



**National Park Service
Fire Ecology Annual Report
Calendar Year 2014**



Spring Big Prairie RX burn 2014

A. Summary

This past summer proved to be yet another light wildfire season locally and regionally. In 2014 the park had a total of six (6) lightning fire starts, Snyder (5.1 acres) was managed for resource benefits and the other five were all managed as suppression wildfires, and burned about one total acre. All were west of the Divide. Glacier Fire Management had four successful prescribed fires; two at Glacier (~240 acres), one at Big Hole National Battlefield (~12 acres), and one maintenance burn at Grant Kohrs National Historic site.

The winter snowpack was well above average with 144% at the Flattop SNOTEL with the snowpack coming off on July 17th, which is 12 days past the average date. Both West Glacier and Many Glacier snowpack's also came off later that average; 8 and 14 days respectively. Summer (June – September) precipitation was well above average (130%) overall west of the Divide, with June and August well above average. East of the Divide was also above average for the summer, with June (the wettest month of the year) being over 200%, and followed the same pattern of wet June, dry July, wet August, and finally a dry September.

Ten days in the summer of 2014 at West Glacier were 90° F or above, with six of the days in July and four days in August. For comparison, the epic fire season of 2003 saw 32 days at or above 90 degrees, and the very rainy (160% of average) 2010 had zero days above 90.

The Energy Release Component (ERC), a commonly used fire severity indice, was below average (<50%) from mid-June through mid-September throughout the park. After mid-September it was above average, but by that late in the fire season, there are very few thunderstorms, which produce minimal lightning.

Two of the monitors were assigned to a 20 person fire crew for 14 day assignments. Both Scott Lang and Mike McClellan assisted with park wildfires in August; Scott as ICT4 on the Bowman Creek Fire. Mike helped with the park Chainsaw (S-212?) training and certification, and both Mike, Scott and the crew spent multiple days helping clearing roads and trails throughout the year.

Prescribed Fire Monitoring

The Big Prairie prescribed fires in Glacier this past year were unique, in the fact that they were spring (April) burns, which had been attempted only once previously. The previous rationale for fall burns was that wildfires in the Northern Rockies only occur from mid to late summer. The problems we found with finding a burn window in the fall (too dry, too wet, no resources, burn windows too short that late in the fire season) finally became almost insurmountable. Spring burns were proposed and one was tried in 2013, but the results were only fair to poor in meeting burn objectives. This year with a better RX window, a bit warmer and much drier, we were able to meet mortality objectives on the seedlings and poles. Whether we met overstory tree objectives will take a couple of more growing seasons to make any final decision. The Flathead Forest, comprised of personnel from three Districts was essential in the parks ability to staff the burn at that time of year. Our seasonal staff is not on board until mid-May, and we do not have enough available Red Carded permanent employees to properly staff the spring burns.

The September 13th Big Hole RX Burn was on Howitzer Hill and was also a huge success in partnering with a wide variety of agency and interagency players. The burn was done in conjunction with Tom Rodhouse, an Ecologist with the NPS Upper Columbia Basin Inventory and Monitoring Network, to burn not only for cultural scene maintenance, but to stimulate and track population changes in the Lemhi

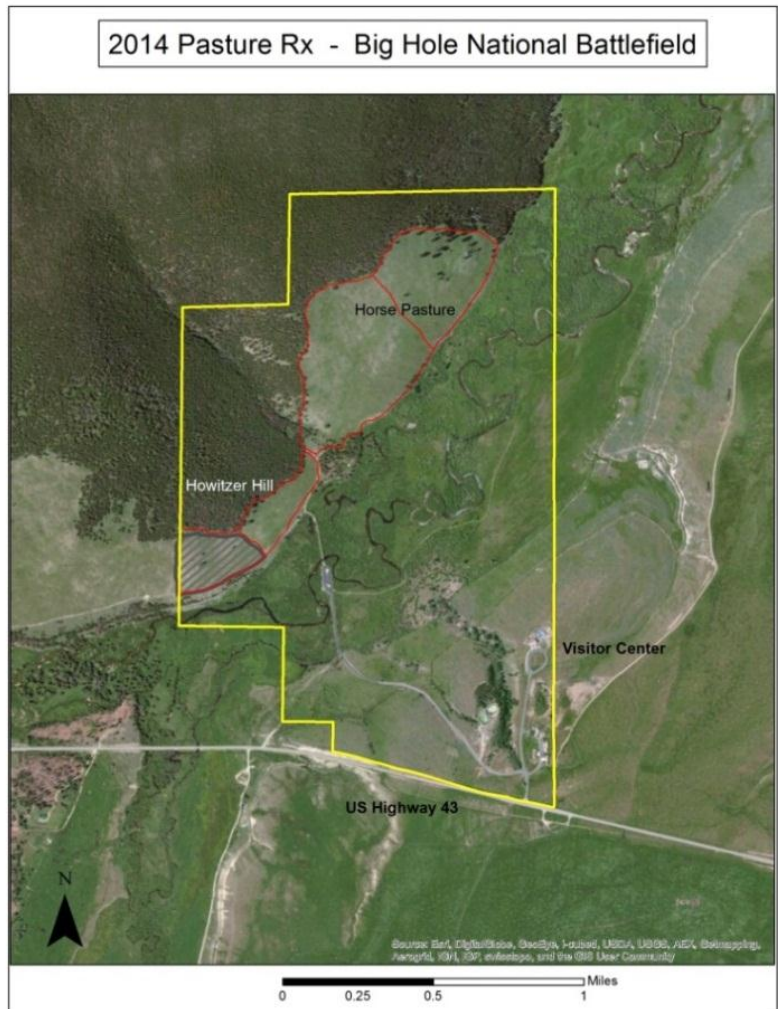
penstemon (*Penstemon lemhiensis*, a species of concern. See the 2013 Annual Report for background on the species and http://science.nature.nps.gov/im/units/ucbn/monitor/lemhi_penstemon.cfm for additional information on the I&M monitoring study.

A Project RAWS station (PRAWS) was ordered from the Boise, ID BLM Remote Sensing / Fire Weather Support Unit (RSFWSU) and installed onsite in August. This ensured that accurate weather could be monitored. The nearest RAWS was 20+ miles distant in a forested area on a different aspect across the broad Big Hole Valley.

Brad Harris, RX Specialist at GLAC worked with Dennis Divoky, Tom Rodhouse, Jason Lyon – Cultural Specialist for Nez Perce National Historic Trail, and Steve Black – Superintendent of BIHO to develop and produce the burn plan. Andy Bundshuh, NPS Intermountain Fuels Specialist, performed the formal review of the burn plan. During the burn, Glacier supplied the Burn Boss, Ignition Specialist, and RX monitoring. The burn was well supported by the Beaverhead-Deerlodge Forest with holding personnel from two Districts and an engine. In addition, the USFS Job Corp Crew, out of Anaconda, MT, was able to gain valuable experience on a prescribed fire; a first for this particular crew.

The burn was also supported by the Missoula Fire Lab. James Reardon, a USFS Soil Scientist, provided soil temperature sensors and Go Pro cameras in protected tripods to capture additional fire severity and behavior information. McClellan and Divoky met with him in Missoula to obtain the equipment and to get training. The NPS Northern Rockies Exotic Plant Management Team is also helping to monitor and treat for Spotted Knapweed, which unfortunately has just recently been observed on the slopes.

Rodhouse has twenty permanent plots split between the two meadows, and over 300 50m long x 2 m wide sample plots throughout the two meadows that have been read in 2009, 2010, and in 2011 to track population changes. See Natural resource conservation in a cultural park: Evaluating the importance of Big Hole National Battlefield to the endemic Lemhi penstemon (*Penstemon lemhiensis*), soon to be published in Natural Areas Journal <http://www.naturalareas.org/> A NPS Fire Story was submitted by Brad Rodhouse <http://www.nps.gov/fire/connect/fire-stories/2014-parks/big-hole-national-battlefield/rodhouse.htm>



This year's burn was in the lowest left crosshatched area – approximately 12 acres (see map). All four blocks will eventually be treated in subsequent years. This allows for a control for two to four years as we subsequently burn the blocks and the monitoring continues in all four blocks.

NPS Wildland Fire Risk Assessments

The fire monitor staff spent the majority of their summer travelling throughout the park collecting data for the NPS Wildland Fire Risk Assessment Project. In early June, contractor Mark Vaughn came to Glacier to provide training and get the crew off to a good start. We used Trimble dataloggers to collect all of the data, which proved at times to be a challenge. The park monitor supervisors worked closely with the contractors from Cartopac. There were multiple issues with uploading and downloading data from the server. The contractors from Cartopac were very timely with their help throughout the summer. Only once did the crew get stymied in the field to the point that they could not complete their work. Unfortunately, it was after a seven mile hike up to Sperry Chalet. Ninety two percent (92%) of all government buildings, or 763 structures were surveyed and the bulk of what remains is private property to be completed. This leaves 313 facilities to be surveyed in 2015.

Table 1. Fire Effects Plot Workload (2014) and Total Plots Installed

Park	Monitoring Unit	Plot Type (FMH Forest/Brush/Grass plot, photo point, Rapid Assessment, CBI, etc.)	Pre-burn 2014	Immed. Post 2014	Postburn (1-20 yrs) 2014	Annual Total (2014)	Total Plots
GLAC	North Fork Grasslands (Forest)	FMH		5	7	12	13
GLAC	North Fork Ponderosa (Forest)	FMH					18
GLAC	Long Term Monitoring Parkwide	LTM			8	8	54
GLAC	Post Fire Composition	PFC					380
GLAC	North Fork Grasslands	Non-native grassland Daubenmire					24
GLAC	Fuel Reduction North Fork Grasslands	Modified Tree Belt			3	3	3*
GLAC	Fuel Reduction Parkwide	Photo Points					86
GLAC	Fuel Moisture Plots Parkwide	Fuel Moisture Collection				4	4
BIHO	Sagebrush Plots	FMH					5
BIHO	PICO Plots	FMH					4
BIHO	PIPO	FMH					2
BIHO	ARTR	FMH					6
GRKO	Riparian Burn Plot Photos - Retake	Photo Points			10		10
Total				5	28	27	609

* Pilot sampling plots

Table 2. Fire Ecology Staffing 2014

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Dennis Divoky	1/1/14	12/31/14	26	Yes	Annual Fire Refresher Avalanche Rescue READ/BAER Webinars Numerous NPS CC, JFSP webinars
Mike McClellan				Yes	Annual Fire Refresher RXB2 taskbook work GIS Training and Development
Scott Lang	5/5/14	11/6/14	13.5	Yes	Monthly Structural Fire Training Annual Wildland Fire Refresher RXB2 Taskbook work RXB3 Taskbook work ICS-300 GIS Training and Development Structural Fire Hazmat training Structural Assessment Training
Ryan Lima	5/19/14	8/14/14	6.5	No	Annual Fire Refresher Bear Safety Training S-212 Taskbook work FFT1 Taskbook work ICT5 Taskbook work Structural Assessment Training
Katie Weidman	6/04/14	10/18/2014	10	No	Annual Fire Refresher Bear Safety Training S-212 Chainsaw Training Structural Assessment Training
Kagan Kaszuba	5/27/2014	9/23/2014	9	No	Annual Fire Refresher Bear Safety Training S-212 Chainsaw Training Structural Assessment Training

Table 3. 2014 Management Objectives and Monitoring Results

All results shown are 80% confidence intervals of the mean. Fuel reduction objectives/results are mean percent reduction from pre-burn to immediate post-burn. Stand density objectives/results are for five-year post-burn mean stand density. An underlined number of plots indicates that the minimum sample size has been attained for that variable.

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (90% confidence interval)	Objective Achieved?	Year Last Analysis Completed
Ponderosa pine	Limit overstory ponderosa pine mortality to = 20% at year 05.	Mortality = 36% (<i>n</i> =18 plots, 4 unique fires*)	No Two units burned under a hot wildfire conditions	2010
	Reduce ladder fuels (pole and seedling conifers other than P-pine) $\geq$ 40% at year 5	Mortality = 35% (<i>n</i> =18 plots, 4 unique fires*)	Yes	2010
	Maintain 95% relative cover by native herbaceous species 5 years postburn.	Non-native species = 3.9% (<i>n</i> =18 plots, 4 unique fires*)	Yes	2010

B. Program Information

Table 4. Planning - 2014

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2014)	Assisted with how many BAER plans in 2014?
Glacier National Park	no	2010	0	0
Big Hole National Battlefield	no	-	0	0
Grant Kohrs National Historic Site	no	-	0	0

Table 5. Monitoring - 2014

Park	% 2014 Data Entered	% 2014 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Glacier National Park	100%	100%	2	0	1	0
Big Hole National Battlefield	100%	100%	1	0	0	0
Grant Kohrs National Historic Site	100%	100%	1	0	0	0

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

Table 6. Communicating Results - 2014

Park	# of Project Monitoring Reports completed in 2014	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
Glacier National Park	1	1	2	No
Big Hole National Battlefield	0	1	0	
Grant Kohrs National Historic Site	0	0	0	

Table 7. Research - 2014

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2014	# of Proposals Funded in 2014	# of Research Projects Supported in 2014*	Additional Comments
Glacier National Park	yes	1	0	1	Cameron Naficy
Big Hole National Battlefield	yes	0	0	1	Tom Rodhouse, UCB I&M Network, Lemhi penstemon research burn
Grant Kohrs National Historic Site	no	0	0	0	

*Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

Reserve Fund Research: Cameron Naficy has initiated his project titled; Extent and contributing factors of delayed post-fire mortality in Glacier National Park. Harris and Divoky met with Naficy in October to discuss the project and the possibility of future burns to aid his study in mixed conifer. He began preliminary field work last summer and fall, and is working this winter on the satellite imagery component of the work. He has two more years of work ahead of him, and at that time a full report will be due and a presentation to the Fire and Resource Management staffs.

C. Fire ecologist accomplishments and areas of focus

Table 8. Fire Ecologist 2014 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	10	• Reviewed Fuels and Burn Plans and NFPORS POW requests • FMP Annual Reviews • Zone NFDRS Plan review
Presentations and Training provided	5	• Taught fire ecology/ history to the entire Interpretation staff • Taught a Fire Ecology session to CCLC Biology Teacher Seminar • Assisted with 3- 8 hour Annual Fire Refreshers • Superintendents (and Deputy Super.) Annual Resource Briefing
NPS Meetings/ Task groups	10	• Biweekly V&RP supervisors meetings (monthly; June – September), 1-2 hours • Chairman of the Board of Review Committee – monthly meetings • Represent Fire Management at USGS/Glacier NP Annual Science Day Meeting • Attend and interact at Glacier Waterton Science and History Day • Bi-annual Division meetings • Safety Committee; bi-monthly • Glacier NP Ranger/Waterton Lakes NP Warden Meeting – 1 day
Interagency work	3	• Park representative on the Interagency Northwest Montana Zone NFDRS Plan writing team • FOBS/FEMO Coordinator and Lead Instructor for zone S-244 Training
Fire & SAR Assignments	5	• Duty Officer; rotated a week at a time throughout summer • READ updates for park
RX and Fuels	5	• FEMO on Spring Big Prairie Burn and Ignition Spec on BIHO Burn • Assisted with Burn Prep • Assists Fuels Specialist with Burn and Fuel Reduction Plans • Helped with pile burning
Research	7	• Naficy – Assisted with procurement of funds and compliance for project: Extent and contributing factors of delayed post-fire mortality in Glacier National Park • Reviewed multiple research “Letter of Support” requests and prepared letters when warranted for Superintendent and FMO
Data entry and management	5	• GNP COOP Stations (3), WIMS (4), and Weather Pro 3 database manager
Data analysis	5	• Additional work on FESC, PIPO and LTM
Supervision/Admin	15	• Directly supervise two permanent employees and indirectly three seasonals • Managed project accounts and acquired supplies and materials for fire monitoring. • Serve as in-house Fire Management GIS specialist supporting wildfire and SAR incidents, working with IMR GIS staff on historical databases/perimeters for NP Map, and maintaining and updating fire management databases. • One of only three in Fire Management with Purchase Card Authority; often act as Logistics on various incidents
Training and Career Development	10	• Future Forest ; NPS Climate Change, JFSP, and WFLLC Webinar series • Park Supervisors Safety Training • Annual Wildland Fire Refresher • Aviation for Supervisors Refresher • Avalanche Rescue Training • Multitude of mandatory training: GSA SmartPay Travel Card, DOI Charge Card Refresher, OSHA Safety, Federal Information Systems, Hiring Reform for Supervisors, Managers and HR Professionals, Uniformed Services Employment and Re-employment Rights Act (USERRA) of mandatory Web training; FISSA, Privacy, and Records, Security Awareness, NPS Responsibilities for Computer Use, Orientation to the Privacy Act, Travel and Purchase Business Lines, DOI Diversity, and DOI Integrated Charge Card Holder.

Miscellaneous	5	• Park coordinator for “Adopt a Highway” Roadside cleanup - twice annually • Wrote fire and weather summaries for annual park summary reports for Concessions, Backcountry, North Fork Subdistrict, and Re-Vegetation monitoring reports.
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D. Fire effects crew accomplishments and areas of focus

Table 9. Fire Effects Crew 2014 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	5%	Read 12 FMH FESC plots
WUI plots	1%	Revisited burn pile scars from last few years for invasive plants
CBI plots	0%	None read in 2014
Other plot work	33%	Approximately 763 structures were assessed for the Wildland Fire Risk Assessment Project throughout the park, in both the frontcountry and backcountry. Eight GLAC-Long Term Monitoring plots read / photos. Fuel Moisture sampling at 4 sites in the Park. Monitored 6 fuel reduction/ thinning monitoring plots created in North Fork Grasslands.
Wildfire assignments	14%	Assisted with Fire Suppression and Fire Monitoring in Glacier National Park. Lang was IC on the multi day Bowman Creek Fire. Also, 2 monitors completed a two week handcrew assignment out of state. Provided parkwide initial attack (for a 1 million acre Park) two days a week during the fire season. Provided backup support parkwide the rest of the week.
Prescribed fire projects	4%	Assisted with RX fire monitoring pre-planning for BIHO which is linked to a possible RX burn in 2014. Completed Prescribed fire project on five burn units in Big Prairie (GLAC). Lang worked on RXB2 training work and as a Firing Boss.
Non-fire fuels projects	15%	Lang, Weidman, and McClellan assisted with piling and burning piles. Crew assisted with Fuel Reduction around Park facilities in numerous locations. READ activities during fuel reduction projects at GLAC.
Travel for plot or project work	3%	Numerous crew members traveled to BIHO for prescribed fire preparation and implementation.
Data entry	5%	Completed 100% of data entry/error checking from 2014 field season.
Data analysis	3%	Some minor analysis/GIS work of GLAC- Long Term Monitoring plots.
Supervision/Admin	12%	Lang supervised (Directed; trained; time management; career development; mentored; evaluated; and counseled) three seasonal monitors.
Training	2%	• McClellan instructed S-212 and assisted with Fire Refreshers. • Lang assisted with Fire Refreshers. • Lang attended monthly Structural Fire Refreshers and Structural Fire Hazmat training • All attended Basic Fire Refresher. • All attended Orientation, Bear, Safety, All Employee, etc.
Miscellaneous	3%	• Performed maintenance and repair of the park's three NFDRS RAWS stations and data entry for three COOP stations. • Assisted other park divisions in clearing roads and trails. • Office maintenance work. • Assisted with Search and Rescue missions in Park.

E. 2015 Direction

First and foremost, continue and complete the structure assessments. Read the Big Prairie plots that were treated in 2014, and Year 15 plot reads in Ponderosa pine. Assist burning the Horse Pasture Burn Unit at Big Hole. Help prep Ponderosa pine burn units. Continue with Long Term Plot Monitoring. Assist and oversee Naficy with his IMR research project. Move the St Mary RAWS to its new location. If time allows, re-take 360 degree lookout photos with a GigaPan Camera Mount. The project was begun by the local NOROCK USGS office in 2003, but was soon discontinued. I feel it is an excellent way to track changes in vegetation and forest composition on a large scale.

F. Optional Information

Winter Storm Blowdown Event

On the evening of November 28th a powerful polar front spilled over the Continental Divide and caused gusty erratic winds that blew hundreds (~300-400) of old growth trees down. The trees were scattered on and around upwards of 50-60 structures in the West Glacier Headquarters and throughout the Lake McDonald Valley and Hotel area, including many private residences and other government owned inholder properties. Damage to some structures was significant and the west entrance to the park was closed for two days to clear park roads. The entire Fire Management staff was heavily involved with either the local Type 3 Incident Management Team formed to accomplish the initial cleanup and temporary repairs to structures, or were performing the hazard tree removal and/or assessments. The staff was engaged for most of two weeks.



Big Hole RX Burn Photos and Graph



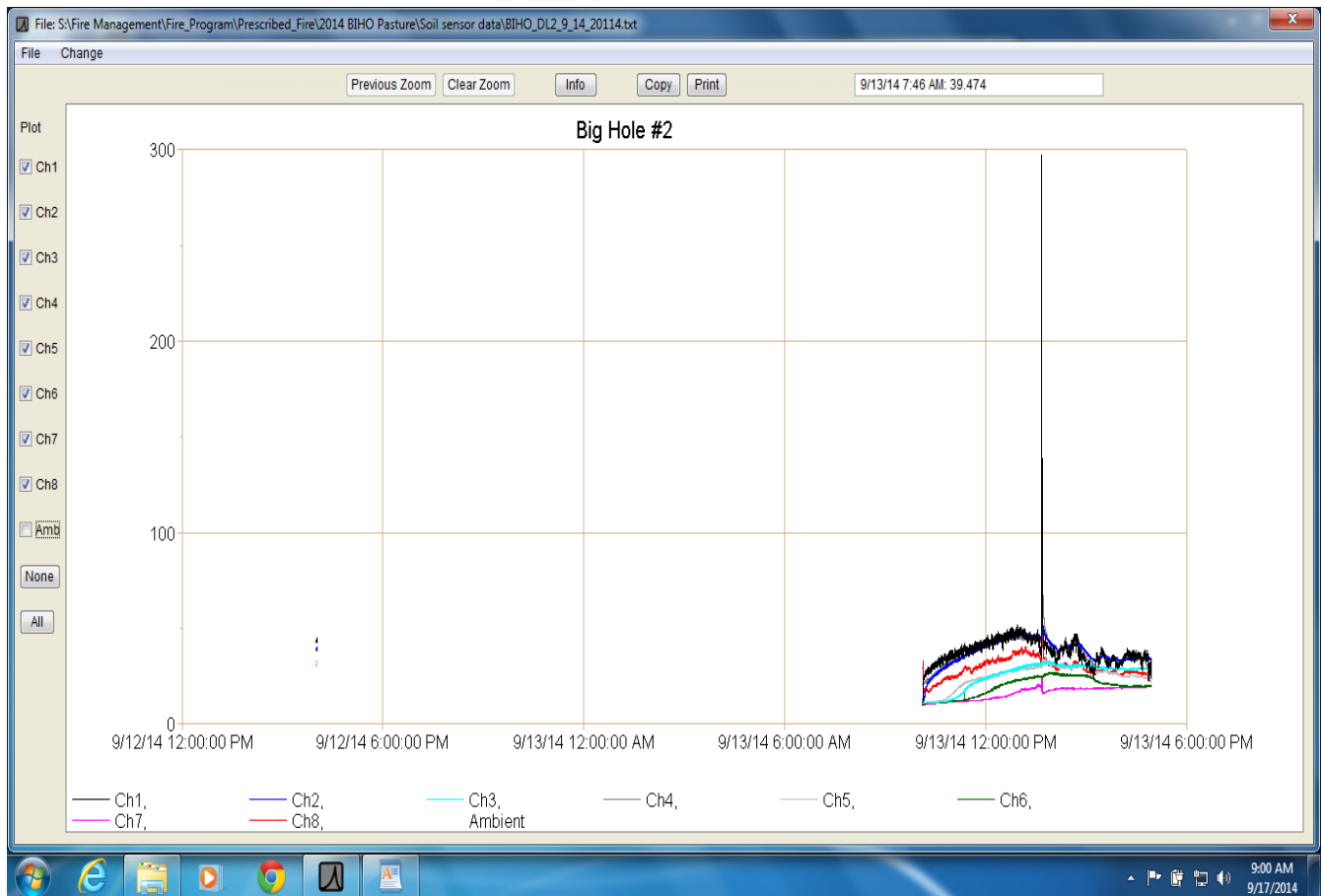
Installing and programming soil sensors



Superintendent Black helping to dig and install sensors



Go Pro cameras in action.



Graph of Big Hole soil heat sensor. The sensors were set to record approximately 3 hours prior to fire quickly running through the location. The slow rise in soil temperature represents the sun's heating, and the spike is the fire running through the plot. Note that the temperatures after the pass of the burn were cooler than pre burn. Increased cloud cover and the less direct sun later in the day on the slope is the likely cause. As we expected in this flashy fuel type, that has very little litter or duff, the heat pulse was very short and a relatively low temperature ($\sim 300^{\circ}\text{F}$) for a wildland fire. The black Channel 1 line is a new prototype surface sensor and the second black line is the standard sensor at the surface of the ground; the others are buried at .5", 1", and 1.5". This soil temperature data may help inform us as to what heat stratification or ignition technique would work best to regenerate the Lemhi penstemon.