

# Smart Phones

Weather Calculation and Archiving  
National Center for Landscape Fire Analysis.  
College of Forestry and Conservation,  
University of Montana

Dry bulb (°F)	Wet bulb (°F)	RH (%)
60	47	35
Wind speed (mph)	Wind gusts (mph)	Wind direction
1	3	West
Projection point	FDFM (%)	PIG (%)
Level	7	50

Save  Do Not Save

Exit Share Observation

**Iphone App here:**

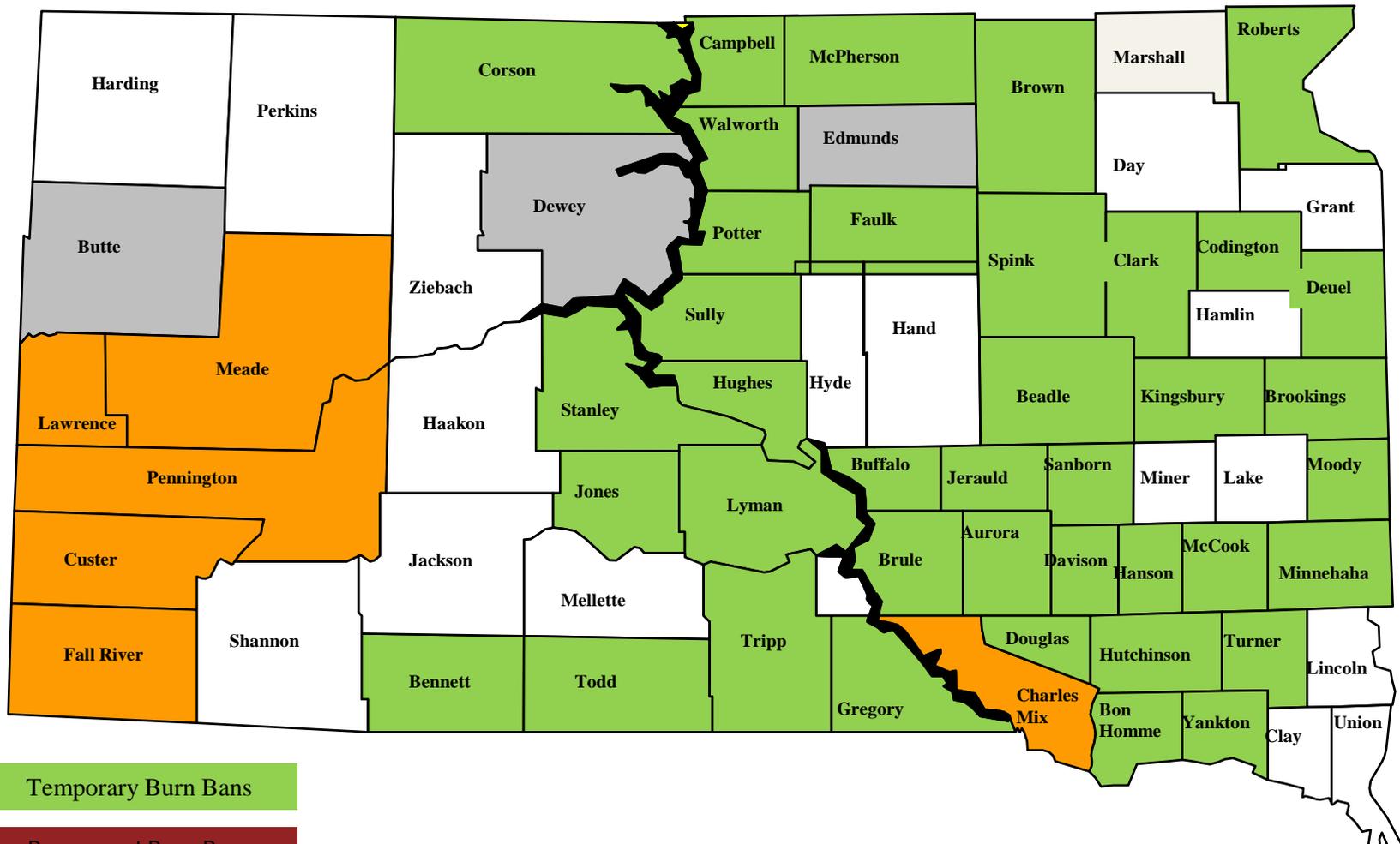
<https://itunes.apple.com/us/app/fire-weather-calculator/id1019236631?mt=8>

**Android App here:**

<https://play.google.com/store/apps/details?id=com.nafundi.nclfa.fdfm>

# South Dakota Burn Bans

April 16, 2015



- Temporary Burn Bans
- Permanent Burn Bans
- Modified Year Round Bans

**\*2015 was the first year we compiled statewide burn ban status**  
**\*Make sure we have your email for SDGRASSINFO updates**

# Summary

– Questions?

# NWS Point Forecasts




## NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



---

HOME
FORECAST
PAST WEATHER
WEATHER SAFETY
INFORMATION CENTER
NEWS
SEARCH
ABOUT

Local forecast by "City, St" or ZIP code

[Location Help](#)

### Severe Thunderstorms Possible for Parts of Gulf Coast and Southeast

The NWS Storm Prediction Center is forecasting a risk of severe thunderstorms late Tuesday into early Wednesday for parts of the central and eastern Gulf Coast and Southeast. The primary threats will be large hail and damaging winds. In addition, flooding and flash flooding is possible from southern Mississippi to southern Georgia. [Read More...](#)

4 MILES WNW SENECA SD
En Español



Fair

# 41°F

5°C

**Humidity** 57%

**Wind Speed** NW 9 mph

**Barometer** 29.82 in (1011.7 mb)

**Dewpoint** 27°F (-3°C)

**Visibility** 10.00 mi

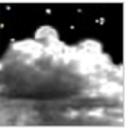
**Wind Chill** 35°F (2°C)

Last Update on 12 Feb 4:52 pm CST

Current conditions at  
**Mobridge Municipal Airport (KMBG)**  
Lat: 45.55 Lon: -100.41 Elev: 1667ft.

[More Local Wx](#) | [3 Day History](#) | [Mobile Weather](#)

+ [Share](#) | [in](#) [f](#) [t](#) [e](#) [m](#)

TONIGHT	WEDNESDAY	WEDNESDAY NIGHT	THURSDAY	THURSDAY NIGHT	FRIDAY	FRIDAY NIGHT	SATURDAY	SATURDAY NIGHT
								
Mostly Cloudy <b>Low: 20 °F</b>	Slight Chc Snow <b>High: 37 °F</b>	Blowing Snow <b>Low: 21 °F</b>	Snow Likely <b>High: 26 °F</b>	Chance Flurries <b>Low: 8 °F</b>	Mostly Cloudy <b>High: 19 °F</b>	Partly Cloudy <b>Low: 0 °F</b>	Mostly Sunny <b>High: 29 °F</b>	Partly Cloudy <b>Low: 15 °F</b>

## 7-DAY FORECAST

**Tonight** Mostly cloudy, with a low around 20. West wind 9 to 11 mph.

**Wednesday** A 20 percent chance of snow before noon. Partly sunny, with a high near 37. Breezy, with a west wind 11 to 16 mph increasing to 18 to 23 mph in the afternoon. Winds could gust as high as 32 mph.

NWS Aberdeen, SD

**Point Forecast:** 4 Miles WNW Seneca SD  
45.08°N 99.6°W (Elev. 1971 ft)

**Last Update:** 4:25 pm CST Feb 12, 2013

**Forecast Valid:** 6pm CST Feb 12, 2013-6pm CST Feb 19, 2013

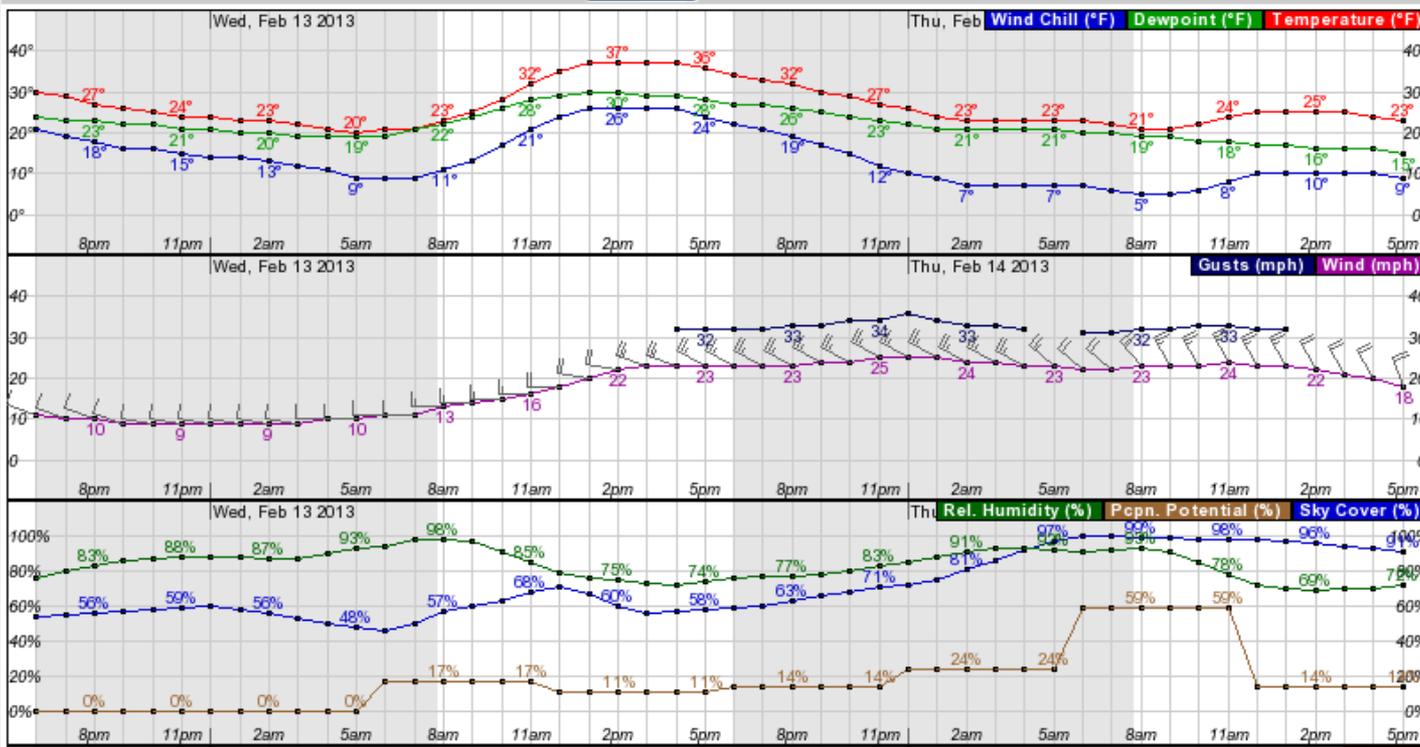
Forecast Discussion

KML
XML

# Hourly Weather Graph

<b>Weather Elements</b> <input checked="" type="checkbox"/> Temperature (°F) <input checked="" type="checkbox"/> Dewpoint (°F) <input checked="" type="checkbox"/> Wind Chill (°F)  <input checked="" type="checkbox"/> Surface Wind <input type="text" value="mph"/> <input checked="" type="checkbox"/> Sky Coverage <input checked="" type="checkbox"/> Precipitation Potential <input checked="" type="checkbox"/> Relative Humidity	<b>Weather/Precipitation</b> <input checked="" type="checkbox"/> Thunder <input checked="" type="checkbox"/> Rain <input checked="" type="checkbox"/> Snow <input checked="" type="checkbox"/> Freezing Rain <input checked="" type="checkbox"/> Sleet	<b>Probabilistic Forecasts (Experimental)</b> Quantitative Precipitation <input type="text" value="6-hr"/> <a href="#">info</a> <input type="checkbox"/> 0.10 <input type="checkbox"/> 0.25 <input type="checkbox"/> 0.50 <input type="checkbox"/> 1.00 Snowfall <input type="text" value="6-hr"/> <a href="#">info</a> <input type="checkbox"/> 0.1in <input type="checkbox"/> 1in <input type="checkbox"/> 3in <input type="checkbox"/> 6in <input type="checkbox"/> 12in
--	---	---

48-Hour Period Starting:



# Weather Effects on Fire

SOUTH DAKOTA



SCHOOL OF MINES  
& TECHNOLOGY

*Darren R. Clabo*

SD State Fire Meteorologist

Department of Atmospheric Sciences, SDSM&T

# Outline

- This section outlines other phenomena you might come across while you burn

# Fire Whirls











# Pyrocumululus





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# Fire Behavior and Fire Breaks

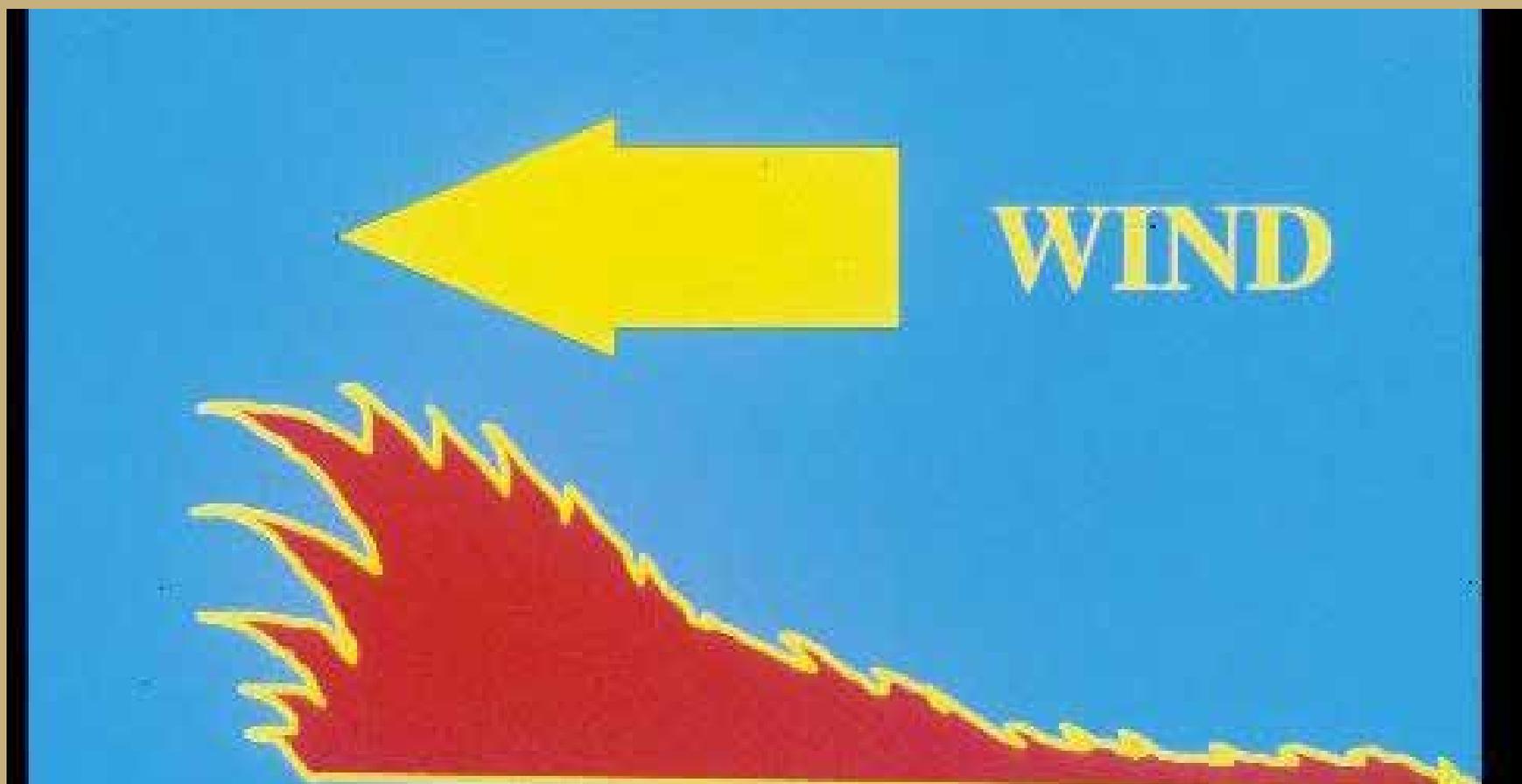




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## Wind Effects





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## Headfire – ‘With the Wind’





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## Headfire – ‘With the Wind’





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## Headfire – ‘With the Wind’





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## Backfire – ‘Against the Wind’





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## Backfire – ‘Against the Wind’





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# Ignition Techniques

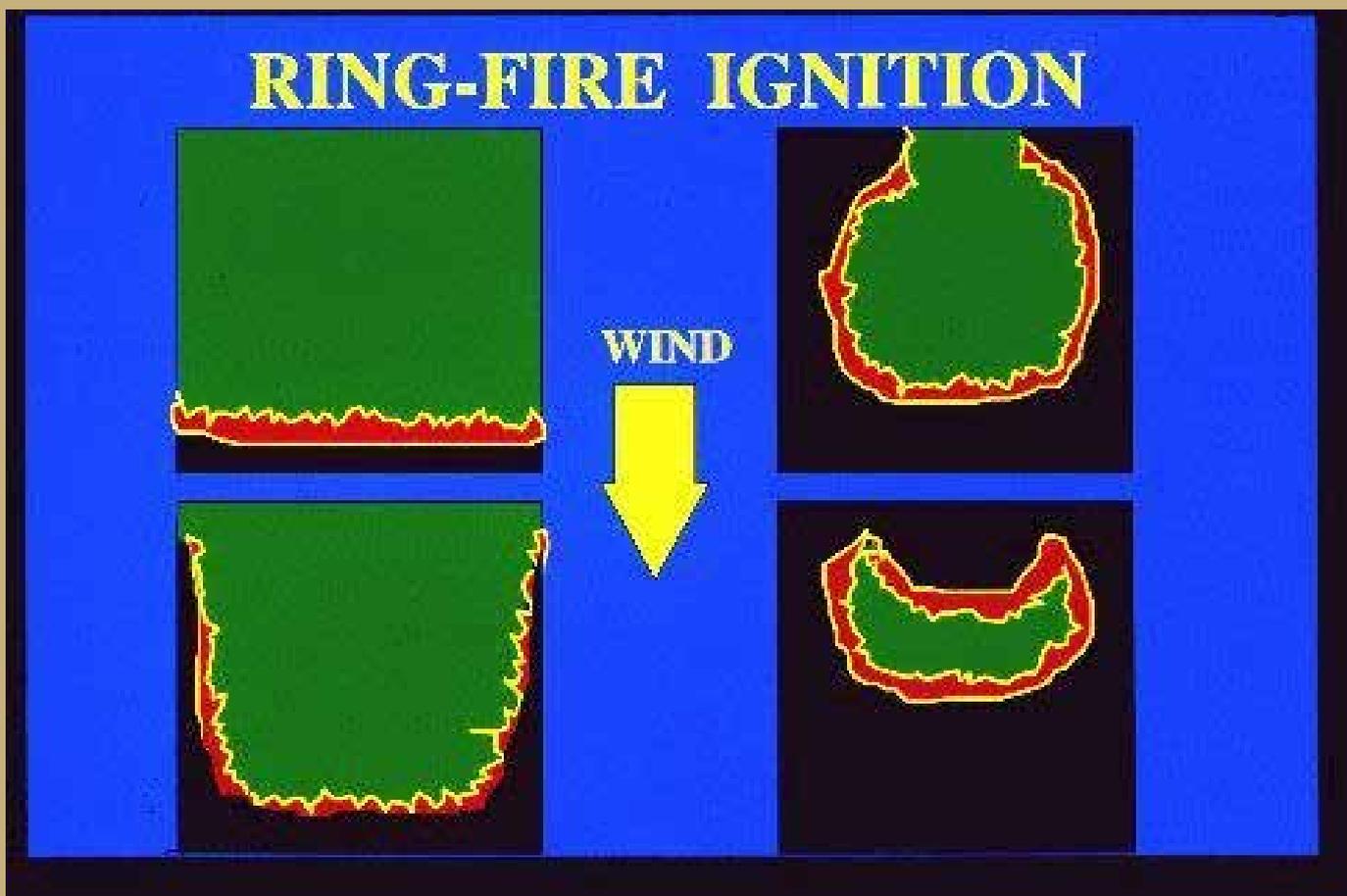




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# Ignition Techniques





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# Ignition Techniques

**STRIP**

**HEADFIRE**

**IGNITION**





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# Topographical Effects

- Slope: Steepness
- Aspect: Direction slope faces
- Position: Fire location on slope

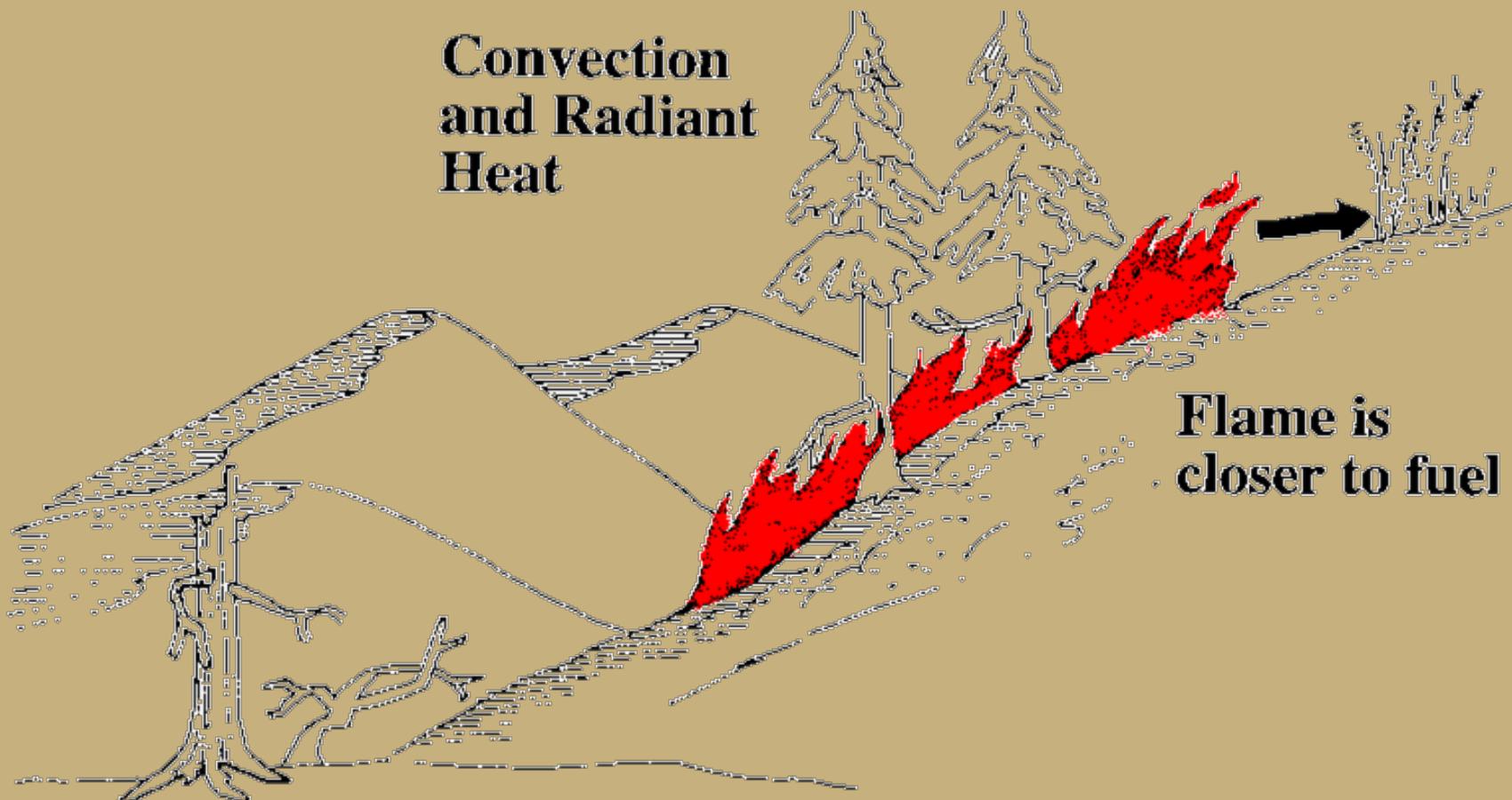


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# Topographical Effects - Slope

**Convection  
and Radiant  
Heat**





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# Topographical Effects - Slope

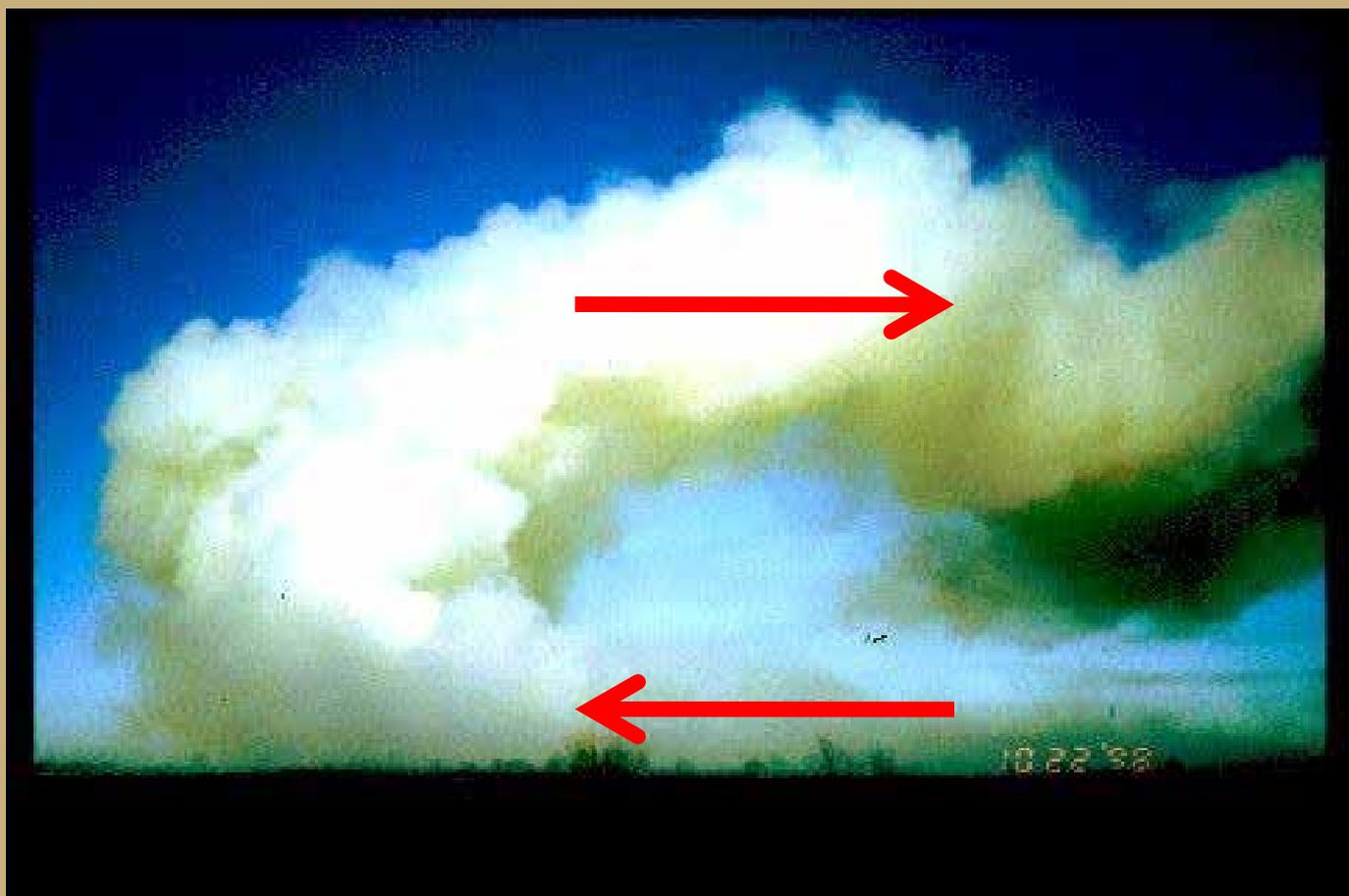




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# Wind and Weather Effects





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## Wind and Weather Effects





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# Wind and Weather Effects





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## Firebreaks

- Any barrier, boundary, or control line that reduces or eliminates the ability of fire to spread
  - 'Hard' firebreak: Eliminates the spread of fire under normal conditions. Headfires require a 'harder' firebreak than backing or flanking fires.
  - 'Soft' firebreak: Reduces the spread or intensity of fire under normal conditions. Effect on fire spread can be variable depending on conditions



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# Firebreaks

- Examples
  - Hard firebreaks: Dependent on fire intensity
    - Water and wet areas
    - Mineral soils and rock areas
    - Previously burned areas
    - Green Lawns
  - Soft firebreaks: Change in fuel composition or structure, may act like a hard break under certain weather /moisture/time of year conditions.
    - Mowed firebreaks
    - Late spring/midsummer 'green' grasslands
    - Crop residue
    - Pasture
    - Crops
    - Dry or dormant lawns



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## Hard Firebreaks – Water/Wet Areas





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# Hard Firebreaks – Water/Wet Areas





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## Hard Firebreaks – Water/Wet Areas





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## Hard Firebreaks – Water/Wet Areas





# Hard Firebreaks – Water/Wet Areas





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## Hard Firebreaks – Water/Wet Areas





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# Hard Firebreaks – Mineral Soils/Rock





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# Hard Firebreaks – Mineral Soils/Rock





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## Hard Firebreaks – Previous Burns





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# Hard Firebreaks – Previous Burns





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## Soft Firebreaks – Green Grasslands

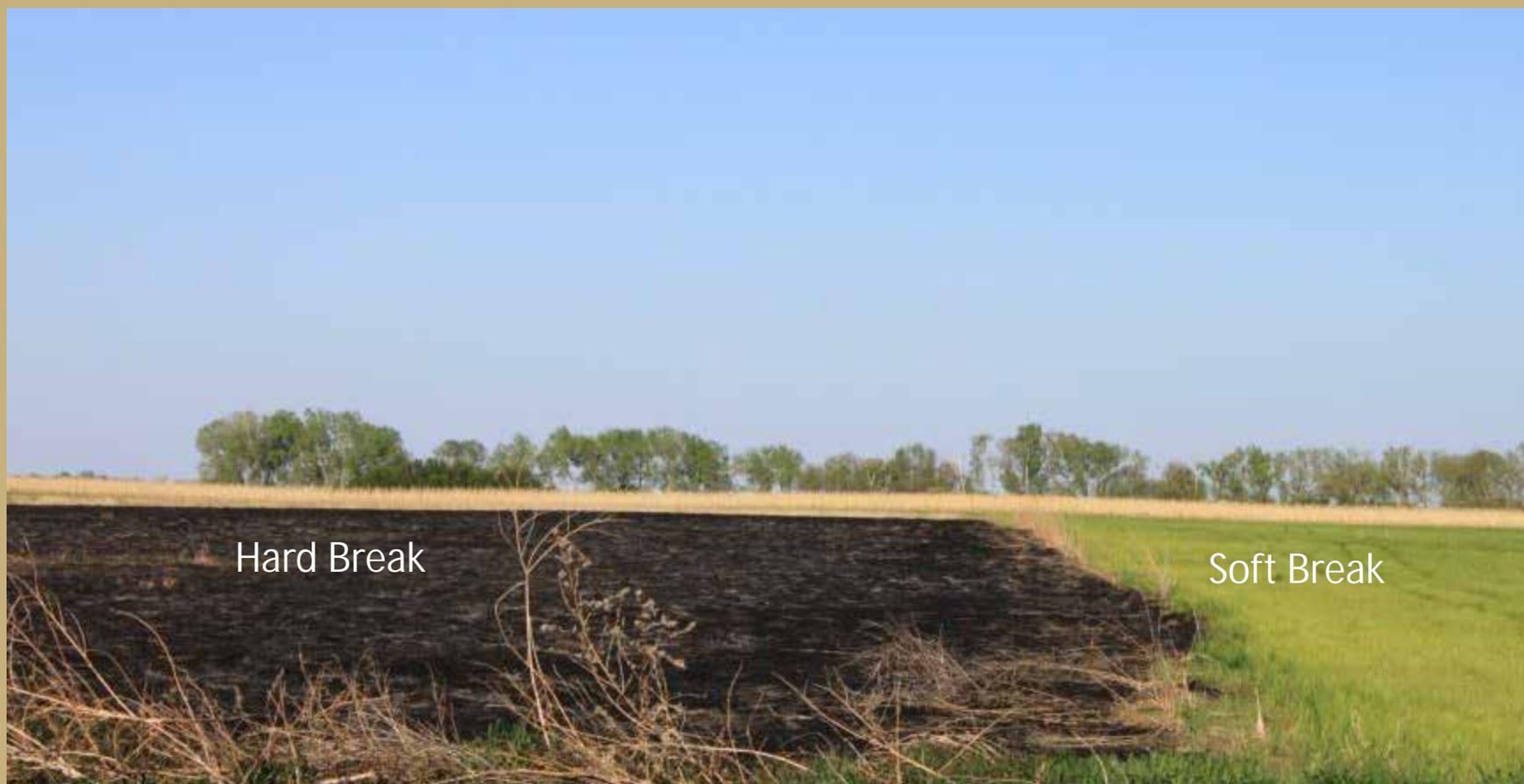




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## Soft Firebreaks





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# Soft Firebreaks – Grazed Pasture





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## Soft Firebreaks – Crop Residue



**MAKE IT BLACK!!!!**



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# Soft Firebreaks – Mowed Firebreaks





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## Soft Firebreaks – Mowed Firebreaks

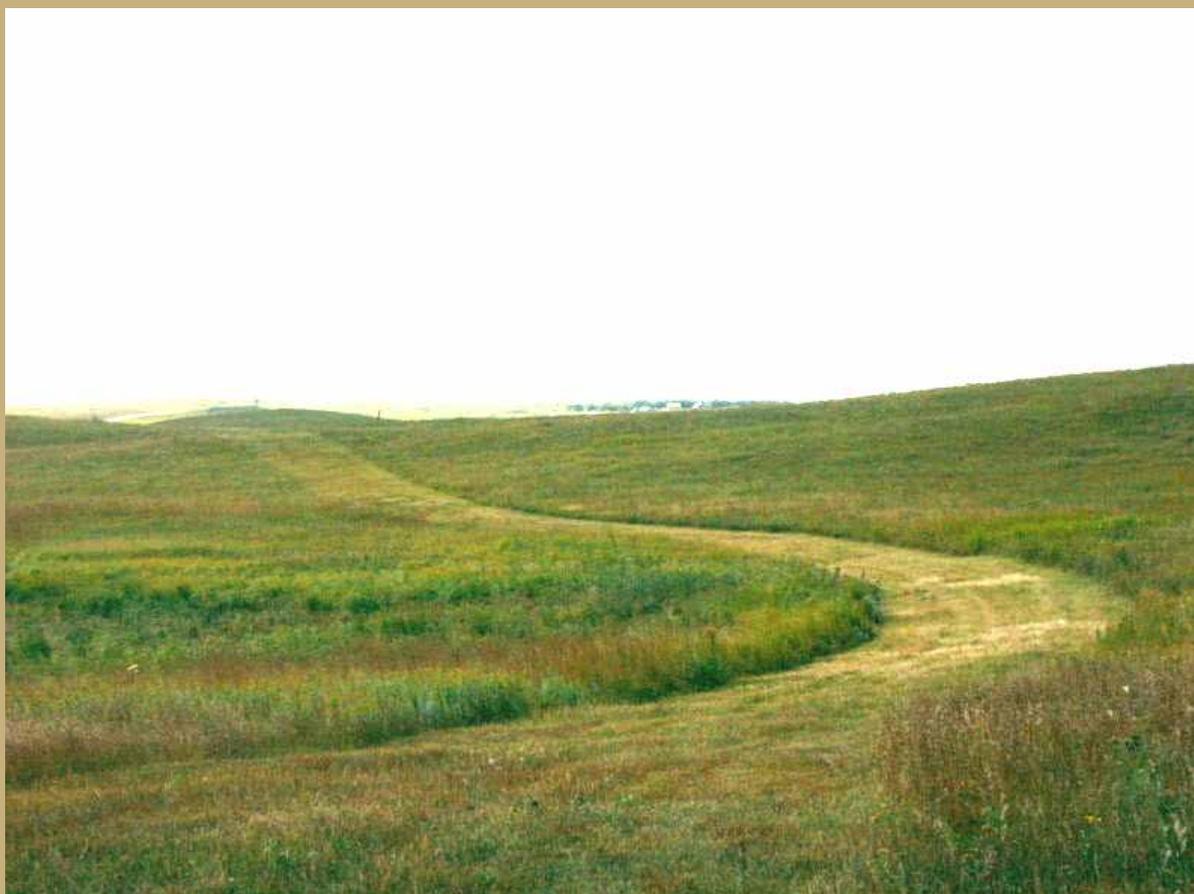




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# Soft Firebreaks – Mowed Firebreaks





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# Soft Firebreaks – Mowed Firebreaks





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## Soft Firebreaks – Mowed Firebreaks





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# Soft Firebreaks – Mowed Firebreaks



Early Spring



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# Soft Firebreaks – Mowed Firebreaks

Mid Spring





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# Soft Firebreaks – Mowed Firebreaks

Late Spring





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# Primary Soft Firebreak Function





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## Poor 'Hard' Fire Break





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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# Soft Firebreaks – Mowing Equipment





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## Soft Firebreaks – Wetlining





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## Soft Firebreaks – Wetlining





# Mowed Breaks – When to mow?

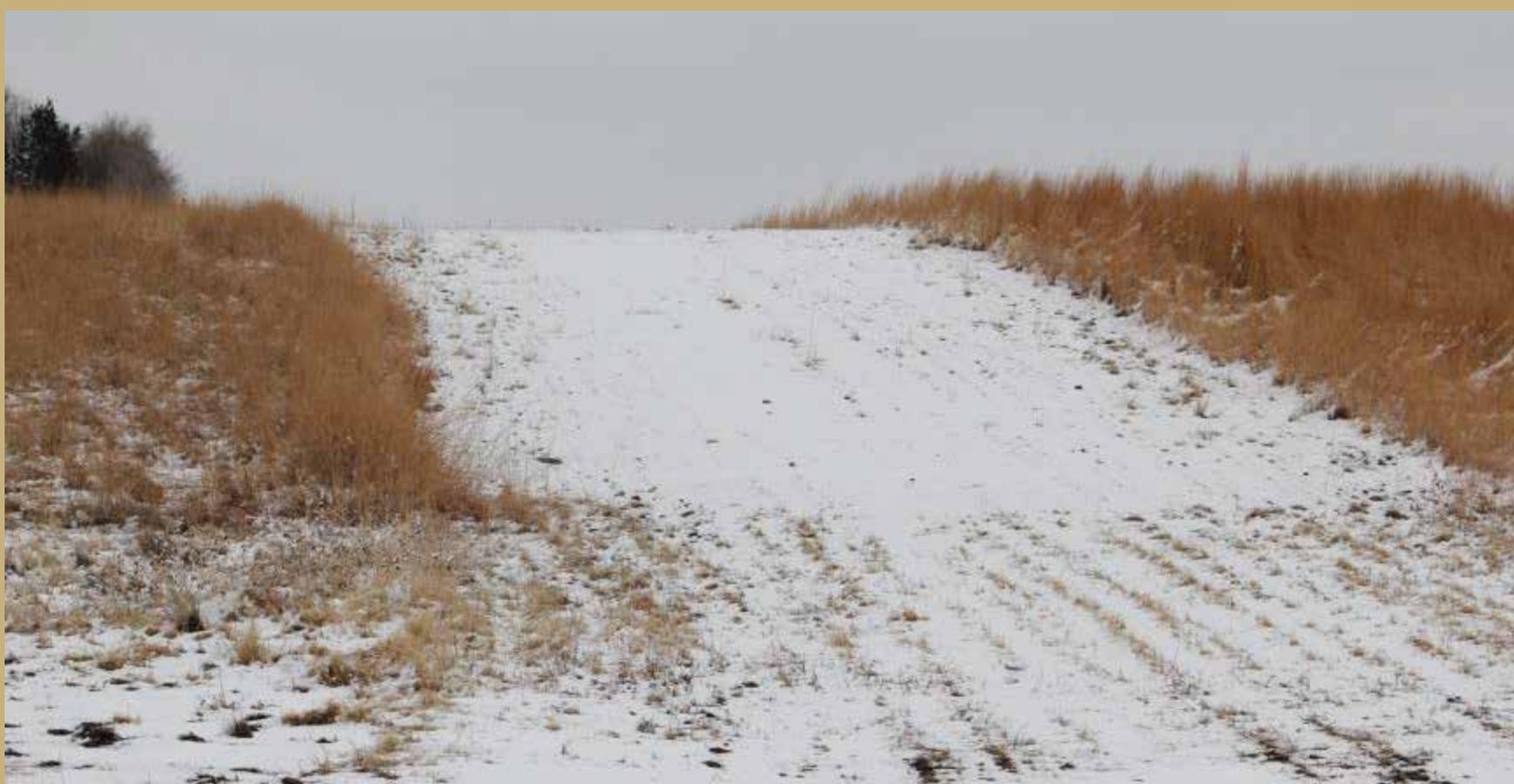
- Fall after killing freeze through first heavy snows
  - Vegetation is dormant and brittle
  - Finely chopped easier to move with side delivery mowers
  - Light residue can blow away with fall/winter winds
  - Remaining residue can 'settle' over winter
  - Frozen ground easy to travel over
- Early spring after snow melt, ground frozen, before green up
  - Vegetation still dormant and brittle
  - Vegetation may not blow off w/wind
  - Ground may still be frozen
- Green heavy vegetation
  - Tough on mowers
  - Requires more power to cut and move residue
  - Soft ground



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## Soft Firebreaks – When to Mow??





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# Firebreaks – Design and Installation

- Firebreaks should be placed with several factors in mind
  - Equipment on Hand
  - Escape Routes / Safety Zones
  - Barriers and Entrapment
  - Fuel Load
  - Expected ground Conditions on Day-of-Burn
  - Probable Day-of-Burn Factors
  - Ignition Plan and Smoke Management



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## Firebreaks - Design

**Headfire or Backfire line?**





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## Firebreaks - Design



# Firebreaks - Design

> 40'  
flamelength

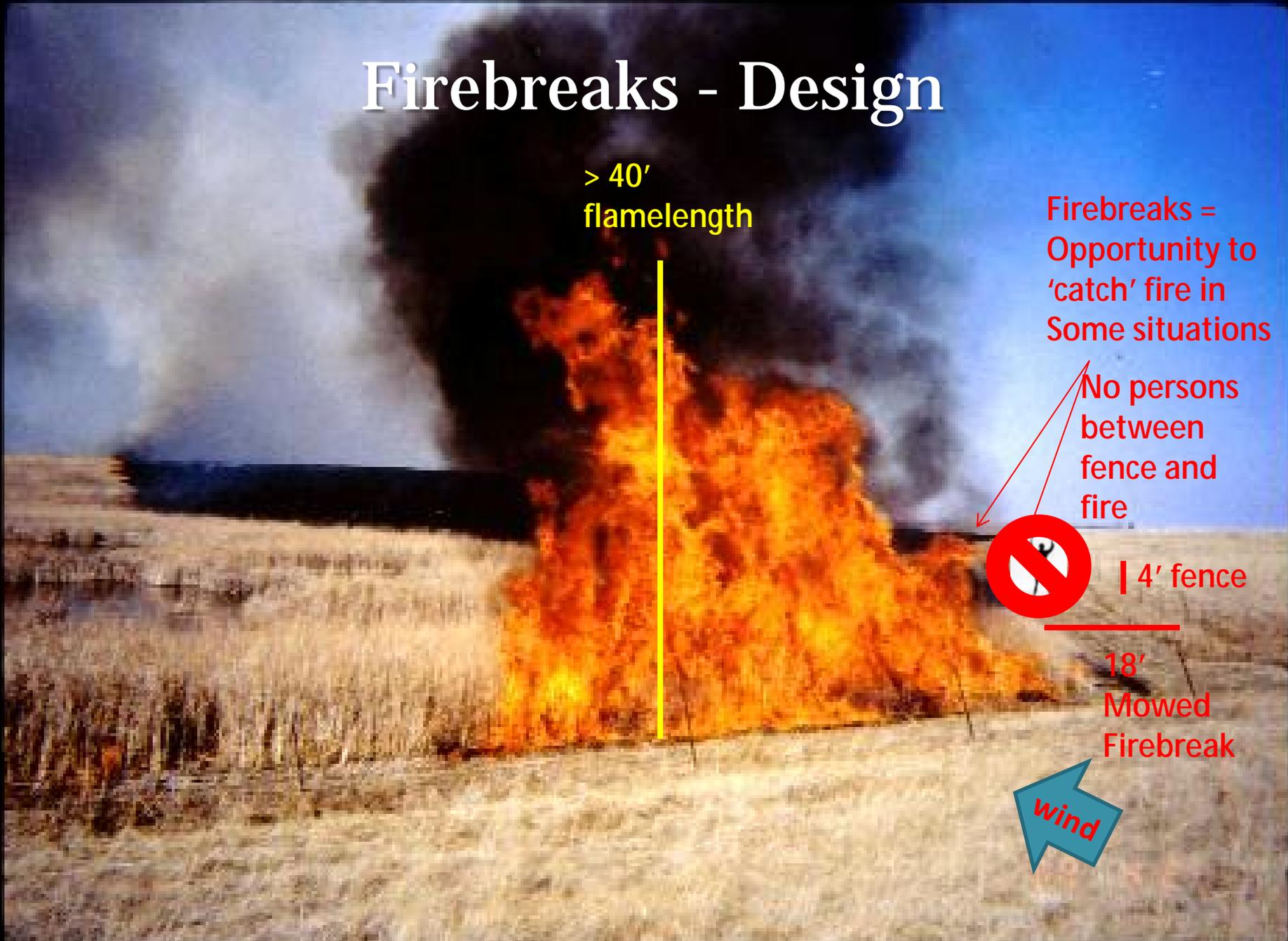
Firebreaks =  
Opportunity to  
'catch' fire in  
Some situations

No persons  
between  
fence and  
fire



4' fence

18'  
Mowed  
Firebreak





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## Firebreaks - Design





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## Firebreaks - Design





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## Firebreaks - Design





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# Firebreaks - Design





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# Firebreaks – Recognizing Opportunity





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# Firebreaks – Recognizing Opportunity





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# Firebreaks – Recognizing Opportunity





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# Firebreaks – Recognizing Opportunity





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## Partners

- Bureau of Indian Affairs
- Day County Conservation District
- Deuel County Extension Service
- Ducks Unlimited
- Ecosun Prairie Farms
- Minnesota Department of Natural Resources
- National Fish and Wildlife Foundation
- National Park Service
- National Resources Conservation Service
- Northern Prairies Land Trust
- Pheasants Forever
- Private Landowners
- Sisseton-Wahpeton Oyate
- South Dakota Department of Agriculture – Wildland Fire Suppression
- South Dakota Association of Conservation Districts
- South Dakota Department of Game, Fish and Parks
- South Dakota Fire Marshall's Office
- South Dakota Grassland Coalition
- South Dakota State University
- The Nature Conservancy
- Upper Big Sioux Watershed Project
- U.S. Fish and Wildlife Service



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**Show pitchfork video**  
**2:15-3 min**





# *PRAIRIE COTEAU HABITAT* PARTNERSHIP



- Show pitchfork video
- Show USFWS ring fire video



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# Hazards





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## Fence Material



Bad Fence





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## Fence Material/Structures



Creosote Fence Post



Deer Stands





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## Trees



Sometimes you want them to burn



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## Trees



Sometimes you don't



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## Trees



Standing trees near fire line



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Trees

Notice the torching mid trunk.



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## Garbage Pits



Gas and oil cans.



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# Garbage Pits



Problems associated with pits



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## Cars



Junk Cars in the unit



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## Cars



Vehicles on the Fire Line – curious neighbors



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## Cars



Ties up man power and equipment, creates safety hazard



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## ATVs





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# Ruts





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## Wildlife



They can burn!



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## Smoke





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## Wildlife



Badger Holes



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## Wildlife



Pheasants



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## People



“wanderer’s” or “Lookie Loo’s”



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## People



Careless crew members



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## Power lines



Poles can burn and heavy smoke can create arching in lines



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## Traffic and Roads



They are watching the fire, not the road.





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# *Fire Tools and Resources*





## PRAIRIE COTEAU HABITAT PARTNERSHIP



### *The minimum “Must have” Resources*

- Needed Equipment
  - Some sort of COMMUNICATION SYSTEM
  - Some sort of RELIABLE water source
  - Multiple people to help
  - Drip torch
  - Lighters
  - Extra torch fuel
  - Pump cans or bladder bags
  - Metal leaf rake
  - Non-flammable clothing / gear





## PRAIRIE COTEAU HABITAT PARTNERSHIP



# What is “Necessary” Personal Protective Equipment

- Leather Boots
- Jeans (Cotton)
- Long Sleeve Shirt (Cotton)
- Eye protection (Sunglasses)
- Leather gloves (no holes in the fingers)
- NOMEX fire resistant clothing is preferred
  - Nomex Pants
  - Nomex Shirt
  - Shrouds (head neck protection)



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## What should you “NOT” wear

- Synthetic material clothing
- Tennis shoes
- Short sleeve T-shirts
- Cotton or synthetic gloves





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## Class Test - Who's Ready to Burn?

— Pick one of these guys





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## PRAIRIE COTEAU HABITAT PARTNERSHIP



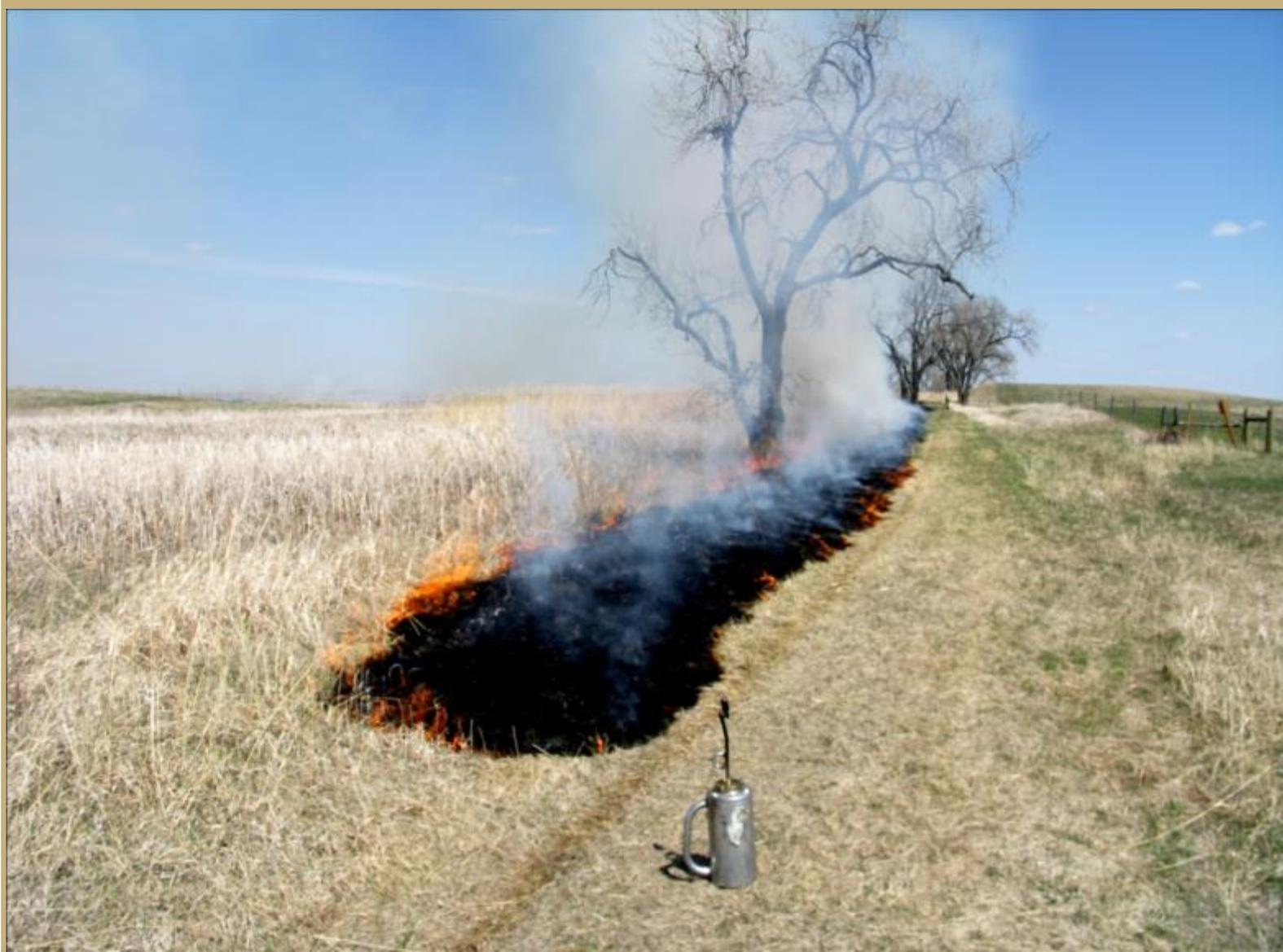
### Extra but “NOT” Necessary

- Additional Equipment
  - Kestrel Weather Kit
  - Mechanical (electric/gas) pump units
  - Multiple drip torches
  - Radios





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# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP



## Equipment





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





# PRAIRIE COTEAU HABITAT PARTNERSHIP





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## Get Creative!





# PRAIRIE COTEAU HABITAT PARTNERSHIP

