



# National Park Service North Pacific/ Columbia Basin Fire Ecology Annual Report Calendar Year 2016

**Karen Kopper, Fire Ecologist**  
**Cedar Drake, Lead Fire Effects Monitor**

## A. Summary

The North Pacific/ Columbia Basin (NPCB) Fire Ecology program had a dynamic and productive field season in 2016. The fire effects monitoring crew completed **112 plot reads** within North Cascades National Park (NOCA), San Juan Island National Historic Park (SAJH), John Day Fossil Beds National Monument (JODA), Lake Roosevelt National Recreation Area (LARO), and Olympic National Park (OLYM). Crew members also assisted prescribed fire operations at LARO and SAJH as well as an extended wildfire assignment in California.

Fire Effects fieldwork began at LARO in mid-April and included eight FMH plot installations in three new fuels management units. LARO plot work continued through early June and was interspersed with fire training for various crew members. During June the NPCB crew visited SAJH twice to complete forest and grass FMH rereads. The crew also participated in the NOCA annual fire refresher and park orientation. In late June three crewmembers attended a local wildland firefighter guard school. From late June through early July the crew visited JODA and completed thirteen 15-year plot reads in the Picture Gorge unit. In mid-July the fire effects crew visited Stehekin (NOCA) where two new forest plots were installed in an experimental thinning treatment unit and four 20-year FMH plot reads were conducted in the Boulder unit. In late July/early August the NPCB crew returned to LARO for FMH plot reads. In mid-August the crew completed thirty-two CBI (Composite Burn Index) fire severity assessments in the rugged terrain of the 2015 Goodell Creek wildfire at NOCA. In late August crewmembers backpacked into the remote reaches of OLYM to revisit RAPs (Rapid Assessment plots) installed in the path of the 2015 Paradise fire. Seven RAPs plots impacted by the fire were revisited and an additional eighteen CBI assessments were completed within the burn perimeter. In September the NPCB crew returned to LARO for additional plot reads and then travelled to SAJH for five days of prescribed fire support as FEMOs on the Young Hill unit. Three FMH plots were monitored during and after the burn. Throughout the remainder of September the crew conducted additional FMH plot reads at LARO and provided support for the Fort Spokane and Ricky Pt. prescribed fires. Three affected FMH plots were monitored during and after the burns. With the onset of fall in October, data collection ceased for the season. Thereafter NPCB crewmembers assisted the NOCA/LARO fuels crew in fuels management projects and the fire ecologist in tree ring sample analysis.

In late September the NPCB Lead Fire Effects Monitor was assigned as lead READ to the Soberanes wildfire along the central California coast. He served in this role for 26 days and oversaw the fire suppression repair of nearly 300 miles of fireline.

Two Environmental Stewards fire ecology interns assisted the NPCB crew with FMH, CBI, and RAPs plot work during the 2016 field season. These individuals, Gregg Knapp and Jessie Thoreson, provided invaluable assistance in completing the plot workload, assisting with data entry, logistical support and fire effects monitoring during prescribed fire operations.

**Table 1. Fire Effects Plot Workload (2016) and Total Plots Installed**

| Park                           | Monitoring Unit                                                 | Plot Type        | Pre-burn 2016 | Immed. Post 2016 | Postburn (1-20 yrs) 2016 | Annual Total (2016) | Total Plots |
|--------------------------------|-----------------------------------------------------------------|------------------|---------------|------------------|--------------------------|---------------------|-------------|
| <b>John Day Fossil Beds NM</b> | Big Sagebrush/Bunchgrass                                        | FMH Brush        | 0             | 0                | 9                        | 9                   | 21          |
|                                | Western Juniper Shrubland                                       | FMH Forest       | 0             | 0                | 4                        | 4                   | 16          |
| <b>Lake Roosevelt NRA</b>      | Ponderosa Pine/ Common Snowberry Forest                         | FMH Forest       | 8             | 3                | 8                        | 19                  | 60          |
|                                | Ponderosa Pine/Bitterbrush                                      | FMH Forest       | 0             | 0                | 0                        | 0                   | 3           |
| <b>North Cascades NP</b>       | Stehekin Valley FFRA: Mixed Conifer                             | FMH Forest       | 2             | 0                | 4                        | 6                   | 45          |
|                                | Stehekin Valley Contours (Open/Mid/Closed Canopy Mixed Conifer) | FMH Forest       | 0             | 0                | 0                        | 0                   | 23          |
|                                | Douglas Fir/ Western Hemlock/ Western Red Cedar: Goodell fire   | CBI              | 0             | 0                | 32                       | 32                  | 32          |
| <b>Olympic NP</b>              | East-side Mixed Conifer (permanent RAPS plots)                  | Rapid Assessment | 0             | 0                | 0                        | 0                   | 5           |
|                                | Sitka Spruce/ Western Hemlock: Paradise fire                    | Rapid Assessment | 0             | 0                | 7                        | 7                   | 18          |
|                                | Sitka Spruce/ Western Hemlock: Paradise fire                    | CBI              | 0             | 0                | 18                       | 18                  | 18          |
| <b>San Juan Island NHP</b>     | Garry Oak Woodland                                              | FMH Forest       | 0             | 3                | 4                        | 7                   | 12          |
|                                | Douglas Fir/ Lodgepole (permanent RAPS plots)                   | Rapid Assessment | 0             | 0                | 0                        | 0                   | 4           |
|                                | Annual Brome Grasses                                            | FMH Grass        | 0             | 0                | 10                       | 10                  | 10          |
|                                | Coastal Prairie Grassland                                       | FMH Grass        | 0             | 0                | 0                        | 0                   | 12          |
| <b>Total</b>                   |                                                                 |                  | <b>10</b>     | <b>6</b>         | <b>96</b>                | <b>112</b>          | <b>279</b>  |

**Table 2. Fire Ecology Staffing 2016**

| Ecologist and Monitors                           | Starting Date | Ending Date | # of Pay Periods | READ Qualified (Yes or No) | Training and Development                                                                |
|--------------------------------------------------|---------------|-------------|------------------|----------------------------|-----------------------------------------------------------------------------------------|
| <b>Karen Kopper</b><br>Fire Ecologist            | 1/01/16       | n/a         | 26               | No                         | Annual fire refresher, UW doctoral research                                             |
| <b>Cedar Drake</b><br>Lead Fire Effects Monitor  | 3/20/16       | 12/24/16    | 20               | Yes                        | Annual fire refresher, S-219 Firing Operations, FEMO, READ, REAF, FIRB(t) assignments   |
| <b>Carolyn Schroeder</b><br>Fire Effects Monitor | 5/1/16        | 11/12/16    | 14               | No                         | Guard School, fire effects and botany training with NPCB crew, FEMO taskbook initiated. |

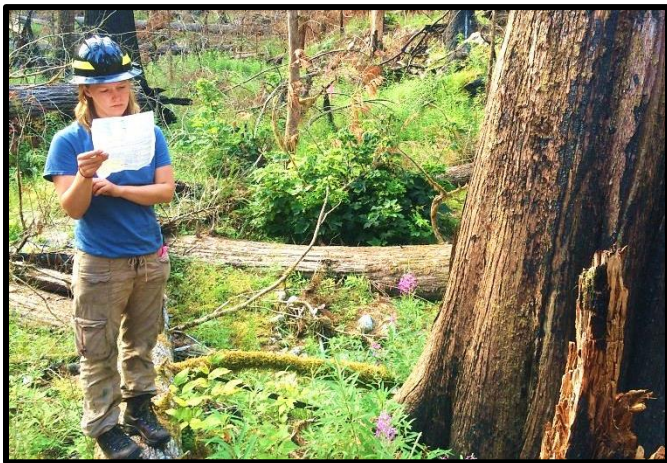
|                                               |         |          |    |    |                                                                                                                                   |
|-----------------------------------------------|---------|----------|----|----|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Martin Jacob</b><br>Fire Effects Monitor   | 5/1/16  | 10/15/16 | 12 | No | Annual fire refresher, fire effects and botany training with NPCB crew, FEMO taskbook initiated. FEMO and FAL3 assignments, S-290 |
| <b>Gregg Knapp</b><br>Fire Ecology Intern     | 6/12/16 | 9/3/16   | 6  | No | Guard School, fire effects and botany training with NPCB crew, FEMO taskbook initiated.                                           |
| <b>Jessie Thoreson</b><br>Fire Ecology Intern | 6/12/16 | 9/3/16   | 6  | No | Guard School, fire effects and botany training with NPCB crew, FEMO taskbook initiated., FEMO assignment                          |



**Cedar Drake** Lead Fire Effects Monitor



**Martin Jacob** Fire Effects Monitor



**Carolyn Schroeder** Fire Effects Monitor



**Gregg Knapp** Fire Ecology Intern



**Jessie Thoreson** Fire Ecology Intern



**2016 North Coast Columbia Basin Fire Effects Monitoring Crew**

## North Cascades National Park: Ponderosa Pine / Douglas Fir Forest



**FPSME2-7 P1-O, PRE Treatment (1996)**



**FPSME2-8 Q1-Q4, PRE Treatment (1996)**



**FPSME2-7 P1-O, 20 years POST Treatment (2016)**



**FPSME2-8 Q1-Q4, 20 years POST Treatment (2016)**

**Table 3a NOCA Management Objectives and Monitoring Results**

| Management Objective                                                                                                                                         | Monitoring Results:<br>2 years POST Broadcast Burn<br>Boulder Unit<br>Total plots (n)=3 (1996-2016) |                     | Monitoring Results:<br>20 years POST Burn-thin<br>Boulder Unit<br>Total plots (n)=3 (1996-2016) |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------|---------------------|
|                                                                                                                                                              | Average (standard deviation)                                                                        | Objective Achieved? | Average (standard deviation)                                                                    | Objective Achieved? |
| <b>Trees</b>                                                                                                                                                 |                                                                                                     |                     |                                                                                                 |                     |
| Reduce the density of saplings and pole size trees (1-6" dbh) to 10-30 trees/acre as measured 2 years after final treatment prior to maintenance.            | 2 Years POST: n=3,<br>PRE= 52.6 (12.1)<br>POST= 40.5 (4.1)<br>trees/acre                            | NO                  | 20 Years POST: n=3,<br>PRE= 52.6 (12.1)<br>POST= 8.1 (8.1)<br>trees/acre                        | NO                  |
| Reduce the density of small and medium sized overstory trees (6-20" dbh) to 25-75 trees/acre as measured 2 years after final treatment prior to maintenance. | 2 Years POST: n=3,<br>PRE= 29.7 (4.7),<br>POST= 22.9 (4.7)<br>trees/acre                            | NO                  | 20 Years POST: n=3,<br>PRE= 29.7 (4.7)<br>POST= 16.2 (4.0)<br>trees/acre                        | NO                  |
| Maintain the density of large overstory trees (>20" dbh) at 1-20 trees/acre as measured 2 years after final treatment prior to maintenance.                  | 2 Years POST: n=3,<br>PRE= 18.9 (2.3),<br>POST= 20.2 (0)<br>trees/acre                              | YES                 | 20 Years POST: n=3,<br>PRE= 18.9 (2.3) trees/acre,<br>POST= 17.5 (2.3) trees/acre               | YES                 |
| Reduce basal area to an average of 70 ( $\pm$ 35) ft <sup>2</sup> / acre as measured 2 years after final treatment prior to maintenance.                     | 2 Years POST: n=3,<br>PRE= 116.4 (21.8),<br>POST= 111.2 (20.9)<br>ft <sup>2</sup> /acre             | NO                  | 20 Years POST: n=3,<br>PRE= 116.4 (21.8),<br>POST= 99.4 (8.3)<br>ft <sup>2</sup> /acre          | YES                 |
| Increase seedlings to 25 – 75 PIPO seedlings per acre by 2 years post-treatment                                                                              | 2 Years POST: n=3,<br>PRE= 22.9 (16.4),<br>POST= 20.2 (10.7)<br>seed/acre                           | NO                  | 20 Years POST: n=3,<br>PRE= 22.9 (16.4),<br>POST= 20.2 (18.5)<br>seed/acre                      | NO                  |
| Increase canopy base height to 2 meters as measured 1 year post-treatment.                                                                                   | Boulder unit 2 Years POST:<br>n=3,<br>PRE= not measured<br>POST= not measured                       | N/A                 | Boulder unit 20 Years POST:<br>n=3,<br>PRE= not measured<br>POST= 5.3 (1.4)<br>meters           | YES                 |

**Table 3a NOCA Management Objectives and Monitoring Results**

| Management Objective                                                                                                                                        | Monitoring Results:<br>2 years POST Broadcast Burn<br>Boulder Unit<br>Total plots (n)=3 (1996-2016)                   |                     | Monitoring Results:<br>20 years POST Burn-thin<br>Boulder Unit<br>Total plots (n)=3 (1996-2016)                       |                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|
|                                                                                                                                                             | Average (standard deviation)                                                                                          | Objective Achieved? | Average (standard deviation)                                                                                          | Objective Achieved? |
| <b>Vegetation</b>                                                                                                                                           |                                                                                                                       |                     |                                                                                                                       |                     |
| Maintain a minimum of 30 percent cover of native understory vegetation (shrubs and herbaceous) 2 years after the initial treatment.                         | 2 Years POST: n=3,<br>PRE= 24.5 (3.9) % cover<br>POST= 45.0 (4.9) % cover                                             | YES                 | 20 Years POST: n=3, PRE= 24.5 (3.9) % cover, POST= 44.0 (2.6) % 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. | 2 Years POST: n=3,<br>BRTE PRE=1.3 (0.5) %<br>BRTE POST=0.9 (0.9) %<br><br>VUBR PRE= 0 (0) %<br>VUBR POST=1.5 (0.3) % | N/A                 | 20 Years POST: n=3,<br>BRTE PRE=1.3 (0.5) %<br>BRTE POST=4.6 (2.6) %<br><br>VUBR PRE= 0% (0)<br>VUBR POST=1.1 (0.9) % | N/A                 |
| <b>Fuel Load</b>                                                                                                                                            | Average (standard deviation)                                                                                          | Objective Achieved? | Average (standard deviation)                                                                                          | Objective Achieved? |
| Maintain an average small diameter (1-100 hour) fuel load of 2-6 tons/acre 2 years after final treatment prior to maintenance.                              | 2 Years POST: n=3,<br>PRE= 1.4 (0.2) tons/acre,<br>POST= 2.0 (1.9) tons/acre                                          | YES                 | 20 Years POST: n=3,<br>PRE= 1.4 (0.2) tons/acre,<br>POST= 1.3 (0.3) tons/acre                                         | NO                  |
| Maintain an average large diameter (1000 hour) fuel load of 4-12 tons/acre 2 years after final treatment prior to maintenance.                              | 2 Years POST: n=3,<br>PRE= 8.3 (7.6) tons/acre,<br>POST= 4.3 (7.3) tons/acre                                          | YES                 | 20 Years POST: n=3,<br>PRE= 8.3 (7.6) tons/acre,<br>POST= 5.1 (3.4) tons/acre                                         | YES                 |
| Maintain an average litter and duff load of 3.5-14 tons/acre 2 years after final treatment prior to maintenance.                                            | 2 Years POST: n=3,<br>PRE= 25.0 (6.8) tons/acre,<br>POST= 11.4 (2.5) tons/acre                                        | YES                 | 20 Years POST: n=3,<br>PRE= 25.0 (6.8) tons/acre,<br>POST= 12.1 (1.0) tons/acre                                       | YES                 |

## Twenty years following a prescribed burn and thinning treatment at NOCA

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 year we assessed current conditions in the Boulder unit (burned in 1996, thinned in 2006) to help guide targets for a scheduled maintenance burn in this area. This analysis also enables us to evaluate the outcomes of the burn and thin treatments by comparing the 20-year post-burn (current) conditions to the conditions 2 years after the initial burn.

**Trees:** The current tree densities in all size classes are below or within the desired range, indicating that no additional thinning is warranted from a hazard fuel reduction stand-point. However, the stand basal area (99.4 ft<sup>2</sup>/acre) is at the high end of the desired range (35 – 105 ft<sup>2</sup>/acre). Selective thinning of approximately 1 large overstory tree (>20" dbh) per acre would open up the canopy and add dimension to the unnaturally evenly spaced trees, while staying within the targeted range of objectives. Thinning of small and medium overstory trees (6-20" dbh) or pole-sized trees (< 6" dbh), however, is not advisable. The 1996 prescribed burn produced more than the desired mortality of smaller overstory trees (PRE=29.7, 2-YR POST=22.9 trees/acre), and fewer pole trees were left following thinning (2-YR Postburn 40.5, 20-YR POST= 8.1 trees/acre).

Seedling densities have never been within the desired range of 25-75 seedlings/acre. The density of seedlings was highest before burning in 1996 (22.9 seedlings/acre), and has remained at 20.2 seedlings/acre through both the 2<sup>nd</sup> and 20-year post-treatment reads. These results re-affirm the potential benefits of selective thinning of a few >20" diameter overstory trees to create openings in the canopy for seedling regeneration.

The canopy base height objective was achieved. CBH is well above the desired 2 meter minimum height in the 20-year post-treatment (CBH=5.3 meters). CBH was not measured in earlier reads.

**Vegetation:** The cover of native understory vegetation increased substantially after the 1996 burn (PRE=24.5%, 2-Yrs POST=45.0% cover), and remained high (44.0% cover), even 20 years following the treatments. Bluebunch wheatgrass (*Pseudoroegneria spicata*) had the highest cover of all native plant species in all reads. Pinemat manzanita (*Arctostaphylos nevadensis*) and Oniongrass (*Melica subulata*) covers were also high in all reads. Variableleaf collomia (*Collomia heterophylla*) and Wheeler's bluegrass (*Poa wheeleri*) were abundant in the 2<sup>nd</sup>-year post-burn, whereas Sandberg bluegrass (*Poa secunda*) cover was high in the 20-year post-treatment.

There were some increases in non-native cover. There was a 1.3 percent cover of Cheatgrass (*Bromus tectorum*) in 1996, before the prescribed burn. Cheatgrass cover was slightly lower (0.9% cover) 2 years after the burn, but had increased to 4.6 percent cover by the 20<sup>th</sup> year post-treatment. Brome fescue (*Vulpia bromoides*) appeared after the burn with a 1.5% cover, and had decreased slightly to 1.1% cover by the 20<sup>th</sup>-year post-treatment.

**Fuel loads:** The surface fuel loadings were all within the desired ranges per size class in the 2<sup>nd</sup> year post-burn, and all but the small diameter fuels (<3" diameter; 1 – 100 hour time-lag classes) remained within the desired range in the 20<sup>th</sup>-year post-treatment. The small diameter fuels were more sparse than desired (20-yr post= 1.3 tons/acre, 2 tons/acre desired); suggesting that pockets of fine fuels should be avoided (if/when possible) during the upcoming underburn. Instead, the burn should carry through the ample litter and duff layers (20-yr POST=12.1 tons/acre litter and duff, 3.5-14 tons/acre desired).

## Lake Roosevelt National Recreation Area: Ponderosa Pine / Snowberry Forest



Pile Burn: FFIPO1-22 P1-O, PRE Treatment (2007)



Thin & Burn: FFIPO1-4 50P-O, PRE Treatment (2001)



Pile Burn: FFIPO1-22 P1-O, POST Treatment (2016)



Thin & Burn: FFIPO1-4 50P-O, POST Treatment (2009)

**Table 3b LARO Management Objectives and Monitoring Results**

| Management Objective                                                                                                                                              | Monitoring Results:<br>Pile Burn vs. Thin & Burn Treatments<br>Pile burn plots n= 5, Thin & Burn plots n= 6,<br>Total plots= 11<br>(2001-2016) |            |                                                                                                                              | Objective Achieved? |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Trees</b>                                                                                                                                                      |                                                                                                                                                |            |                                                                                                                              |                     |
| <b>Average (standard deviation)</b>                                                                                                                               |                                                                                                                                                |            |                                                                                                                              |                     |
| Reduce the density of live pole size trees (1-6”dbh) to 2-20 trees/acre as measured 2 years after final treatment prior to maintenance.                           | <b>Pile Burn:</b> n= 5<br>PRE= 163.5 (83.4),<br>YR02= 2.4 (5.4),<br>YR05= 2.4 (5.4)<br>trees/acre                                              | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 201.7 (170.0)<br>YR02= 0 (0),<br>YR05= 2.0 (5.0)<br>trees/acre                          | <b>YES</b>          |
| Reduce the density of live small and medium sized overstory trees (6-20”dbh) to 25-75 trees/acre as measured 2 years after final treatment prior to maintenance.  | <b>Pile Burn:</b> n= 5<br>PRE= 163.5 (56.0),<br>YR02= 81.7 (31.9),<br>YR05= 76.1 (28.7)<br>trees/acre                                          | <b>NO</b>  | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 173.3 (85.6),<br>YR02= 25.0 (20.1),<br>YR05= 18.9 (19.6)<br>trees/acre                  | <b>NO</b>           |
| Maintain or increase the density of live large overstory trees (> 20” dbh) to 1-8 trees/acre as measured 5 years after final treatment prior to maintenance.      | <b>Pile Burn:</b> n= 5<br>PRE= 3.2 (5.3),<br>YR02= 2.4 (5.4),<br>YR05= 2.4 (5.4)<br>trees/acre                                                 | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 0 (0),<br>YR02= 0 (0),<br>YR05= 0 (0)<br>trees/acre                                     | <b>N/A</b>          |
| Reduce live mean basal area (poles+overstory) to an average of 70 (±35) ft <sup>2</sup> /acre as measured 2 years after final treatment prior to maintenance.     | <b>Pile Burn:</b> n= 5<br>PRE= 131.2 (19.4),<br>YR02= 86.1 (24.5),<br>YR05= 83.4 (22.9)<br>ft <sup>2</sup> /acre                               | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 115.8 (42.9),<br>YR02= 23.8 (18.9),<br>YR05= 19.0 (21.4)<br>ft <sup>2</sup> /acre       | <b>NO</b>           |
| Increase live canopy base height (poles+overstory) to 2 meters as measured 1 year post-treatment.                                                                 | <b>Pile Burn:</b> n= 5<br>PRE= not collected<br>YR02= 8.1 (1.1),<br>YR05= 7.3 (1.4)<br>meters                                                  | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 5<br>PRE= not collected,<br>YR02= not collected,<br>YR05= 12.4 (4.1)<br>meters                    | <b>YES</b>          |
| Reduce the live density of seedlings to 2-20 trees/ as measured 2 years after final treatment prior to maintenance.                                               | <b>Pile Burn:</b> n= 5<br>PRE=506.2 (643.8),<br>YR02= 253.0(197.0),<br>YR05=62.2 (67.2)<br>trees/acre                                          | <b>NO</b>  | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 344.2(452.9),<br>YR02=24.2 (37.5),<br>YR05=18.4 (19.5)<br>trees/acre                    | <b>YES</b>          |
| <b>Vegetation</b>                                                                                                                                                 |                                                                                                                                                |            |                                                                                                                              |                     |
| <b>Average (standard deviation)</b>                                                                                                                               |                                                                                                                                                |            |                                                                                                                              |                     |
| Maintain a minimum of 30 percent cover of native understory vegetation 2 years after initial treatment.                                                           | <b>Pile Burn:</b> n= 5<br>PRE= 57.1 % (11.4),<br>YR02= 59.2 % (20.5),<br>YR05= 66.1 % (29.0)<br>cover                                          | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 37.3 % (14.0),<br>YR02= 86.1% (23.0),<br>YR05= 64.6% (9.9)<br>cover                     | <b>YES</b>          |
| Maintain <20% cover of non-native understory species <u>relative to total cover (RC)</u> by 5 years following treatment. Percent Cover (%C) listed for reference. | <b>Pile Burn:</b> n= 5<br>PRE= 13.4 (10.9) %C, 19.1% RC<br>YR02= 19.0 (5.4) %C, 24.3 %RC<br>YR05= 32.3(20.0)%C, 32.8 %RC                       | <b>NO</b>  | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 3.2 (4.6) %C, 8.0 %RC<br>YR02= 21.1(10.1) %C, 19.7 %RC<br>YR05=18.2 (16.3) %C, 21.9 %RC | <b>NO</b>           |

**Table 3b LARO Management Objectives and Monitoring Results**

| Management Objective                                                                                                                                           | Monitoring Results:<br>Pile Burn vs. Thin & Burn Treatments<br>Pile burn plots n= 5, Thin & Burn plots n= 6,<br>Total plots= 11<br>(2001-2016) |            |                                                                                                      | Objective Achieved? |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------|---------------------|
| Fuels                                                                                                                                                          | Average (standard deviation)                                                                                                                   |            |                                                                                                      |                     |
| Maintain an average small diameter ( $\leq 3$ inch) woody fuel load of 2–6 tons/acre 2 years after final treatment prior to maintenance.                       | <b>Pile Burn:</b> n= 5<br>PRE= 2.9 (1.5),<br>YR02= 4.4 (2.1),<br>YR05=4.9 (1.6)<br>tons/acre                                                   | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 3.7 (1.8),<br>YR02= 2.6 (1.5),<br>YR05=4.4 (4.0)<br>tons/acre   | <b>YES</b>          |
| Maintain an average large diameter ( $\geq 3$ inch) woody fuel load (no litter and duff) of 1-10 tons/acre 2 years after final treatment prior to maintenance. | <b>Pile Burn:</b> n= 5<br>PRE= 4.3 (4.5),<br>YR02= 2.7 (2.9),<br>YR05= 3.0 (2.3)<br>tons/acre                                                  | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 3.9 (3.8),<br>YR02= 6.4 (5.8),<br>YR05= 13.7 (6.6)<br>tons/acre | <b>NO</b>           |
| Maintain an average litter and duff fuel load of 3.5-14.0 tons/acre 2 years after final treatment prior to maintenance.                                        | <b>Pile Burn:</b> n= 5<br>PRE= 17.3 (12.2),<br>YR02= 4.8 (3.3),<br>YR05= 8.8 (3.5)<br>tons/acre                                                | <b>YES</b> | <b>Thin &amp; Burn:</b> n= 6<br>PRE= 28.5 (3.2),<br>YR02=8.8 (2.1),<br>YR05= 7.8 (2.9)<br>tons/acre  | <b>YES</b>          |

### Comparison of post-treatment effects on pile burns vs. thin-burn treatments

Pile-burning (PB) and thinning followed by broadcast burning (TB) have both been used at Lake Roosevelt NRA (LARO) to reduce hazard fuels and restore Ponderosa pine ecosystem characteristics. The following is a comparison of these different treatments using 2<sup>nd</sup> and 5<sup>th</sup> year post-treatment results of pile-burns (2011) in the Kettle Admin, Rickey Point, and Fort Spokane units and of thin (2001) and broadcast burns (2004) in the Evans and Cloverleaf/Gifford units. The following is a summary of some of the most important results.

**Trees:** The PB effects on trees were more controlled and less aggressive than the TB treatment effects. The Evans and Cloverleaf/Gifford TB units were thinned to less than 1 pole-sized tree per acre (2-20 pole trees/acre desired), and the overstory trees were thinned by more than half. The subsequent broadcast burns resulted in higher than expected overstory mortality; resulting in overstory densities that were just within the desired range (25-75 trees/acre) by the 2<sup>nd</sup> year post-burn, and too low by the 5<sup>th</sup> year post-burn (Yr-2TB=25, Yr-5TB=19 trees/acre). In comparison, the PB treatments left slightly more small to medium overstory trees standing than desired (Yr-2PB=82, Yr-5PB=76 trees/acre).

The basal area objective (to maintain 35-105 ft<sup>2</sup>/acre) was not achieved in the TB units, confirming that these units were thinned too aggressively. However, the TB treatments were more effective at reducing the seedling density (Yr-2TB=24, Yr-5TB=18 seedlings/acre; 2-20 seedlings/acre desired) compared to the pile burn treatments (Yr-2PB=253, Yr-5PB=62 seedlings/acre). PB and TB treatments were both successful in maintaining the live canopy base height above 2 meters.

**Vegetation:** Differences in the PB and TB treatments were less evident in the vegetation. The cover of native vegetation (forbs, graminoids and vines) well exceeded the minimum requirements (to remain above 30 percent) in all pre- and post-treatment reads. Antelope bitterbrush (*Purshia tridentata*) cover was high before the treatments, and remained so in the 2<sup>nd</sup> and 5<sup>th</sup> years following PB treatments. Silky lupine (*Lupinus sericeus*) was abundant in all reads, especially the 2<sup>nd</sup> and 5<sup>th</sup> years following the TB treatments, in which the more subdued Desert fescue (*Vulpia microstachys*) was also plentiful. Ross' sedge (*Carex rossii*) was abundant in the 2<sup>nd</sup> year after pile-burning, as well as in the 5<sup>th</sup> year after pile-burning, in which Yarrow (*Achillea millefolium*) cover was also ample.

Unfortunately, the objective to maintain the relative cover of non-native vegetation below 20 percent, was not achieved in the post-treatment reads for either treatment type. Although the relative covers were within the acceptable range before the treatments (PRE PB=19.1, PRE TB=8.0 RC), they exceeded the maximum range by the 2<sup>nd</sup> years post-treatment (Yr-2PB=24.3%, Yr-2TB=19.7% RC), and continued to increase by the 5<sup>th</sup> years post-treatment (Yr-5PB=32.8%, Yr-5TB=21.9% RC). Cheatgrass (*Bromus tectorum*) was prominent following all of the treatments, whereas Bulbous bluegrass (*Poa bulbosa*) was more pervasive following the PB treatments than the TB treatments.

**Fuels:** The targeted ranges for each fuel size-class (3.5-14.0 tons/acre litter and duff, 2-6 tons/acre small diameter fuels, 1-10 tons/acre large diameter fuels desired) were achieved by the 2<sup>nd</sup> year and maintained through the 5<sup>th</sup> year following PBs. The objectives were also achieved with the TB treatments, except for the large diameter fuels, which exceeded the targets by the 5<sup>th</sup> year post-burn (Yr-5TB=13.7 tons/acre).

## San Juan Island National Historical Park: Annual Brome Grassland



**GB RTE1-3 0P-30P, PRE Treatment (2009)**



**GB RTE1-4 0P-30P, PRE Treatment (2009)**



**GB RTE1-3 0P-30P, 2 Yr POST Treatment (2016)**



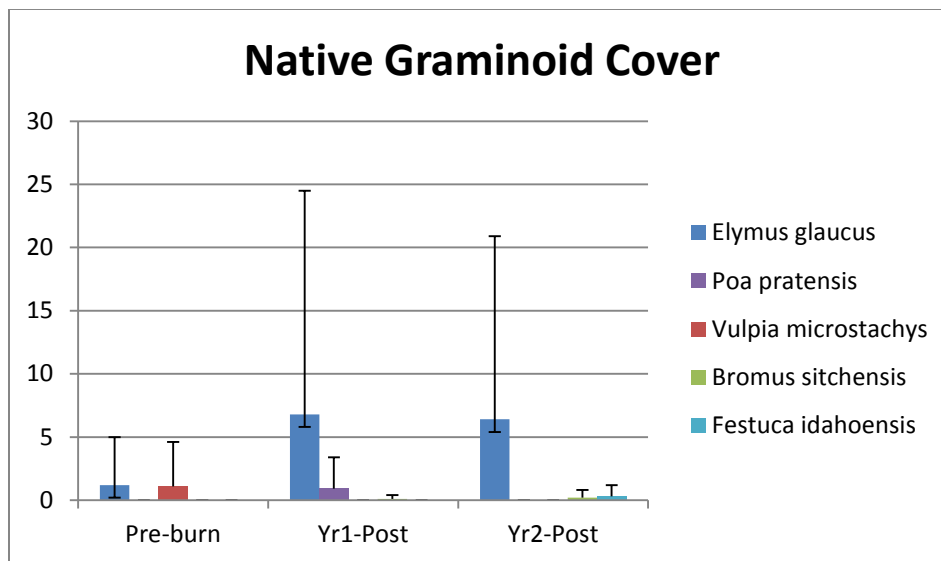
**GB RTE1-4 0P-30P, 2 Yr POST Treatment (2016)**

| Table 3c SAJH Management Objectives and Monitoring Results                                                               |                                                                                       |                        |                                                                                       |                        |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------|------------------------|
| Management Objective                                                                                                     | Monitoring Results:<br>1 Year POST Broadcast<br>Burn (2015)<br>Total n=10 (2009-2015) | Objective<br>Achieved? | Monitoring Results:<br>2 Year POST Broadcast<br>Burn (2016)<br>Total n=10 (2009-2016) | Objective<br>Achieved? |
| <b>Understory Cover</b> <b>Average (standard deviation)</b>                                                              |                                                                                       |                        |                                                                                       |                        |
| <b>Increase and maintain the absolute cover of native graminoids at <math>\geq 20</math> percent cover.</b>              | PRE=2.3 % (4.9)<br>POST= 7.8% (17.5)<br>cover of native graminoids                    | <b>NO</b>              | PRE=2.3 % (4.9)<br>POST= 6.9% (14.5)<br>cover of native graminoids                    | <b>NO</b>              |
| <b>Reduce and/or not exceed the absolute cover of non-native graminoids compared to the pretreatment cover.</b>          | PRE= 127.2 % (14.8)<br>POST= 112.0% (35.9)<br>cover of non-native graminoids          | <b>YES</b>             | PRE= 127.2 % (14.8)<br>POST=136.9.0% (23.5)<br>cover of non-native graminoids         | <b>NO</b>              |
| <b>Increase and maintain the absolute cover of native herbaceous species at 20 percent cover.</b>                        | PRE= 10.2% (7.7)<br>POST= 17.8% (9.1)<br>cover of native herbaceous species           | <b>NO</b>              | PRE= 10.2% (7.7)<br>POST= 11.0% (8.9)<br>cover of native herbaceous species           | <b>NO</b>              |
| <b>Reduce and/or not exceed the absolute cover of non-native herbaceous species compared to the pre-treatment cover.</b> | PRE= 45.5% (19.0)<br>POST= 87.0% (22.2)<br>cover of non-native herbaceous species     | <b>NO</b>              | PRE= 45.5% (19.0)<br>POST= 53.9% (23.8)<br>cover of non-native herbaceous species     | <b>NO</b>              |

## Second-year post treatment effects of broadcast burning in an annual brome grassland

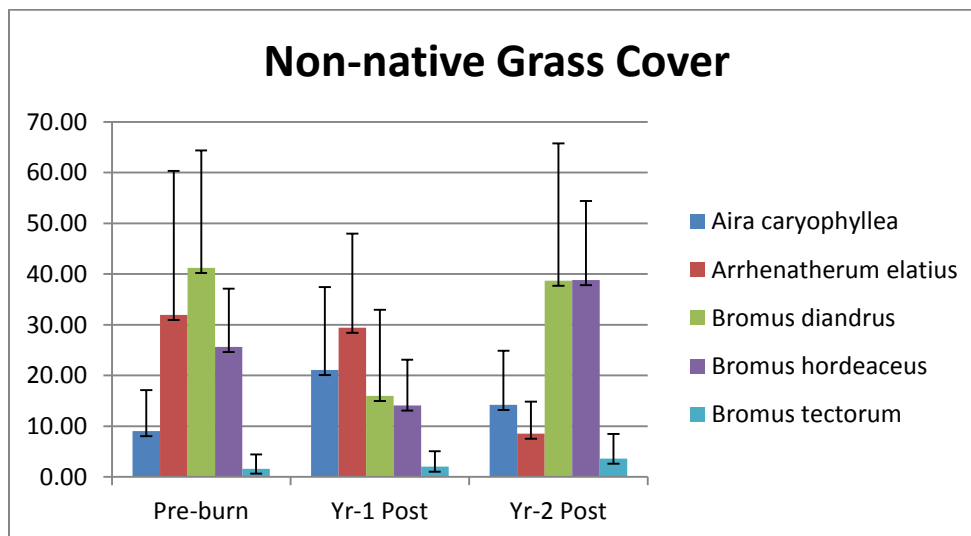
This summary focuses on the responses of understory species to the 2014 prescribed burn that was conducted in the open grassland at Young Hill, English Camp. The primary purpose of the burn was to reduce fuels in the open grassland, thereby enabling subsequent treatment of the Garry oak woodland below. It is understood that although prescribed burning is an effective means to reduce fuels; it can conflagrate non-native species encroachment. In this summary we compared the 1<sup>st</sup> and 2<sup>nd</sup>-year post-burn effects on native and non-native understory cover as a follow-up to last year's annual report of 1<sup>st</sup>-year fire effects.

**Native graminoid cover:** The absolute cover of native grasses and grass-like species more than doubled in the 1<sup>st</sup>-year following the burn (Pre=2.3 %, 1-yr Post=7.8 % cover); mainly due to the increase of Blue wildrye (*Elymus glaucus*). The native graminoid cover declined slightly between the 1<sup>st</sup> and 2<sup>nd</sup>-year post-burn (2-yr Post=6.9% cover); however, this difference is not statistically significant, and still constitutes a vast improvement over the pre-burn cover. These are very positive results despite the fact that the objective to increase and maintain the absolute cover of native graminoids at 20 percent cover was not achieved.



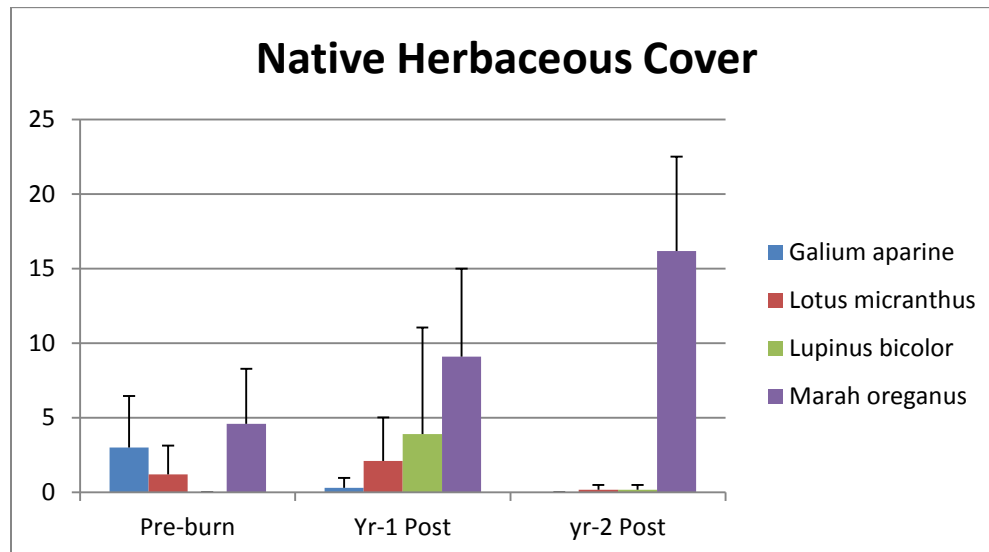
Fire effects on the average cover of all native grass species: Blue wildrye (*Elymus glaucus*), Kentucky Bluegrass (*Poa pratensis*), Small fescue (*Vulpia microstachys*), Alaska brome (*Bromus sitchensis*) and Idaho fescue (*Festuca idahoensis*).

**Non-native graminoid cover:** Unfortunately, the reduction of non-native graminoid cover that was achieved in the 1<sup>st</sup>-year post-burn (Pre=127%, 1-yr Post=112%) was not maintained in the 2<sup>nd</sup>-year post-burn (Yr-2 Post=137%). The cover of Ripgut brome (*Bromus diandrus*), which had declined markedly in the Yr-1 post-burn, was almost back to its pre-burn cover, and Soft brome (*Bromus hordeaceus*) had far exceeded its pre-burn cover. Cheatgrass (*Bromus tectorum*) cover, although still relatively low, continued to increase from its pre-burn and Yr-1 post-burn covers.



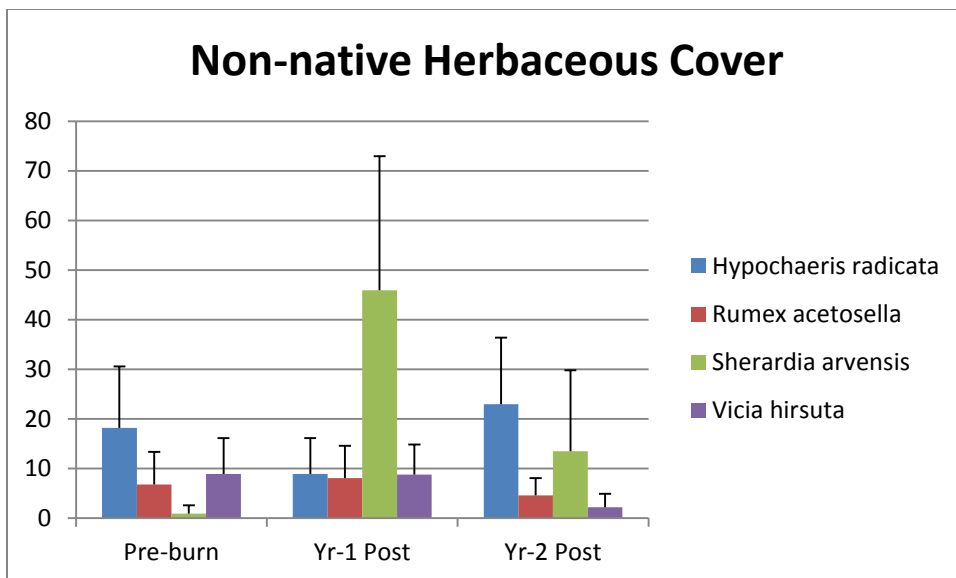
Fire effects on the most commonly occurring non-native graminoid species (>30 datapoints each): Silver hairgrass (*Aira caryophyllea*), Tall oatgrass (*Arrhenatherum elatius*), Ripgut brome (*Bromus diandrus*) and Soft brome (*Bromus hordeaceus*). Cheatgrass (*Bromus tectorum*) is included, despite having fewer than 30 datapoints, because of its high potential for conflagration.

**Native herbaceous cover:** The absolute cover of native herbaceous species increased in the 1<sup>st</sup> year following the burn (Pre=10.2%, Yr-1 Post=17.8%), however it was almost back to its pre-burn level by the 2<sup>nd</sup> year post-burn (Yr-2 Post= 11.0%). This is a step back from meeting the final objective, to increase and maintain the absolute cover at 20 percent.



Fire effects on the most commonly occurring native herbaceous species (>30 datapoints each): Catchweed bedstraw (*Galium aparine*), Desert deervetch (*Lotus micranthus*), Miniature lupine (*Lupinus bicolor*), and Western wild cucumber (*Marah oreganus*).

**Non-native herbaceous cover:** Unlike the 1<sup>st</sup>-year post-burn results, in which the absolute cover of non-native herbaceous species almost doubled in response to the prescribed burn (Pre=45.5%, Post=87.0%), the 2<sup>nd</sup>-year post-burn cover was re-approaching its pre-burn cover (Yr-2 Post=53.9% cover). The dramatic increase in Blue field madder (*Sherardia arvensis*) cover after the burn, and its subsequent decline in the 2<sup>nd</sup>-year post-burn, are the main reasons for this refreshingly positive result. Although Hairy cat's ear (*Hypochaeris radicata*) cover was still above its pre-burn level, the other dominant non-native herbs, Sheep sorrel (*Rumex acetosella*) and Tiny vetch (*Vicia hirsute*) remained lower.



Fire effects on the cover of the most commonly occurring non-native herbaceous species (>100 datapoints each): Hairy cat's ear (*Hypochaeris radicata*), Sheep sorrel (*Rumex acetosella*), Blue fieldmadder (*Sherardia arvensis*) and Tiny vetch (*Vicia hirsuta*).

In summary, native forbs and graminoid covers increased substantially in the 1<sup>st</sup> year post-treatment, but were only slightly above their pre-treatment covers by the 2<sup>nd</sup> year post-treatment. Results were mixed for non-native species. Unfortunately, although non-native graminoid cover had been low in the 1<sup>st</sup> year post-treatment, it had exceeded its pre-treatment cover by the 2<sup>nd</sup> year post-treatment. On a positive note, the non-native herbaceous cover declined in the 2<sup>nd</sup> year post-treatment. We will continue to monitor these trends in the 5<sup>th</sup> year post-treatment.

## John Day Fossil Beds National Monument: Western Juniper Forest/ Big Sagebrush Shrubland



**BARTR1-4 OP-30P, PRE Treatment (1999)**



**BARTR1-4 OP-30P, 15 Yr POST Treatment (2014)**



**FJUOC1-6 Q2-Q3, PRE Treatment (1999)**



**FJUOC1-6 Q2-Q3, 15 Yr POST Treatment (2014)**

| Table 3d JODA Management Objectives and Monitoring Results                                                        |                                                                                                                |                     |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------|
| Management Objective                                                                                              | Monitoring Results:<br>BARTR and JUOC 15 Years POST Burn<br>Total plots: Brush n=11, Forest n=6<br>(1999-2016) | Objective Achieved? |
| <b>Western Juniper Forest</b>                                                                                     | <b>Average (standard deviation)</b>                                                                            |                     |
| Reduce density of junipers 10-40% trees/acre by 1 year post-burn                                                  | n= 6, x= 20.3 % reduction YR15, PRE= 43.2 (30.3), YR05= 33.1 (26.8), YR15= 34.4 (29.1) trees/acre              | <b>YES</b>          |
| Reduce shrub density by 20-60% shrubs/acre by 1 year post-burn                                                    | n= 6, x= 41.9 % reduction YR15, PRE= 379.1 (149.5), YR05= 159.2 (90.1), YR15= 220.3 (64.6) shrubs/acre         | <b>YES</b>          |
| Increase and maintain the absolute cover of native graminoids at or above the pretreatment level.                 | n= 6, PRE= 58.0 % (7.9), YR05= 57.1% (9.5), YR15= 57.5% (22.5) cover of native graminoids                      | <b>YES</b>          |
| Reduce and/or not exceed the absolute cover of non-native graminoids compared to the pretreatment cover.          | n= 6, PRE= 9.7 % (7.7), YR05= 27.5% (15.0), YR15= 40.1% (19.3) cover of non-native graminoids                  | <b>NO</b>           |
| Increase and maintain the absolute cover of native herbaceous species at 20 percent cover.                        | n= 6, PRE=5.0 % (3.1), YR05= 7.6% (5.0), YR15= 4.7% (3.5) cover of native herbaceous species                   | <b>NO</b>           |
| Reduce and/or not exceed the absolute cover of non-native herbaceous species compared to the pre-treatment cover. | n= 6, PRE= 1.2% (1.1) YR05= 8.5% (9.2), YR15= 7.5% (6.5) cover of non-native herbaceous species                | <b>NO</b>           |
| <b>Big Sagebrush Shrubland</b>                                                                                    | <b>Average (standard deviation)</b>                                                                            |                     |
| Reduce shrub density by 20-60% shrubs/acre by 1 year post-burn                                                    | n= 11, x= 65.9 % reduction YR15, PRE= 424.3 (115.8), YR05= 125.1 (129.0), YR15= 144.7 (115.9) shrubs/acre.     | <b>NO</b>           |
| Increase and maintain the absolute cover of native graminoids at or above the pretreatment cover.                 | n= 11, PRE= 38.9% (25.4), YR05= 33.1% (26.5), YR15= 34.6% (26.2) cover of native graminoids                    | <b>NO</b>           |
| Reduce and/or not exceed the absolute cover of non-native graminoids compared to the pretreatment cover.          | n= 11, PRE= 50.8% (31.5), YR05= 62.8% (31.7), YR15= 65.5% (35.9) cover of non-native graminoids                | <b>NO</b>           |

| Table 3d JODA Management Objectives and Monitoring Results                                                        |                                                                                                                |                     |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------|
| Management Objective                                                                                              | Monitoring Results:<br>BARTR and JUOC 15 Years POST Burn<br>Total plots: Brush n=11, Forest n=6<br>(1999-2016) | Objective Achieved? |
| Increase and maintain the absolute cover of native herbaceous species at 20 percent cover.                        | n= 11,<br>PRE= 5.5% (4.0), YR05= 3.4% (3.6), YR15= 1.6% (2.1)<br>cover of native herbaceous species            | <b>NO</b>           |
| Reduce and/or not exceed the absolute cover of non-native herbaceous species compared to the pre-treatment cover. | n= 11,<br>PRE= 1.6% (2.5), YR05= 10.9% (12.9), YR15= 14.5% (7.8)<br>cover of non-native herbaceous species     | <b>NO</b>           |

### Fifteen years following prescribed burns in the Juniper/Sagebrush Shrublands of JODA

Prescribed burns were conducted to reduce juniper and shrub densities at John Day Fossil beds NM. Although these objectives were met; the burns have had long-lasting negative consequences on the shrubland and grassland ecosystems. Although the burns have had a minimal impact on native graminoid cover (woodland PRE=58%, Yr-5 Post=57%, Yr-15 Post=58%; shrubland PRE=39%, Yr-5 Post=33%, Yr-15 Post=35%), the non-native graminoid cover has increased substantially (woodland PRE=10%, Yr-5 Post=28%, Yr-15 Post=40%; shrubland PRE=51%, Yr-5 Post=63%, Yr-15 Post=66%). Cheatgrass (*Bromus tectorum*) and other aggressive non-native graminoid species are well established, and have continued to increase in each read. Non-native herbaceous covers have also increased in both the woodlands and shrublands. We will continue to monitor these trends in the 20-year post burn. No future burning is advised.



**Fire Ecology Interns, Gregg Knapp and Jessie Thoreson, collecting fire effects data in the 2015 Paradise fire: Olympic National Park**



**NPCB Fire Effects monitoring Crew completing FMH plot reads at John Day Fossil Beds National Monument**



**NPCB Fire Effects monitoring Crew completing FMH plot reads at North Cascades National Park**



**Prescribed fire operations at San Juan National Historic Park**

## B. Program Information

**Table 4. Planning - 2016**

| Park                    | Does Park have written Desired Future Conditions? (yes or no) | Date Park-level Monitoring Plan completed (or revised) | Total # of Project- or Community-level Monitoring Plans (not just 2016) | Assisted with how many BAER/BAR plans in 2015? |
|-------------------------|---------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------|
| John Day Fossil Beds NM | yes                                                           | 2000                                                   | 1                                                                       | 0                                              |
| Lake Roosevelt NRA      | yes                                                           | 2013                                                   | 1                                                                       | 1                                              |
| North Cascades NP       | yes                                                           | 2010, revision in progress                             | 3                                                                       | 0                                              |
| San Juan Island NHP     | yes                                                           | 1998                                                   | 1                                                                       | 0                                              |
| Olympic NP              | no                                                            | unknown                                                | n/a                                                                     | 0                                              |

**Table 5. Monitoring - 2016**

| Park                    | % 2016 Data Entered | % 2016 Data Quality Checked | # Prescribed Fires Monitored* | # Non-fire Fuels Treatments Monitored* | # Wildfires Monitored* | # BAER Treatments Monitored* |
|-------------------------|---------------------|-----------------------------|-------------------------------|----------------------------------------|------------------------|------------------------------|
| John Day Fossil Beds NM | 100%                | 100%                        | 2                             | 0                                      | 0                      | 0                            |
| Lake Roosevelt NRA      | 100%                | 100%                        | 9                             | 0                                      | 0                      | 0                            |
| North Cascades NP       | 100%                | 100%                        | 2                             | 0                                      | 1                      | 0                            |
| San Juan Island NHP     | 100%                | 100%                        | 1                             | 0                                      | 0                      | 0                            |
| Olympic NP              | 100%                | 100%                        | 0                             | 0                                      | 1                      | 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 - 2016**

| Park                | # of Project Monitoring Reports completed in 2015 | # 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                                      | 1                                    | Yes                  |
| San Juan Island NHP | 1                                                 | 1                                      | 1                                    | Yes                  |
| Olympic NP          | n/a                                               | 1                                      | n/a                                  | n/a                  |
| Lake Roosevelt NRA  | 1                                                 | 1                                      | 1                                    | Yes                  |

**Table 7. Research - 2016**

| Park                | Are research needs identified in FMP or Monitoring Plan? | # of Proposals Submitted in 2016 | # of Proposals Funded in 2016 | # of Research Projects Supported in 2016* | Additional Comments                            |
|---------------------|----------------------------------------------------------|----------------------------------|-------------------------------|-------------------------------------------|------------------------------------------------|
| Lake Roosevelt NRA  | yes                                                      | 0                                | 0                             | 0                                         |                                                |
| North Cascades NP   | yes                                                      | 0                                | 1                             | 2                                         | Fire history research, Fuel treatment modeling |
| San Juan Island NHP | yes                                                      | 1                                | 0                             | 0                                         | RTE butterfly/snake proposal                   |
| Olympic NP          | no                                                       | 0                                | 0                             | 1                                         | Paradise RAPs                                  |
| Mount Rainier NP    | n/a                                                      |                                  |                               | 1                                         | Fuel Mapping with LiDAR                        |

\*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 2016 Accomplishments/Focus Areas**

| Category                  | Percent Time | Accomplishments and/or areas of activities                                                                            |
|---------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------|
| Planning                  | 7            | NOCA READ guide Update                                                                                                |
| Presentations             | 1            | FX-reports NOCA, LARO, SAJH, UW lab                                                                                   |
| NPS Meetings/ task groups | 5            | NOCA wilderness committee, NOCA housing committee, NOCA Resource Division meetings, NPS Gnarly Question Working Group |
| Interagency work          | 5            | NW Fire Science Consortium, Pacific Wildland Fire Sciences Lab, UW Fire and Mountain Ecology Lab Meetings             |
| Wildfire assignments      | <1           | Hart Fire BAER                                                                                                        |
| Prescribed fire projects  | 4            | GIS work – shape files for treatment areas                                                                            |
| Non-fire fuels projects   | 4            | GIS work – shape files for treatment area documentation                                                               |
| Research                  | 30           | NOCA fire history and severity research, West-side fire treatments                                                    |
| Data collection           | 1            | Fire history                                                                                                          |
| Data entry                | 2            | NOCA fire history data                                                                                                |

| Category                                    | Percent Time | Accomplishments and/or areas of activities                                    |
|---------------------------------------------|--------------|-------------------------------------------------------------------------------|
| Data analysis                               | 20           | Fire effects YER, NOCA fire history                                           |
| 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            | Travel for NOCA FMP Revision                                                  |
| Miscellaneous                               | 1            | NOCA fire team meetings, Season AAR                                           |

#### D. Fire effects crew accomplishments and areas of focus

**Table 9. Fire Effects Crew 2016 Accomplishments/Focus Areas**

| Category                        | Percent Time | Notes                                                                                                     |
|---------------------------------|--------------|-----------------------------------------------------------------------------------------------------------|
| FMH plots                       | 41           | 55 FMH plot reads at 4 different sites in 2016                                                            |
| CBI plots                       | 10           | 50 CBI plots reads on 2 different fires in 2016                                                           |
| Other plot work                 | 10           | 7 Rapid Assessment plots on Paradise fire at OLYM                                                         |
| Supervision/Admin               | 9            | Travel, payroll, credit card statements, vehicle maintenance, purchasing, hiring, performance evaluations |
| Travel for plot or project work | 8            | Travel to OLYM, JODA, LARO, NOCA and OLYM.                                                                |
| Data entry                      | 5            | Includes data entry and error checking for FMH, CBI, RAPS plots. Database cleanup.                        |
| Training                        | 5            | Fire Refresher, NOCA orientation, S-219, S-290, Guard School                                              |
| Wildfire assignments            | 3            | READ and REAF duties on a wildfire fire assignment in CA.                                                 |
| Data analysis                   | 3            | Data analysis and completion of 2015 Year End Report                                                      |
| Prescribed fire projects        | 3            | FEMO, FEMO (t), FIRB (t) duties on LARO and SAJH RX burns.                                                |
| Miscellaneous                   | 3            | Training fire ecology interns                                                                             |

The NPCB fire ecology program is looking forward to continuing to monitor fire and fuel treatments at LARO, NOCA, SAJH and JODA using standard FMH protocols on the existing plots. In addition, the crew is planning to collect CBI data on 2016 wildfires at OLYM. The NOCA fire program is beginning to scope out new treatment areas on the west-side of the park that will eventually require fire effects monitoring. The monitoring protocols will include additional protocols to validate LiDAR data that is available for some of this area.

To accommodate a reduction in the NPCB fire effects monitoring budget for JODA, we are sharing the work load and data with the Upper Columbia Basin Inventory & Monitoring Program. This agreement is working out well for both programs.

## **F. Overall Data Entry Status and FFI suggestions**

**Program Data** - 90 % of the total monitoring program data is in FFI. The other 10% of the data are fuel mapping data for MORA, NOCA and OLYM, Rapid Assessment Plot data, and CBI data that are stored in Microsoft Access tables backed up on the North Cascades Fire Server.

### **FFI Feedback**

- Improve the means that “Default Monitoring Status” is ordered on the Project Management tab. It is often difficult to select the default monitoring status needed from the drop down menu.
- Cut and Paste functions would significantly increase efficiency in data entry.
- Ability to copy data sheets over from previous reads....similar to copying tree data from previous reads but for other protocols as well.
- **Ability to toggle off drop down menus and/or drag them to a different location on the screen. Species drop down menus often get in the way when entering data.**
- In Cover\_Points (metric) it would be extremely helpful to have a tool (button) that when pressed automatically changes the sample point number to the next subsequent value and populates the position number to “1”. Additionally, each added new row would automatically increase the position number while maintaining the sample point number. When a new sample point is measured then the data recorder can simply push the button to populate the next ascending sample point with a position number of “1”. This may seem like a minor point but consider that an average 50 meter herb transect line has 166 points often with an additional 50-100 rows of positional data. With two transect lines per plot this means that sample point and position points are each entered between 300-400 times per plot. It is a time consuming and tiring task for the data recorder and one that could easily be completed by FFI’s software.
- Please provide a toggled option in Surface Fuels tab to automatically populate Transect and Sample Location fields for Browns Lines fuel sampling in forested plots. This template of 40 points would be for Transect 1,2,3,4 each with sample locations of 1,5,10,15,20,25,30,35,40,45.
- Provide some means of mitigating issues related to multiple entries of the same species in the Species management tab. It is a ponderous task to consolidate these multiple entries into one entry for the species and “replace species in method data” for all occurrences of multiple species entries. When there are multiple entries with the same four letter code it is often confusing to decipher which code(s) are being recognized and worked with.
- Review of the nativity data in the Species Management tab. We have encountered repeated occurrences in which native/non-native assignments per species is incorrect.

### **FFI LITE Feedback**

- Most all points mentioned in the FFI section apply to FFI Lite as well.
- Ability to **enter data points via voice command** would generate a quantum shift in data collection productivity.
- Ability to enter plot visit date in Project Management in FFI-Lite and have it carry over to Project Management in FFI.



NPCB Fire Effects Crew: Paradise Fire in Olympic National Park