



## **North Pacific / Columbia Basin Fire Ecology Annual Report Calendar Year 2010**

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### **2010 Summary**

The North Pacific / Columbia Basin (NPCB) Fire Effects Monitoring crew had a highly productive field season in 2010 revisiting a total of sixty-nine plots 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 rereading six FMH forest plots on Young Hill in English camp and locating sites for two new plots to be installed in a new management unit in 2011. The crew also performed post RX data collection for an annual Brome treatment experiment on Young Hill. Two rapid assessment plots (RAP)s which were prescribed burned in fall 2008 were also revisited.

Next the crew travelled to LARO to install six FMH forest plots each in two new burn units: Clark Lake and Bradbury Beach. In 2011 three additional forest plots will be installed in the Clark Lake Unit. The crew also completed three post-thin reads and a post-burn read.

Two SCA Fire Ecology interns assisted the NPCB crew with FMH plotwork on SAJH and in LARO. In July they travelled to Mount Rainier National Park (MORA) for two payperiods to complete fuel survey plots in various locations throughout the park.

At NOCA the NPCB crew revisited four forest plots in the Stehekin valley and installed and read two new forest plots in the Coon Lake contour unit. The crew also assisted in wildfire suppression and logistical support duties during the 3,000 acre Rainbow Bridge Fire in Stehekin. The wildfire burned up to twelve forest plots which will be revisited in 2011. The NPCB crew also assisted in fire suppression for two days on the Flat Creek fire north of LARO.

The crew revisited three remote rapid assessment plots along the perimeter of the 2009 Brush Creek fire and two along the edge of the 2009 Panther Creek fire. An additional fourteen CBI plots were read within the Brush Creek fire and fifteen within the Panther Creek fire. Members of the Olympic fire crew assisted the NPCB crew with CBI and RAPs data collection in Brush Creek.

A brief visit was also made JODA where three Year 05 post-burn reads were completed.

In October the crew participated as both fire monitors (FEMO)s and fire crew members for two prescribed fires at NOCA and LARO. The fire at NOCA burned three established FMH plots.

Additionally, two crew members travelled to the Deep Water Horizon Oil Spill in the Gulf of Mexico to serve as Resource Advisors. One crewmember served as a READ on a fire assignment in southern Oregon.



**Rainbow Bridge Wildfire in the Stehekin valley (NOCA)**

**Table 1. Fire Effects Plot Workload 2010**

| Park                           | Vegetation Monitoring Type                  | Plot Type        | Pre-burn  | Immed. Post | Postburn (1-20 yrs) | Total Plots |
|--------------------------------|---------------------------------------------|------------------|-----------|-------------|---------------------|-------------|
| <b>John Day Fossil Beds NM</b> | Big Sagebrush                               | FMH brush plot   | 0         | 0           | 3                   | <b>21</b>   |
|                                | Western Juniper                             | FMH forest plot  | 0         | 0           | 0                   | <b>16</b>   |
| <b>Lake Roosevelt NRA</b>      | Ponderosa Pine                              | FMH forest       | 12        | 0           | 4                   | <b>34</b>   |
| <b>North Cascades NP</b>       | Stehekin Valley Forest Fuel Reduction Areas | FMH forest       | 0         | 2           | 4                   | <b>37</b>   |
|                                | Stehekin Valley Wall Contours               | FMH forest       | 2         | 0           | 0                   | <b>21</b>   |
|                                | Brush Creek RAP                             | Rapid Assessment | 0         | 0           | 3                   | <b>3</b>    |
|                                | Brush Creek Wildfire                        | CBI              | 0         | 0           | 14                  | <b>14</b>   |
|                                | Panther Creek RAP                           | Rapid Assessment | 0         | 0           | 2                   | <b>2</b>    |
|                                | Panther Creek Wildfire                      | CBI              | 0         | 0           | 15                  | <b>15</b>   |
|                                |                                             |                  |           |             |                     |             |
| <b>Olympic NP</b>              | East-side Mixed Conifer                     | Rapid Assessment | 0         | 0           | 0                   | <b>5</b>    |
| <b>San Juan Island NHP</b>     | Garry Oak Woodland                          | FMH forest       | 0         | 0           | 6                   | <b>10</b>   |
|                                | Douglas Fir/ Lodgepole                      | Rapid Assessment | 0         | 0           | 2                   | <b>4</b>    |
|                                | Annual Brome Grasses                        | FMH grass        | 0         | 0           | 0                   | <b>10</b>   |
| <b>Whitman Mission NHS</b>     | Giant Wild Rye – Meadow Restoration         | FMH grass        | 0         | 0           | 0                   | <b>5</b>    |
| <b>Total</b>                   |                                             |                  | <b>14</b> | <b>2</b>    | <b>53</b>           | <b>197</b>  |

\* Pilot sampling plots

**Table 2. Fire Ecology Staffing 2010**

| Ecologist and Monitors                                   | Start Date | End Date | # Pay Period | Training – Formal                                        | Development                                                                                                                           |
|----------------------------------------------------------|------------|----------|--------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Karen Kopper</b><br>Fire Ecologist                    | 1/01/10    | n/a      | 26           | Fire Refresher                                           | UW fire severity and fire history research in pursuit of PhD, attended PWR Fire Ecologists conference                                 |
| <b>Cedar Drake</b><br>Lead Fire Effects Monitor          | 3/14/10    | 12/31/10 | 21           | Fire Refresher, READ course, S-212, L-280, ATV           | FALA taskbook initiated and completed, FFT1 taskbook initiated, RX fire and READ assignments, attended PWR Fire Ecologists conference |
| <b>Sarah Hoff</b><br>Assistant Lead Fire Effects Monitor | 5/12/10    | 10/9/010 | 11           | Fire Refresher                                           | FEMO taskbook completed, RX and wildfire assignments                                                                                  |
| <b>Sheah Mucci</b><br>Fire Effects Monitor               | 5/12/10    | 10/9/010 | 11           | Fire Refresher, S-271, First Aid/ CPR, Defensive Driving | HECM taskbook initiated, FALA taskbook initiated, RX and wildfire assignments                                                         |

|                                                     |         |         |    |                                                    |                                                               |
|-----------------------------------------------------|---------|---------|----|----------------------------------------------------|---------------------------------------------------------------|
| <b>Robbie Andrus</b><br>Fire Effects<br>Monitor     | 5/12/10 | 10/9/10 | 11 | Guard School, First Aid/ CPR,<br>Defensive Driving | RX and wildfire<br>assignments, UW GIS<br>certificate program |
| <b>Matt Hughes</b><br>SCA-Fire<br>Ecology Intern    | 5/26/10 | 8/2/10  | 5  | First Aid/ CPR, Defensive Driving                  | Fire Effects and botany<br>training with NPCB<br>crew         |
| <b>Thomas Brussel</b><br>SCA-Fire<br>Ecology Intern | 5/26/10 | 8/4/10  | 5  | First Aid/ CPR, Defensive Driving                  | Fire Effects and botany<br>training with NPCB<br>crew         |

The remainder of this report focuses on the results of the fire effects monitoring data at NOCA, LARO and SAJH, where the majority of the monitoring occurred in 2010. Analyses were not performed at JODA or WHMI because only 3 plots were read at JODA, and none were scheduled to be read at WHMI. We look forward to analyzing more 10-year post-burn results at JODA in 2011.

# Table 3. Management Objectives and Monitoring Results North Cascades National Park



FPSME2-36 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
Pre-burn (1997)



FPSME2-23 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
00PRE (1996)



FPSME2-36 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
2 years post-thin & burn (2006)



FPSME2-23 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
2 years post-thin & 2 burns (2006)



FPSME2-36 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
5 years post-thin & burn (2009)



FPSME2-23 Q3-Q2  
Douglas Fir / Ponderosa Pine Forest  
5 years post-thin & 2 burns (2009)

| North Cascades National Park                                                        |                                                                                                                                                                                                                                                                            |                      |                                                                                                                                           |                        |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Douglas-fir/<br>Ponderosa pine<br>Forest:<br>FPSME2D08<br><br>Monitoring Objectives | 04YR05 (1 RX burn + 1 thin)                                                                                                                                                                                                                                                |                      | 05YR05 (2 RX burns + 1 thin)                                                                                                              |                        |
|                                                                                     | Monitoring Results                                                                                                                                                                                                                                                         | Objectives Achieved? | Monitoring Results                                                                                                                        | Objectives Achieved?   |
| 1) Decrease live pole trees by 50-85%                                               | 1) x= 77.2 % Reduction, 90%CI: (38.6<x<115.8) n=15, Pre=63.9, 04YR05=14.6 trees/acre                                                                                                                                                                                       | 1) Yes               | 1) x=88.1 % Reduction, 90%CI: (62.1<x<114.1) n=9 Pre=79.1, 05YR05=9.4 trees/acre                                                          | 1) Over achieved       |
| 2) Reduce overstory tree density by 30-60%                                          | 2) x=38.0% Reduction, 90%CI: (25.0<x<51.0) n=15, Pre=130.6, 04YR05=80.9 trees/acre                                                                                                                                                                                         | 2) Yes               | 2) x=49.5% Reduction, 90%CI: (30.0<x<69.0) n=9, Pre=138.0, 05YR05=69.7trees/acre                                                          | 2) Yes                 |
| 3) Reduce total basal area by 40-60%                                                | 3)x=20.4% Reduction, 90%CI:(11.6<x<29.3), n=15, Pre=150.7, 04YR05=119.9 ft <sup>2</sup> /acre                                                                                                                                                                              | 3) No                | 3)x=38.3% Reduction, 90%CI: (21.9<x<54.8) n=9, Pre=148.2, 05YR05=91.4 ft <sup>2</sup> /acre                                               | 3) Almost              |
| 4) Accept individual exotic species to increase by no more than 20% cover           | 4) a. 16.7% Increase Cheatgrass ( <i>Bromus tectorum</i> )Yr5=0.14% Cover Pre=0.12,Yr2=0.33% Cover                                                                                                                                                                         | 4)a. Yes             | 4) a.100% Increase Cheatgrass ( <i>B. tectorum</i> ) Yr5=0.57% Cover Pre=0, Yr2=0.30% Cover                                               | 4)a. No                |
|                                                                                     | b. 100% Increase each Creeping Bellflower ( <i>Campanula rapunculoides</i> ) Yr5=0.02% Cover Prickly Lettuce ( <i>Lactuca serriola</i> )Yr5=0.42% Cover Kentucky Bluegrass ( <i>Poa Pratensis</i> )Yr5=0.02% Cover Wall Lettuce ( <i>Mycellis muralis</i> )Yr5=0.02% Cover | b. No                | b. 100% Increase each Orchard grass ( <i>Dactylis glomerata</i> )Yr5=0.03% Cover Bulbous bluegrass ( <i>Poa bulbosa</i> ) Yr5=0.03% Cover | b. No                  |
|                                                                                     | c. 100% Reduction Grass-leaf starwort ( <i>Stellaria graminea</i> ) Pre= 0.02% Cover                                                                                                                                                                                       | c. Yes               |                                                                                                                                           |                        |
| 5) Increase native ground cover by 10-30%                                           | 5)x=11.2%Increase,90%CI: (-0.3<x<24.9),n=15,Pre= 26.0, 04Yr5=28.9% Cover                                                                                                                                                                                                   | 5)Yes                | 5)x=39.2%Increase, 90%CI: (11.7<x<66.8) n=9 Pre=29.0,05Yr5=40.4% Cover                                                                    | 5) Yes (Over-achieved) |

|                                                    |                                                                                    |        |                                                                                   |        |
|----------------------------------------------------|------------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|--------|
| 6) Fuel Load Reduction                             | 6a) x=4.1% Increase,<br>90%CI:(-24.3<x<32.6) n=15, Pre=0.52 04Yr5=0.54 tons/acre   | 6a) No | 6a) x=9.5% Reduction,<br>90%CI: (-16.6<x<35.6) n=9 Pre=0.47, 05Yr5=0.43 tons/acre | 6a) No |
| a) Reduce fuel loading of 1-hour fuels by 55-90%.  |                                                                                    |        |                                                                                   |        |
| b) Reduce fuel loading of 10-hour fuels by 45-65%  | b) x=9.8% Increase,<br>90%CI:(-36.7<x<56.2) n=15, Pre=1.5, 04Yr5=1.6 tons/acre     | b)No   | b) x=20.9% Increase,<br>90%CI: (-18.4<x<60.3), n=9, Pre=1.2 05Yr5=1.5 tons/acre   | b) No  |
| c) Reduce fuel loading of 100-hour fuels by 15-35% | c) x=130.9% Increase,<br>90%CI:(-0.8<x<262.5) n=15, Pre=1.15, 04Yr5=2.65 tons/acre | c)No   | c) x=173.5% Increase,<br>90%CI:(66.6<x<280.5), n=9, Pre=0.7, 05Yr5=1.9 tons/acre  | c)No   |
| d) Reduce 1,000-hour fuels by 0-20%                | d) x=87.4% Increase,<br>90%CI:(41.8<x<133.2), n=15, Pre=4.2, 04Yr5=7.8 tons/acre   | d)No   | d) x=135.7% Increase,<br>90%CI:(64.5<x<206.8), n=9 Pre=4.3, 5Yr5=10.1 tons/acre   | d)No   |
| e) Reduce Litter and duff by 10 – 90%              | e) x=39.0% Reduction,<br>90%CI:(23.7<x<54.4), n=15, Pre=23.0, 04Yr5=14.0 tons/acre | e) Yes | e) x=48.1% Reduction,<br>90%CI:(24.7<x<71.5), n=9 Pre=24.8, 05Yr5=12.9 tons/acre  | 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. Fifteen plots were thinned and burned once (04YR05), and nine plots were thinned once and burned twice (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 ( $\leq 14.9$  cm dbh) and overstory trees ( $> 15$  cm dbh) were met with one burn (77 percent and 38 percent reduction poles and overstory), and slightly overachieved with the second burn (88 percent and 50 percent reduction poles and overstory). However, it took two burns to approach the desired basal area reduction of 40 to 60 percent (20 percent reduction with one burn, 38 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 (17 percent increase), whereas it spread to new areas that previously did not have Cheatgrass five years after the second burn (100 percent increase).

Prickly lettuce (*Lactuca serriola*) had the greatest cover of all exotic species (0.42 percent cover). It appeared in plots that were burned once. Orchard grass (*Dactylis glomerata*) and Bulbous bluegrass (*Poa bulbosa*) also colonized the burned plots. They were found in areas that were burned twice.

**Native Ground Cover:** Native ground cover (forbs, grasses, grass-like, ferns and vines) increased by 11 percent on plots that burned once, and by 39 percent on plots that burned twice. The same species were most abundant on plots that burned once or twice; Bluebunch wheatgrass (*Pseudoroegneria spicata*, 5 and 11 percent cover respectively), Pinegrass (*Calamagrostis rubescens*, 10 and 13 percent cover respectively), and Houndstongue hawkweed (*Hieracium cynoglossoides*, 4 and 5 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:** Whereas fuel reduction objectives are far from being met on the plots that only burned once, 10 percent of all fine fuels (1 hour fuels, < 0.25”) were consumed on the plots that burned twice. However, the other woody fuels on the plots that burned twice increased even more than they did on the plots that burned once. Litter and duff was reduced by 29 percent and 48 percent on the plots that burned once and twice, respectively.

**Recommendations:** The plots that have been thinned once and burned twice are closer to meeting standing and downed fuel reduction objectives than plots that have been thinned and burned once. 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. Methods for treating the population are under discussion, and should be addressed in the NOCA Weed EA. Fire and resource managers need to continue to discuss ways to mitigate Cheatgrass spread in the treatment areas.

# Lake Roosevelt National Recreation Area



**FPIPO1-23 Q4-Q1**  
**Ponderosa Pine-Snowberry Forest**  
**Clark Lake Unit**  
**00PRE (2010)**



**FPIPO1-32 P1-O**  
**Ponderosa Pine-Snowberry Forest**  
**Bradbury Beach Unit**  
**00PRE (2010)**

## LARO: Lake Roosevelt National Recreation Area

| Monitoring Type                               | Monitoring Variables                                                            | Bradbury Beach Burn Unit                                                                                                                                                                       | Clark Lake Units 1 & 2                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ponderosa Pine - Snowberry Forest (FPIPO1D10) | 1) Pole tree density                                                            | 1) $x = 210.4$ trees/acre<br>90%CI:(109.9< $x$ <310.9), $n=6$                                                                                                                                  | 1) $x = 357.5$ trees/acre<br>90%CI:(61.3< $x$ <653.6), $n=6$                                                                                                                                                                                                                                                                                                                                  |
|                                               | 2) Overstory tree density                                                       | 2) $x = 164.6$ trees/acre<br>90%CI:(130.6< $x$ <198.5), $n=6$                                                                                                                                  | 2) $x = 105.2$ trees/acre<br>90%CI:(51.3< $x$ <159.2), $n=6$                                                                                                                                                                                                                                                                                                                                  |
|                                               | 3) Total basal area                                                             | 3) $x = 155.8$ ft <sup>2</sup> /acre<br>90%CI:(124.7< $x$ <186.9), $n=6$                                                                                                                       | 3) $x = 103.8$ ft <sup>2</sup> /acre<br>90%CI:(80.4< $x$ <127.2), $n=6$                                                                                                                                                                                                                                                                                                                       |
|                                               | 4) Non-native herbaceous ground cover (ferns, forbs, graminoids, sedges, vines) | 4) $x = 0.8\%$ Cover<br>90%CI:(0.01< $x$ <1.60), $n=6$                                                                                                                                         | 4) $x = 22.13\%$ Cover<br>90%CI:(4.28< $x$ <39.98), $n=6$                                                                                                                                                                                                                                                                                                                                     |
|                                               | 5) % Cover of individual non-native species over 0.3%                           | 5) Cheatgrass ( <i>Bromus tectorum</i> )<br>$x=0.30\%$ Cover, 90%CI:(-0.2< $x$ <0.8), $n=6$<br><br>Bulbous bluegrass ( <i>Poa bulbosa</i> )<br>$x=0.35\%$ Cover, 90%CI:(-0.2< $x$ <0.9), $n=6$ | 5) Japanese Brome ( <i>Bromus japonicus</i> )<br>$x=1.2\%$ Cover, 90%CI:(-0.6< $x$ <2.9), $n=6$<br><br>Cheatgrass ( <i>B. tectorum</i> )<br>$x=1.9\%$ Cover, 90%CI:(-0.3< $x$ <4.0), $n=6$<br><br>Bulbous bluegrass ( <i>P. bulbosa</i> )<br>$x=13.1\%$ Cover, 90%CI:(0.6< $x$ <25.6), $n=6$<br><br>Sheep sorrel ( <i>Rumex acetosella</i> )<br>$x=2.5\%$ Cover, 90%CI:(0.6< $x$ <4.3), $n=6$ |
|                                               | 6) Native herbaceous ground cover (ferns, forbs, vines, graminoids, sedges)     | 6) $x = 5.6\%$ Cover,<br>90%CI:(0.8< $x$ <10.5), $n=6$                                                                                                                                         | 6) $x = 37.6\%$ Cover<br>90%CI:(15.5< $x$ <59.7), $n=6$                                                                                                                                                                                                                                                                                                                                       |

|                     |                                                       |                                                       |
|---------------------|-------------------------------------------------------|-------------------------------------------------------|
| 7) Shrub cover      | 7) x = 35.8% Shrub Cover<br>90%CI:(19.7<x<52.0), n=6  | 7) x = 91.7% Shrub Cover<br>90%CI:(57.6<x<125.8), n=6 |
| 8) Fuel loading     | 8)                                                    | 8)                                                    |
| a) 1-hour fuels     | a) x = 0.11 tons/acre,<br>90%CI:(0.05<x<0.18), n=6    | a) x = 0.19 tons/acre,<br>90%CI:(0.09<x<0.29), n=6    |
| b) 10-hour fuels    | b) x = 1.12 tons/acre,<br>90%CI:(0.68<x<1.56), n=6    | b) x = 1.66 tons/acre,<br>90%CI:(1.03<x<2.29), n=6    |
| c) 100-hour         | c) x = 2.08 tons/acre,<br>90%CI:(1.40<x<2.76), n=6    | c) x = 1.92 tons/acre,<br>90%CI:(1.33<x<2.50), n=6    |
| d) 1,000-hour fuels | d) x = 11.61 tons/acre,<br>90%CI:(6.64<x<16.59), n=6  | d) x = 14.03 tons/acre,<br>90%CI:(2.16<x<25.90), n=6  |
| e) litter and duff  | e) x = 23.25 tons/acre,<br>90%CI:(17.13<x<29.36), n=6 | e) x = 17.78 tons/acre,<br>90%CI:(10.91<x<24.66), n=6 |

### Lake Roosevelt National Recreation Area (LARO)

The fuels management program is very active at LARO. There are 34 fire effects monitoring plots scattered throughout nine burn units in the Ponderosa pine forests of the park. This is a report of the pre-treatment condition of the fuels and vegetation on the two newest units, Bradbury Beach and Clark Lake.

**Trees:** The fuels management objectives at LARO focus on basal area rather than on tree density, however the number of trees per acre is reported to help determine how much of the basal area comes from pole trees ( $\leq 14.9$  cm dbh) versus overstory trees ( $> 15$  cm dbh). The Bradbury Beach unit contains fewer pole trees (210 per acre) and more overstory trees (165 per acre) than the Clark Lake unit, which has 358 pole trees per acre and 105 overstory trees per acre. The predominance of larger trees at Bradbury Beach is reflected in the basal area of 156 ft<sup>2</sup> per acre, whereas Clark Lake has a basal area of 104 ft<sup>2</sup> per acre. The management objective is to reduce the basal area to 40 to 60 ft<sup>2</sup> per acre.

**Exotics:** Non-native species are far less prevalent at Bradbury Beach (0.8 percent cover) than at Clark Lake (22.1 percent cover). Bulbous bluegrass (*Poa bulbosa*) is the dominant invasive at both sites, with 0.4 percent cover at Bradbury Beach and 13.1 percent cover at Clark Lake. Cheatgrass (*Bromus tectorum*) is also present at Bradbury Beach (0.3 percent cover) and Clark Lake (1.9 percent cover). Japanese brome (*B. japonicus*) and Sheep sorrel (*Rumex acetosella*) are also of concern at Clark Lake due to their prevalence (1.2 and 2.5 percent cover respectively). The management objective is to accept no more than a 20 percent increase in either the total non-native ground cover or in any species' individual cover.

**Native Ground Cover:** The native ground cover (ferns, forbs, vines, graminoids and grass-like species) is also sparser at Bradbury Beach than at Clark Lake; with a 6 percent cover and 38 percent cover respectively. Silky lupine (*Lupinus sericeus*, 13 percent cover) and Bluebunch wheatgrass (*Pseudoroegneria spicata*, 6 percent cover) were the most common species at Clark Lake, whereas Largeleaf sandwort (*Arenaria macrophylla*, 1 percent cover) and Ross' sedge (*Carex rossii*, 1 percent cover) were the dominant species at Bradbury beach. A 500 percent

increase in herbaceous cover is needed at Bradbury beach to reach desired conditions, whereas even a slight reduction in cover would be acceptable at Clark Lake to maintain 30 percent cover of native herbaceous species.

**Shrub Cover:** There is a 36 percent cover of shrubs at Bradbury Beach, which is within the range of the management objective to maintain a 30 percent or greater cover of shrubs. The predominant shrub species at Bradbury Beach are Shiny-leaf meadowsweet (*Spiraea betulifolia*, 13 percent cover), Serviceberry (*Amelanchier alnifolia*, 10 percent cover), and Snowberry (*Symphoricarpos albus*, 9 percent cover). There is a 92 percent cover of shrubs at Clark Lake, primarily comprised of Snowberry (53 percent cover) and Bitterbrush (*Purshia tridentata*, 21 percent cover). A maximum desired shrub cover needs to be determined because the current shrub cover at Clark Lake is at hazardous levels with respect to fire danger.

**Fuel Loading:** The total woody fuel loadings at Bradbury Beach (15 tons per acre) and Clark Lake (17.8 tons per acre) will require multiple treatments to maintain 2 to 6 tons per acre, the stated objective. It is expected that all of the thinning debris, especially the large diameter fuels (1000 hours,  $\geq 3''$  diameter) will be removed from site or pile burned. Even so, there will likely be an increase in woody fuels after the first thin and burn due to thinning debris and the shedding of dead branches from snags.

**Recommendations:** Bradbury Beach is in better condition than Clark Lake, although both units will require multiple treatments to reach desirable fuel loadings. Small diameter trees and shrubs need to be aggressively targeted for removal at Clark Lake. Increases in invasive species cover following treatments are likely, especially at Clark Lake. It is important for managers to be proactive with respect to invasive species management.

# San Juan Island National Historic Park



**FQUGA1-8 Q4-Q1**  
**Garry Oak Woodland**  
**Young Hill Unit**  
**00PRE (2004)**



**FQUGA1-2 Q2-Q3**  
**Garry Oak Woodland**  
**Young Hill Unit**  
**00PRE (1999)**



**FQUGA1-8 Q4-Q1**  
**Garry Oak Woodland**  
**04YR01 (2007)**



**FQUGA1-2 Q2-Q3**  
**Garry Oak Woodland**  
**05yr01 (2010)**

## SAJH: San Juan Island National Historic Park

| Garry Oak Woodland<br>(FQUGA1D02)<br>Monitoring Objectives | 04YR01 (1 RX burn + 1 thin)                                                            |                      | 05YR01 (2 RX burns + 1 thin)                                                              |                      |
|------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------|----------------------|
|                                                            | Monitoring Results                                                                     | Objectives Achieved? | Monitoring Results                                                                        | Objectives Achieved? |
| 1) Maintain less than 5% mortality of overstory QUGA.      | 1) x=6.2% Reduction, 90%CI:(-5.6<x<18.1), n=8<br>Pre=16.2, 04YR01=15.2 stems/acre      | 1) Not quite         | 1) x=30.0% Reduction, 90%CI:(6.5<x<53.5), n=4<br>Pre=10.1, 05YR01=7.1 stems/acre          | 1) No                |
| 2) Reduce the total fuel load by at least 50%.             |                                                                                        |                      |                                                                                           |                      |
| a. Total fuel load                                         | a) x=2.3% Reduction, 90%CI:(-59.7<x<64.3), n=7, Pre=14.7, 04YR01=14.3 tons/acre        | a) No                | a) x=59.5% Reduction, 90%CI:(-18.9<x<137.8), n= 4, Pre=29.1, 05YR01= 11.8 tons/acre       | a) Yes               |
| b. One-hour fuels                                          | b) x=86.6% Reduction, 90%CI:(17.7<x<154.8), n=7 Pre=1.8, 04YR01=0.2 tons/acre          | b) Yes               | b. x=93.0% Reduction, 90%CI:(18.0<x<168.0), n= 4, Pre=2.6, 05YR01=0.2 tons/acre           | b) Yes               |
| c. Ten-hour fuels                                          | c) x=58.6% Reduction, 90%CI:(-9.1<x<126.4), n=7, Pre=0.8, 04YR01=0.3 tons/acre         | c) Yes               | c. x=73.3% Reduction, 90%CI:(0.5<x<146.0), n= 4, Pre=1.1, 05YR01=0.3 tons/acre            | c) Yes               |
| d. Hundred-hour fuels                                      | d) x=10.5% Reduction, 90%CI:(-41.4<x<62.4), n=7, Pre=2.6, 04YR01= 2.4 tons/acre        | d) No                | d. x=69.3% Reduction, 90%CI:(29.2<x<109.3), n= 4, Pre=3.5, 05YR01=1.1 tons/acre           | d) Yes               |
| e. Thousand-hour fuels                                     | e) x=96.5% Increase, 90%CI:(-86.0<x<279.0), n=7, Pre=3.5, 04YR01=6.9 tons/acre         | e) No                | e. x=51.0% Reduction, 90%CI:(-81.9<x<183.8), n= 4, Pre=12.2, 05YR01= 6.0 tons/acre        | e) Yes!!             |
| f. Litter and duff                                         | f) x=24.0% Reduction, 90%CI:(-7.5<x<55.5), n=7 Pre=5.9, 04YR01=4.5 tons/acre           | f) Yes               | f. x=56.2% Reduction, 90%CI:(-13.6<x<125.9), n= 4, Pre=9.6, 05YR01= 4.2 tons/acre         | f) Yes               |
| 3) Decrease the percent cover of shrubs by 30%.            | 3) x=9.9% Reduction, 90% CI:(-18.8<x<38.6), n=8<br>Pre=25.1%, 04YR01=21.6% shrub cover | 3) No                | 3) x=29.8% Reduction, 90% CI:(-48.2<x<107.9), n=4<br>Pre=32.8%, 05YR01= 23.0% shrub cover | 3) Yes!!             |

|                                                                                               |                                                                                         |        |                                                                                        |        |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------|--------|
| 4) Increase the percent cover of native perennial grasses by 20%.                             | 4) $x=0.18\%$ Increase, 90%CI:(-95.3< $x$ <130.4), $n=8$ , Pre=3.8, 04YR01=4.5% cover   | 4) No  | 4) $x=674.1\%$ Increase, 90%CI:(-357< $x$ <1705), $n=4$ , Pre=0.6, 05YR01=4.7% cover   | 4) Yes |
| 5) Accept up to a 20% increase in cover of non-native grass                                   | 5) $x=13.3\%$ Reduction, 90%CI:(-35.1< $x$ <61.8), $n=8$ , Pre=33.9, 04YR01=29.4% cover | 5) Yes | 5) $x=18.3\%$ Increase, 90%CI:(-99.5< $x$ <136.0), $n=4$ Pre=33.0, 05YR01=39.0% cover  | 5)Yes  |
| 6) Increase the percent cover of native herbaceous species (forbs, vines, grass-like) by 20%. | 6) $x=21.4\%$ Decline, 90%CI:(-28.7< $x$ <71.5), $n=8$ Pre=27.1, 04YR01=21.3% cover     | 6) No  | 6) $x=0.03\%$ Increase, 90%CI:(-48.3< $x$ <48.4), $n=4$ Pre=33.72, 05YR01=33.73% cover | 6)Yes  |
| 7) Accept a 20% increase in cover of non-native herbaceous species from preburn levels.       | 7) $x=40.1\%$ Increase, 90%CI:(-20.7< $x$ <12.8), $n=8$ , Pre=22.7, 04YR01=31.8% cover  | 7) No  | 7) $x=70.0\%$ Increase, 90%CI:(50.6< $x$ ,89.3), $n=4$ , Pre=26.4, 05YR01=44.8% cover  | 7) No  |

### 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 by comparing 8 plots that have been thinned and burned once to 4 plots that have been thinned once and burned twice.

**Trees:** A few overstory (> 15 cm dbh) Garry oak trees have been lost during each prescribed burn despite efforts to prevent their death. One tree per acre was lost after thinning and burning once. Three trees per acre were lost on plots that were thinned and burned twice.

**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. Sixty 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. Remarkably, 51 percent of the pre-burn large diameter fuels (1000-hour,  $\geq 3''$  diameter) were consumed despite the fact that they had increased by 97 percent after the first burn. A large proportion of the 100-hour fuels and litter and duff were also consumed after the second burn.

**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 30 percent, just 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 native grass cover on plots that were thinned and burned once (4.5 percent cover) or thinned once and burned twice (4.7 percent cover) were very similar, however, the former gained only 0.2 percent cover, whereas the later gained 674 percent cover from the pre-treatment condition. Wildrye (*Elymus glaucus*, 3 percent cover) was the predominant species on the plots that burned once, whereas Velvet grass (*Holcus lanatus*, 4 percent cover) was more prevalent on the plots that burned twice.

Although burning once does not appear to have had much of an effect on native grass cover, it may have had an impact on the cover of non-native grass. Non-native grass cover declined by 13 percent on the plots that were thinned and burned once, whereas it increased by 18 percent on plots that were burned twice. Poverty brome (*Bromus sterilis*) had the most significant decline (16 to 8 percent cover) on the plots that burned once. Tall oatgrass (*Arrhenatherum elatius*) had the largest increase (6 to 15 percent cover) on the plots that burned twice. All of the plots met the management objective to accept no more than a 20 percent increase in non-native grass cover; however the plots that burned twice only narrowly achieved this goal.

**Herbaceous Cover:** Herbaceous cover declined by 21 percent on plots that burned only once, whereas it increased slightly (if at all given the margin of error) on plots that burned twice. Notably, Bedstraw (*Galium aparine*) declined from 13 percent cover to 2 percent cover on the plots that burned only once, and Marah oreganus increased from 6 percent cover to 14 percent cover on the plots that burned twice.

Of greater concern, is the fact that non-native herbaceous cover increased after one or two burns (40 percent and 70 percent, respectively). Tiny vetch, (*Vicia hirsuta*) and Garden vetch (*V. sativa*) increased the most on plots that burned once (from 5 and 7 percent cover respectively, to 8 percent cover on each) or twice (from 7 and 9 percent cover respectively, to 10 and 8 percent cover respectively). Mouse-ear chickweed (*Cerastium fontanum*) also increased significantly on plots that burned twice (from 2 to 6 percent cover).

**Recommendations:** Preliminary results suggest that the plots that have undergone one thin and two burn treatments are within the desired management condition for fuels, shrubs and vegetation. This achievement reflects the diligence of the OLYM fire managers and crew. Managers should continue to monitor fuel reduction objectives and vegetation cover (natives vs. exotics) as more units undergo secondary treatments. Special care should be taken to protect the large Garry oaks during subsequent treatments.

## B. Fire ecologist accomplishments and areas of focus

**Table 4. Fire Ecologist Accomplishments/Focus Areas**

| Category                  | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                   |
|---------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning                  | 2            | FMP, EA, EIS, CE, section 7 consultation, monitoring plan, etc.                                                                                                                                                                                              |
| Presentations             | 3            | Presented Stehekin Fire History Research Update to UW Fire and Mtn Ecology Lab, Presented Fire History Pre-proposal at PW Fire Ecologist Meeting, Presented fire effects monitoring report to NOCA managers                                                  |
| NPS Meetings/ task groups | 5            | NRCA - Analysis of fire ecology of MORA and NOCA, NOCA Wilderness Committee member, NOCA Housing Representative for Resource Management                                                                                                                      |
| Interagency work          | 8            | Attended regional workshop for PNW Fire Ecology Consortium, Collaborating with UW CESU on LIDAR and fuel mapping project at MORA, Active member of UW Fire and Mtn Ecology Laboratory (attend weekly lab meetings discussing fire ecology graduate research) |
| Wildfire assignments      |              | n/a – on maternity leave all fire season                                                                                                                                                                                                                     |
| Prescribed fire projects  | 2            | GIS for fire effects monitoring of LARO and SAJH rx units                                                                                                                                                                                                    |
| Non-fire fuels projects   | 10           | Hired and coordinated SCAs for fuel mapping effort at MORA                                                                                                                                                                                                   |
| Research                  | 25           | UW Doctoral research on Stehekin fire history and severity                                                                                                                                                                                                   |
| Data collection           |              | n/a – on maternity leave all field season                                                                                                                                                                                                                    |
| Data entry                | 2            | Entered some fuel mapping data and fire behavior data                                                                                                                                                                                                        |
| Data analysis             | 15           | Summary stats of all fuel mapping data for CESU research project, 2009 fire effects monitoring report                                                                                                                                                        |
| Supervision/Admin         | 25           | Hiring, supervision, payroll, travel authorization/vouchers, purchasing, etc.                                                                                                                                                                                |
| Training                  |              |                                                                                                                                                                                                                                                              |
| Miscellaneous             | 3            | GIS work for CBI and Rapid Assessment plots on wildfires                                                                                                                                                                                                     |

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

**Table 5. Fire Effects Crew Accomplishments/Focus Areas**

| Category                        | Percent Time | Notes                                                                                                                         |
|---------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------|
| FMH plots                       | 40%          | The NPCB crew visited 33 FMH plots at 4 different sites in 2010. Logistical prep time and travel                              |
| Data entry                      | 14%          | Completed all data entry for 2010. Updated all species names in database                                                      |
| Wildfire and Detail Assignments | 9%           | HECM, FEMO, FFT2, READ duties on the Oak Flat and Rainbow Bridge fires                                                        |
| RAPs and CBI plots              | 6%           | Post-reads of 5 wildfire plots and 2 rereads of 2008 RX burn plots. 29 CBI plots conducted                                    |
| Supervision/Admin               | 6%           | Travel, payroll, credit card statements, logistics planning, vehicle maintenance, purchasing, hiring, performance evaluations |
| Training                        | 6%           | S-271, S-212, S-212, L-280, READ, ATV, NOCA Fire Refresher,                                                                   |

|                                              |    |                                                                                                                                                                        |
|----------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              |    | First Aid/CPR, Defensive Driving, PWR Fire Ecologists meeting                                                                                                          |
| MORA Fuel Survey plots                       | 5% | Data collection of fuel loading in Mount Rainier National Park by Fire Ecology SCA interns                                                                             |
| Plant identification / herbarium maintenance | 4% | Keying out and mounting voucher specimens, inventorying herbarium and field voucher collections in database                                                            |
| Miscellaneous                                | 4% | RX fire monitoring report, photo database organization, writing FFI data entry protocols, training SCA interns, creating insect damage guide, Search and Rescue duties |
| RX Fire Assignments                          | 2% | FEMO, FFT1, FFT2 duties on the Coon Run and Napoleon RX burns                                                                                                          |
| Data analysis and YER completion             | 2% | Data analysis and completion of 2010 Year End Report                                                                                                                   |
| Fuels Projects                               | 1% | Cross training with Fuels crew (thinning)                                                                                                                              |
| SAJH Annual Brome treatment                  | 1% | Data collection for study of the effects of spring/fall RX burning on annual grass species on Young Hill                                                               |

#### D. Additional Information

**Table 6. Data Entry and Projects Monitored**

| 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%                        | 0                             | 0                                      | 0                      | 0                            |
| Lake Roosevelt NRA      | 100%                | 100%                        | 0                             | 0                                      | 0                      | 0                            |
| North Cascades NP       | 100%                | 100%                        | 1                             | 0                                      | 0                      | 0                            |
| San Juan Island NHP     | 100%                | 100%                        | 0                             | 0                                      | 0                      | 0                            |

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

#### E. Optional Information

**To help in the ongoing effort to improve FFI, please include any feedback or suggestions here based on your experiences using FFI.**

- It would be extremely useful to have a toggle box in FFI Query to filter live/dead when determining live tree density and basal area. – CD

**This report is available online at**

<http://npsfamshare.nps.doi.net/wildlandfire/firescience/fireecology/default.aspx>