



North Pacific/ Columbia Basin Fire Ecology Annual Report Calendar Year 2014

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North Cascades National Park**

A. Summary

The North Pacific/ Columbia Basin (NPCB) Fire Ecology program had a productive and highly varied field season in 2014. The fire effects monitoring crew completed a total of seventy-six plot reads within North Cascades National Park (NOCA), San Juan Island National Historic Park (SAJH), John Day Fossil Beds National Monument (JODA) and Lake Roosevelt National Recreation Area (LARO). Crew members also assisted wildland/ prescribed fire operations at NOCA, LARO, and SAJH as well as wildland fire assignments in Oregon, and a detail as a crew lead at YOSE.

In 2014 the NPCB fire ecology program staff offered considerable support to a variety of fire operations. Crew members contributed approximately 160 operational shifts on wildfire/ prescribed fire assignments between April and November. These roles included helicopter manager trainee, helicopter crewmember, resource advisor, GIS trainee, firefighter type 2, FEMO trainee and squad boss trainee. These opportunities supported suppression efforts and enabled crewmembers to make strides in attaining valued qualifications. In 2014 one crewmember became qualified as a Firefighter Type 1 and two others initiated taskbooks and gained prescribed fire experience as FEMOs (Fire Effects Monitors).

The remainder of the season was devoted to administrative tasks, training, data entry, database management, processing fire ecology samples, GIS support, and transitioning to FFI Lite data collection via tablet computers.

In June and July NPCB Assistant Lead Fire Effects Monitor, Sheah Mucci, completed a detail at Yosemite National Park (YOSE) assisting in the collection of fire effects data associated with the 2013 Rim fire. Sheah was responsible for training and co-supervising a 6-person USGS data

collection crew. Their efforts resulted in the completion of 32 FMH forest plots and 24 circular FMH-hybrid plots within the Rim fire. Subsequently, NPCB staff completed FFI data entry for the 32 FMH forest plots.

Two Student Conservation Association (SCA) fire effects monitoring interns assisted the NPCB crew with FMH plot work during the 2014 field season. These individuals, Julia Bartley and Ben Saari, provided invaluable assistance in completing the plot workload, assisting with data entry, processing fire ecology research samples, firefighting, logistical support, and fire effects monitoring during prescribed fire operations.

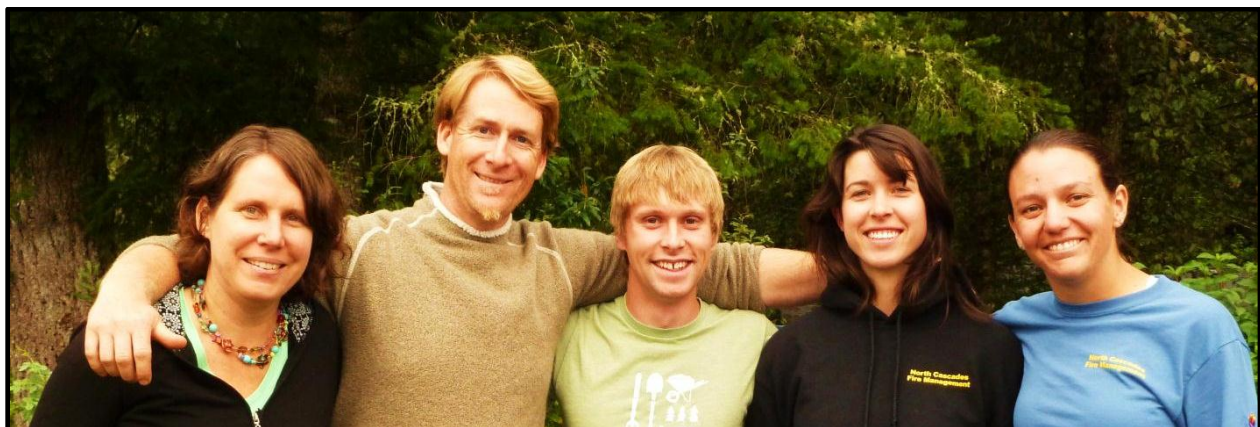
Table 1. Fire Effects Plot Workload 2014

Park	Vegetation Monitoring Type	Plot Type	Pre-burn	Immed. Post-burn	Post-thin	Post burn 1-20 yrs	Annual Total (2014)	Total Plots
John Day Fossil Beds NM	Big Sagebrush/Bunchgrass	FMH Brush	0	0	n/a	11	11	21
	Western Juniper Shrubland	FMH Forest	0	0	0	10	10	16
Lake Roosevelt NRA	Ponderosa Pine/ Common Snowberry Forest	FMH Forest	6	0	0	20	26	49
	Ponderosa Pine/Bitterbrush	FMH Forest	0	0	0	0	0	3
North Cascades NP	Stehekin Valley FFRA: Mixed Conifer	FMH Forest	0	0	0	9	9	40
	Stehekin Valley Contours (Open/Mid/Closed Canopy Mixed Conifer)	FMH Forest	0	0	0	0	0	23
Olympic NP	East-side Mixed Conifer (permanent RAPS plots)	Rapid Assessment	0	0	0	0	0	5
San Juan Island NHP	Garry Oak Woodland	FMH Forest	0	3	0	5	8	12
	Douglas Fir/ Lodgepole (permanent RAPS plots)	Rapid Assessment	0	0	0	2	2	4
	Annual Brome Grasses	FMH Grass	0	10	n/a	0	10	10
Total			6	13	0	57	76	188

Pilot sampling plots*

Table 2. Fire Ecology Staffing 2014

Ecologist and Monitors	Start Date	End Date	# Pay Periods	READ Qualified?	Training	Development
Karen Kopper Fire Ecologist	1/01/14	n/a	26	No	Fire Refresher, GIS and WFDSS training during wildfire assignment	UW fire severity and fire history doctoral research
Cedar Drake Lead Fire Effects Monitor	4/6/14	12/31/14	20	Yes	Fire Refresher, S-371 (Helicopter Manager), S-230 (Crew Boss), S-231 (Engine Boss), Fundamentals V	HECM, HMGB (t), FEMO assignments. Initiated HMGB taskbook.
Sheah Mucci Assistant Lead Fire Effects Monitor	4/6/14	10/18/14	14	Yes	Fire Refresher, L-280 (Followership to Leadership)	8 week detail to YOSE to conduct fire effects data collection in 2013 Rim fire, FFT1(t), READ, FEMO assignments. Completed FFT1 taskbook.
Jennifer Brown Fire Effects Monitor	5/4/14	11/1/14	12	No	Fire Refresher	FFT2, FEMO(t) assignments. FEMO taskbook initiated. Fire effects and botany training with NPCB crew
Julia Bartley SCA-Fire Ecology Intern	6/18/14	9/17/14	7	No	Fire Refresher	Fire effects and botany training with NPCB crew. FEMO(t) assignments. FEMO taskbook initiated.
Ben Saari SCA-Fire Ecology Intern	6/18/14	9/2/14	6	No	Fire Refresher	Fire effects and botany training with NPCB crew



2014 NPCB Fire Effects Monitoring crew
(l. to r. Karen Kopper, Cedar Drake, Ben Saari, Julia Bartley, Jennifer Brown, Sheah Mucci (not pictured))

Table 3a Management Objectives and Monitoring Results

North Cascades National Park



FPSME2-19 Q1-Q4
Douglas Fir/ Ponderosa Pine Forest
PRE Treatment (1997)



FPSME2-19 P1—Q1-Q4
Douglas Fir/ Ponderosa Pine Forest
10 years POST Treatment (2013)



FPIPO2-24 Q4-Q1
Douglas Fir/ Ponderosa Pine Forest
PRE Treatment (1996)



FPIPO2-24 Q4-Q1
Douglas Fir/ Ponderosa Pine Forest
10 Years POST Treatment (2014)

Stehekin Forest Fuel Reduction Area Douglas fir / Ponderosa pine forest				
Management Objective	Monitoring Results: 10 years POST 1st Broadcast Burn of a “Thin-Burn” unit n=10 (Company Creek Rx burn 2003 = 3n, Rx burn 2004 = 3n) (Orchard Rainbow Rx burn 2002 = 3n, Rx burn 2003 = 1n)		Monitoring Results: 10 years POST 2nd Broadcast Burn of a “Burn-Thin-Burn” unit n=8 (Company Creek Rx burn 2003 = 2n, Rx burn 2004 = 6n)	
Trees		Achieved?		Achieved?
Reduce the density of saplings and pole size trees (2.5-14.9 cm dbh) to 10-30 trees/acre as measured 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 70.8 (62.1) trees/acre POST= 5.7 (4.7) trees/acre	NO	Total 10 Years POST: n=8 PRE= 82.0 (34.0) trees/acre POST= 12.1 (12.4) trees/acre	YES
	Company Creek Unit: n=6 PRE= 45.9 (39.4) trees/acre POST= 4.0 (5.1) trees/acre	NO	Company Creek Unit: n=8 PRE= 82.0 (34.0) trees/acre POST= 12.1 (12.4) trees/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 108.3 (76.7) trees/acre POST= 8.1 (3.3) trees/acre	NO		
Reduce the density of small and medium sized overstory trees (6-24” dbh) to 25-75 trees/acre as measured 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 109.3 (43.3) trees/acre POST= 56.3 (26.9) trees/acre	YES	Total 10 Years POST: n=8 PRE= 133.0 (59.9) trees/acre POST= 60.2 (22.2) trees/acre	YES
	Company Creek Unit: n=6 PRE= 109.9 (48.4) trees/acre POST= 57.3 (32.5) trees/acre	YES	Company Creek Unit: n=8 PRE= 133.0 (59.9) trees/acre POST= 60.2 (22.2) trees/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 108.3 (41.6) trees/acre POST= 54.6 (20.0) trees/acre	YES		
Maintain the density of large overstory trees (>24” dbh) at 1-20 trees/acre as measured 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 6.5 (5.5) trees/acre POST= 8.5 (6.7) trees/acre	YES	Total 10 Years POST : n=8 PRE= 6.6 (6.1) trees/acre POST= 4.0 (5.3) trees/acre	YES
	Company Creek Unit: n=6 PRE= 7.4 (7.0) trees/acre POST= 10.1 (8.4) trees/acre	YES	Company Creek Unit: n=8 PRE= 6.6 (6.1) trees/acre POST= 4.0 (5.3) trees/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 5.1 (2.0) trees/acre POST= 6.1 (2.3) trees/acre	YES		
Reduce basal area to an average of 70 (± 35) ft ² /acre as measured 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 128.6 (36.7) trees/acre POST= 105.5 (39.0) trees/acre	NO	Total 10 Years POST: n=8 PRE= 153.0 (46.4) trees/acre POST= 92.7 (29.3) trees/acre	YES
	Company Creek Unit: n=6 PRE= 146.7 (32.7) trees/acre POST= 120.2 (40.4) trees/acre	NO	Company Creek Unit: n=8 PRE= 153.0 (46.4) trees/acre POST= 92.7 (29.3) trees/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 101.6 (24.9) trees/acre POST= 83.5 (27.8) trees/acre	YES		
Increase canopy base height to 2 meters as measured 1 year post-treatment.	Total 10 Years POST: n=10 POST= 7.1 (2.6) m.	YES	Total 10 Years POST: n=8 POST= 6.2 (2.4) m.	YES
	Company Creek Unit: n=6 POST= 7.6 (2.8) m.	YES	Company Creek Unit: n=8 POST= 6.2 (2.4) m.	YES

Stehekin Forest Fuel Reduction Area Douglas fir / Ponderosa pine forest				
Management Objective	Monitoring Results: 10 years POST 1st Broadcast Burn of a “Thin-Burn” unit n=10 (Company Creek Rx burn 2003 = 3n, Rx burn 2004 = 3n) (Orchard Rainbow Rx burn 2002 = 3n, Rx burn 2003 = 1n)		Monitoring Results: 10 years POST 2nd Broadcast Burn of a “Burn-Thin-Burn” unit n=8 (Company Creek Rx burn 2003 = 2n, Rx burn 2004 = 6n)	
	Orchard Rainbow Unit: n=4 POST= 6.2 (2.4) m.	YES		
Vegetation		Achieved?		Achieved?
Maintain a minimum of 30 percent cover of native understory vegetation (shrubs and herbaceous) 2 years after the initial treatment.	Total 10 Years POST: n=10 PRE= 41.8 (20.9) % cover POST= 39.1 (19.4) % cover	YES	Total 10 Years POST: n=8 PRE= 46.3 (31.5) % cover POST= 47.7 (28.8) % cover	YES
	Company Creek Unit: n=6 PRE= 54.6 (15.0) % cover POST= 47.8 (18.4) % cover	YES	Company Creek Unit: n=8 PRE= 46.3 (31.5) % cover POST= 47.7 (28.8) % cover	YES
	Orchard Rainbow Unit: n=4 PRE= 41.8 (20.9) % cover POST= 39.1 (19.4) % cover	YES		
Report percent cover of non-natives per species. Alert managers to the presence of new exotic species, and work with them to determine critical thresholds.	Total 10 Years POST: n=10 BRTE % cover: PRE= 0.2 (0.2) %, POST=0.4 (0.9) % TAOF % cover: PRE= 0 (0) % , POST=0.03 (0.09) %	N/A	Total 10 Years POST: n=8 BRTE % cover: PRE= 0 (0) % , POST= 0.04 (0.11) %	N/A
	Company Creek Unit: n=6 BRTE % cover: PRE= 0.2 (0.3) % , POST=0.1 (0.1) % TAOFF % Cover: PRE= 0 (0) % , POST=0.1 (0.1) %	N/A	Company Creek Unit: n=8 BRTE % cover: PRE= 0 (0) % , POST= 0.04 (0.11) %	N/A
	Orchard Rainbow Unit: n=4 BRTE % cover: PRE= 0.2 (0.2) % , POST= 0.8 (1.3) %	N/A		
Fuel Load		Achieved		Achieved?
Maintain an average small diameter (1-100 hour) fuel load of 2-6 tons/acre 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 2.7 (1.4) tons/acre POST= 3.4 (0.9) tons/acre	YES	Total 10 Years POST: n=8 PRE= 2.2 (0.9) tons/acre POST= 5.0 (4.2) tons/acre	YES
	Company Creek Unit: n=6 PRE= 2.9 (1.3) tons/acre POST= 3.8 (0.8) tons/acre	YES	Company Creek Unit: n=8 PRE= 2.2 (0.9) tons/acre POST= 5.0 (4.2) tons/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 2.5 (1.7) tons/acre POST= 2.6 (0.6) tons/acre	YES		
Maintain an average large diameter (1000 hour) fuel load of 4-12 tons/acre 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 2.9 (2.6) tons/acre POST= 6.8 (3.8) tons/acre	YES	Total 10 Years POST: n=8 PRE= 4.4 (2.5) tons/acre POST= 12.5 (6.2) tons/acre	NO
	Company Creek Unit: n=6 PRE=1.5 (2.0) tons/acre POST= 7.0 (4.2) tons/acre	YES	Company Creek Unit: n=8 PRE= 4.4 (2.5) tons/acre POST= 12.5 (6.2) tons/acre	NO

Stehekin Forest Fuel Reduction Area Douglas fir / Ponderosa pine forest				
Management Objective	Monitoring Results: 10 years POST 1st Broadcast Burn of a “Thin-Burn” unit n=10 (Company Creek Rx burn 2003 = 3n, Rx burn 2004 = 3n) (Orchard Rainbow Rx burn 2002 = 3n, Rx burn 2003 = 1n)		Monitoring Results: 10 years POST 2nd Broadcast Burn of a “Burn-Thin-Burn” unit n=8 (Company Creek Rx burn 2003 = 2n, Rx burn 2004 = 6n)	
	Orchard Rainbow Unit: n=4 PRE= 4.8 (2.2) tons/acre POST= 6.6 (3.6) tons/acre	YES		
Maintain an average litter and duff load of 3.5-14 tons/acre 2 years after final treatment prior to maintenance.	Total 10 Years POST: n=10 PRE= 20.2 (8.0) tons/acre POST=11.0 (2.4) tons/acre	YES	Total 10 Years POST: n=8 PRE= 25.1 (8.8) tons/acre POST= 9.2 (3.0) tons/acre	YES
	Company Creek Unit: n=6 PRE=24.0 (7.8) tons/acre POST=11.1 (1.8) tons/acre	YES	Company Creek Unit: n=8 PRE= 25.1 (8.8) tons/acre POST= 9.2 (3.0) tons/acre	YES
	Orchard Rainbow Unit: n=4 PRE= 14.5 (4.0) tons/acre POST= 10.8 (3.4) tons/acre	YES		

Ten years following 1st and 2nd entry broadcast burns

The forest fuel reduction program at NOCA uses a combination of thinning and prescribed burning to reduce hazardous fuel loads and restore fire-adapted Doug fir / Ponderosa pine forests in the wildland-urban interface of Stehekin. This report compares the 10th-year post-burn effects of thinning followed by broadcast burning (1st broadcast burn; “thin-burn”) and burning before thinning and burning again (2nd broadcast burn; “burn-thin-burn”).

Trees: Fire effects on tree densities and basal areas differed between thin-burn plots and burn-thin-burn plots. Pole-sized trees were over-thinned in thin-burn plots; however, average basal area in these plots was still too high, indicating that more medium-sized overstory trees (6-24” dbh) should be thinned at these sites. Areas that were burn-thin-burned met all tree density and basal area objectives, although there was some unintentional mortality of large overstory trees (greater than 24” dbh) due to burning before thinning. Sites that were thinned before burning saw an increase in the number of large overstory trees by the 10th year post-burn, whereas average overstory tree density decreased on the burn-thin-burn plots. Even ten-years following treatment, canopy base-heights were well over 2 meters in thin-burn and burn-thin-burn plots, maintaining the fire-wise objective.

Vegetation: Both treatments met the objective to maintain a 30 percent cover of native understory vegetation, even 10-years following burning. Pinegrass (*Calamagrostis rubescens*), Scouler’s woollyweed (*Hieracium scouleri*), Pinemat manzanita (*Arctostaphylos nevadensis*), and Bluebunch wheatgrass (*Pseudoroegneria spicata*) have the highest cover of all native plant species on pre-burn and 10th-year post-burn plots at Company Creek (both treatments), and the latter two species have the highest cover on the Orchard Rainbow plots.

Fuel loads: Surface fuel reduction objectives were accomplished across all diameter classes on thin-burn plots, and for all but large diameter (3”+, 1000-hour) woody fuels on burn-thin-burn plots. Woody fuel loads increased following thinning in both treatment types; however, consumption on the burn-thin-burn plots was not as complete.

Lake Roosevelt National Recreation Area



FFIPO1-4 P1-O
Ponderosa Pine/ Snowberry Forest
PRE Treatment (2001)



FFIPO1-4 P1-O
Ponderosa Pine/ Snowberry Forest
10 Years POST Treatment (2014)



FFIPO1-5 P2-O
Ponderosa Pine/ Snowberry Forest
PRE Treatment (2001)



FFIPO1-5 P2-O
Ponderosa Pine/ Snowberry Forest
10 Years POST Treatment (2001)

Lake Roosevelt National Recreation Area Ponderosa Pine / Snowberry Forest		
Management Objective	Monitoring Results: 10 Years POST 1st Broadcast Burn of a Thinned Unit n=6 (Cloverleaf/Gifford Rx burn 2004= 3n, Evans Rx burn 2004 = 3n)	Achieved?
Trees		
Reduce the density of live pole size trees (2.5-14.9 cm dbh) to 2-20 trees/acre as measured 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 346.7 (98.0), POST= 18.9 (29.3) trees/acre	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= 58.0 (29.8), POST= 4.0 (7.0) trees/acre	YES
	POST Treatment Total: n=6, PRE= 202.3 (170.9), POST= 11.5 (20.7) trees/acre	YES
Reduce the density of live small and medium sized overstory trees (15-60 cm dbh) to 25-75 trees/acre as measured 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE=199.6 (81.0), POST= 4.0 (4.0) trees/acre	NO
	Cloverleaf/ Gifford Unit: n=3, PRE= 145.7 (95.7), POST= 35.1 (15.3) trees/acre	YES
	POST Treatment Total: n=6, PRE= 172.7 (84.6), POST= 19.6 (19.7) trees/acre	NO
Maintain or increase the density of live large overstory trees (> 60 cm dbh) to 1-8 trees/acre as measured 5 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 0 (0), POST= 0 (0) trees/acre	NO
	Cloverleaf/ Gifford Unit: n=3, PRE= 0 (0), POST= 0 (0) trees/acre	NO
	POST Treatment Total: n=6, PRE= 0 (0), POST= 0 (0) trees/acre	NO
Reduce live mean basal area (poles+overstory) to an average of 70 (±35) ft ² / acre as measured 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 122.5 (43.9), POST= 2.6 (1.8) trees/acre	NO
	Cloverleaf/ Gifford Unit: n=3, PRE= 109.1 (50.5), POST= 42.2 (15.7) trees/acre	YES
	POST Treatment Total: n=6, PRE= 115.8 (42.9), POST= 22.4 (23.9) trees/acre	NO
Increase live canopy base height (poles+overstory) to 2 meters as measured 1 year post-treatment.	Evans Unit: n=3, PRE= n/a, POST= 9.2 (9.0) m	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= n/a, POST= 11.2 (2.8) m.	YES
	POST Treatment Total: n=6, PRE= n/a, POST= 10.2 (6.1) m.	YES
Vegetation		
Maintain a minimum of 30 percent cover of native understory vegetation (shrubs and herbaceous) 2 years after initial treatment.	Evans Unit: n=3, PRE= 35.5 (11.7) % cover, POST= 101.1 (22.3) % cover	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= 33.3 (10.7) % cover, POST= 60.3 (16.4) % cover	YES
	POST Treatment Total: n=6, PRE= 34.4 (10.1) % cover, POST= 80.7 (28.4) % cover	YES

Lake Roosevelt National Recreation Area Ponderosa Pine / Snowberry Forest		
Management Objective	Monitoring Results: 10 Years POST 1st Broadcast Burn of a Thinned Unit n=6 (Cloverleaf/Gifford Rx burn 2004= 3n, Evans Rx burn 2004 = 3n)	Achieved?
Maintain <20% cover of non-natives relative to total cover by 5 years following treatment.	Evans Unit: n=3, PRE= 5.1 (6.4) % cover, POST= 16.7 (15.5) % cover PRE Rel Cover = 13 %, POST Rel Cover=14 %	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= 1.4 (1.3) % cover, POST= 23.2 (14.0) % cover PRE Rel Cover= 4%, POST Rel Cover=28 %	NO
	POST Treatment Total: n=6, PRE= 3.2 (4.6) % cover, POST= 19.9 (13.7) % cover PRE Rel Cover=9%, POST=19.7%	YES
Fuels		
Maintain an average small diameter (≤ 3 inch) woody fuel load of 2–6 tons/acre 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 2.5 (0.8), POST= 5.6 (5.7) tons/acre	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= 5.0 (1.6), POST= 1.8 (1.3) tons/acre	NO
	POST Treatment Total: n=6, PRE= 3.7 (1.8), POST= 3.7 (4.3) tons/acre	YES
Maintain an average large diameter (≥ 3 inch) woody fuel load (no litter and duff) of 1-10 tons/acre 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 0.9 (0.7), POST= 17.8 (5.0) tons/acre	NO
	Cloverleaf/ Gifford Unit: n=3, PRE= 6.9 (3.1), POST= 10.5 (4.1) tons/acre	NO
	POST Treatment Total: n=6, PRE= 3.9 (3.8), POST= 14.2 (5.7) tons/acre	NO
Maintain an average litter and duff fuel load of 3.5-14.0 tons/acre 2 years after final treatment prior to maintenance.	Evans Unit: n=3, PRE= 29.2 (4.5), POST= 5.1 (1.2) tons/acre	YES
	Cloverleaf/ Gifford Unit: n=3, PRE= 27.9 (2.2), POST= 7.5 (2.5) tons/acre	YES
	POST Treatment Total: n=6, PRE= 28.6 (3.2), POST= 6.3 (2.2) tons/acre	YES

Fire effects ten years after thinning and one broadcast burn

Trees: Thinning and burning has been more effective at meeting tree density and basal area objectives at Cloverleaf than in the Evans burn unit. Neither unit had any live large overstory trees (> 60 cm dbh) before treatment began, and too many medium-sized overstory trees were thinned on the Evans unit. Additional trees were lost between the 2nd and 5th year post-treatment. Basal area increased in the remaining trees by the 10th year post-burn, however still remains lower than by the 2nd year post-burn.

Average canopy base height varied widely at Evans (from 0.3 to 18.4 meters), whereas it was more consistent across the Cloverleaf/Gifford Unit.

Vegetation:

The percent cover of native vegetation across the units increased significantly after burning, and remained at more than double the pre-burn cover by the tenth-year postburn. These results far surpassed the minimum requirement to maintain a 30 percent cover. The native species with the highest cover in the tenth year post-burn were Redstem ceanothus (*Ceanothus sanguineus*, 18 % cover), California brome (*Bromus carinatus*, 6 %) and Prairie junegrass (*Koeleria macrantha*, 6%) on the Cloverleaf /Gifford unit, and Prairie junegrass (42%), Silky lupine (*Lupinus sericeus*, 7%), and Poverty oatgrass (*Danthonia spicata*, 6%) on the Evans unit.

A less than 20 percent cover of non-native vegetation relative to total understory vegetation was achieved on the Evans unit (relative cover = 17%), but not on the Cloverleaf/Gifford unit (relative cover = 28%). The combined result was an average relative cover of 19.9 percent on all plots, meeting the objective. Non-native grasses comprised the majority of non-native cover on the Cloverleaf/Gifford unit, including Cheatgrass (*Bromus tectorum*, 6%), Japanese brome (*B. japonicus*, 6%), and Bulbous bluegrass (*Poa bulbosa*, 6%), whereas non-native vetches were prevalent on the Evans unit; Hairy vetch (*Vicia villosa*, 31% and American deervetch (*V. americana*, 9%).

Fuels: Even ten years following broadcast burns, the loadings of small diameter fuels ($\leq 3''$ diameter, 1-100 hour fuels) and litter and duff were within the desired range (although small diameter fuels were low in the Cloverleaf/Gifford unit). Loadings of large diameter woody fuels ($\geq 3''$ diameter, 1000 hour fuels) were still too high, although very close to the desired condition of 1-10 tons per acre on the Cloverleaf/Gifford unit (10.5 tons/acre).

San Juan Island National Historical Park



**FQUGA1-2 Q1-Q4
Garry Oak Woodland
PRE Treatment (1999)**



**FQUGA1-2 Q1-Q4
Garry Oak Woodland
5 Years POST Treatment (2014)**



**FQUGA1-2 Q2-Q3
Garry Oak Woodland
PRE Treatment (1999)**



**FQUGA1-2 Q2-Q3
Garry Oak Woodland
5 Years POST Treatment (2014)**

San Juan Island National Historical Park Garry Oak Woodland

Management Objective	Monitoring Results: 2 years POST 2 nd Broadcast Burn of a Previously Thinned Unit n=4 (1n = RX 2005, 2 post 2007; 3n = RX 2009, 2 post 2011)		Monitoring Results: 5 years POST 2 nd Broadcast Burn of a Previously Thinned Unit n=4 (1n = RX 2005, 5 post 2010; 3n = RX 2009, 5 post 2014)	
		Achieved?		Achieved?
Trees				
Maintain less than 5% mortality of overstory ($\geq$ 15 cm dbh) QUGA trees/acre.	x= 23.3 % QUGA mortality PRE= 10.1 (13.0) POST=7.1 (8.4) trees/acre	NO	x= 0 % QUGA mortality PRE= 10.1 (13.0) POST= 11.1 (7.0) trees/acre	YES
Shrub Cover				
Maintain 5-40 % shrub cover.	PRE= 32.8 (27.9) % cover POST= 38.5 (27.2) % cover	YES	PRE= 32.8 (27.9) % cover POST= 40.8 (25.0) % cover	NO
Fuel Load				
Maintain total fuel load of 4-12 tons/acre.	PRE= 29.0 (17.2) POST= 9.5 (6.7) t/ac	YES	PRE= 29.0 (17.2) POST= 16.1 (11.9) t/ac	NO
Maintain one-hour fuel load of 0.1-2.0 tons/acre.	PRE= 2.6 (1.6) POST= 0.1 (0.1) t/ac	YES	PRE= 2.6 (1.6) POST= 0.1 (0.1) t/ac	YES
Maintain ten-hour fuel load of 0.1-2.0 tons/acre.	PRE= 1.1 (0.7) POST= 0.2 (0.2) t/ac	YES	PRE= 1.1 (0.7) POST= 0.2 (0.2) t/ac	YES
Maintain hundred-hour fuel load of 0.1-2.0 tons/acre.	PRE= 3.5 (1.8) POST= 0.7 (0.4) t/ac	YES	PRE= 3.5 (1.8) POST= 0.5 (0.4) t/ac	YES
Maintain thousand-hour fuel load of 2-6 tons/acre.	PRE= 12.2 (11.9) POST= 7.0 (7.8) t/ac	NO	PRE= 12.2 (11.9) POST= 6.6 (7.6) t/ac	NO
Maintain litter and duff load of 2-6 tons/acre.	PRE= 9.6 (4.2) POST= 1.5 (1.0) t/ac	NO	PRE= 9.6 (4.2) POST= 8.7 (13.2) t/ac	NO
Understory Cover				
Increase and maintain the absolute cover of native grass at 20 percent cover.	PRE= 0.5% (0.9) POST= 8.4 (9.7) % native grass cover	NO	PRE= 0.5 % (0.9) POST= 17.4 (9.4) % native grass cover	NO
Reduce and/or not exceed the absolute cover of non-native grass compared to the pre-treatment cover.	PRE= 33.1 (31.9) POST= 66.0 (34.2) % non-native grass cover	NO	PRE= 33.1 (31.9) POST= 63.4 (46.1) % non-native grass cover	NO
Increase and maintain the absolute cover of native herbaceous species at 30 percent cover.	PRE= 33.7 (11.0) POST= 20.5 (5.8) % native herbaceous cover	NO	PRE= 33.7 (11.0) POST= 11.1 (5.6) % native herbaceous cover	NO

San Juan Island National Historical Park Garry Oak Woodland				
Management Objective	Monitoring Results: 2 years POST 2 nd Broadcast Burn of a Previously Thinned Unit n=4 (1n = RX 2005, 2 post 2007; 3n = RX 2009, 2 post 2011)		Monitoring Results: 5 years POST 2 nd Broadcast Burn of a Previously Thinned Unit n=4 (1n = RX 2005, 5 post 2010; 3n = RX 2009, 5 post 2014)	
Reduce and/or not exceed the absolute cover of non-native herbaceous species compared to the pre-treatment cover.	PRE=26.4 (19.6) POST=23.6 (8.6) % non-native herbaceous cover	YES	PRE= 26.4 (19.6) POST=24.5 (10.1) % non-native herbaceous cover	YES

Fire effects two and five years following second entry of prescribed fire

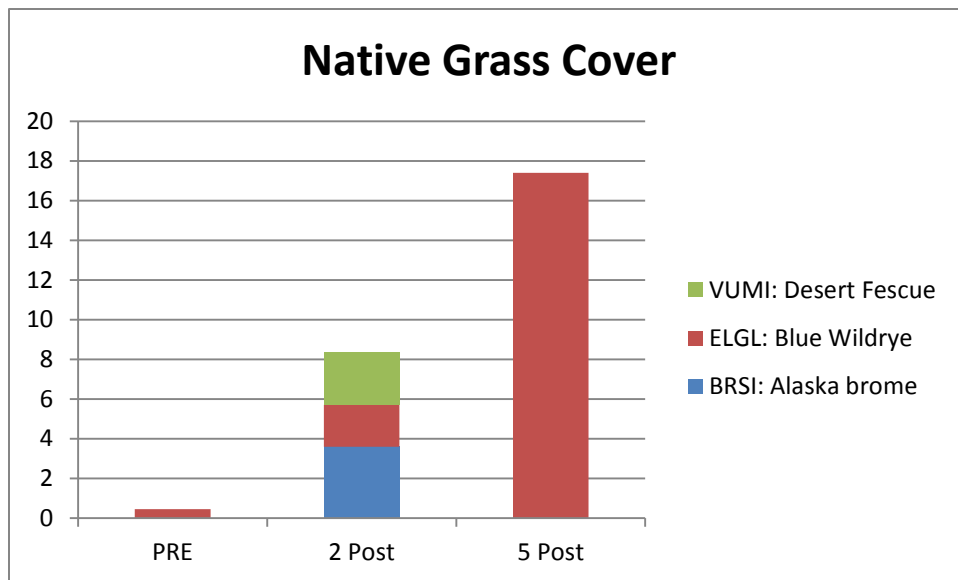
Thinning and burning have been used to restore the Garry oak woodland and reduce fuels at Young Hill for over a decade. This year's analysis compares results from the 2nd and 5th year following the second entry of prescribed fire in Unit 2. One plot burned in 2005, and 3 burned in 2009.

Trees: The objective to maintain less than 5 percent mortality of overstory (15 cm + dbh) Garry oaks was not achieved by the 2nd year post-burn. Fortunately, several oaks grew to canopy size thereafter, enabling the objective to be met by the 5th year post-burn.

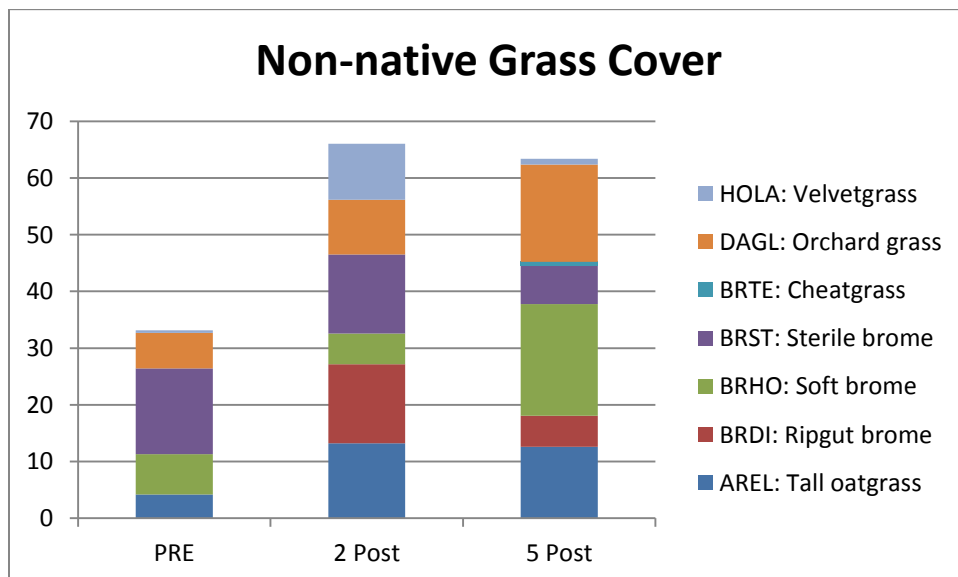
Shrubs: The objective to maintain a 5-40 percent cover of shrubs was achieved in the 2nd year post-burn (38.5 % cover), and narrowly missed in the 5th year post-burn (40.8% cover).

Surface Fuels: The individual fuel loads did not change much between the 2nd and 5th year post-burn with the exception of the litter and duff load. The litter and duff was significantly reduced by the 2nd year post-burn, declining by 8.1 tons per acre (pre = 9.6 t/ac; 2 post = 1.5 t/ac), easily meeting the objective to maintain 2 – 6 tons per acre. However, the litter and duff was close to its pre-burn loading by the 5th year post-burn (5 post = 8.7 t/ac). The total fuel load objective was met in the 2nd year post-burn, and not in the 5th year post-burn, due to the differences in litter and duff loadings.

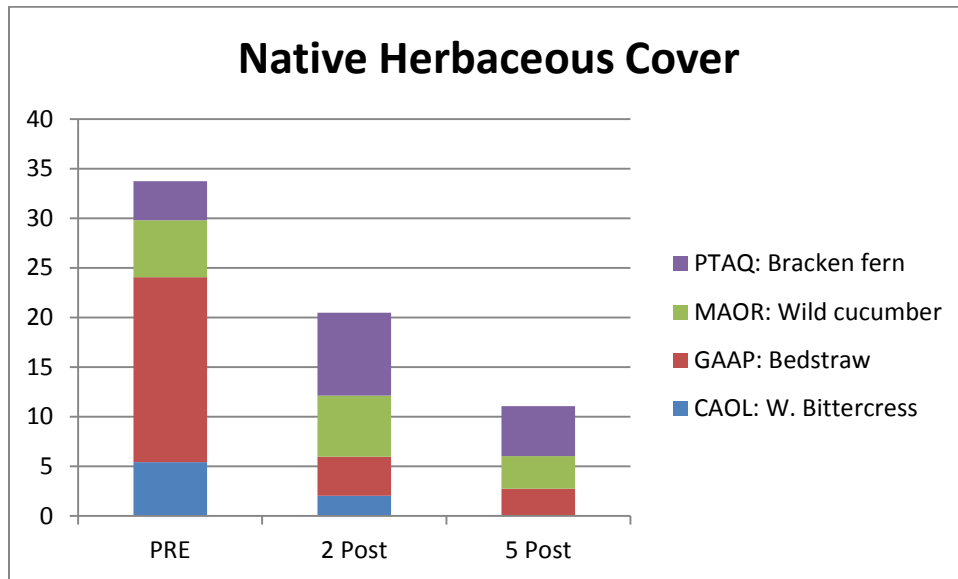
Understory: Native grass cover continues to improve following burning, increasing from less than 1 percent cover before treatment, to more than 8 percent by the 2nd year post-burn, and to more than 17 percent by the 5th year post-burn. The majority of this increase is Blue wildrye (*Elymus glaucus*). Interestingly, Alaska brome (*Bromus sitchensis*) and Desert fescue (*Vulpia microstachys*) were only present in the 2nd year post-burn, where they exceeded Blue wildrye cover.



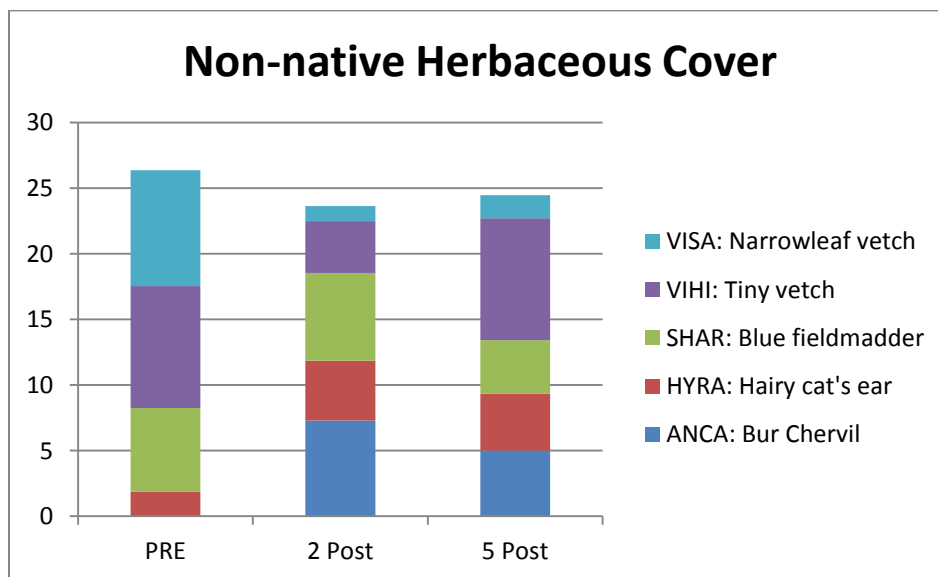
Non-native grass cover has increased substantially following treatment, doubling by the 2nd year post-burn, and declining slightly by the 5th year post-burn. Although there are 14 species of non-native grasses present in the plots, the graph only shows Cheatgrass (*Bromus tectorum*), because of its especially deleterious effects) and those species with an average cover above 10 percent in one or more of the reads. Orchard grass (*Dactylis glomerata*), Soft brome (*Bromus hordeaceus*) and Tall oatgrass (*Arrhenatherum elatius*) had the highest average cover by the 5th year post-burn.



The goal to increase the absolute cover of native herbaceous (forbs, ferns, sedges, vines) vegetation was not achieved. Absolute cover was at 34 percent before treatment, fell to 20 percent by the 2nd year post-burn, and to 11 percent by the 5th year post-burn. Four of 19 species had a cover greater than 5 percent in one or more reads; Bracken fern (*Pteridium aquilinum*), Wild cucumber (*Marah oreganus*), Bedstraw (*Galium aparine*), and Western bittercress (*Cardamine oligosperma*).



The goal to not exceed the pre-treatment cover of non-native herbaceous cover was achieved. The absolute cover was reduced following treatment, declining from 26% cover in the pre-treatment, to 24% and 25% cover in the 2nd and 5th years post-burn, consecutively. The graph above shows the relative cover of 5 of 20 non-native herbaceous species that had 5 percent cover or greater in one or more plot reads. Tiny vetch (*Vicia hirsuta*) was the most abundant species in both the pre- and 5th year post-burn plots, whereas Bur chervil (*Anthriscus caucalis*) was most prevalent in the 2nd year post-burn.





Julia Bartley collecting fire effects data at San Juan Island National Historical Park.



Jennifer Brown and Ben Saari completing a forest plot at John Day Fossil Beds National Monument



Sheah Mucci (bottom right) leading NPS Fire Effects crew in Rim fire during YOSE detail.

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?
John Day Fossil Beds NM	yes	2000	1	0
Lake Roosevelt NRA	yes	2013, revision in progress	1	0
North Cascades NP	yes	2010, revision in progress	3	1
San Juan Island NHP	yes	1998	1	0
Olympic NP	no	unknown	n/a	0

Table 5. Monitoring

Park	% 2014 Data Entered	% 2014 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored *	# BAER Treatments Monitored*
John Day Fossil Beds NM	100%	100%	5	0	0	0
Lake Roosevelt NRA	100%	100%	8	2	0	0
North Cascades NP	100%	100%	1	0	0	0
San Juan Island NHP	100%	100%	5	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?*
Lake Roosevelt NRA	1	1	1	Yes
North Cascades NP	1	1	2	Yes
San Juan Island NHP	1	1	1	Yes
Olympic NP	0	1	0	n/a

Table 7. Research - 2014

Park	Are research needs identified in FMP or Monitoring Plan?	# of Proposals Submitted in 2014	# of Proposals Funded in 2014	# of Research Projects Supported in 2014*	Additional Comments
Lake Roosevelt NRA	yes	0	0	0	
North Cascades NP	yes	0	1	1	Fire ecology research, Wilderness Character Report, NRCA assessment
San Juan Island NHP	yes	0	0	0	NRCA assessment
Olympic NP	no	0	0	0	
Mount Rainier NP	n/a	1	1	2	Lidar Fuel mapping, NRCA assessment

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

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	NOCA FMP Revision, NOCA READ guide
Presentations	2	FX-reports NOCA, LARO, SAJH, Seasonal Orientation, UW lab
NPS Meetings/ task groups	3	NOCA wilderness committee, NOCA housing committee, NOCA Resource Division meetings
Interagency work	5	NW Fire Science Consortium, F.S. Pacific Fire Science Lab, UW Fire and Mountain Ecology Lab Meetings
Wildfire assignments	7	Lone Mountain 1 GIS and WFDSS trainee
Prescribed fire projects	5	GIS work – shape files for treatment areas
Non-fire fuels projects	5	GIS work – shape files for treatment area documentation
Research	30	MORA Lidar Fuel Mapping research, NOCA fire history and severity research
Data collection	2	Stehekin Temperature Sensor data, Fire history
Data entry	2	NOCA fire history data
Data analysis	10	Fire effects YER, MORA fuel mapping report analyses, Wilderness Character Report fire interval analysis, NOCA NRCA Report
Supervision/Admin	15	Hiring, supervision, payroll, travel authorization/vouchers, purchasing, etc.
Training	1	Defensive Driving, Fire Refresher
Travel out-of-park for plot or project work	1	Include <u>travel time only</u> for distant, multi-day plot/project work requiring a travel authorization (Note: include data collection or project time associated with these trips in the plot or project categories above)
Miscellaneous	2	NOCA fire team meetings, Season AAR

D. Fire Effects crew accomplishments and areas of focus

Table 9. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	37%	The NPCB crew conducted 76 FMH plot reads at 4 different sites in 2014. Includes logistical prep time and foot travel to plots.
Wildfire and Detail Assignments	28%	FFT1, FFT2, HMGB(t) and READ duties on a variety of wildfire assignments in WA and OR. Includes Assistant Lead Fire Effects Monitor's 8 week Fire FX detail assignment to YOSE (Rim Fire)
Data entry	9%	Time includes data entry and error checking for NPCB and YOSE plots. Database cleanup.
Training	6%	Fire Refresher, L-280, S-230, S-231, S-371, Fundamentals V
Supervision/Admin	5%	Travel, payroll, credit card statements, logistics planning, vehicle maintenance, purchasing, hiring, performance evaluations
Travel out-of-park for plot or project work	5%	Travel from Marblemount to LARO, SAJH, JODA, NOCA (Stehekin)
RX Fire Assignments	3%	FEMO and FFT2 duties on LARO and SAJH RX burns
Non-Fire Fuels Treatments	3%	Cross training with NOCA fire crew
Miscellaneous	2%	Tablet computer testing, training SCA interns
Data analysis and YER completion	2%	Data analysis and completion of 2013 Year End Report

E. 2015 Direction

The NPCB Fire Ecology Program looks forward to another productive field season in 2015. The fire effects crew will consist of a lead, 2 seasonal monitors and 2 Student Conservation Association interns. The crew will continue to collect data into field tablets, thus enabling them to spend more time collecting data, and less on entering data into PCs at the end of the season. Plot work at LARO will be prioritized since a majority of the project work was completed there. The crew also looks forward to revisiting the plots that burned at SAJH in 2014. Another highlight will be collecting CBI data in the area burned in the 2014 Lone Mountain fire at NOCA.

F. Recommendations for FFI / FFI-lite

FFI

1. When entering “1” in the order column of the herbline (Cover-points metric) then automatically update point and tape number to the next position. This would greatly improve the efficiency of our most time intensive protocol.
2. Create the ability to save view settings in FFI and have them transfer through to FFI-Lite. (eg. column selection and column order)
3. Create the ability to select (Control-A) and copy a string of data points which can be pasted elsewhere.

FFILite

1. Bug: Dates of sample visits are not completely shown in Reports/Analysis tab.
2. Bug: “Canopy classification” changes to “O” whenever using the keyboard to enter values. This does not seem to be a problem when using the dropdown menu.
3. Bug: FFI-Lite randomly erases rows of data in the Cover Points protocol. It seems to be related to entering an unrecognizable species code, but at other times it also seems to occur even when the technician is taking extra care to enter data correctly.
4. Bug: We had the experience one plot this summer that numerous trees with the “CUS” crown code were deleted from a plot in FFI-Lite. The tree data was saved in FFI-Lite and later exported into FFI. When the tree data was reviewed in FFI the previously deleted trees with the “CUS” designation were still present. This event happened at the end of the field season. It is unclear whether this is somehow a fluke error on our side or an underlying issue. We will continue to monitor it in 2015.
5. When entering “1” in the order column of the herbline (Cover-points metric) then automatically update point and tape number to the next position. This would greatly improve the efficiency of our most time intensive protocol.
6. Create an autosave function to prevent accidental data loss during data collection in the field. Provide the ability to set the periodicity of autosaving.
7. Create a “Control-S” function for saving.
8. Provide the ability to copy fuels data from a previous read to a current read or the ability to autopopulate those parameters which do not change...ie transect, azimuth, slope, and sample location.
9. Create the ability to select (Control-A) and copy a string of data points which can be pasted elsewhere.

10. After saving tree data do not refresh the data to the top of the datasheet. Allow the cursor to remain in the position in which the last data was entered.
11. Create a popup notepad (scribblepad) feature for tallying 1,10, 100 hr fuels.