



**North Pacific / Columbia Basin
Fire Ecology Annual Report
Calendar Year 2011**

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North Cascades National Park**

A. 2011 Field Season Summary

The North Pacific / Columbia Basin (NPCB) Fire Effects Monitoring crew had an exciting and productive field season in 2011 completing a total of seventy-nine plot reads within North Cascades National Park (NOCA), John Day Fossil Beds National Monument (JODA), San Juan Island National Historical Park (SAJH), and Lake Roosevelt National Recreation Area (LARO).

The crew began the field season by installing and reading six new FMH forest plots at LARO; three of which were installed in a new monitoring type, Ponderosa Pine/Bitterbrush, which represents the driest and most southern burn unit at Lake Roosevelt. Two post-burn reads were also completed in the Kettle Falls Admin unit further to the north.

Next the crew travelled to SAJH to install two new FMH forest plots on Young Hill and revisit six additional forest plots in the English Camp unit.

Two SCA Fire Effects Monitoring interns assisted the NPCB crew with FMH plot work at NOCA and JODA during the 2011 field season. They provided essential assistance in completing our substantial workload. Another two SCA Fire Ecology interns assisted the fire ecologist in revisiting fire ecology research plots that burned in the Rainbow Bridge wildfire.

In late June the NPCB crew travelled to JODA in central Oregon where they revisited plots in the Picture Gorge Burn Unit. Confronted by the John Day River in advanced flood stage, the crew was forced to adopt arduous alternate routes to reach the remote FMH forest and brush plots. Despite exceptionally long days, the crew was able to complete all nine plots safely and within the allotted time.

In 2011 the bulk of the summer's plot work occurred at NOCA. As a result of the 2010 Rainbow Bridge wildfire along the eastern slopes of the Stehekin Valley, ten of the thirteen remote "valley contour" FMH forest plots were consumed to various degrees. In order to maximize efficiency and crew safety, immediate post-burn, year one post-burn, and CBI plots were performed at each

plot during the same visit. An additional fourteen CBI plots were installed and read within the fire perimeter. Furthermore, six post-burn reads were conducted in the Stehekin valley bottom; of which four were fifteen year post-burns. The NPCB crew rounded out the summer with the installation of four new forest plots in the Coon Lake burn unit.

In October the NPCB crew participated as both fire monitors (FEMO)s and fire crew members on numerous prescribed fires at LARO. Due to brief spring and fall burn windows no FMH plots were treated by broadcast burning this year. However, numerous plots were thinned and pile burned which will result in an active fieldwork season in 2012.

NPCB crew members also engaged in a variety of additional opportunities in 2011. The Fire FX Lead returned to the Deep Water Horizon Oil Spill in the Gulf of Mexico to serve as Resource Advisor as well as acting as a Lead READ on a Type 1 wildfire assignment. Another crewmember served for a two week wildfire assignment on an NPS engine. Crew members participated as wildland firefighters on five additional fire assignments.

Table1. Fire Effects Plot Workload 2011

Park	Vegetation Monitoring Type	Plot Type	Pre-burn	Immed. Post-burn	Post-thin	Postburn (1-20 yrs)	Annual Total (2011)	Total Plots
John Day Fossil Beds NM	Big Sagebrush/Bunchgrass	FMH Brush	0	0	0	6	6	21
	Western Juniper Shrubland	FMH Forest	0	0	0	3	3	16
Lake Roosevelt NRA	Ponderosa Pine/ Common Snowberry Forest	FMH Forest	6	0	1	1	8	37
	Ponderosa Pine/Bitterbrush	FMH Forest	3*	0	0	0	3	3
North Cascades NP	Stehekin Valley FFRA: Mixed Conifer	FMH Forest	0	0	0	6	6	37
	Stehekin Valley Contours (Open/Mid/Closed Canopy Mixed Conifer)	FMH Forest	4	10	0	10	20	23
	Rainbow Bridge Wildfire	CBI	0	24	0	0	24	-
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	2	0	1	5	9	12
	Douglas Fir/ Lodgepole (permanent RAPS plots)	Rapid Assessment	0	0	0	0	0	4
	Annual Brome Grasses	FMH Grass	0	0	0	0	0	10
Whitman Mission NHS	Giant Wild Rye – Meadow Restoration	FMH Grass	0	0	0	0	0	5
Total			15	34	2	31	79	173

Pilot sampling plots*

Table 2. Fire Ecology Staffing 2011

Ecologist and Monitors	Start Date	End Date	# Pay Period	Training – Formal	Development
Karen Kopper Fire Ecologist	1/01/11	n/a	26	Fire Refresher	UW fire severity and fire history research in pursuit of PhD
Cedar Drake Lead Fire Effects Monitor	3/26/11	12/31/11	20	Fire Refresher, S-131, S-200, S-211, NPS Fundamentals2, Supervisory Training	Lead READ wildfire assignment, READ assignment on DWH Oil Spill
Sheah Mucci Assistant Lead Fire Effects Monitor	4/22/11	10/2/11	12	Fire Refresher, S-131, S-200, S-211	FALA taskbook experience, RX and wildfire assignments
Robbie Andrus Fire Effects Monitor	4/22/11	10/2/11	12	Fire Refresher, S-131, S-200, S-211	RX and wildfire assignments, UW GIS certificate program
Isabella Welch SCA-Fire Effects Monitoring Intern	6/8/11	8/24/11	6	First Aid/ CPR, Defensive Driving	Fire Effects and botany training with NPCB crew
Alexandra Soper SCA-Fire Effects Monitoring Intern	6/8/11	8/24/11	6	First Aid/ CPR, Defensive Driving	Fire Effects and botany training with NPCB crew
Jason Webster SCA-Fire Ecology Intern	6/12/11	9/3/11	6	First Aid/CPR, Defensive Driving, Fire Refresher	Fire Ecology training
Nicholas Casey SCA-Fire Ecology Intern	6/12/11	9/3/11	6	First Aid/CPR, Defensive Driving	Fire Ecology training

Table 3a. Management Objectives and Monitoring Results

North Cascades National Park



FPSME2-9 Q3-Q2
Douglas Fir / Ponderosa Pine Forest
Pre-burn (2000)



FPSME2-9 Q3-Q2
Douglas Fir / Ponderosa Pine Forest
5 Years after 1st Burn of a Thinned Unit: 04YR05 (2010)



FPSME2-5 Q3-Q2
Douglas Fir / Ponderosa Pine Forest
Pre-treatment (1997)



FPSME2-5 Q3-Q2
Douglas Fir / Ponderosa Pine Forest
5 Years after 2nd Burn of a Thinned Unit: 05YR05 (2008)

North Cascades National Park

Monitoring Objectives Douglas-fir/ Ponderosa pine Forest (FPSME2D08)	04YR05 (5 years after 1 RX burn + 1 thin)		05YR05 (5 years after 2 RX burns + 1 thin)	
	Monitoring Results	Objectives Achieved?	Monitoring Results	Objectives Achieved?
1) Decrease live pole density by 50-85% trees/acre (t/ac)	1) x=75.8% Reduction, 90%CI: (33.9<x<117.7) n=13, PRE= 68.2 t/ac, SD=58.1; 04YR01 (n=11) = 20.6 t/ac, SD=24.2; 04YR05= 16.5 t/ac, SD= 21.6	1) Yes	1) x=87.0 % Reduction, 90%CI: 58.3<x<115.6) n=8, PRE= 82.0 t/ac, SD=34.0; 05YR01= 16.7 t/ac, SD= 20.7; 05YR05= 10.6 t/ac, SD=11.8	1) Over-achieved
2) Reduce overstory tree density by 30-60% trees/acre (t/ac)	2) x= 37.0 % Reduction, 90%CI: (22.0<x<51.9) n=13, PRE= 126.4 t/ac, SD=55.7, 04YR01(n=11) = 77.6 t/ac, SD=29.6; 04YR05=79.7 t/ac, SD =28.5	2) Yes	2) x=51.8% Reduction, 90%CI: (30.4<x<73.2) n=8, PRE= 139.6 t/ac, SD=59.5; 05YR01= 69.8 t/ac, SD=26.3; 05YR05= 67.3 t/ac, SD=25.8	2) Yes
3) * Reduce Total Basal Area (ft ² /acre) by 40-60%	3) x=21.5 % Reduction, 90%CI:(10.7<x<32.5), n=13, PRE= 134.2 ft ² /acre, SD= 49.0; 04YR01 (n=11) 106.1 ft ² /acre, SD= 40.0; 04YR05= 105.2 ft ² /acre, SD=33.4	3) No	3) x=41.3 % Reduction, 90%CI:(25.2<x<57.4), n=8, PRE= 153.1 ft ² /acre, SD=46.4; 05YR01= 127.5 ft ² /acre, SD=103.2; 05YR05=89.9 ft ² /acre, SD= 29.3	3) Yes
4) Accept individual exotic species to increase by no more than 20% cover	4) a. 16.7 % increase in cover Cheatgrass (<i>Bromus tectorum</i>) 90%CI: (-0.88<x<1.19), n=11, PRE= 0.14 % cover, SD=0.20; 04YR01(n=11) = 0.25 % cover, SD=0.55; 04YR05=0.16 % cover, SD= 0.36	4)a. Yes	4) a. 100 % increase in cover Cheatgrass (<i>Bromus tectorum</i>) 90%CI (p=0.32), n=8, PRE= 0 % cover, SD=0; 05YR01= 0.08 % cover, SD=0.21; 05YR05= 0.64% cover, SD=1.69	4)a. No
	b. 100% Increase for Kentucky Blue Grass (<i>Poa pratensis</i>) and Wall Lettuce (<i>Mycelis muralis</i>) 04YR05=0.02% cover 0% Increase for Prickly Lettuce (<i>Lactuca serriola</i>) 04YR05=0.07% cover	b. No (POPR & MYMU) Yes (LASE)		b. No

North Cascades National Park

North Cascades National Park				
Monitoring Objectives Douglas-fir/ Ponderosa pine Forest (FPSME2D08)	04YR05 (5 years after 1 RX burn + 1 thin)		05YR05 (5 years after 2 RX burns + 1 thin)	
	Monitoring Results	Objectives Achieved?	Monitoring Results	Objectives Achieved?
5) Increase native ground cover by 10-30%	5) x= 8.82% increase in cover, 90%CI: (-5.83<x<23.50), n=13, PRE= 29.3% cover, SD=18.5; 04YR01 (n=11) =20.0% cover, SD=8.6; 04YR05= 31.7% cover, SD=16.8	5) Not yet	5) x= 39.40% increase in cover, 90% CI: (9.50<x<69.28), n=8, PRE= 31.9% cover, SD=22.6; 05YR01= 30.49% cover, SD=14.54; 05YR05= 44.5 % cover, SD=17.7	5) No (Over-achieved)
6) Fuel Load Reduction				
a) Reduce fuel loading of 1-hour fuels by 55-90% tons/acre (ton/ac)	6a) x= 9.43% reduction, 90%CI:(-9.62<x<8.00) n= 13, PRE=0.53 ton/ac, SD=0.18; 04YR01(n=11) = 0.38 ton/ac, SD=0.21; 04YR05=0.48 ton/ac, SD=0.25	6a) No	6a) x= 7.69% reduction, 90%CI:(-24.94<x<40.33) n= 8, PRE=0.43 ton/ac, SD=0.15; 05YR01= 0.34 ton/ac, SD=0.12; 05YR5= 0.40 ton/ac, SD= 0.20	6a) No
b) Reduce fuel loading of 10-hour fuels by 45-65% tons/acre (ton/ac)	b) x= 12.90% increase, 90%CI:(-44.73<x<70.61) n= 13, PRE= 1.31 ton/ac, SD=0.68; 04YR01 (n=11) = 1.27 ton/ac, SD= 1.01; 04YR05=1.48 ton/ac, SD=1.33	b) No	b) x= 26.47% increase, 90%CI:(-18.16<x<71.09) n= 8, PRE=1.23 ton/ac, SD=0.63; 05YR01=1.01 ton/ac, SD=0.36; 05YR5= 1.55 ton/ac, SD=0.63	b) No
c) Reduce fuel loading of 100-hour fuels by 15-35% tons/acre (ton/ac)	c) x= 43.87% increase, 90%CI:(-26.7<x<114.43) n= 13, PRE=1.06 ton/ac, SD=0.85; 04YR01(n= 11) = 0.81 ton/ac, SD=0.71; 04YR05=1.53 ton/ac, SD= 1.39	c) No	c) x= 260.93% increase, 90%CI:(118.52<403.33) n= 8, 00, PRE=0.54 ton/ac, SD=0.32; 05YR01= 0.90 ton/ac, SD=0.69; 05YR05= 1.95 ton/ac, SD=1.32	c) No
d) Reduce 1,000-hour fuels by 0-20% tons/acre (ton/ac)	d) x= 90.78% increase, 90%CI:(38.33<x<143.23) n=13, PRE=3.5 ton/ac, SD=3.0; 04YR01(n =11) = 5.9 ton/ac, SD=3.3; 04YR05=6.6 ton/ac, SD=4.2	d) No	d) x= 146.50% increase, 90%CI:(73.81<x<218.97) n= 8, PRE=4.43 ton/ac, SD=2.5; 05YR01= 8.2 ton/ac, SD=3.7; 05YR05= 10.9 ton/ac. SD= 5.2	d) No
e) Reduce Litter and duff by 10 – 90%	e) x= 38.5% Reduction, 90%CI: (21.6<x<55.4) n= 13, PRE=21.3 ton/ac, SD=7.8; 04YR01 = 12.0 ton/ac, SD=3.4; 04YR05 =13.1 ton/ac, SD=4.8	e) Yes	e) x= 51.0% Reduction, 90%CI:(25.3<x<76.8) n= 8, PRE=25.1 ton/ac, SD=8.8; 05YR01= 10.0 ton/ac, SD=2.3; 05YR05= 12.3 ton/ac, SD=5.6	e) Yes

North Cascades National Park

Fire effects monitoring plots are utilized to track fuel reduction and restoration objectives for tree density, understory cover, and dead and downed fuel loads in the Stehekin Valley. Each unit is thinned and burned as needed. Thirteen plots were thinned and burned once five years ago (04YR05), and eight plots were thinned once and burned twice five years ago (05YR05). This is a robust sample, producing a reliable comparison of the treatment effects that remain five years after one or two burns.

Trees: The objectives to reduce pole trees (≤ 14.9 cm dbh) and overstory trees (> 15 cm dbh) were met with one burn (75.8 percent reduction poles, 37.0 percent reduction overstory), and slightly overachieved with the second burn (87.0 percent reduction poles, 51.8 percent reduction overstory). However, it took two burns to achieve the desired basal area reduction of 40 to 60 percent (21.5 percent reduction with one burn, 41.3 percent reduction with two burns).

Exotic Species: Cheatgrass (*Bromus tectorum*) is the exotic species of greatest concern in the Stehekin valley. Cheatgrass remained at acceptable levels five years after one thin and burn (16.7 percent increase from pre-treatment). Cheatgrass cover was 0.14 percent cover in the pre-treatment, increased to 0.25 percent cover by the first year post-treatment, and declined to 0.16 percent cover in the fifth year post-treatment. Unfortunately Cheatgrass spread to new areas after the second burn (100 percent increase). There was no Cheatgrass encountered in the plots in the pre-treatment reads, a 0.08 percent cover by the first year post-treatment, and a 0.64 percent cover by the fifth year following the second burn.

Prickly lettuce (*Lactuca serriola*) cover remained constant at 0.07 percent by the fifth year after one thin and burn. Kentucky Blue Grass (*Poa pratensis*) and Wall Lettuce (*Mycelis muralis*) appeared for the first time in the fifth year after one thin and burn with 0.02 percent cover each. Bulbous Blue Grass (*Poa bulbosa*) was the only exotic species other than Cheatgrass to occur in the plots that were thinned and burned twice. It appeared for the first time in the fifth year with 0.04 percent cover.

Native Ground Cover: Native ground cover (forbs, grasses, grass-like, ferns and vines) increased by 8.8 percent on plots that burned once, and by 39.4 percent on plots that burned twice. The same species were most abundant on plots that burned once or twice; Bluebunch wheatgrass (*Pseudoroegneria spicata*, 6 and 12 percent cover respectively), Pinegrass (*Calamagrostis rubescens*, 10 and 13 percent cover respectively), and Scouler's woollyweed (*Hieracium scouleri* 5 and 6 percent cover respectively). Technically, the ground cover in the plots that burned twice is greater than desired, although the present levels are not concerning.

Fuel Loading: Litter and duff are the only fuel class where objectives have been met; plots that were thinned and burned once or twice had a 38.5 percent and 51.0 percent reduction, respectively. Otherwise, woody fuel tonnage increased in all fuel classes except for 1-hour fuels, which had modest reductions of 9.4 percent and 7.7 percent after one or two burns, respectively. Ten hour fuels (0.25" to 1" diameter) had a moderate increase (12.9 percent thin and burn; 26.5% thin and two burns), whereas hundred hour (1" to 3" diameter) and thousand hour fuels (>3 " diameter) had substantial increases after thinning and burning (43.9 (100 hour) and 90.8 (1000 hour) percent thin and burn; 260.9 (100 hour) and 146.5 (1000 hour) percent thin and two burns).

Recommendations: The plots that have been thinned and burned once have met tree density objectives, whereas plots that have been thinned and burned twice have overachieved pole density reduction objectives due to latent tree mortality that occurs between the second and fifth year post-burn. Plots that have been thinned and burned once are also closer to meeting fuel reduction objectives than plots that have been thinned once and burned twice. Pile burning may be required to reduce large diameter woody fuels.

Cheatgrass levels were found to have increased to an unacceptable amount following the second burn. Cheatgrass will be monitored in the burn units before and after future treatments.

Table 3b. Management Objectives and Monitoring Results

John Day Fossil Beds National Monument



FJUOC1-9 Q2-Q3
Western Juniper Shrubland
Pre-burn (2000)



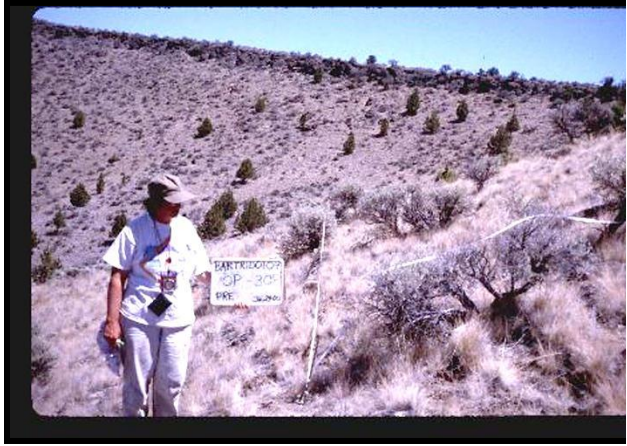
FJUOC1-9 Q2-Q3
Western Juniper Shrubland
10 Year Post-burn (2011)



FJUOC1-5 Q3-Q2
Western Juniper Shrubland
Pre-burn (2000)



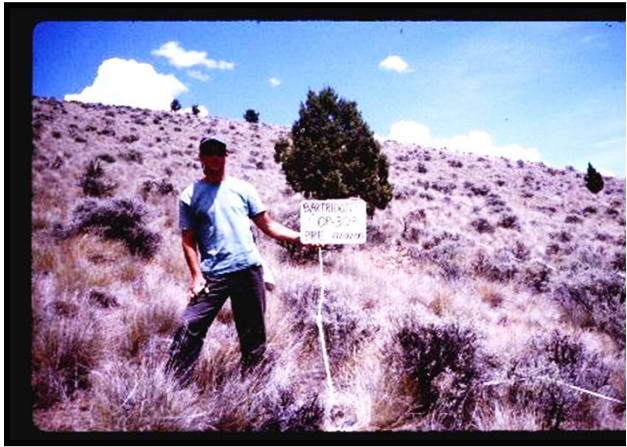
FJUOC1-5 Q3-Q2
Western Juniper Shrubland
10 Year Post-burn (2011)



BARTR1-9 0P-30P
Big Sagebrush/ Bunchgrass
Pre-burn (2000)



BARTR1-9 0P-30P
Big Sagebrush/ Bunchgrass
10 Years Post-burn (2011)



BARTR1-11 0P-30P
Big Sagebrush/ Bunchgrass
Pre-burn (2000)



BARTR1-11 0P-30P
Big Sagebrush/ Bunchgrass
10 Years Post-burn (2011)

JODA: John Day Fossil Beds National Monument

Western Juniper Forest (FJUOC1D06)	01YR05 (5 Years Post-Broadcast Burn)		01YR010 (10 Years Post-Broadcast Burn)	
	Monitoring Results	Objectives Achieved?	Monitoring Results	Objectives Achieved?
Monitoring Objectives				
1) Reduce density of junipers 10 – 40 % trees/ac (t/ac) by 1 year post-burn	1) x=23.4% Reduction, 90%CI: (6.7<x<40.1) n=6, PRE=43.2 t/ac, SD= 30.3; 01YR01=35.8 t/ac, SD=25.9; 01YR05= 33.1 t/ac, SD=26.8	1) Yes	1) 1) x=21.9% Reduction, 90%CI: (3.2<x<40.6) n=6, PRE=43.2 t/ac, SD=30.3; 01YR05=33.1 t/ac, SD=26.8; 01YR10= 33.7 t/ac, SD=29.7	1) Yes
2) Reduce shrub density by 20 – 60 % shrubs/acre (s/ac) by 1 year post-burn	2) x=58.0% Reduction, 90%CI: (18.6<x<97.4) n=6, PRE=379.1 s/ac, SD=149.6; 01YR01=207.7 s/ac, SD=112.3; 01YR05 =159.2 s/ac, SD=90.1	2) Yes	2) x=44.3% Reduction, 90%CI: (1.9<x<86.6) n=6, PRE=379.1 s/ac, SD=149.6; 01YR05=159.2 s/ac, SD=90.1; 01YR10 =211.3 s/ac, SD=55.9	2) Yes
3) Reduce or maintain non-native grass cover within 10% of pre-burn cover by 2 nd year post-burn.	3) x=182.4% Increase, 90%CI: (107.5<x<257.4) n=6, PRE=9.7% cover, SD=7.7; 01YR01=13.1 % cover, SD=10.0; 01YR05=27.5 % cover, SD=15.0	3) No	3) x=212.4% Increase, 90%CI: (115.4<x<309.3) n=6, PRE=9.7% cover, SD=7.7; 01YR05=27.5% cover, SD=15.0; 01YR010=30.4 % cover, SD=18.1	3) No
Big Sagebrush Shrubland (BARTR1D02)	01YR05 (5 Years Post-Broadcast Burn)		01YR010 (10 Years Post-Broadcast Burn)	
	Monitoring Results	Objectives Achieved?	Monitoring Results	Objectives Achieved?
Monitoring Objectives				
1) Reduce shrub density by 20 – 60 % shrubs/acre (s/ac) by 1 year post-burn	1) x=70.5% Reduction, 90%CI: (49.9<x<91.1) n=11, PRE=424.3 s/ac, SD=115.8; 01YR01=110.4 s/ac, SD=116.0; 01YR05=125.1 s/ac, SD=129.0	1) No (Over-achieved)	1) 1) x=69.4% Reduction, 90%CI: (53.8<x<84.9) n=11, PRE=424.3 s/ac, SD=115.8; 01YR05=125.1 s/ac, SD=129.0; 01YR10=130.0 s/ac, SD=95.6	1) No (Over-achieved)
2) Reduce or maintain non-native grass cover within 10% of pre-burn cover by 2nd year post-burn.	2) x=23.8% Increase, 90%CI: (0.4<x<47.2) n=11, PRE=50.8% cover, SD=31.5; 01YR01= 38.6% cover, SD=23.6; 01YR05=62.9% cover, SD=31.8	2) No	2) x=14.9% Increase, 90%CI: (-5.8<x<35.4) n=11, PRE=50.8% cover, SD=31.5; 01YR05=62.9% cover, SD=31.8; 01YR10=58.4% cover, SD=27.6	2) No

John Day Fossil Beds National Monument

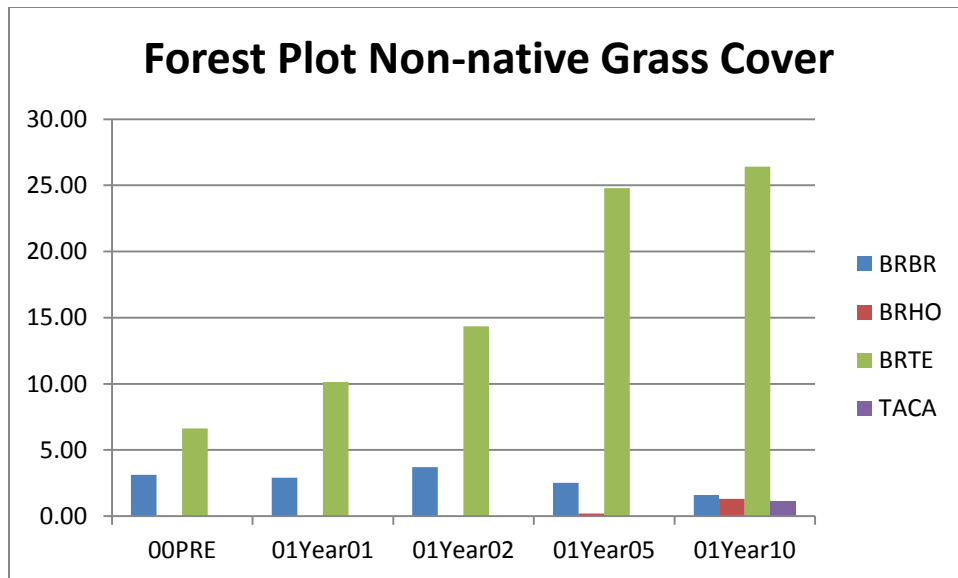
The primary objectives for prescribed burning in the juniper forest and sagebrush shrublands are to reduce encroachment of juniper into the shrublands, and sagebrush into the grasslands. A secondary goal is to prevent the increase of non-native grass cover. The monitoring results in this report compare fifth and tenth year post-burn effects on forest and shrub-dominated plots in the Windy Point and Picture Gorge prescribed fire units.

Trees: The objective to reduce juniper encroachment in the forested areas was achieved within 1 year of prescribed burning, with a 17.2 percent reduction in the number of trees per acre (35.8 trees per acre). An additional 6.2 percent juniper mortality occurred by the fifth year post-burn (33.1 trees per acre). Juniper density was on the incline again by the tenth year post-burn (33.7 trees per acre).

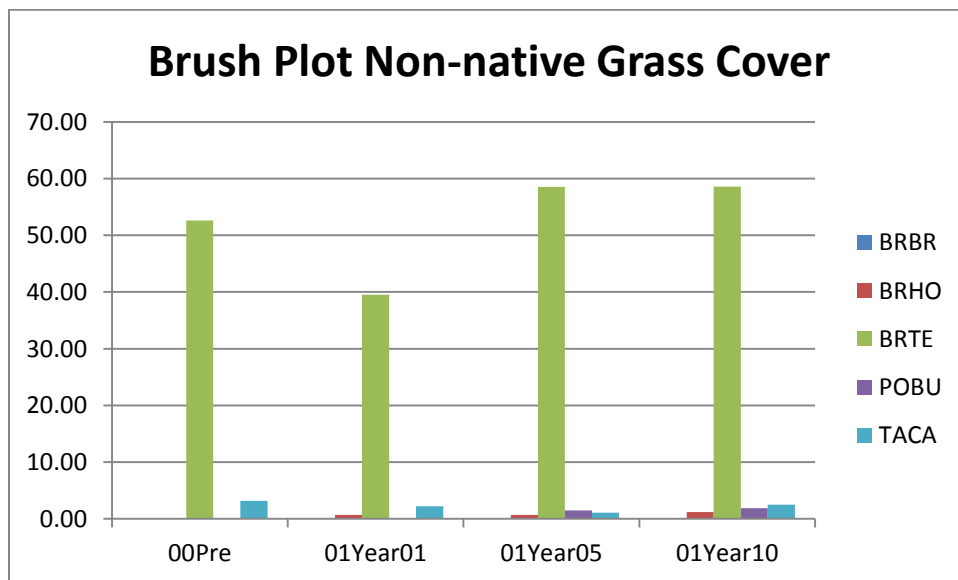
Shrubs: The objective to reduce shrub density by twenty to sixty percent was achieved in the forest within the first year post-burn (45.2 percent reduction to 207.7 shrubs per acre), however it was overachieved in the shrub-dominated areas (74.0 percent reduction to 110.4 shrubs per acre). Shrub density continued to decline through the fifth year post-burn in the forest (58 percent reduction, 159.2 shrubs per acre), but remained within the targeted range of conditions, and by the tenth year post-burn it had recovered to 44.3 percent of the pretreatment condition (211.3 shrubs per acre). Shrub recovery on the brush-dominated sites was much slower, and still exceeded the targeted range by the tenth year post-burn; shrub density was 70.5 percent (125.1 shrubs per acre) less than the pretreatment condition on the fifth year post-burn, and 69.4 percent (130.0 shrubs per acre) less on the tenth year post-burn. The shrub composition in both units is predominantly Big Sagebrush (*Artemisia tridentata*) and Rabbitbrush (*Gutierrezia sarothrae*).

Non-Native Grass Cover: Non-native grasses responded differently on the forest and shrub-dominated sites. Non-native grass cover on the forested sites increased by 26 percent (13.1 percent cover) after the first year post-burn, failing to meet the objective to remain within ten percent of the pre-treatment condition. Non-native grass cover continued to increase through the tenth year post-burn (182.4 percent increase by fifth year post-burn; 212.4 percent increase by tenth year post-burn) on the forested sites. Alternatively, non-native cover declined by 47 percent (31.5 percent cover) after the first year post-burn on the brush-dominated sites. Non-native grass cover had increased to 23.8 percent above the pre-treatment condition by the fifth year post-burn, and then fell again to 14.9 percent above the pre-treatment cover by the tenth year post-burn.

Other Fire Effects: Please see the graphs below for information about individual plant species changes over time. All species with greater than 0.3 percent cover are included in the analyses.

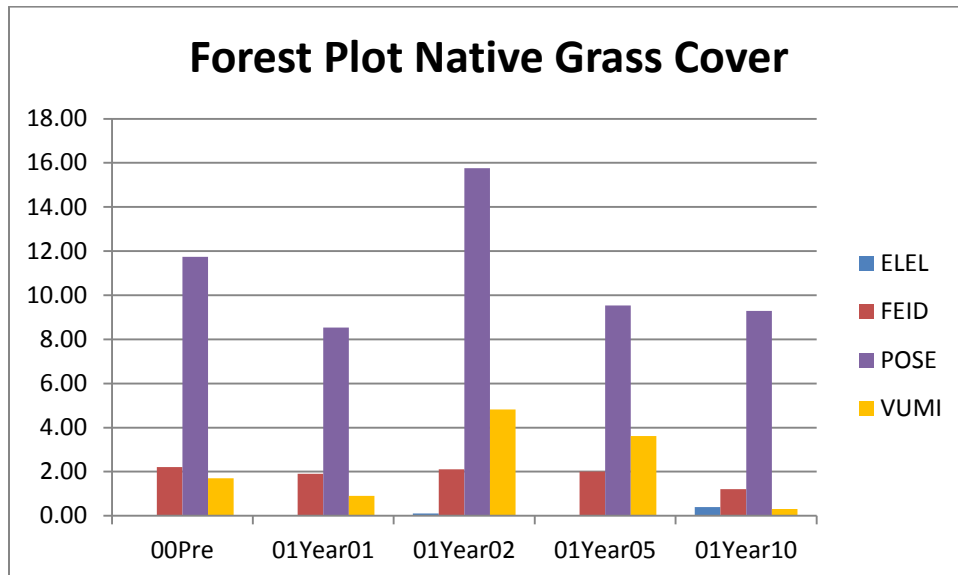


Cheatgrass (*Bromus tectorum*) was the dominant non-native grass species in forested plots. Cheatgrass cover continued to increase each year for ten years. Soft brome (*Bromus Hordeaceus*) and Medusa-head (*Taeniatherum caput-medusae*) appeared five and ten years following the burns.

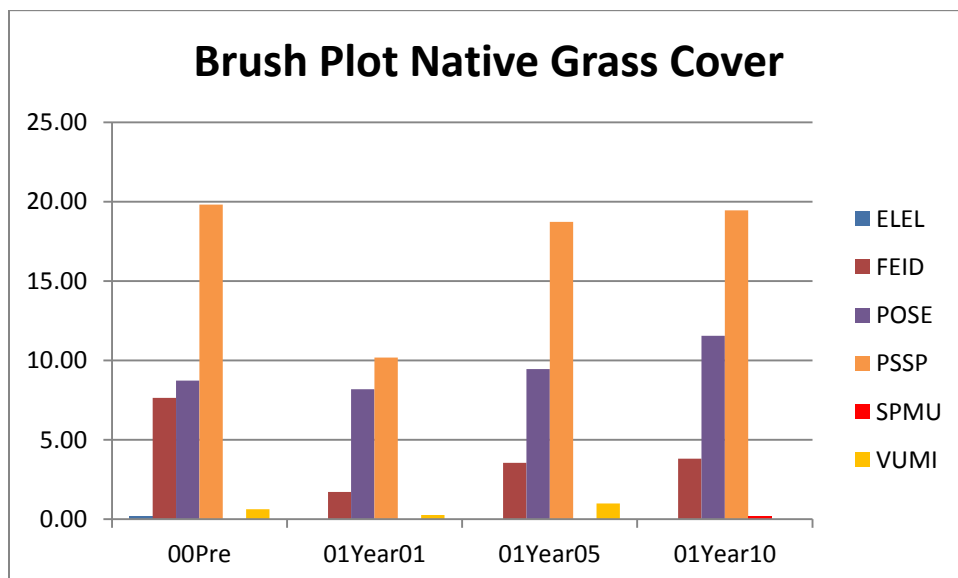


Cheatgrass was the dominant non-native grass in brush plots, where its cover initially declined after burning and then exceeded its pre-burn cover by the fifth year post-burn. Species composition was similar to that of forested plots with the exception of Bulbous bluegrass (*Poa bulbosa*), which was only found on brush plots.

Native Grass Cover:

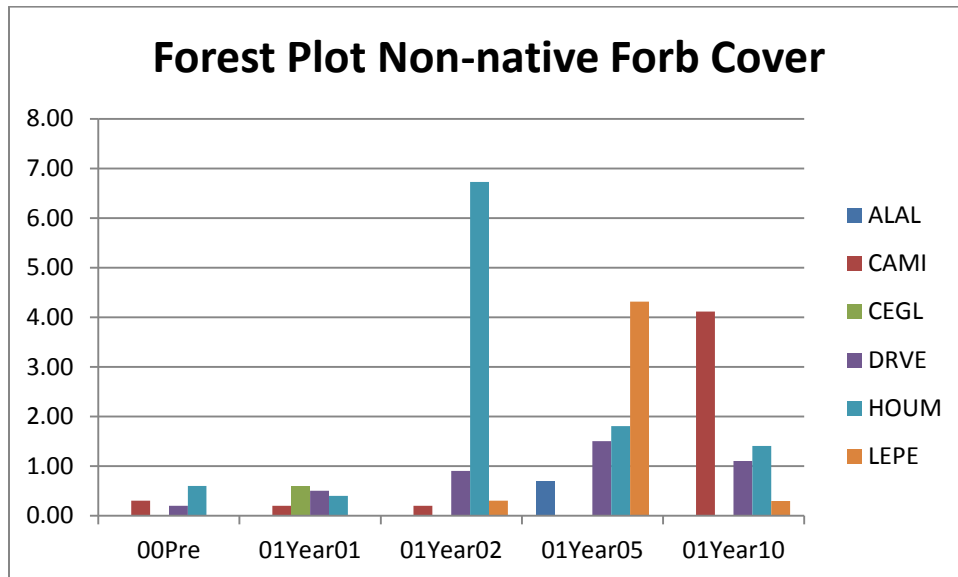


Sandberg bluegrass (*Poa secunda*) was the dominant native grass on forested plots. Its cover declined following the burn, increased in the second year post-burn, and then stabilized at slightly below the pre-burn cover in the fifth year post-burn. The other native grasses present on the forest plots were Squirreltail (*Elymus elymoides*), Idaho fescue (*Festuca idahoensis*), and Small fescue (*Vulpia microstachys*).

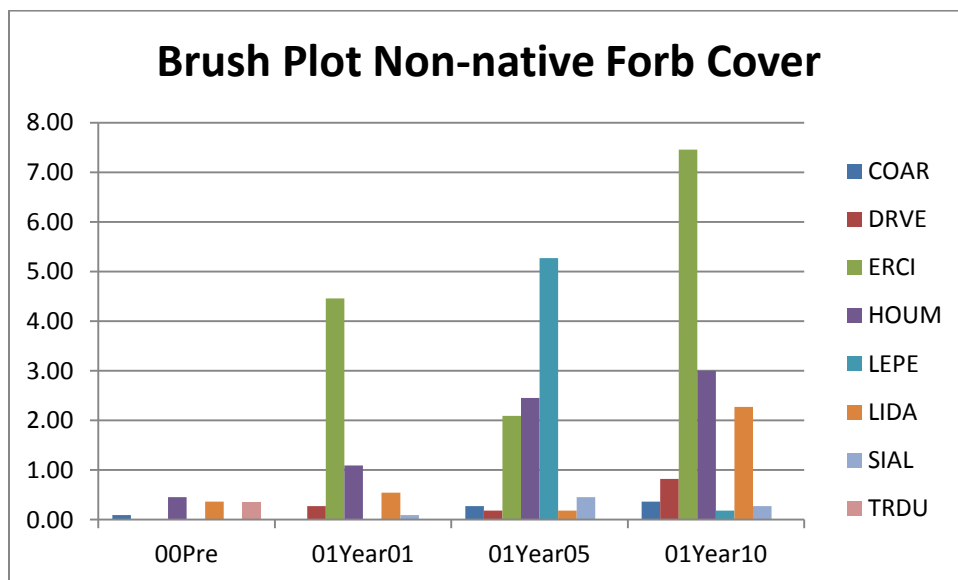


Bluebunch wheatgrass (*Pseudoroegneria spicata*) was the dominant native grass species on the brush plots, although Sandberg bluegrass was also common. Bluebunch wheatgrass cover declined significantly following the burn but was close to regaining its pre-burn cover by the fifth year post-burn. Sand dropseed (*Sporobolus cryptandrus*) was present in addition to the other grass species found on forest plots.

Non-native Forb Cover:

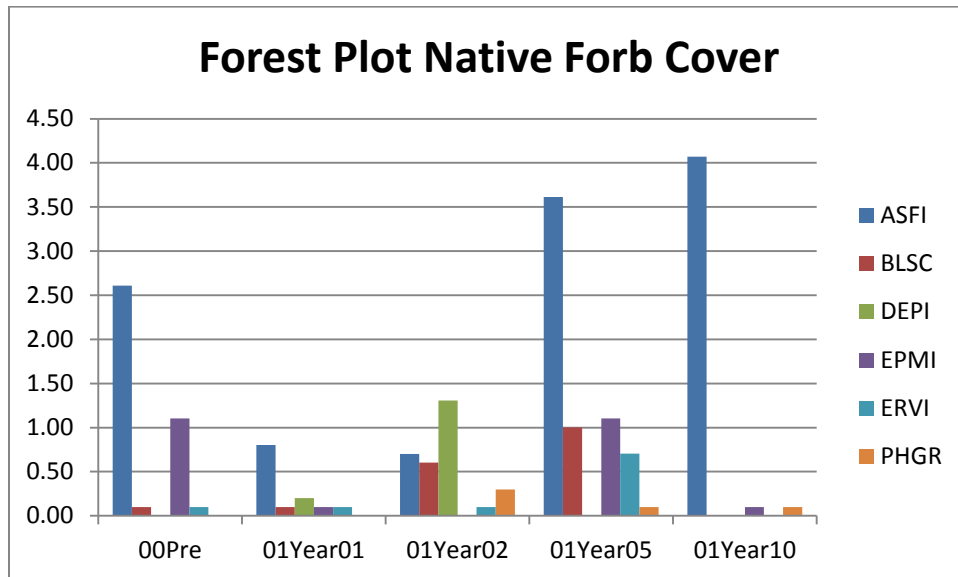


Jagged chickweed (*Holosteum umbellatum*), Claspig pepperweed (*Lepidium perfoliatum*) and Littlepod false flax (*Camelina microcarpa*) were the most prevalent non-native forbs in the burned forest plots. Spring draba (*Draba verna*), Pale madwort (*Alyssum alyssoides*), and Sticky chickweed (*Cerastium glomeratum*) were also common.

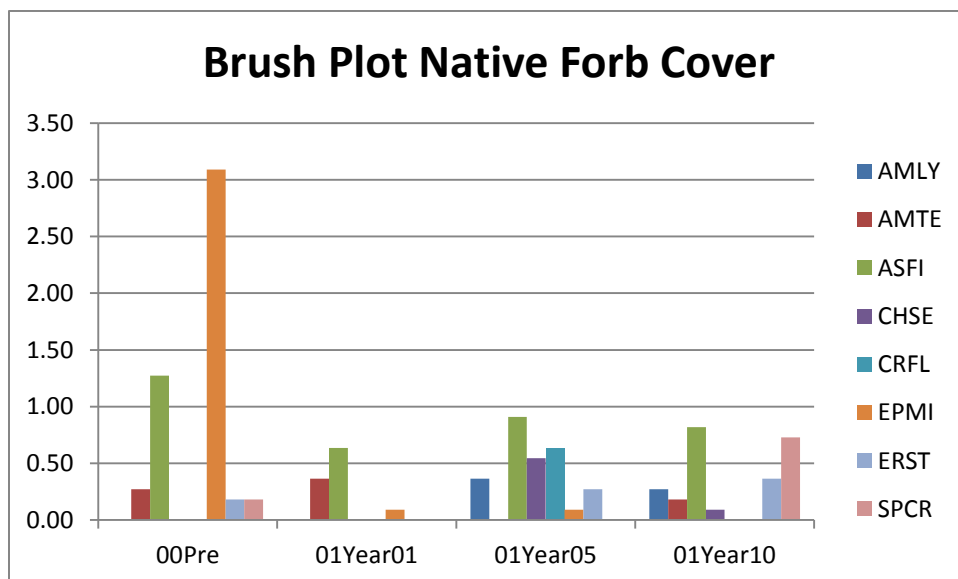


The most common non-native forbs on the burned brush plots were Redstem stork's bill (*Erodium cicutarium*), Claspig pepperweed, Dalmation Toadflax (*Linaria dalmatica*) and Jagged chickweed. Other common species were Field bindweed (*Convolvulus arvensis*), Spring draba, Tall tumbledustard (*Sisymbrium altissimum*), and Yellow salsify (*Tragopogon dubius*).

Native Forb Cover:



Basalt milkvetch (*Astragalus filipes*) was the dominant native forb on the forest plots. It was prevalent before the burn, declined for two years after burning, and then exceeded its pre-burn cover by the fifth year post-burn. Rough eyelashweed (*Blepharipappus scaber*), Paradise tansymustard (*Descurainia pinnata*) and Slender phlox (*Phlox Gracilis*) cover increased after burning. Leafy willowherb (*Epilobium minutum*) cover declined after burning until the fifth year post-burn, and Bailey's buckwheat (*Eriogonum vimineum*) remained constant until the fifth year post-burn.



Leafy willowherb was the most common native forb on the brush plots before the burn, but declined significantly following burning and disappeared entirely by the tenth year after burning. Basalt milkvetch cover declined in the first year post-burn, but began to recover by the fifth year post-burn. Douglas' buckwheat (*Eriogonum strictum*) and Spike dropseed (*Sporobolus cryptandrus*) both disappeared after burning until the tenth year post-burn. Bristly fiddleneck

(*Amsinckia tessellata*), Thymeleaf sandmat (*Chamaesyce serpyllifolia*) and Weakstem cryptantha (*Cryptantha flaccida*) were common in some years and absent in others.

Recommendations: Fire is not recommended as a tool for shrub reduction on forest or brush plots. Shrub cover on brush plots is still below stated objectives ten years after burning. The shrubs are recovering on forest plots, but Cheatgrass cover continues to increase ten years following burning.

Table 3c. Management Objectives and Monitoring Results

San Juan Island National Historic Park



FQUGA1-2 Q1-Q4
Garry Oak Woodland
Young Hill Unit
Post initial thin (1998)



FQUGA1-2 Q1-Q4
Garry Oak Woodland
Young Hill Unit
2 Years following the 2nd Burn of a Thinned Unit (2011)



FQUGA1-2 Q2-Q3
Garry Oak Woodland
Young Hill Unit
Post initial thin (1998)



FQUGA1-2 Q2-Q3
Garry Oak Woodland
Young Hill Unit
2 Years following the 2nd Burn of a Thinned Unit (2011)

SAJH: San Juan Island National Historic Park

Garry Oak Woodland (FQUGA1D02) Objectives	05YR02 (2 Years after 2 RX Burns +1 Thin)	
	Monitoring Results	Objectives Achieved?
1) Maintain less than 5% mortality of overstory QUGA trees/acre	1) $x=22.2\%$ Reduction, 90%CI:(-8.0< x <52.4), $n=4$, PRE*=9.1 t/ac, SD=9.0; 05YR02=7.1 trees/ac, SD=6.9	1) No
2) Reduce the fuel load by at least 50% tons/acre	a) $x=61.7\%$ Reduction, 90%CI:(-16.6< x <140.0), $n=4$, PRE*=24.9 tons/ac, SD=15.2; 05YR02=9.5 tons/ac, SD=6.7	a) Yes
b. One-hour fuels	b) $x=93.7\%$ Reduction, 90%CI:(-100.3< x <287.5), $n=4$, PRE*=2.0 tons/ac, SD=3.4; 05YR02=0.1 tons/ac, SD=0.1	b) Yes
c. Ten-hour fuels	c) $x=72.1\%$ Reduction, 90%CI:(-52.5< x <196.7), $n=4$, PRE*=0.6 tons/ac, SD=0.6; 05YR02= 0.2 tons/ac, SD=0.2	c) Yes
d. Hundred-hour fuels	d) $x=78.3\%$ Reduction, 90%CI:(-35.5< x <192.0), $n=4$, PRE*=3.1 tons/ac, SD=2.7; 05YR02= 0.7 tons/ac, SD=0.4	d) Yes
e. Thousand-hour fuels	e) $x=51.1\%$ Reduction, 90%CI:(-36.2< x <138.4), $n=4$, PRE*=14.3 tons/ac, SD=9.6; 05YR02= 7.0 tons/ac, SD=7.8	e) Yes
f. Litter and duff	f) $x=67.9\%$ Reduction, 90%CI:(-27.7< x <163.3), $n=4$, PRE*=4.8 tons/ac, SD=3.1; 05YR02=1.5 tons/ac, SD=1.0	f) Yes
3) Decrease the percent cover of shrubs by 30%.	3) $x=32.4\%$ Reduction, 90% CI:(-17.3< x <82.1), $n=4$, PRE*=58.1% shrub cover, SD=36.9; 05YR02= 39.3% shrub cover, SD=27.3	3) Yes
4) Increase the percent cover of native perennial grasses by 20%.	4) $x=0.09\%$ Reduction, 90%CI:(-112.8< x <130.9), $n=4$, PRE*=9.2% cover, SD=8.0; 05YR02= 8.4% cover, SD=9.7	4) No
5) Accept up to a 20% increase in cover of non-native grass	5) $x=15.8\%$ Increase, 90%CI:(-35.1< x <66.6), $n=4$, PRE*=57.4% cover, SD=46.9, 05YR02=66.4 cover, SD=33.9	5) Yes
6) Increase the percent cover of native herbaceous species by 20%.	6) $x=42.5\%$ Reduction, 90%CI:(-47.2< x <132.2), $n=4$, PRE*=35.1 % cover, SD=21.7; 05YR02= 20.2% cover, SD=5.7	6) No
7) Accept a 20% increase in cover of non-native herbaceous species from preburn levels.	7) $x=48.9\%$ Increase, 90%CI:(-9.7< x <107.6), $n=4$, PRE*= 15.2% cover, SD=10.6; 05YR02= 22.7% cover, SD=10.4	7) No

* The PRE plots were thinned before they were read, but not burned.

San Juan Island National Historical Park

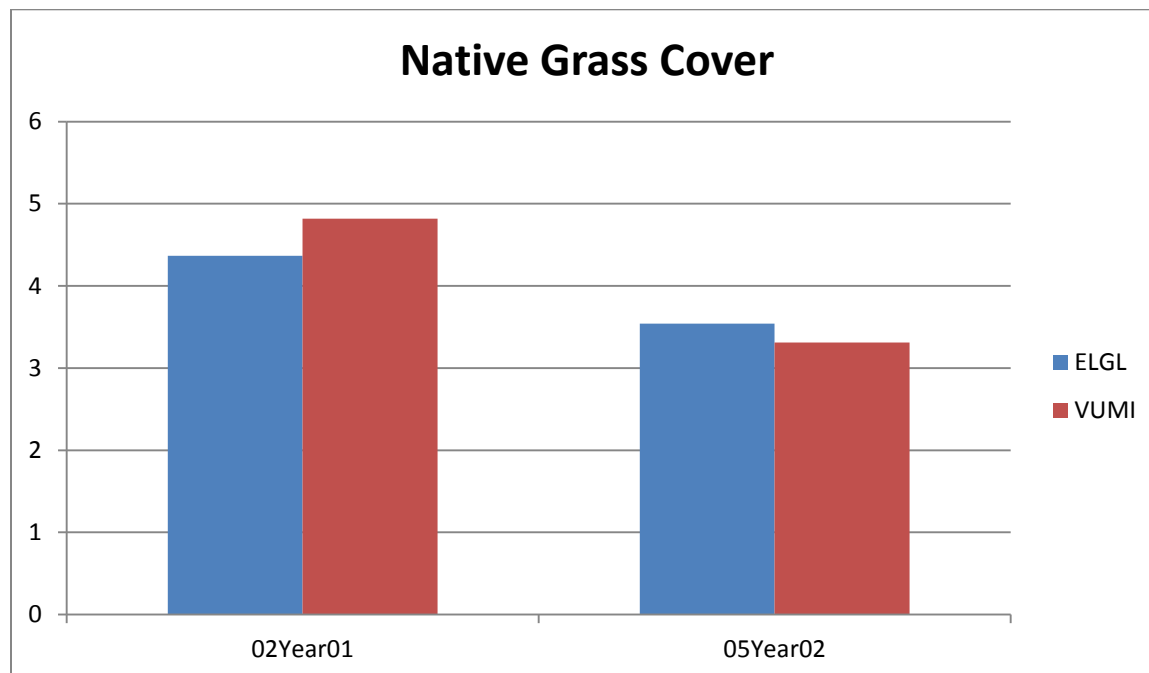
The Olympic NP fuels crew has been working on fuels reduction and Garry Oak restoration on Young Hill for over a decade now. Several plots have been thinned and burned multiple times. This report documents the progress towards fuels management objectives over time by tracking second year post-burn effects on four plots that have been thinned once and burned twice.

Trees: Two trees per acre of overstory (> 15 cm dbh) Garry oak trees were lost despite efforts to prevent their death.

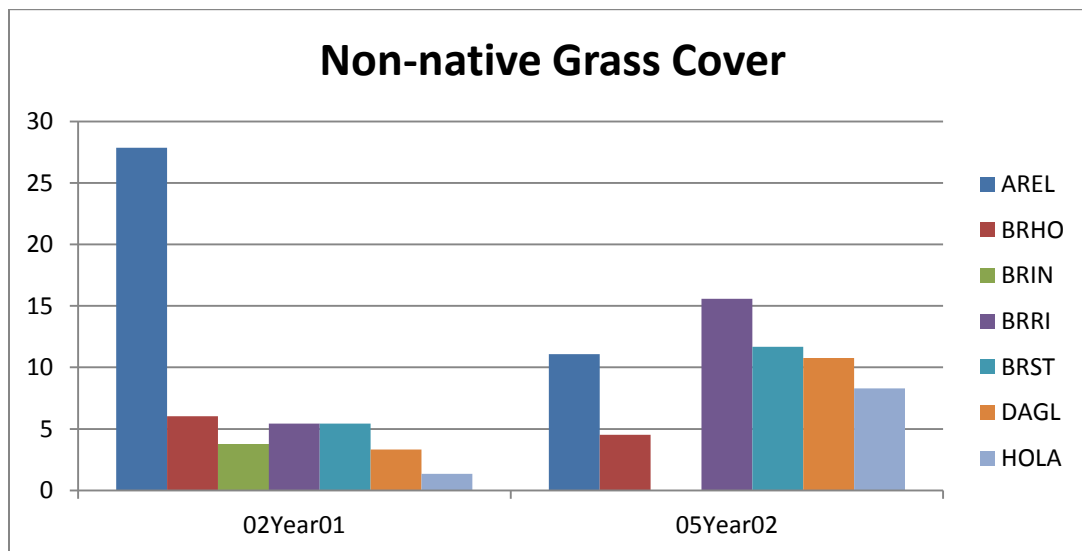
Fuels: Although the results of thinning and burning twice are preliminary due to the small number of plots that have undergone two burns; they indicate that all of the fuels reduction objectives were met after the second treatment. 61.7 percent of the total fuel load was consumed after the second burn, a result which met the management objective to reduce the total fuel load by at least 50 percent. The tonnage declined by more than half in all size classes.

Shrubs: The primary shrub at SAJH is Snowberry (*Symphoricarpos albus*), which has been identified as a hazardous fuel. The second burn made a big impact on the total shrub cover, which was reduced by 32.4 percent, narrowly meeting the management objective. The wide error bars within the confidence intervals indicate that like the fuels results, these numbers are preliminary, although it is apparent that thinning and burning twice is moving the units towards their desired condition.

Grass Cover: The second prescribed fire was not effectual at increasing native grass cover (pre-burn 9.2%, 2nd year post-treatment 8.4%; 0.09% reduction), but non-native grass cover was maintained at an acceptable level (pre-burn 57.4%, 2nd year post-treatment 66.4%; 15.8% increase).

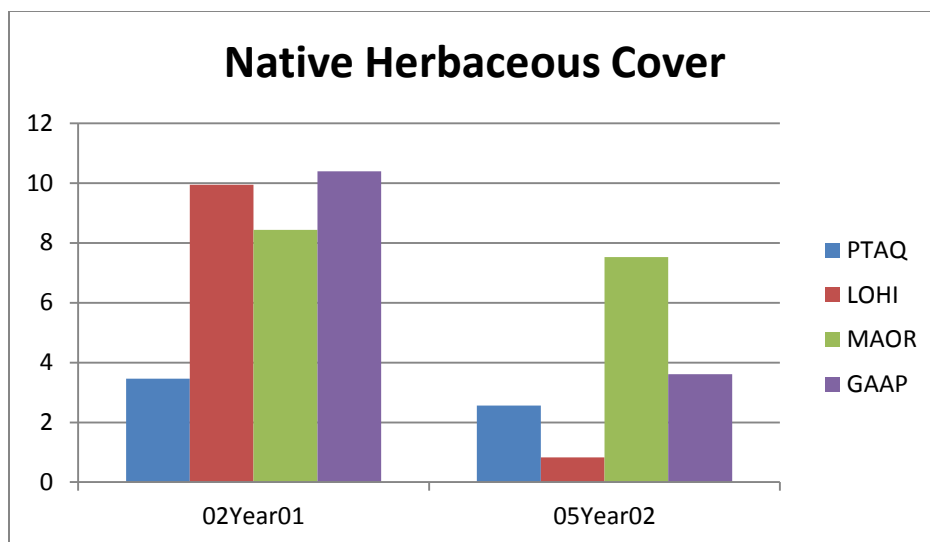


Blue wildrye (*Elymus glaucus*) and Small fescue (*Vulpia microstachys*) were the only native grasses with > 3% cover in the plots. Cover of both species declined slightly after the second year of the second burn.

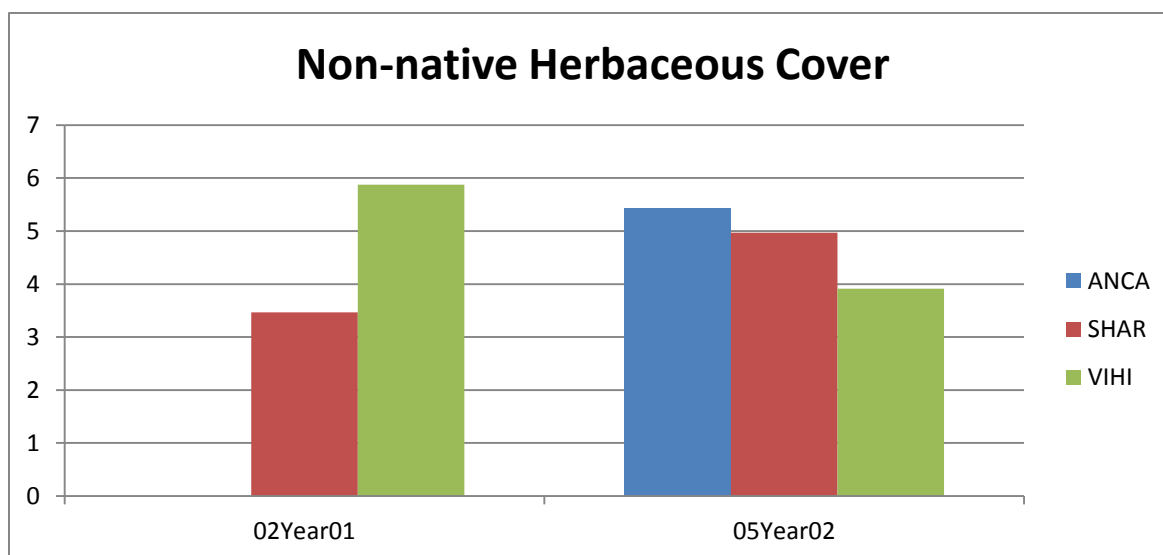


Tall oatgrass (*Arrhenatherum elatius*) was the clear dominant non-native grass before burning. Fortunately, its cover, and that of Soft brome (*Bromus hordeaceus*) and Smooth brome (*B. inermis*) had declined significantly after the 2nd year of the second burn. On the contrary, Ripgut brome (*B. rigidis*), Poverty brome (*B. sterilis*), Orchardgrass (*Dactylis glomerata*), and Velvetgrass (*Holcus lanatus*) cover increased. The total increase in cover remained below 20 percent.

Herbaceous Cover: The second burn had a negative impact on herbaceous species (forbs, vines and ferns) cover and composition. There was a 42.5 percent reduction in the cover of native species (Pre-burn=35.1% cover, 2 years post-2nd burn=20.2% cover) and a 48.9 percent increase in the cover of non-native species (Pre-burn=15.2% cover, 2 years post-2nd burn=22.7% cover). The effects of the second burn on individual herbaceous species that had greater than 3 percent cover are illustrated in the graphs below.



Sticky Willy (*Galium aparine*) and Pink honeysuckle (*Lonicera hispidula*) were the dominant native herbaceous vegetation in the pre-treatment plots, and both declined by more than half after the 2nd year after the second burn. Western brackenfern (*Pteridium aquilinum*) and Coastal manroot (*Marah oreganus*) also declined following the second burn.



The appearance of Bur chervil (*Anthriscus Caulalis*) after the second burn was the main cause for the jump in non-native herbaceous cover. Blue field madder (*Sherardia arvensis*) cover also increased, whereas Tiny vetch (*Vicia hirsuta*) cover declined.

Recommendations: Preliminary results suggest that the plots that have undergone one thin and two burn treatments are within the desired management condition for fuels and shrubs. This achievement reflects the diligence of the OLYM fire managers and crew. Managers should continue to weigh the benefits of the fuel reduction objectives against the impacts on vegetation cover and composition. These results are very sensitive to small changes in the cover and composition of native and non-native plants. The effects of the treatments will become more apparent as more units undergo secondary treatments.

B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist 2011 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	15	LARO and NOCA FMP Reviews, GIS documentation of fire and fuels projects for LARO and NOCA
Presentations	2	SAJH Restoration Presentation, NOCA monitoring results in Stehekin
NPS Meetings/task groups	3	NOCA Housing Committee, NOCA wilderness Committee, Division Meetings
Interagency work	2	North Cascadia Adaptation Plan Workshop
Wildfire assignments	0	
Prescribed fire projects	0	Included in planning activities
Non-fire fuels projects	0	Included in planning activities
Research	35	Fire History Research, MORA Fuel Mapping
Data collection	5	Fire severity research plots
Data entry	1	Estimated amount of time spent entering data from paper to PC
Data analysis	25	Fire Severity Research plot analysis, Fuel Mapping Data analysis, FMH data analysis
Supervision/Admin	10	Hiring, supervision, payroll, travel authorization/vouchers, purchasing, etc.
Training	1	Estimated amount of time spent in training (include time for all training courses attended including in-park, NPS/interagency, and non-government)
Travel out-of-park for plot or project work	1	Stehekin
Miscellaneous		Things that don't fit in other categories – BAER, BAR plans, etc.

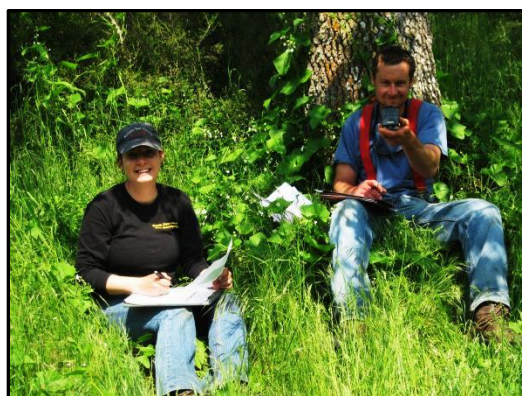
C. Fire effects crew accomplishments and areas of focus

Table 5. Fire Effects Crew Accomplishments/Focus Areas



NPCB Fire Effects Crew completing CBI plots in 2010 Rainbow Bridge Fire (NOCA: Stehekin Valley)

Category	Percent Time	Notes
FMH plots	40%	The NPCB crew conducted 55 FMH plot reads at 4 different sites in 2011. Includes logistical prep time and travel to plots.
Wildfire and Detail Assignments	13%	FFT2 and READ duties on the Dollar Lake, Tumwater, Roland Pt wildfires and READ duties on DWH Oil Spill
Data entry	11%	Completed all data entry for 2011. Updated all species names in database.
Travel out-of-park for plot or project work	9%	Travel from Marblemount to LARO, JODA, SAJH, NOCA (Stehekin)
Supervision/Admin	8%	Travel, payroll, credit card statements, logistics planning, vehicle maintenance, purchasing, hiring, performance evaluations
Training	6%	S-131,S-200, S-211, NPS Fundamentals2, Fire Refresher, First Aid/CPR, Defensive Driving,
CBI plots	3%	24 CBI plots conducted in Rainbow Bridge Fire
Miscellaneous	3%	Writing FFI data entry protocols, training SCA interns, verifying Fire FX plot visit history, creating new GIS maps for monitoring units
Plant identification / herbarium maintenance	2%	Keying out and mounting voucher specimens, inventorying herbarium and field voucher collections in database
RX Fire Assignments	2%	FEMO and FFT2 duties on LARO RX burns
Data analysis and YER completion	2%	Data analysis and completion of 2011 Year End Report
Non-Fire Fuels Treatments	1%	Cross training with Fuels crew (assisting with thinning)



NPCB Fire Effects Crew: Sheah Mucci and Robbie Andrus



NPCB Fire Effects Crew: Alexandra Soper (SCA), Sheah Mucci, Isabella Welch (SCA)

D. Additional Program Information

Table 6. Planning - 2011

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 2011)	Assisted with how many BAER plans in 2011?
John Day Fossil Beds NM	yes	2000	1	0
Lake Roosevelt NRA	yes	2003, revision in progress	1	0
North Cascades NP	yes	2005, revision in progress	2	0
San Juan Island NHP	yes	1998	1	0
Olympic NP	no	unknown	n/a	0
Whitman Mission NHS	yes	2001	1	0

Table 7. Monitoring

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
John Day Fossil Beds NM	100%	100%	1	0	0	0
Lake Roosevelt NRA	100%	100%	2	1	0	0
North Cascades NP	100%	100%	2	0	1	0
San Juan Island NHP	100%	100%	1	1	0	0

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

Table 8. Communicating Results - 2011

Park	# of Project Monitoring Reports completed in 2011	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
John Day Fossil Beds NM	0	0	0	Yes
Lake Roosevelt NRA	1	1	0	Yes
North Cascades NP	2	5	1	Yes
San Juan Island NHP	1	0	1	Yes
Olympic NP	0	0	0	Yes
Whitman Mission NHS	0	0	0	Yes

* This information will help to assess Minitab multi-user license needs.

Table 9. Research - 2011

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2011	# of Proposals Funded in 2011	# of Research Projects Supported in 2011*	Additional Comments
John Day Fossil Beds NM	no	1	0	0	1 NRAC project proposed
Lake Roosevelt NRA	yes	1	0	2	GIS project history supported
North Cascades NP	yes	1	0	2	Fire history research is supported, GIS project history supported
San Juan Island NHP	no	0	0	0	
Olympic NP	no	0	0	0	
Whitman Mission NHS	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.

E. 2012 Direction

The NPCB fire effects monitoring team is prepared to continue monitoring for all of the Pacific west park units that have funded projects. We will adjust our staffing and monitoring schedule to meet the needs of this cluster during this time of budget cuts.

INSTRUCTIONS FOR UPLOADING 2011 ANNUAL REPORT

1. Save your report as a PDF file using the following file naming convention "2011 *Park/Network Name* Annual Report.pdf".
2. Go to the NPS Fire Ecology Sharepoint site (<http://npsfamshare.nps.doi.net/wildlandfire/firescience/fireecology/default.aspx>). In Fire Ecology Documents, upload your report to the 2011 Park and Network Fire Ecology Program Annual Reports folder.
3. Please e-mail your regional ecologist, Nate Benson, and MaryBeth Keifer to let us know when you get your report uploaded.

Call MaryBeth Keifer (603-795-2333) or Nate Benson (208-387-5219) if you have any questions or problems.