University of Wisconsin - Madison
Biocore Prairie

Prescribed Fire Plan
2010

Fire Planners

Steve Glass, Jim Elleson, Seth McGee, Cathie Bruner

Burn Boss

Jim Elleson

Quercus Land Stewardship Services

Draft 3/16/10

1. **Location**

   The Biocore Prairie is part of the University of Wisconsin's Lakeshore Nature Preserve located at the base of Picnic Point in Madison, WI. (see appendix B for map)
   Latitude 43° 05' 17" N
   Longitude 89° 25' 46" W

2. **Sources of emergency assistance**
   a. Fire: 911
   b. Law Enforcement: UW Police 608-262-2957
   c. Medical: 911
   d. Attorney: UW Legal Services 608-263-7400
   e. Nearest phone to unit:
      Jim Elleson cell# 608-712-0542
      Seth McGee cell# 608-695-7049
      Cathie Bruner cell# 608-225-8373

3. **Permits**
   a. Permit acquired through City of Madison Fire Department. Valid through 12-31-10

4. **Notifications**

   Notifications will be carried out by Cathie Bruner, Lakeshore Nature Preserve Manager. No ignition will take place unless all entities listed as "required" on the notification list have been notified (see appendix A for notification list).

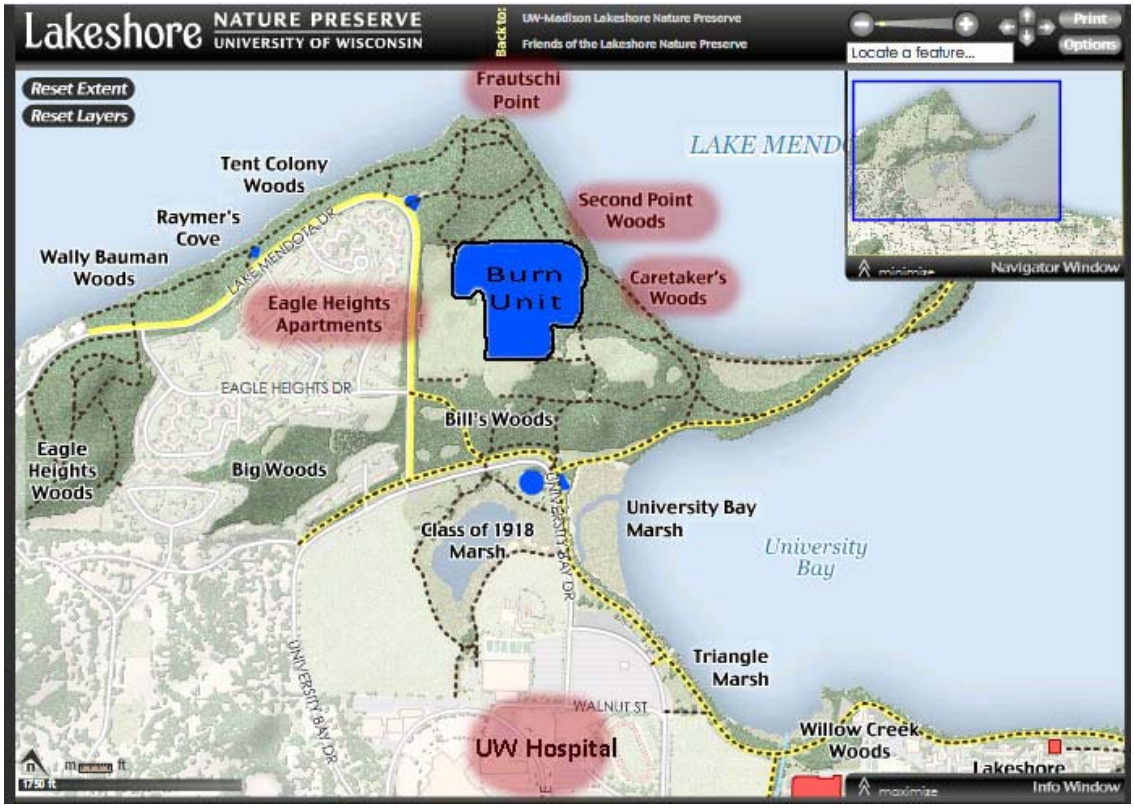
5. **Unit Description**
   a. The 11.9 acres that make up the Biocore Prairie have been divided into 5 burn subunits. The Prairie is surrounded by mown firebreaks on all sides. Wooded areas of the Lakeshore Nature Preserve neighbor the prairie to the north, south and east. To the west of the prairie is Eagle Heights Community Gardens.
   b. Areas of concern
      i. The UW Hospital located 0.6 miles south of the prairie. It is critical that no smoke reaches the Hospital area.

ii. Eagle Heights Housing located 0.15 miles west of the prairie. This is a smoke sensitive area.

iii. Picnic Point and Frautschi Point where Preserve visitors could come into contact with smoke.

iv. Frautschi Point, Caretakers Woods, Second Point Woods. These are adjacent woodlands to the north and east of the burn unit into which a fire could escape. Fuel model: Timber Understory. Mature trees are mostly oaks, maples, basswoods and elms. Primary carrier of fire would be forest litter in combination with some herbaceous and shrub fuels. These areas are shown in the map below and also indicated on the Fire Crew Map.

v. There is no building or right of way within 25 feet of the burn unit.



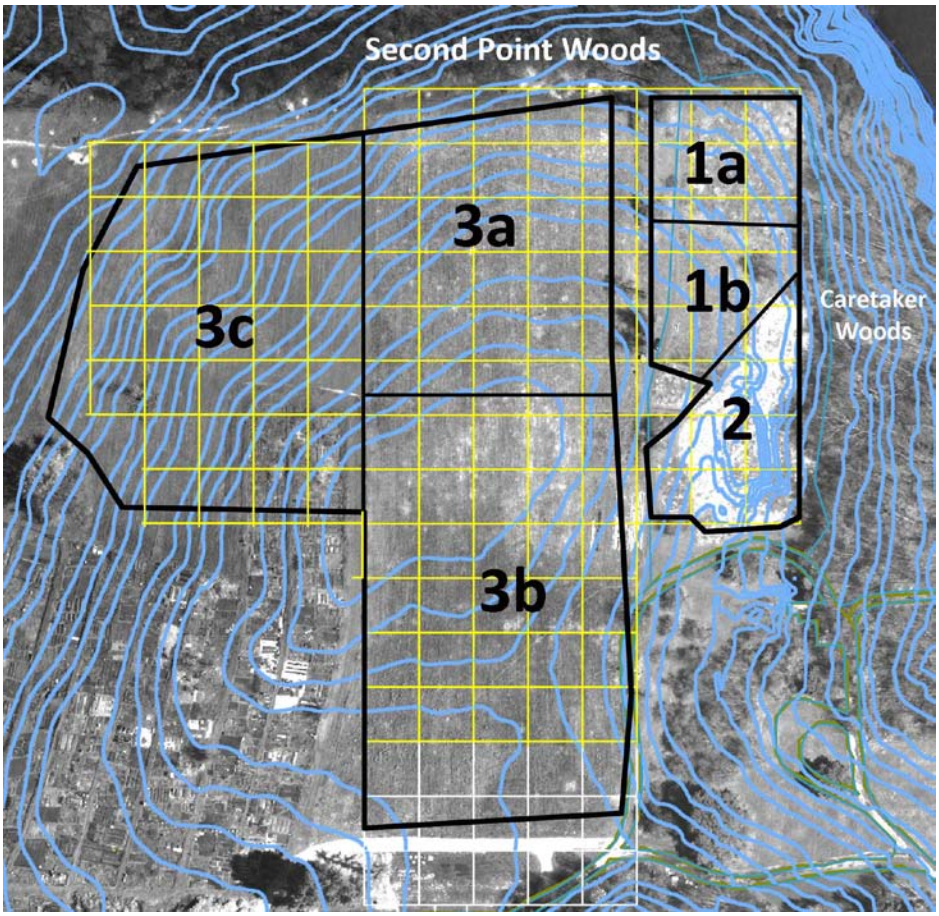
c. Size, Topography and Fuel Description for each unit

Subunit	Size (acres)	% Slope	Aspect	Fuel Model	Unique Features
1A	0.6	8	To NE	#3	
1B	0.5	7	To NE	#3	
2	1	9	To E	#3	Weather Station
3A	3.9	5	To NNE	#3	Camera mount Base (PVC)
3C	2.8	21	To W	#1	
Total	11.9				

d. Fire Unit Narrative Description

a. The topography of the Biocore Prairie is slightly sloping. The steepest grade is in area 3c where the slope runs from east to west at about 20%. In the other areas, topography will have little influence on the fire.
The primary carrier of fire in all areas is dead grass and herbaceous material. The fuel bed is about 2 ft deep and in some areas is patchy and discontinuous. Past fires have required spot firing after the backing fire was completed. The most dense fuel load occurs in area 2 where bluestem and Indian grass dominate.
It should be noted that wind speed can vary across the burn unit due to the gradual downward slope towards the lake from the top of area 3a. Southwest winds increase toward the middle of the unit and slow down slightly as they move toward the lake on the down slope. In the event of a weak head wind, momentary wind shifts caused by gusts off of the lake can occur.

There are no significant shrubs or obstacles of concern in the interior of the unit. See map below indicating the burn unit boundaries in black, 2ft contour lines in blue, and a 20meter grid scale in yellow.



e. Maps: see Appendix B

f. Roadways – road signs will be posted on major thoroughfares and informative signs will be posted on trails notifying visitors that no one unauthorized is allowed near the burn unit for the duration of the burn procedure.

6. Prescribed Burn Justification and Goals

The primary objective for establishing a prairie in this location is to provide opportunities for education and research at the University of Wisconsin, as well as provide an example of a tall grass prairie for visitors of the Lakeshore Nature Preserve. Prescribed burning is an integral part of the management plan in order to accomplish the following objectives:

a. Reduce the establishment and spread of non-native species in the restoration
b. Control sprouting shrubs and invasive cool season grasses
c. Suppress woody vegetation encroachment from surrounding woodlands
d. Promote growth and spread of existing native prairie vegetation
e. Increase germination of native seed
f. Provide opportunities to study the effects of fire on the prairie ecosystem

While the prairie restoration plan incorporates many management techniques (mowing, hand cutting, weeding, herbicide, etc) to help accomplish these objectives, none would achieve the same results without the incorporation of prescribed fire. In the 9 years that we have integrated fire into the restoration plan, we have seen outstanding results after burning. Fire is not only furthering the success of the restoration, it is also providing research opportunities to document its effects. The restoration is managed for wildlife, as well as vegetation, and considerations are taken into account concerning how fire will affect both fauna and flora.

7. Fuel and Weather Prescription (acceptable ranges)

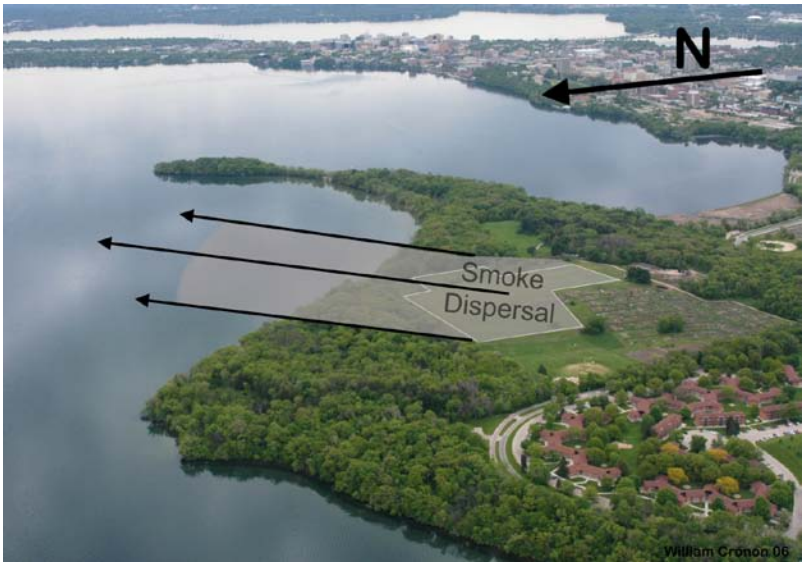
Required Parameter	**Max**	**Min**	**Preferred**
Wind Direction	south southwest	West southwest	Southwest
Effective Wind Speed (at ground level 40% of 20' winds)	12mpg	3mpg	8mph
1 hr Fuel Moisture	9%	4%	6%
Live Fuel Moisture			
Atmospheric Mixing Height		≥1700ft	
Transport Winds		≥ 9mph	
Smoke Dispersal		Good or >	
Air Temperature	75F	45F	60F
Relative Humidity	65%	30%	40%
20' Wind Speed	30	10	20
Mid-Flame Wind Speed	12	4	8
Parameter combinations that will be avoided	1) RH<30% combined with a temp>70F or effective wind speed >12mph 2) RH>60% combined with temperature <45F or effective wind speed <5mph		

8. Predicted Fire Behavior

a. A hot, slow-moving backing fire is desired. Firing pattern will rely to the extent possible on backing and flanking fires. Head fires will be used when deemed necessary (i.e. for safety reasons).
b. Predicted parameters generated using BehavePlus 4.0.0 fire modeling software.
c. See Appendix E for fire modeling software results

9. Smoke Management Plan

a. Smoke will be dispersed predominately to the northeast. Smoke will be dispersed over Lake Mendota as much as possible.
b. It is critical to avoid the following smoke sensitive areas 1) The UW Hospital located 0.6miles south of the prairie 2) Eagle Heights Housing located 0.15mi west of the prairie. The burn will be conducted in a manner that will reduce the possibility of smoke reaching these areas. Trail areas on Picnic Point and Frautschi Point are also of concern and will be avoided as much as possible. Signs will be posted along foot paths and nearby roads informing visitors and traffic that a prescribed burn is taking place. A smoke screening will be conducted ahead of time.
c. Wind patterns: Attention will be paid to topographic and lake effects on wind speed and direction. In the event of a weak head wind, momentary wind shifts caused by gusts off of the lake can occur. Wind can also be affected by the nature of the open field amongst a setting of trees. Southwest winds increase toward the middle of the unit and slow down slightly as they move toward the lake on the downslope.
d. Air Quality: No burn will be started if ozone levels and particulate matter readings are above “moderate” or on days that the DNR issues a burn ban for Dane County.
e. Smoke dispersal map



10. Crew Organization

a. The burn will be conducted by employees of Quercus Land Stewardship Services. The fire will be bossed by owner Jim Elleson. See Appendix C for contractor's qualifications.

11. Equipment

a. All equipment will be provided by Quercus including road signs. Trail signage will be taken care of by Lakeshore Nature Preserve staff.

12. Burn Duration

a. Preparation/Briefing 2 hours
b. Spreading fire 1.5 hours
c. Mop-up 1 hour

13. Managing the Burn

a. Firebreak preparations:
There are existing mowed firebreaks around the entire burn unit. Some vegetation will be mowed prior to the burn day in order to widen these breaks. Breaks will be at least twice as wide as the tallest vegetation in that area. Wet lines will be used where deemed necessary.
Firebreaks are indicated by the blue lanes on the map below. Areas within those breaks are designated burn area unless specified as refugia. Teal areas indicate Safety Zones.

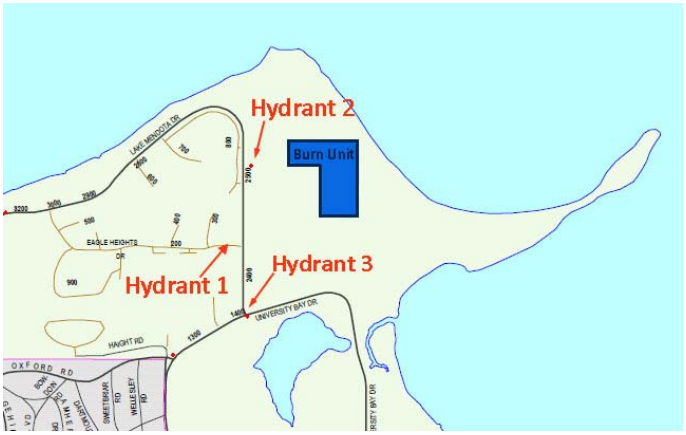
b. Firing techniques and ignition pattern:
Firing will be done by hand via drip-torch. No ignition will take place until all crew members are in position and have made contact with the burn boss. All prescribed fires will be preceded by a test fire to determine if conditions are go or no-go. Ignition patterns will follow backfiring, flanking, spotting, or strip head techniques. Generally, no head fires will be set unless the fire boss makes a determination that they are necessary and issues an order.

c. Fire suppression methods:
   Back cans will be the primary source of fire suppression. There will also be two ATV's onsite with mechanical water tanks (60 gal, 25 gal) as well as a Type 7 engine (200 gal) that can be utilized if necessary. Hand tools (Mccloud rake, Polaski, fire swatter, shovel) will also be on site which could be used as fire control devices.
d. Crew communication:
   Crew will use two-way radios to communicate. The burn boss's cell phone will be on hands at all times and the number to this phone will be given to the UW Police and Dane County Dispatch.
e. Fire behavior and weather monitoring:
   An observer will make updated temperature and RH readings periodically. These will be relayed to the burn boss as they are taken.
f. Safety considerations:
   Safety zones are burned and black areas, fire lanes, and grassy areas surrounding the prairie. Escape routes are fire lanes. Firebreaks and safety zones are indicated on the Burn Crew Map.
g. Mop-up:
   Crew stays on site until all flames are extinguished and no smoke is visible.
h. Public relations:
   A Lakeshore Nature Preserve staff person will be designated "Public Relations Coordinator". This person's primary responsibility will be to inform and direct visitors. Visitors will be encouraged to leave before ignition. During the burn visitors will be directed away from, and kept out of, burn units. A notice will be sent to the Eagle Heights Community Garden committee to notify gardeners of the burn. Signs will be placed on trails informing visitors that no one unauthorized will be permitted to be in the area.

14. Contingency Planning

a. UW Chancellor (Biddy Martin), Associate Vice Chancellor FPM (Alan Fish), and the UW Chief of Police (Susan Riseling) have absolute authority to call off the burn at any time for any reason.
b. A test burn will be conducted to insure that fire behavior is within prescribed parameters. If the burn boss feels that the test fire behavior is outside of acceptable parameters, the burn will not proceed.
c. Weather data will be taken before, during, and after the burn. If at any time, the weather conditions are unfavorable for a safe burn, the burn will be halted at a point in which the burn boss deems safe to extinguish the fire.
d. Fire spotters will be located in downwind locations to monitor for spotfires or firebreak leaps. Particular attention should be paid to Second Point Woods and Caretaker's Woods.

e. Auxiliary water sources: The closest fire hydrant is along Eagle Heights Drive just west of Lake Mendota Drive at the area indicated on the map (Hydrant 1). Hydrants 2 and 3 are accessible by Emergency Response Crews only.



f. In the event that the fire escapes the intended burn unit, the burn boss will be notified immediately and action will be taken to extinguish the fire. Burn boss will assign 1 squad boss, and crew members as required, to monitor fireline(s). An ATV pumper or Type 7 engine will be brought to the escaped fire. Crew will direct attack spotfire, working along flanks toward head. If direct attack is unsuccessful, crew will drop back to suitable downwind location, establish a line and ignite along edge.

g. If the burn boss deems the escape beyond the control of the burn crew, he will call 911 to report a wildfire.

h. An escaped fire will be treated as a wildfire. Emergency crews responding to the 911 report, will be asked to contain and extinguish the fire as quickly as possible.

i. Any crewmembers that are available to direct emergency response vehicles will be assigned locations along roadways. See map below for paths that are accessible by fire engine.

15. Legal considerations

a. Ownership of the site: UW Board of Regents
b. Fire Boss, crew and equipment will be provided by the contractor Quercus who accepts liability for the burn
c. The credentials of the contractor and terms for this service have been reviewed and approved by the UW Safety Department.
d. UW Chancellor (Biddy Martin), Associate Vice Chancellor FPM (Alan Fish), and the UW Chief of Police (Susan Riseling) have absolute authority to call off the burn at any time for any reason.

16. Monitoring

a. Photos will be taken before, during, and after the burn. Data will be collected during the burn to document weather and fire behavior. See Appendix D for data sheet. Plots will be studied after the burn to examine the effects of fire on the prairie ecosystem.

Pre-Burn Checklist and Crew Briefing

(A burn may not proceed if the answer to any of the following questions is anything but "yes")

Yes	No	Question
		Fire unit is described in plan
		Required firebreaks in place
		Permit is obtained Permit #_____
		Notification list completed (see appendix A)
		Required equipment is on-site and functioning
		List of emergency numbers is available to burn leaders
		Vehicles and equipment checked and in good operating order
		Each crew member has a burn unit map
		Fire unit size and boundaries discussed
		Fire unit hazards discussed
		Anticipated fire and smoke behavior discussed
		Organization of crew and assignments reviewed
		Methods of ignition, holding, mop-up, and communications reviewed
		Location of vehicles, keys and nearest phone identified
		All contingencies including escape routes reviewed
		Questions from crewmembers have been answered
		Crewmembers have been given opportunity to decline participation

Just prior to ignition checklist

(A burn may not proceed if the answer to any of the following questions is anything but "yes")

Yes	No	Question
		Checked www.gov/airnow for air quality condition report
		Weather and fuel conditions are within prescription
		Weather forecast obtained within two hours of ignition says prescribed weather will hold for two hours past expected duration of burn
		Crew members have required protective clothing
		Test fire conducted

Before leaving burn unit checklist

Yes	No	Question
		Mop-up completed as described in prescription

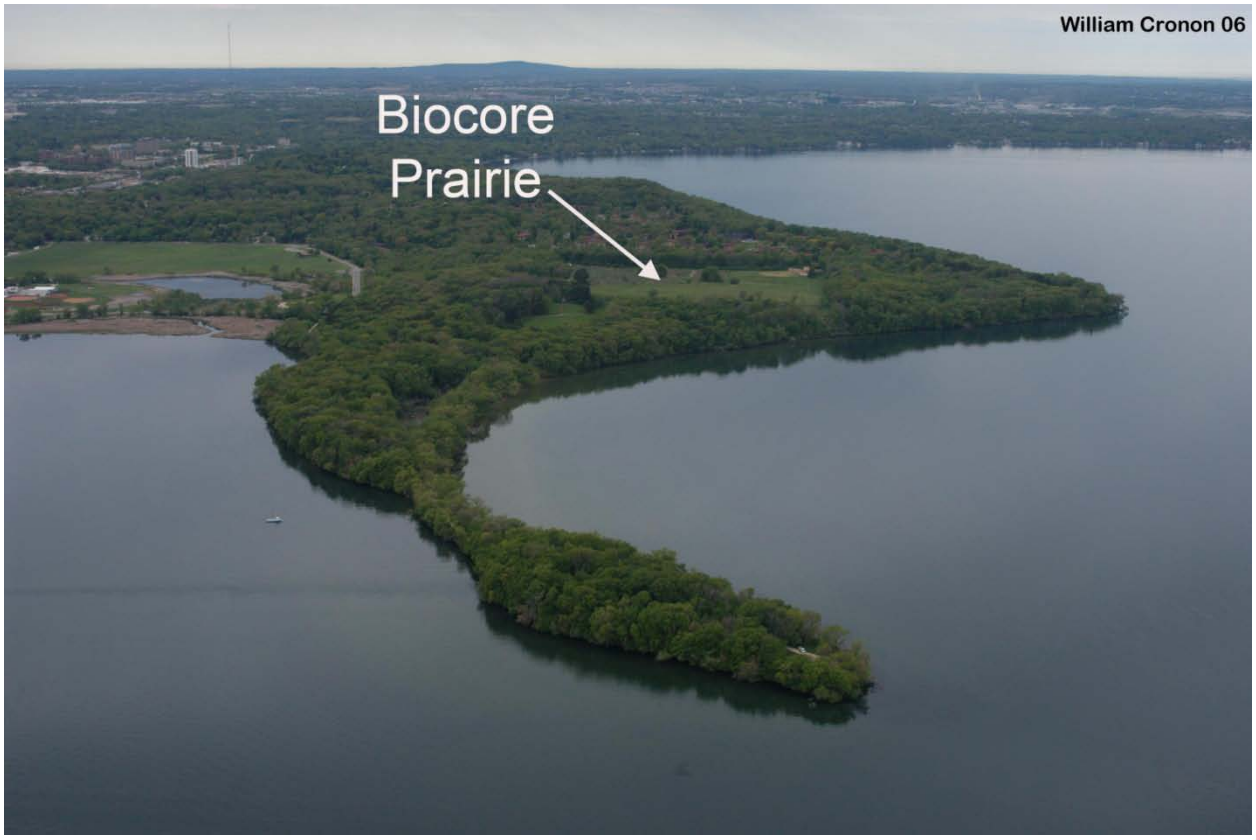
_____ _____

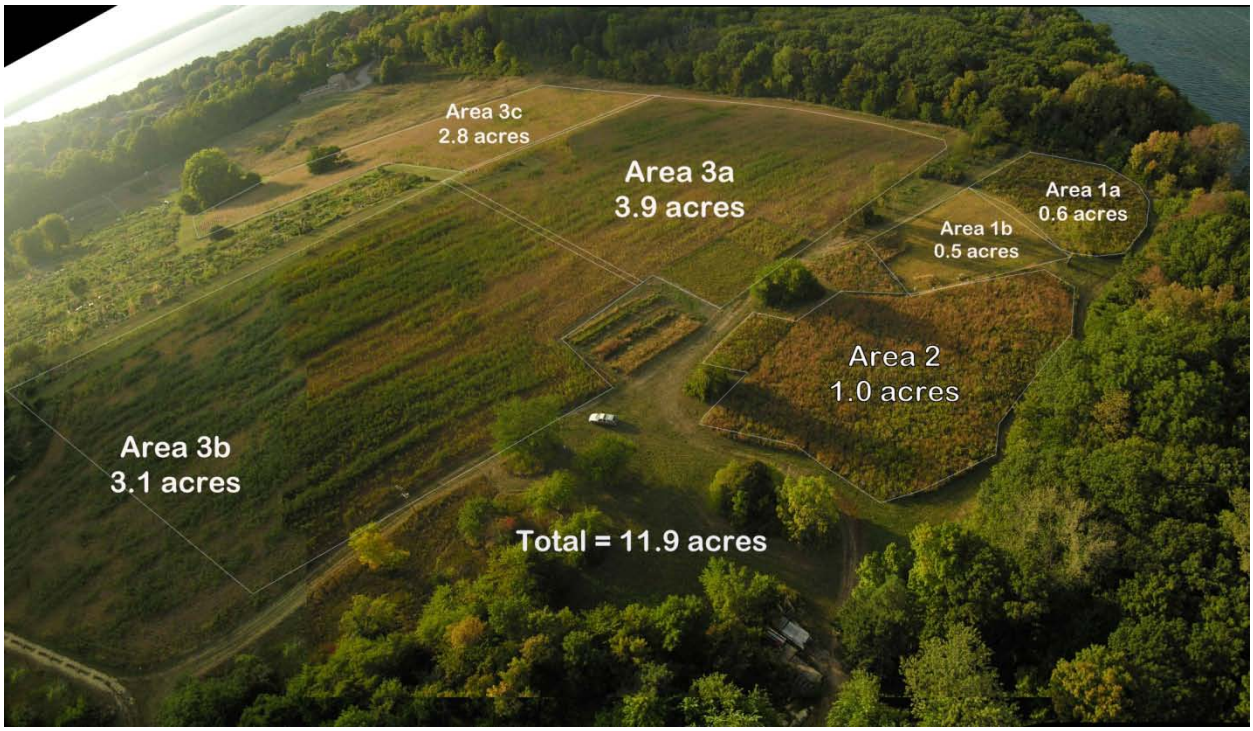
Burn Boss **Date**

Appendix A – Notification List

Date and time notified	Required notification	Contact before burn date	Contact	Phone	Notes or Email address
	Yes		Dane County Dispatch	255-2345	BURN BOSS MAKES THE CALL
	Yes		UW Police Chief Sue Riesling	262-2957	BURN BOSS MAKES THE CALL
	Yes		UW CARS	263-3333	
	Yes		Alan Fish Assoc. Vice Chancellor FPM office WARF	262-3488	
	Yes		City of Madison Fire Department: Cheryl Peterson	266-4420 262-9657	BURN BOSS MAKES THE CALL
	Yes		City of Madison Fire Department: Brian Kruser	266-4487	
	Yes		Madison Police	266-4275	
	Yes		Village of Shorewood Hills	267-2680	
	Yes		Village of Shorewood Hills Fire Department Keith Anderson – Chief	267-2680	
	Yes	Yes	Eagle Heights Gardens Registrar		ehgardens@rso.wisc.edu
	Yes		UW Hospital Engineering	263-5205	
	Yes		UW Hospital Med Flight Dispatch	263-3258	
		Yes	Eagle Heights Housing	262-3407	universityapartments@housing.wisc.edu must call on Friday if might burn on weekend
		Yes	UW Housing Paul Evans	262-6982	paul.evans@housing.wisc.edu
	Yes		Assistant Director Physical Plant - Kris Ackerbauer	265-2758	
	Yes		Director Physical Plant- John Harrod	263-3077	
	Yes		UW Safety Department – Keith Burdick	265-5000	
		Yes	Health Special Needs Top Tanttivivat	263-3021 or263-3000	
		Yes	Madison Water Utility: Al Larson P.E.	266-4653	
	Yes		Amy Toburen	262-0925	atoburen@wisc.edu
	Yes		Dennis Chaptman	262-9406	dchaptman@wisc.edu
		Yes	Wisconsin Week	262-3846	wisweek@uc.wisc.edu
		Yes	Event Alert - Central Reservations	262-2511	centralreso@union.wisc.edu

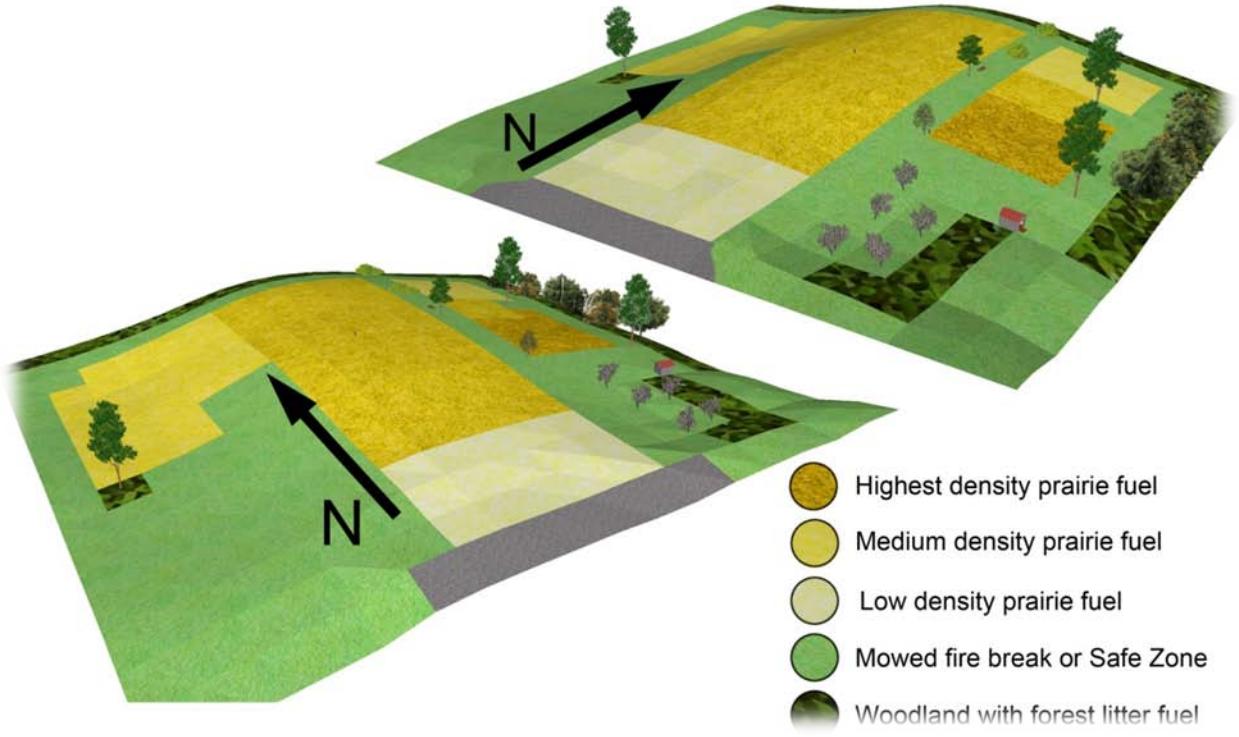
Appendix B – Aerial Photos & Maps

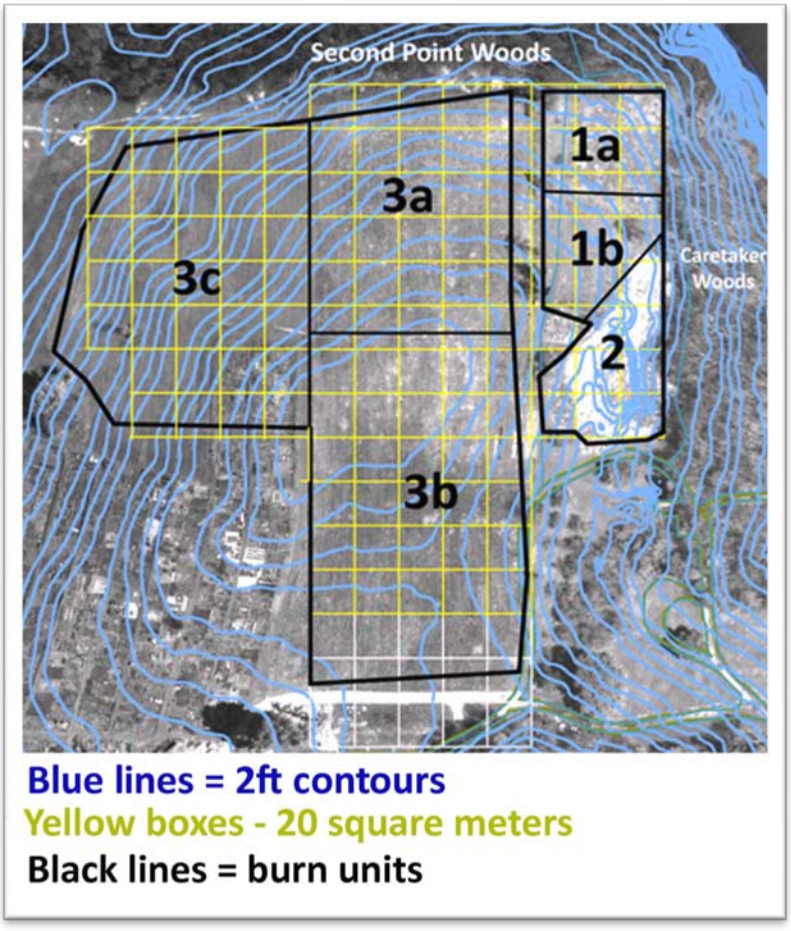




~Fire Crew Map will be handed out before burn~

Topography and Fuel Types





Appendix C – Quercus Prescribed Fire Qualifications and Experience

Quercus
Land Stewardship Services

4671 Highway JJ
Black Earth, WI 53515
608-767-3553
www.quercus-ls.com
mail@quercus-ls.com

Quercus Burn Crew Qualifications
Fall 2009

Prescribed Fire Burn Boss – James S. Elleson

Experienced since 1995 as crew member, crew leader and burn leader on hundreds of grassland and woodland prescribed burns in southern Wisconsin. Established Quercus Land Stewardship Services in 2003. Managed 152 burns totaling 2,515 acres for clients in 2004-2009.
Instructor for:
Introduction to Prescribed Burning, March 2004 and October 2006.
S130/S190, Wisconsin Prescribed Fire Council, October 2005 and October 2006.
NWCG Safety Refresher, The Nature Conservancy, October 2007 and October 2008.
Member of Wisconsin Prescribed Fire Council, 2003 to present. Vice-chair 2007; Chair 2008; Treasurer 2009.

NWCG Training	Date	Offered By
S-130/190/I-100, Basic Fire Fighting/Intro to Fire Behavior/ Incident Command System	March 2003	The Nature Conservancy
S-131, Advanced Firefighter	November 2004	WI Prescribed Fire Council
S-290, Intermediate Fire Behavior	December 2004	Chicago Wilderness
S-234, Ignition Operations	August 2005	Wisconsin DNR
RX-310, Fire Effects	October 2005	The Nature Conservancy
S-390 Intro to Fire Behavior Calculations	December 2005	Wisconsin DNR
I-200 Basic ICS	March 2006	The Nature Conservancy
S-200 Initial Attack ICT4	March 2006	The Nature Conservancy
S-230 Crew Boss Single Resource	March 2006	The Nature Conservancy
L-280 Followership to Leadership	March 2006	The Nature Conservancy
S-234, Ignition Operations	March 2006	The Nature Conservancy
RX-300, Prescribed Fire Burn Boss	October 2006	The Nature Conservancy
RX-410, Smoke Management Techniques	December 2007	WI Interagency Fire Council

Crew Leader – L. Jaya Elleson

Crew member and crew leader on prescribed burns in southern Wisconsin, 2004-2008. Instructor for NWCG Safety Refresher, The Nature Conservancy, October 2007 and October 2008.

NWCG Training	Date	Offered By
S-130/190/I-100	March 2004	UW Stevens Point
S-290, Intermediate Fire Behavior	February 2006	SD Dept. of Agriculture
S-131, Advanced Firefighter	November 2006	WI Prescribed Fire Council
S-234, Ignition Operations	February 2007	Fox Valley Tech. Institute
S-390, Intro to Fire Behavior Calculations	May 2009	Fox Valley Tech. Institute

Appendix D – Data Collection

Weather

Parameter	**Max**	**Min**	**Preferred**	**Time____**	**Time____**	**Time____**
Wind Direction	south southwest	west southwest	southwest			
20' Wind Speed	30	10	20			
Effective Wind Speed (40% of 20' winds)	12mpg	3mpg	8mph			
Mid-Flame Wind Speed	12	4	8			
Air Temperature	75F	45F	60F			
Relative Humidity	65%	20%	40%			
1 hr Fuel Moisture	9%	4%	6%			
Live Fuel Moisture						
Atmospheric Mixing Height		>1700ft				
Haines Index	NA	NA				
Transport Winds		>9mph				
Smoke dispersal			Good or better			

Plant phenology at time of burn

_____

_____

Burn start time _____

Burn complete time _____

Sub-unit	Max flame length	Max flame height	Avg flame length	Avg flame height	% burned	Notes

Other observations or recommendations

_____

_____

Appendix D – Participant List

Name	email

Appendix E - Predict fire behavior

Behave Plus 4.0.0 Results

Inputs

Fuel Model	gr2, gr3, gr6, tl2	Live Herbaceous Moisture	30	%
1-h Moisture	6-9 %	Midflame Wind Speed (upslope)	0-12	mi/h
10-h Moisture	8 %	Slope Steepness	8	%
100-h Moisture	10 %			

Results for: Fuel Model gr2 – Low load dry climate grass

1-h	Maximum Rate of Spread (ft/min)					Flame Length (ft)				
Moisture	Midflame Wind Speed, mi/h					Midflame Wind Speed, mi/h				
%	0	4	8	10	12	0	4	8	10	12
6	3	40	106	146	159	1.3	4.5	7	8.1	8.4
7	3	38	101	139	147	1.3	4.3	6.8	7.8	8.1
8	2	37	96	132	137	1.2	4.2	6.6	7.6	7.8
9	2	35	91	125	125	1.2	4.1	6.3	7.3	7.4

Back/Flank/Head Fire. Fuel Model gr2 1hr moisture =7%

Midflame wind	Rate of Spread (ch/hr)			Flame Length (ft)		
	Back	Flank	Head	Back	Flank	Head
4	2.7	5.1	38.4	1.3	1.7	4.3
8	3	5.7	100.9	1.3	1.8	6.8
12	2.9	5.7	147.5	1.3	1.8	8.1

Results for: Fuel Model gr3 – Low load course humid climate grass

1-h	Maximum Rate of Spread (ft/min)					Flame Length (ft)				
Moisture	Midflame Wind Speed, mi/h					Midflame Wind Speed, mi/h				
%	0	4	8	10	12	0	4	8	10	12
6	3	60	134	174	217	1.8	7	10.2	11.5	12.7
7	3	55	124	161	200	1.7	6.6	9.6	10.9	12
8	3	52	116	150	187	1.6	6.3	9.2	10.3	11.4
9	3	48	109	141	176	1.6	6.1	8.8	9.9	11

Back/Flank/Head Fire. Fuel Model gr3 1hr moisture =7%

Midflame wind	Rate of Spread (ch/hr)			Flame Length (ft)		
	Back	Flank	Head	Back	Flank	Head
4	3.9	7.3	55.3	2	2.6	6.6
8	3.6	7	123.9	1.9	2.6	9.6
12	3.2	6.3	200.4	1.8	2.5	12

Results for Fuel Model gr6 – Moderate load humid climate grass

1-h Moisture	Maximum Rate of Spread (ft/min) Midflame Wind Speed, mi/h					Flame Length (ft) Midflame Wind Speed, mi/h				
%	0	4	8	10	12	0	4	8	10	12
6	8	91	249	347	456	4.5	13.8	22	25.6	29
7	7	84	230	321	422	4.2	13.1	20.8	24.2	27.5
8	7	78	214	298	393	4	12.4	19.7	23	26.1
9	6	73	200	279	367	3.9	11.9	18.8	22	24.9

Back/Flank/Head Fire. Fuel Model gr6. 1-hr moisture = 7%

Midflame wind	Rate of Spread (ch/hr)			Flame Length (ft)		
	Back	Flank	Head	Back	Flank	Head
4	6	11.2	84.2	3.9	5.2	13.1
8	6.7	13.1	230	4.1	5.6	20.8
12	6.8	13.4	422	4.1	5.6	27.5

Results for: Fuel Model tl2 – Low load hardwood litter

1-h Moisture	Maximum Rate of Spread (ft/min) Midflame Wind Speed, mi/h					Flame Length (ft) Midflame Wind Speed, mi/h				
%	0	4	8	10	12	0	4	8	10	12
6	0.2	1.2	2.3	2.3	2.3	0.3	0.7	1	1	1
7	0.2	1.1	2.1	2.1	2.1	0.3	0.7	0.9	0.9	0.9
8	0.2	1	1.9	1.9	1.9	0.3	0.7	0.9	0.9	0.9
9	0.2	1	1.7	1.7	1.7	0.3	0.6	0.8	0.8	0.8

Back/Flank/Head Fire. Fuel Model tl2. 1-hr moisture = 7%

Midflame wind	Rate of Spread (ch/hr)			Flame Length (ft)		
	Back	Flank	Head	Back	Flank	Head
4	0.1	0.1	1.1	0.2	0.3	0.7
8	0.1	0.2	2.1	0.2	0.3	0.9
12	0.1	0.2	2.1	0.2	0.3	0.9

1-hour moisture for Feb, Mar, Apr, Aug, Sep, Oct; slope <30%, and time from noon to 4 pm:

	RH									
Temp	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
30-49	6	6	7	8	8	8	9	10	10	11
50-69	6	6	7	7	8	8	9	9	10	10
70-89	5	6	6	7	8	8	9	9	9	10

for other conditions, see tables in Fireline Handbook