



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

### **A. Summary**

2014 was another productive year for the Northern Great Plains (NGP) fire ecology program. A total of 101 plots of various types were measured in ten park units, which included 61 installs in 7 park units. Eight prescribed fires, burned 27 plots, occurred in 5 NGP parks with 17 plots being measured immediately post-burn.

This was the fifth field season in which the NGP fire ecology program collaborated with the Northern Great Plains Inventory and Monitoring Network (NGPN). The NGP fire ecology program continues to collaborate with the NGP I&M program in pre- and postseason field season meetings, botany training, field monitoring, unknown plant id sessions, and FFI database management. After our fire effects monitor crew seasons ended, the NGPN crew helped us out tremendously this fall with post-burn reads following the Cold Brook and Canyons prescribed burns as well as with data checking.

Permanent staffing within our program continues to decline as personnel leave for “greener” pastures. Phil Graeve, lead fire effects monitor, left for the U.S.F.S. in April for a position that would give him more pay periods per year at the same grade level. Fortunately, we were able to hire three seasonals this field season, two of which were returning for their second and sixth seasons. Due to the vast field experience, botanical knowledge, and “can-do” attitude we were able to accomplish our entire plot rereads as well as install plots in seven burn units.

This May, NGP Fire Management and the ND park group conducted the Beef Corral Wash prescribed burn, 2600 acres, at Theodore Roosevelt N.P. on May 9, 2014, as well as conducted a “live” training exercise for S-234 Firing Operations on May 3 at Agate Fossil Beds N.M.. September of 2014 wasn’t a good month for prescribed burning for several reasons: 1.) grasses hadn’t cured out early in the month due to abundant summer moisture, 2.) the Black Hills received an unseasonably early snowstorm on September 11, 3.) last two weeks of September “FBMS black-out” period, and 4.) 4” of rain the last two days of September throughout the area. Fortunately the first three weeks of October were generally mild and dry which allowed the fuels to dry out. The week of October 20 was very busy in our park network with three prescribed burns completed at Wind Cave N.P. and one at Jewel Cave N.M. for a total of 1831 NPS acres. In addition, the NGP Fire Management program burned 616 acres at Agate Fossil Beds N.M. in mid-September with the primary objective to reduce fuel loading.

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

| Park                      | Monitoring Unit     | Type of Plot (FMH, photo point, other) | Pre-burn 2014 | Imm. Post 2014 | Postburn (1-20 yrs) 2014 | Annual Total (2014) | Total Plots |
|---------------------------|---------------------|----------------------------------------|---------------|----------------|--------------------------|---------------------|-------------|
| <b>Agate Fossil Beds</b>  | Mixed grass prairie | I&M Style Veg                          | 4             | 5              | 1                        | 10                  | 17          |
| <b>Badlands</b>           | Mixed grass prairie | I&M Style Veg                          | 8             |                |                          | 8                   | 40          |
|                           | Mixed grass prairie | Photo point                            |               |                |                          |                     | 3           |
| <b>Devils Tower</b>       | Mixed grass prairie | I&M Style Veg                          | 2             |                |                          | 2                   | 9           |
|                           | Ponderosa forest    | I&M Style Forest                       |               |                |                          |                     | 39          |
|                           | Ponderosa forest    | I&M Style Forest & Veg                 |               |                | 3                        | 3                   | 16          |
|                           | Mixed grass prairie | Photo point                            | 3             |                |                          | 3                   | 3           |
|                           | Ponderosa forest    | Photo point                            |               |                |                          |                     | 3           |
| <b>Fort Union</b>         | Mixed grass prairie | I&M Style Veg                          |               |                | 4                        | 4                   | 6           |
|                           | Mixed grass prairie | Photo point                            |               |                |                          |                     | 1           |
| <b>Jewel Cave</b>         | Ponderosa forest    | FMH Forest                             |               |                |                          |                     | 3           |
|                           | Ponderosa forest    | I&M Style Forest                       |               | 4              | 1                        | 5                   | 44          |
|                           | Ponderosa forest    | I&M Style Forest & Veg                 | 3             | 2              | 1                        | 6                   | 16          |
| <b>Knife River</b>        | Mixed grass prairie | I&M Style Veg                          |               |                | 2                        | 2                   | 16          |
| <b>Mount Rushmore</b>     | Ponderosa forest    | I&M Style Forest                       |               |                | 1                        | 1                   | 45          |
|                           | Ponderosa forest    | I&M Style Forest & Veg                 |               |                |                          |                     | 15          |
|                           | Ponderosa forest    | Photo point                            |               |                | 3                        | 3                   | 3           |
| <b>Scotts Bluff</b>       | Mixed grass prairie | I&M Style Veg                          | 14            |                |                          | 14                  | 15          |
|                           | Juniper Woodland    | FMH Forest                             |               |                |                          |                     | 2           |
|                           | Mixed grass prairie | Photo point                            |               |                |                          |                     | 2           |
| <b>Theodore Roosevelt</b> | Mixed grass prairie | I&M Style Veg                          | 7             |                | 4                        | 11                  | 16          |
|                           | Juniper woodland    | I&M Style Forest & Veg                 |               |                |                          |                     | 5           |
|                           | Mixed grass prairie | Photo point                            |               |                |                          |                     | 1           |
|                           | Cottonwood forest   | Photo point                            |               |                |                          |                     | 2           |
|                           | Juniper woodland    | Photo point                            |               |                |                          |                     | 5           |
| <b>Wind Cave</b>          | Mixed grass prairie | Photo point                            |               |                |                          |                     | 4           |
|                           | Ponderosa forest    | Photo point                            |               |                |                          |                     | 7           |
|                           | Ponderosa forest    | FFV                                    |               |                | 3                        | 3                   | 3           |
|                           | Ponderosa forest    | F&F                                    |               |                |                          |                     | 11          |
|                           | Ponderosa forest    | I&M Forest & Veg                       | 16            | 6              |                          | 22                  | 16          |
|                           | Ponderosa forest    | I&M Forest                             |               |                |                          |                     | 90          |
|                           | Mixed grass prairie | I&M Veg                                | 4             |                |                          | 4                   | 9           |
|                           | Ponderosa forest    | CBI                                    |               |                |                          |                     | 48          |
| <b>Total</b>              |                     |                                        | <b>61</b>     | <b>17</b>      | <b>23</b>                | <b>101</b>          | <b>515</b>  |

**Table 2. Fire Ecology Staffing 2014**

| Ecologist and Monitors | Starting Date | Ending Date | # of Pay Periods | READ qualified | Training and Development                                                                                                                                                                                                                                                                                                                     |
|------------------------|---------------|-------------|------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dan Swanson            | 1/1/2014      | 12/31/2014  | 26               | No             | Black Hills Area Bot/Eco workshop, Cool-Season Invasive Grasses of the NGP Workshop, Dakotas Society of American Foresters Conference, botany training, fire refresher. AGFO-Daemonelix/River RX, AGFO-River Middle/South RX, WICA-Cold Brook RX, JECA-Canyon RX, CSP-Pleasant Valley RX, CSP-South Fork RX. FEMO 7 fire operational periods |
| Phil Graeve            | 3/31/2014     | 4/18/2014   | 2.5              | No             | Black Hills Area Bot/Eco workshop, Dakotas Society of American Foresters Conference                                                                                                                                                                                                                                                          |
| Valena Perreault       | 4/14/2014     | 10/3/2014   | 12.5             | No             | botany training, Wilderness First Aid, fire refresher, AGFO-River Middle/South RX, 1 operational period                                                                                                                                                                                                                                      |
| Ellery Watson          | 4/14/2014     | 10/17/2014  | 13.5             | No             | botany training, Wilderness First Aid, fire refresher, S-131, S-133, S-212, THRO-Beef Corral Wash RX, AGFO-River Middle/South RX. Went with Black Hills Wildland Fire Module to Staley complex and Muskrat wildfires in OR. 16 operational periods                                                                                           |
| William Watson         | 5/19/14       | 9/30/14     | 9.5              | No             | Botany training, fire refresher, AGFO-River Middle/South RX, 1 operational period                                                                                                                                                                                                                                                            |



Dan Swanson and Bill Watson reading a vegetation transect at Fort Union N.H.S.

**Table 3. 2014 Management Objectives and Monitoring Results**

All results shown are 80% confidence intervals of the mean. Fuel reduction objectives/results are mean percent reduction from pre-burn to immediate post-burn. Stand density objectives/results are for 2-year post-burn mean stand density. An underlined number of plots indicates that the minimum sample size has been attained for that variable.

| Park                       | Project Unit                                                       | Management Objective                                                                                                                                                                                                                                                                                                                                                       | Monitoring Results (80% C.I.)                                                                          | Objective Achieved                                                | Year Last Analysis Completed (Range of data included in analysis) |
|----------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Jewel Cave N.M.</b>     | <b>Canyons Unit</b><br>Ponderosa Pine slash / Mixed-grass prairie  | Reduce 1000-hr fuel loading by at least 40% following one prescribed burn<br>Reduce Total fuel loading by at least 50% following one prescribed burn                                                                                                                                                                                                                       | 58-78% Decrease<br>54-67% Decrease                                                                     | Yes; N=6<br>Yes; N=6                                              | 2015<br>(2011-2014)                                               |
|                            | <b>Hill Top Unit</b><br>Ponderosa Pine slash / Mixed-grass prairie | Reduce Total fuel loading by 70-90% following one prescribed burn                                                                                                                                                                                                                                                                                                          | 28-50% Decrease                                                                                        | No; N=6                                                           | 2009<br>(2008-2009)                                               |
| <b>Mount Rushmore N.M.</b> | <b>Hazardous Fuels Reduction Project</b><br>Ponderosa Pine Forest  | Thin & pile Pond. Pine < 6" DBH in designated areas throughout Memorial                                                                                                                                                                                                                                                                                                    | 89-97% Decrease                                                                                        | Yes; N=13                                                         | 2013<br>(2010-2012)                                               |
|                            |                                                                    | Thin & chip Pond. Pine < 10" DBH in designated areas throughout Memorial<br>Increase crown base height compared to untreated areas<br>Thin & Pile<br>Thin & Chip                                                                                                                                                                                                           | 90-96% Decrease<br>1.8 m Increase<br>2.5 m Increase                                                    | Yes; N=13<br>Yes; N=13                                            |                                                                   |
| <b>Wind Cave N.P.</b>      | <b>Cold Brook North Unit</b><br>Ponderosa Pine Forest              | Reduce 100-hr and 1000-hr fuel loading by at least 30% following one prescribed burn<br>Two years following prescribed burn:<br>Achieve 20-50% mortality of > 6" dbh ponderosa pine<br>Achieve 20-30% mortality of 1-6" dbh ponderosa pine<br>Achieve 50-70% mortality of < 1" dbh ponderosa pine                                                                          | No change<br>No change<br>TBD<br>TBD<br>TBD                                                            | No; N=6<br>No; N=6                                                | 2015<br>(2014)                                                    |
|                            | <b>American Elk Unit</b><br>Ponderosa Pine Forest                  | Reduce 100-hr and 1000-hr fuel loading by at least 40% following one prescribed burn<br>One year following prescribed burn:<br>Achieve 20-50% mortality of > 6" dbh ponderosa pine<br>Achieve 50-70% mortality of 1-6" dbh ponderosa pine<br>Achieve 70-95% mortality of < 1" dbh ponderosa pine                                                                           | 51-70% Decrease<br>11-50% Decrease<br>23-37% Decrease<br>54-71% Decrease<br>59-81% Decrease            | Yes; N=60<br>Yes; N=60<br>Yes; N=60<br>Yes; N=60<br>Yes; N=60     | 2012<br>(2009-2011)                                               |
|                            | <b>Headquarters West Unit</b><br>Ponderosa Pine Forest             | Reduce fine fuel loading by at least 70% following one prescribed burn<br>Reduce 100-hr and 1000-hr fuel loading by at least 20% following one prescribed burn<br>One year following prescribed burn:<br>Achieve 10-30% mortality of > 6" dbh ponderosa pine<br>Achieve 40-60% mortality of 1-6" dbh ponderosa pine<br>Achieve 70-90% mortality of < 1" dbh ponderosa pine | 36-80% Decrease<br>56-75% Decrease<br>7-84% Decrease<br>No change<br>0-98% Decrease<br>30-67% Decrease | No; N=3<br>Yes; N=3<br>Yes; N=3<br>Yes; N=3<br>No; N=3<br>No; N=3 | 2011<br>(2009-2010)                                               |
|                            | <b>Native Mixed-grass Prairie</b>                                  | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                           | 5% Decrease<br>No change<br>23% Decrease                                                               | No; N=7<br>No; N= <u>7</u><br>Yes; N=6                            | 2008<br>(1998-2013)                                               |
|                            | <b>Non-native Grass Prairie</b>                                    | Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 20%                                                                                                                                                                                                     | 59% Increase<br>No change                                                                              | Yes; N=5<br>No; N=5                                               | 2008                                                              |

|                          |                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                     |                                                         |
|--------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------|
|                          |                                                                    | within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No change                                                                                                 | No; N=5                                                                             |                                                         |
|                          | Ponderosa Pine Forest                                              | Increase the relative cover of native herbs by at least 25% within two growing seasons after the burn<br>Decrease the relative cover of non-native herbs by at least 25% within two growing seasons after the burn<br>Reduce the density of overstory ponderosa pine ( $\geq 14.9$ cm dbh) by at least 30% two growing seasons after the burn.<br>Reduce the density of pole-size ponderosa pine (2.5 – 14.8 cm dbh) by at least 50% two growing seasons after the burn.<br>Reduce the density of seedling ponderosa pine by at least 70% one growing season after the burn<br>Reduce total fuel loading by at least 30% following one prescribed burn | 17% Decrease<br><br>No change<br><br>6% Decrease<br><br>No change<br><br>78% Decrease<br><br>21% Decrease | No; N=5<br><br>No; N=5<br><br>No; N=9<br><br>No; N=9<br><br>Yes; N=9<br><br>No; N=9 | 2008                                                    |
| <b>Devils Tower N.M.</b> | <b>Belle Fourche Unit</b><br>Ponderosa Pine Forest                 | Reduce 1-hr and 10-hr fuel loading by at least 50% following one prescribed burn<br>Reduce 100-hr and 1000-hr fuel loading by at least 20% following one prescribed burn<br>Decrease the relative cover of non-native forbs by at least 20% within two growing seasons after the burn.<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                                 | 66-77% Decrease<br>38-98% Decrease<br>No change<br>32-73% Decrease<br>No change<br><br>No change          | Yes; N=4<br>Yes; N=4<br>No; N=4<br>Yes; N=4<br>No; N=4<br><br>No; N=4               | 2015<br>(2012-2014)                                     |
|                          | <b>Red Beds Unit</b><br>Ponderosa Pine Forest/ Mixed-grass Prairie | Decrease the relative cover of non-native forbs by at least 20% within two growing seasons after the burn.<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                                                                                                                             | No change<br>No change                                                                                    | No; N=3<br>No; N=3                                                                  | 2013<br>(2010-2012)                                     |
|                          | Non-native Grass Prairie                                           | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                       | 39% Increase<br><br>74% Increase<br><br>49% Decrease                                                      | Yes; N=3<br><br>Yes; N=3<br><br>Yes; N=3                                            | 2008                                                    |
|                          | Ponderosa Pine                                                     | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 10% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.<br>Reduce total fuel loading by at least 30% following one prescribed burn                                                                                                                                                                                                                                            | 13% Increase<br><br>36% Increase<br><br>No change<br><br>43-64% Decrease                                  | Yes; N=7<br><br>Yes; N=6<br><br>No; N=7<br><br>Yes; N=11                            | 2008<br><br>2008<br><br>2008<br><br>2013<br>(1996-2013) |
|                          |                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |                                                                                     |                                                         |
| <b>Badlands N.P.</b>     | <b>Castle Unit</b><br>Western wheatgrass Mixed-grass Prairie       | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                       | 16-24% Decrease<br><br>No change<br><br>79-86% Decrease                                                   | No; N=7<br><br>No; N=7<br><br>Yes; N=7                                              | 2014<br><br>(2010-2013)                                 |
|                          | <b>Pinnacles Unit</b><br>Non-native grass Prairie                  | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 10% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                       | No change<br><br>24-38% Decrease<br><br>34-56% Decrease                                                   | No; N=7<br><br>No; N=7<br><br>Yes; N=7                                              | 2014<br><br>(2010-2013)                                 |
|                          | <b>Interior Unit</b><br>Western wheatgrass Mixed-grass Prairie     | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at                                                                                                                                                                                                                                                                                                                                                                            | No change<br><br>52-82% Decrease<br><br>89-98% Decrease                                                   | No; N=7<br><br>No; N=7<br><br>Yes; N=7                                              | 2013<br><br>(2010-2012)                                 |

|                                           |                                                                |                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                                           |                     |
|-------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------|---------------------|
|                                           |                                                                | least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                                                                                                                      |                                                             |                                           |                     |
|                                           | <b>Conata 1&amp;2 Unit</b><br>Non-native grass Prairie         | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 10% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.                                                          | No change<br>18-46% Increase<br>37-111% Increase            | No; N=5<br>Yes; N=5<br>No; N=5            | 2010<br>(2006-2009) |
|                                           | Western wheatgrass Mixed-grass Prairie                         | Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.                                                          | No change<br>No change<br>38-60% Decrease                   | No; N=45<br>No; N=45<br>Yes; N=45         | 2014<br>(1998-2009) |
| <b>Theodore Roosevelt N.P.</b>            | <b>NW Corner Unit</b><br>Native Mixed-grass Prairie            | Increase the relative cover of native grasses by at least 20% within two growing seasons after the 2 <sup>nd</sup> RX burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the 2 <sup>nd</sup> RX burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the 2 <sup>nd</sup> RX burn. | 4-22% Increase<br>23% Decrease<br>35-87% Decrease           | No; N=3<br>No; N=3<br>Yes; N=3            | 2014<br>(2001-2013) |
|                                           | <b>SE Corner Unit</b><br>Kentucky Bluegrass Non-native Prairie | Increase the relative cover of native grasses by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the 3 <sup>rd</sup> RX burn. | 81% Increase<br>182% Increase<br>19% Decrease               | Yes; N=2<br>Yes; N=2<br>No; N=2           | 2014<br>(1998-2013) |
|                                           | <b>I-94 Unit</b><br>Crested Wheatgrass Non-native Prairie      | Increase the relative cover of native grasses by at least 20% within five growing seasons after the 1 <sup>st</sup> RX burn<br>Decrease the relative cover of non-native grasses by at least 20% within five growing seasons after the 1 <sup>st</sup> RX burn.                                                                                                                           | 18-93% Decrease<br>37-71% Decrease                          | No; N=3<br>Yes; N=3                       | 2013<br>(2000-2012) |
|                                           | <b>Little Missouri Unit</b><br>Silver Sagebrush                | Five years following the 1 <sup>st</sup> RX burn:<br>Reduce silver sage density by 40-60%<br>Increase native forb cover by 20%.<br>Reduce non-native herb cover by at least 25%<br>Increase native perennial grass cover by at least 25%.                                                                                                                                                 | 38% Decrease<br>30% Increase<br>12% Increase<br>6% Increase | No; N=2<br>Yes; N=2<br>No; N=2<br>No; N=2 | 2010<br>(1998-2009) |
|                                           | Kentucky Bluegrass Non-native Prairie                          | Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.                                                          | 57% Increase<br>No change<br>3% Decrease                    | Yes; N=3<br>No; N=3<br>No; N=3            | 2008                |
|                                           | Crested Wheatgrass Non-native Prairie                          | Increase the relative cover of native grasses by at least 20% within five growing seasons after the burn<br>Decrease the relative cover of non-native grasses by at least 20% within five growing seasons after the burn.                                                                                                                                                                 | No change<br>No change                                      | No; N=3<br>No; N=3                        | 2008                |
|                                           | Native Mixed-grass Prairie                                     | Increase the relative cover of native grasses by at least 20% within five growing seasons after the burn<br>Decrease the relative cover of non-native herbs by at least 20% within five growing seasons after the burn.                                                                                                                                                                   | 8% Increase<br>8% Increase                                  | No; N=3<br>No; N=3                        | 2008                |
|                                           |                                                                |                                                                                                                                                                                                                                                                                                                                                                                           |                                                             |                                           |                     |
| <b>Knife River Indian Villages N.H.S.</b> | <b>Peninsula Unit</b><br>Non-native Prairie                    | Increase the relative cover of native grasses by at least 20% within two growing seasons after the RX burn                                                                                                                                                                                                                                                                                | 20-86% Decrease                                             | No; N=3                                   | 2015                |
|                                           |                                                                | Increase the relative cover of native forbs by at least 20% within two growing seasons after the RX burn                                                                                                                                                                                                                                                                                  | 10-86% Decrease                                             | No; N=3                                   | (2009-2014)         |
|                                           |                                                                | Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the RX burn.                                                                                                                                                                                                                                                                           | 1-22% Decrease                                              | No; N=3                                   |                     |
|                                           |                                                                | Decrease the relative cover of non-native forbs by at least 30% within two growing seasons after the RX burn.                                                                                                                                                                                                                                                                             | No Change                                                   | No; N=3                                   |                     |

|                              |                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                             |                                            |                     |
|------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------|---------------------|
|                              | <b>VC East Unit</b><br>Non-native<br>Prairie                             | Increase the relative cover of native grasses by at least 20% within two growing seasons after the RX burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the RX burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the RX burn.<br>Decrease the relative cover of non-native forbs by at least 30% within two growing seasons after the RX burn. | No Change<br>No Change<br>No Change<br>177-795% Increase    | No; N=6<br>No; N=6<br>No; N=6<br>No; N=6   | 2014<br>(2011-2013) |
|                              | <b>North Prairie Unit</b><br>Kentucky<br>Bluegrass Non-native<br>Prairie | Increase the relative cover of native grasses by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn<br>Increase the relative cover of native forbs by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn<br>Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the 3 <sup>rd</sup> RX burn.                                                                  | 7-55% Increase<br>622-1173% Increase<br>No Change           | No; N=4<br>Yes; N=4<br>No; N=4             | 2014<br>(2008-2013) |
|                              | <b>Big Hidatsa Unit</b><br>Native Mixed-grass<br>Prairie                 | Increase the relative cover of native grasses by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn<br>Decrease the relative cover of non-native forbs by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn.<br>Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the 3 <sup>rd</sup> RX burn.                                                             | 32-60% Decrease<br>No Change<br>514-1148% Increase          | No; N=4<br>No; N=4<br>No; N=4              | 2011<br>(1998-2010) |
| <b>Agate Fossil Beds N.M</b> | <b>Carnegie Unit</b><br>Native Mixed-grass<br>Prairie                    | Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn.<br>Decrease the relative cover of non-native herbs by at least 20% within two growing seasons after the burn.                                                                                                                                                                                                                                     | 51- 71% Increase<br>64 – 82% Decrease                       | Yes; N=3<br>Yes; N=3                       | 2013<br>(2008-2011) |
| <b>Scottsbluff N.M.</b>      | Needlegrass/Sedge Mixed-grass<br>Prairie                                 | Increase the relative cover of native grasses by at least 20% five growing seasons after the RX burn<br>Increase the relative cover of native forbs by at least 20% five growing seasons after the RX burn<br>Decrease the relative cover of non-native grasses by at least 20% five growing seasons after the RX burn.<br>Decrease the relative cover of non-native forbs by at least 20% five growing seasons after the RX burn.                         | No Change<br>No Change<br>44-54% Increase<br>No Change      | No; N=5<br>No; N=5<br>No; N=5<br>No; N=5   | 2014<br>(1998-2005) |
|                              | <b>Saddle Rock Unit</b><br>Brome/Non-native<br>prairie                   | Increase the relative cover of native grasses by at least 20% five growing seasons after the RX burn<br>Increase the relative cover of native forbs by at least 20% five growing seasons after the RX burn<br>Decrease the relative cover of non-native grasses by at least 20% five growing seasons after the RX burn.<br>Decrease the relative cover of non-native forbs by at least 20% five growing seasons after the RX burn.                         | 43% Decrease<br>50% Increase<br>5% Increase<br>33% Decrease | No; N=2<br>Yes; N=2<br>No; N=2<br>Yes; N=2 | (2000-2006)         |

## Jewel Cave N.M.

The 274 acre interagency Canyon prescribed fire was completed on October 24, 2014. Two hundred acres of the unit fell within the west and southwest portion of Jewel Cave National Monument, and 74 acres were within the Hell Canyon R.D. of the Black Hills N.F. Much of the unit consisted of ponderosa pine slash from the moderate to high severity Jasper wildland fire which occurred on Aug. 25, 2000. A mixed-grass prairie plant community has developed within the high woody fuel loading in the intervening 14 years since the wildland fire. The primary objective for the fire was to reduce 1000-hour fuel loading by 40% or greater and total fuel loading by 50% or greater. A secondary objective was to burn at least 70% of the project area to produce nutrient flush and to encourage growth of native species.



Fire moving uphill from control line through heavy fuels



Active fire behavior continues into the evening

The paired fire effects plot data from six plots was analyzed for relative change from pre-burn to immediate postburn using ratio of means (RoM) at an 80% confidence level. 1000-hr fuels were significantly reduced between 58 and 78% while total fuel loading was reduced between 54 and 67% (Figure 1). In addition eighty-one percent of the project area was burned. The Canyons prescribed burn was successful in meeting the fuel reduction objectives as well as exceeding the desired project area burned. Further monitoring next summer will help to determine if native herbaceous cover has increased. Total and woody debris fuel loads in this unit are now at a level consistent with historical values within the southern Black Hills.

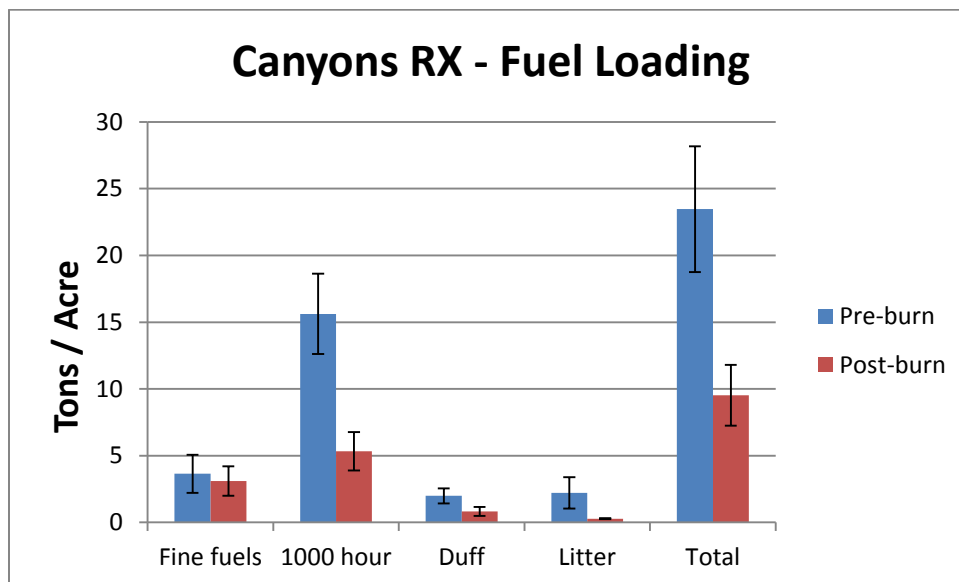


**Figure 1** Changes in fuel loading by size class for six plots within the Canyons unit after the October 24, 2014, prescribed burn. Values represent means  $\pm$  standard errors.

## Wind Cave N.P.

Unit 1 and unit 3 of Cold Brook were treated with prescribed fire on October 23 & 25, 2014, within the ecotone between ponderosa pine forest and mixed-grass prairie in the southwestern corner of the park. Portions of the 1,210 acres treated within the two units had burned in three wildland fires between 18 and 26 years ago. Specific burn objectives included achieving at least a 30% reduction in the 100-hr and 1000-hr fuels, greater than 60% reduction of grass thatch fuel loading, 50-70% mortality in ponderosa pine seedlings, 20-30% mortality in pole-size ponderosa pine (1-6" dbh), and decrease encroachment of ponderosa pine regeneration at the forest-prairie ecotone.

Six plots were read within the unit in June 2014 and all of them were either partially or completely burned during the fire. These plots were reread in early November to assess burn severity and fuel reduction objectives. The paired fire effects plot data was analyzed for relative change from pre-burn to immediate postburn using ratio of means (RoM) at an 80% confidence level. Severity measurements indicated that substrate and vegetation burn severity was primarily light. 100-hr and 1000-hr fuels were not significantly reduced during the burn (Figure 2). Total fuel loading significantly decreased between 18 and 45%. In addition eighty-five percent of the project area was burned.

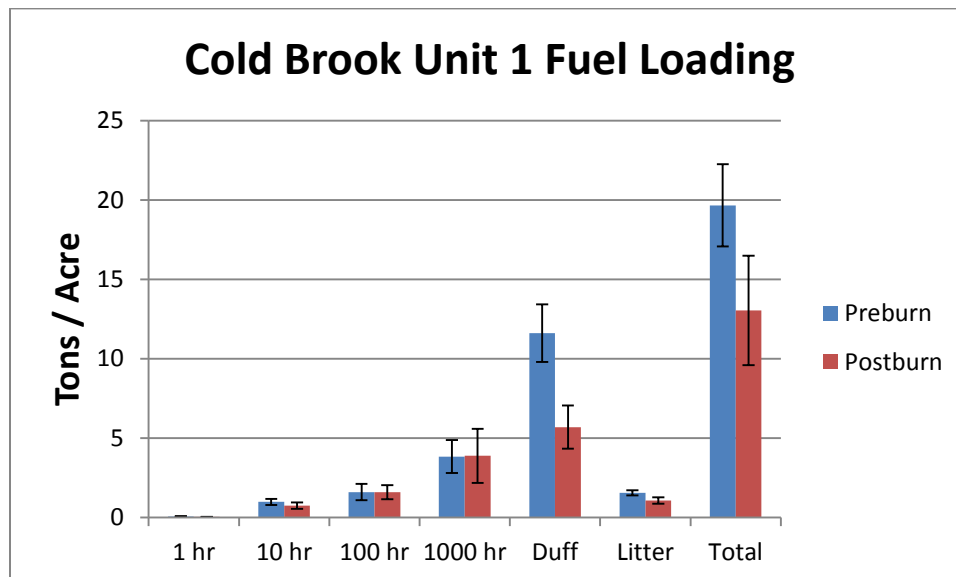


**Figure 2** Changes in fuel loading by size class for six plots within the Cold Brook unit after the October 23, 2014, prescribed burn. Values represent means  $\pm$  standard errors.



Holding resources along western boundary of unit



FEMO (T) Mike Prowatzke recording fire behavior/smoke observations

The Cold Brook prescribed fire accomplished the objective of restoring fire back to the area where fire had been excluded or suppressed, and this was achieved without compromising safety of firefighters or the public. Although the resource objectives with respect to 100- and 1000-hour fuel loads do not appear to have been met, some reduction of heavy fuels is likely to have occurred within the unit, as evidenced by fire behavior observations during the burn period. Observations of seedlings torching and crown scorching indicate that a moderate level of mortality is certain. In the summer of 2015 the NGP fire effects monitoring crew will revisit plots in Unit 1 to assess ponderosa pine mortality by size class and changes to vegetation composition and cover to see if resource objectives were met. The Northern Great Plains Fire Management program hopes to burn Unit 2, 988 acres, of Cold Brook in the spring of 2015 when weather conditions and fuel moistures allow for the achievement of resource objectives.

### **Devils Tower N.M.**

The 300 acre Belle Fourche prescribed burn was completed on May 7, 2013, in an open ponderosa pine community with an understory consisting of mixed-grass prairie species. This was the second entry of fire into this unit. Specific burn objectives included achieving at least a 50% reduction in the 1 & 10-hr fuels, 20% reduction in the 100 & 1000-hr fuels, and greater than 20% decrease in non-native herbaceous cover two growing seasons after the burn. Five plots were installed/read within the unit in July 2012, with four of them being burned during the fire and were revisited the first and second growing seasons after the burn in late June & early July 2013 and 2014.

The paired fire effects treatment plot data was analyzed for relative change from pre-burn to second growing season after prescribed fire using ratio of means (RoM) at an 80% confidence level. ANOVA was used to compare changes in cover for treatment plots to control plots. Non-native forb cover increased in treatment plots between 250 and 425% from preburn to year two (Figure 3); however there was no significant difference when compared to control plots. Native forb cover increased between 165 and 240% from preburn to year two, and this increase was significant when compared to control plots (Figure 4). Non-native grass cover did not change, while native grass cover increased between 18 and 56% but this was not significantly different from changes in control plots.



PCM-016 Photo taken July 7, 2014, second growing season after the May 7, 2013 RX burn

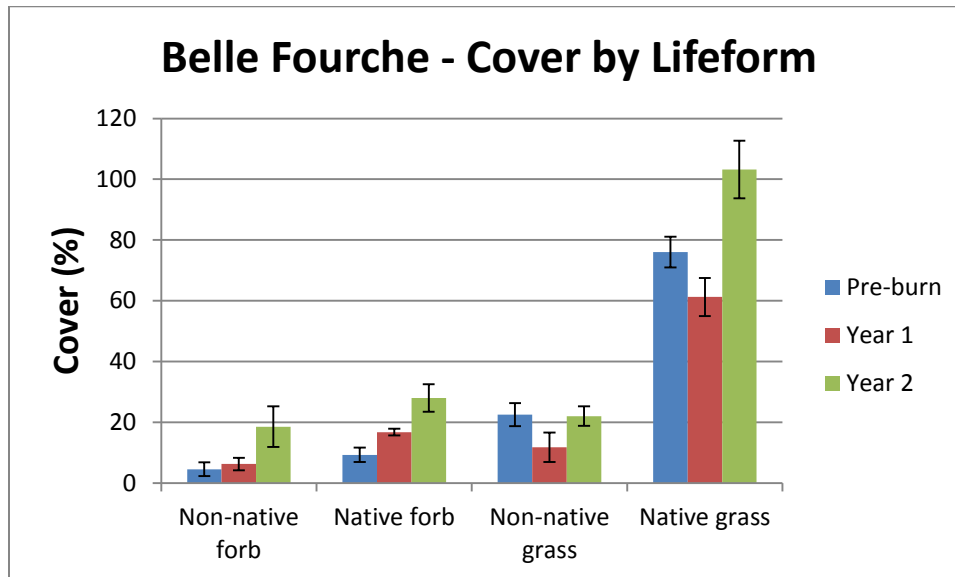


**Figure 3** Changes in vegetative cover by lifeform for four plots within the Belle Fourche unit after the May 7, 2013, prescribed burn. Values represent means  $\pm$  standard errors.

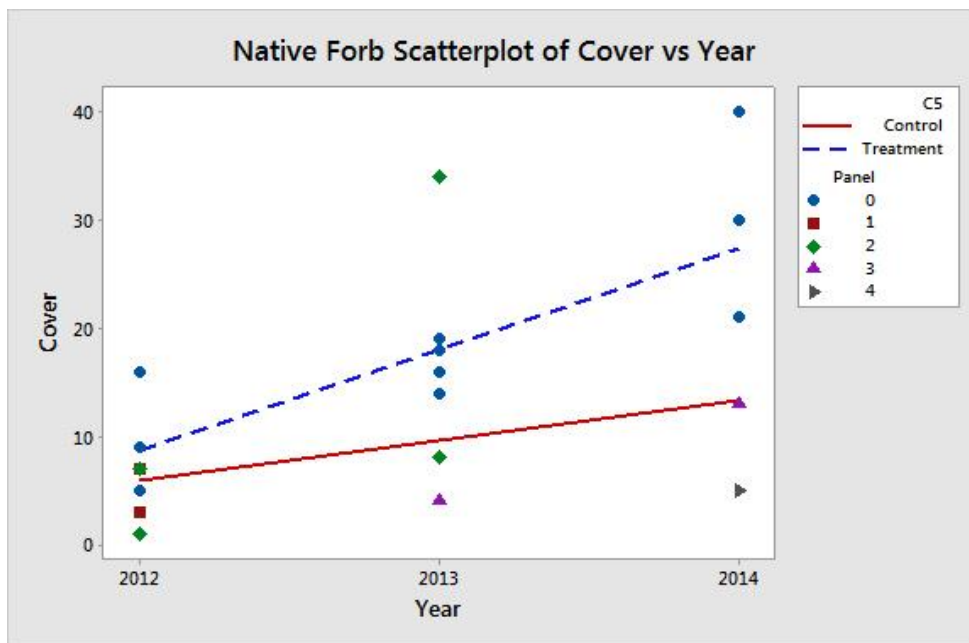


**Figure 4** Changes in native forb cover between 2012 and 2014 in treatment and control plots within the Belle Fourche unit.

In the treatment plots all dominant species significantly increased in cover from preburn to second growing season after the May 2013 prescribed fire with the exception of Needle & Thread (Figure 5). However, only sun sedge and western wheatgrass had significant changes in cover when compared to control plots.

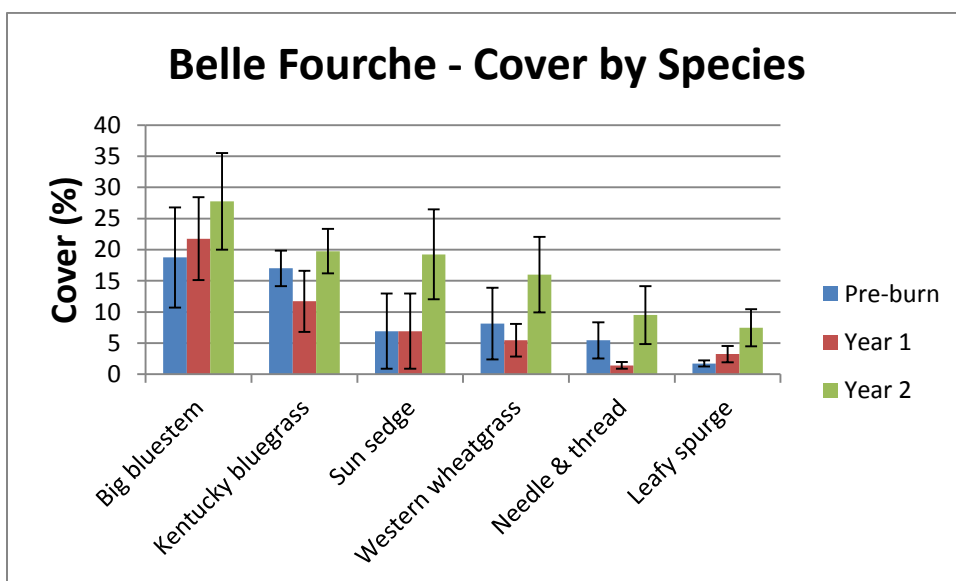


**Figure 5** Changes in vegetative cover by dominant species for four plots within the Belle Fourche unit after the May 7, 2013, prescribed burn. Values represent means  $\pm$  standard errors.

### Theodore Roosevelt N.P.

The 2600 acre Beef Corral Wash prescribed burn was completed on May 9, 2014, in a mixed-grass prairie that included a large component of Rocky Mountain junipers. This was the first

entry of fire into this unit. Primary resource objectives included decreasing fuel loading and promoting wildlife habitat. Six plots were installed within the unit in July 2011 for preburn reads with four of them being burned during the fire and were revisited the first growing season after the burn in July 2014. Primary purpose of the plots was to assess short to long-term changes in species composition and cover of non-native and native forbs and grasses. Immediate post-burn data was not collected due to time constraints.

The paired fire effects treatment plot data was analyzed for relative change from pre-burn to second growing season after prescribed fire using ratio of means (RoM) at an 80% confidence level. ANOVA was used to compare changes in cover for treatment plots to control plots. There was no change in non-native forb cover from preburn to first growing season postburn for treatment plots or between treatment and control plots (Figure 6). Native forb cover significantly decreased between 42 and 65% and this change was also significant compared to the control plots. Non-native grass cover decreased between 70 and 86% but this change wasn't significant compared to changes in the control plots. Native grass cover decreased between 20 and 32% in treatment plots and this change was significant compared to control plots.



Active fire behavior in Rocky Mountain Juniper.



Fire carried well throughout interior portions of unit.

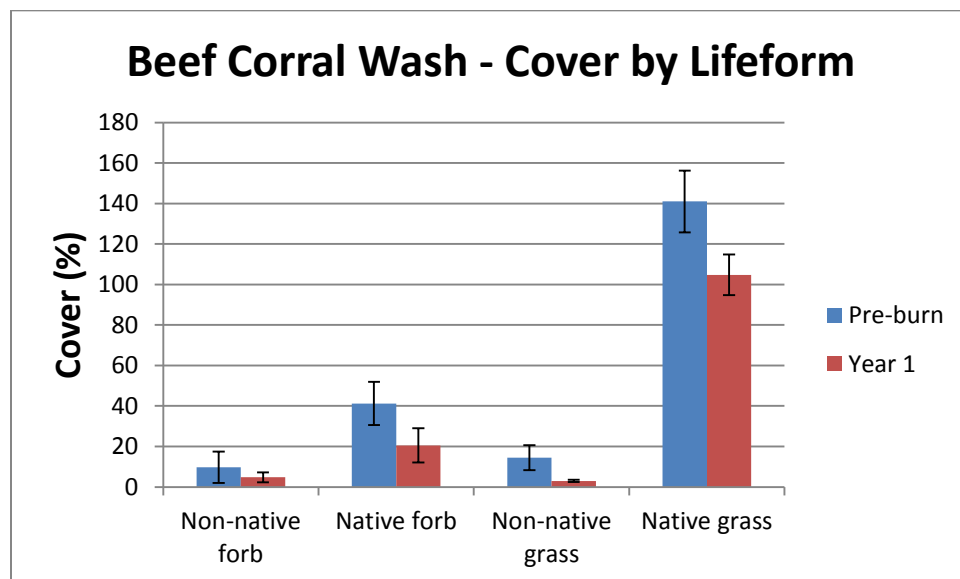


**Figure 6** Changes in vegetative cover by lifeform for four plots within the Beef Corral Wash unit after the May 9, 2014, prescribed burn. Values represent means  $\pm$  standard errors.

For the six dominant species in the Beef Corral Wash unit, only sideoats grama and plains muhly significantly changed in cover from preburn to first growing season postburn in relation to the control plots, with both increasing in cover (Figure 7). In 2015 we will return to these plots again for their second growing season post-burn reads. I feel that this read is the most telling with regards to the longer-term vegetational composition and cover that will be realized in the unit after a fire.

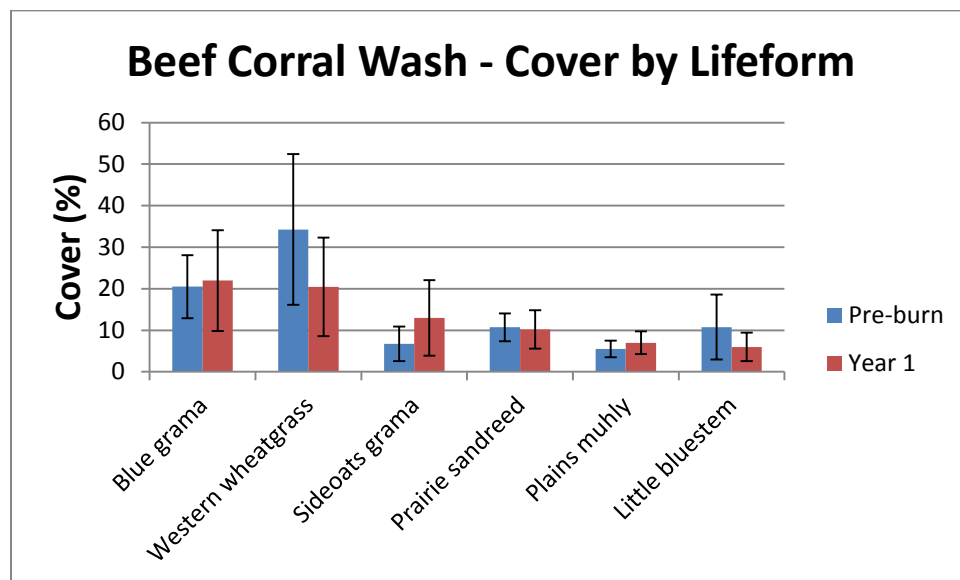


**Figure 7** Changes in vegetative cover by dominant species for four plots within the Beef Corral Wash unit after the May 9, 2014, prescribed burn. Values represent means  $\pm$  standard errors.

### Agate Fossil Beds N.M.

The River Middle/River South prescribed fire was completed September 15, 2014. The 616 acre fire was conducted for ecological maintenance of Agate Fossil Beds National Monument. The primary objective for the fire was to reduce fuel loading. A secondary objective included decreasing non-native herbaceous cover by at least 10% one-year postburn. The units were mixed-grass prairie with a strong presence of Russian Thistle (*Kochia scoparia*). Both units were burned simultaneously with three ignition teams.

Six plots were installed/read within the unit in late May/early June 2011 through 2014 and four of them were either partially or completely burned during the fire. These plots were reread the day after the burn to assess burn severity. Substrate burn severity measurements indicated most locations were either scorched or lightly burned while vegetation burn severity measurements were predominantly light to moderately burned (Figure 8).

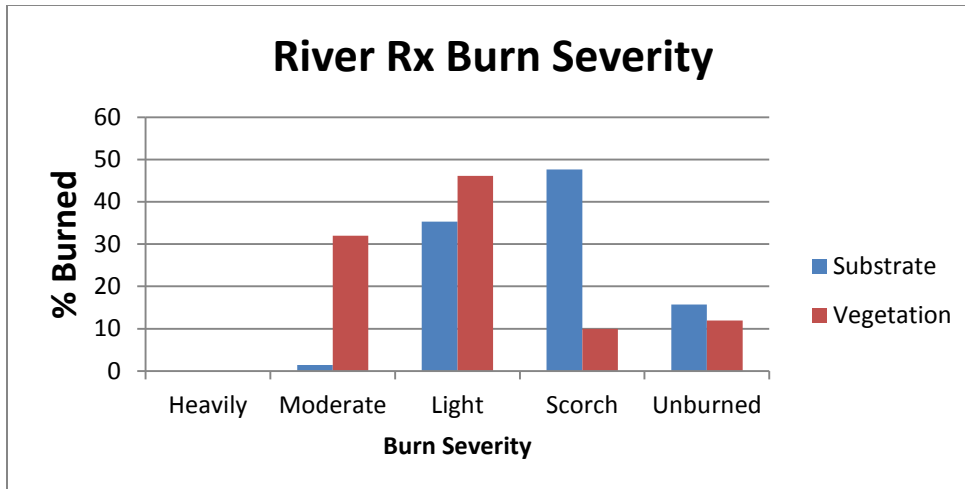


**Figure 8** Substrate and vegetation burn severity ratings for four plots within the River Middle/ River South unit after the September 15, 2014, prescribed burn.



Blacklining east control line of River South

The units burned as a mosaic and fuel reduction objectives were met except in areas dominated by Russian thistle which did not carry fire due to lack of thatch at the ground level. Monitoring will continue at 1, 2, and 5 years to track changes in vegetation composition and ground cover.

## B. Program Information

**Table 4. Planning – 2014**

| Park                            | Does Park have written DFCs? (yes or no) | Date Park-level Monitoring Plan completed (or revised) | Total # of Project- or Community-level Monitoring Plans (not just 2014) | Assisted with how many BAER plans in 2014? |
|---------------------------------|------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------|
| Agate Fossil Beds N.M.          | no                                       | 2004                                                   | 0                                                                       | 0                                          |
| Badlands N.P.                   | no                                       | 2003                                                   | 0                                                                       | 0                                          |
| Devils Tower N.M.               | yes                                      | 2004                                                   | 0                                                                       | 0                                          |
| Fort Union Trading Post NHS     | no                                       | 2007                                                   | 0                                                                       | 0                                          |
| Jewel Cave N.M.                 | no                                       | 2004                                                   | 0                                                                       | 0                                          |
| Knife River Indian Villages NHS | no                                       | 2007                                                   | 0                                                                       | 0                                          |
| Mount Rushmore N.M.             | yes                                      | 2007                                                   | 0                                                                       | 0                                          |
| Scotts Bluff N.M.               | yes                                      | 2004                                                   | 0                                                                       | 0                                          |
| Theodore Roosevelt N.P.         | no                                       | 2007                                                   | 0                                                                       | 0                                          |
| Wind Cave N.P.                  | no                                       | 2005                                                   | 0                                                                       | 0                                          |

**Table 5. Monitoring – 2014**

| Park                            | % 2014 Data Entered | % 2014 Data Quality Checked | # Prescribed Fires Monitored* | # Non-fire Fuels Treatments Monitored* | # Wildfires Monitored* | # BAER Treatments Monitored* |
|---------------------------------|---------------------|-----------------------------|-------------------------------|----------------------------------------|------------------------|------------------------------|
| Agate Fossil Beds N.M.          | 100%                | 100%                        | 2                             | 0                                      | 0                      | 0                            |
| Badlands N.P.                   | 100%                | 100%                        | 1                             | 0                                      | 0                      | 0                            |
| Devils Tower N.M.               | 100%                | 100%                        | 3                             | 0                                      | 1                      | 0                            |
| Fort Union Trading Post NHS     | 100%                | 100%                        | 2                             | 0                                      | 0                      | 0                            |
| Jewel Cave N.M.                 | 100%                | 100%                        | 1                             | 0                                      | 1                      | 0                            |
| Knife River Indian Villages NHS | 100%                | 100%                        | 1                             | 0                                      | 0                      | 0                            |
| Mount Rushmore N.M.             | 100%                | 100%                        | 1                             | 1                                      | 0                      | 0                            |
| Scotts Bluff N.M.               | 100%                | 100%                        | 4                             | 0                                      | 0                      | 0                            |
| Theodore Roosevelt N.P.         | 100%                | 100%                        | 3                             | 0                                      | 0                      | 0                            |
| Wind Cave N.P.                  | 100%                | 100%                        | 4                             | 0                                      | 0                      | 0                            |

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



The mosquitoes and black flies are making Valena go crazy at KNRI!

**Table 6. Communicating Results – 2014**

| Park                            | # of Project Monitoring Reports completed in 2014 | # of Annual meeting(s) with Park staff | # of Formal presentations of results | Do you use Minitab?* |
|---------------------------------|---------------------------------------------------|----------------------------------------|--------------------------------------|----------------------|
| Agate Fossil Beds N.M.          | 2                                                 | 1                                      | 1                                    | Yes                  |
| Badlands N.P.                   | 0                                                 | 1                                      | 1                                    | Yes                  |
| Devils Tower N.M.               | 0                                                 | 1                                      | 1                                    | Yes                  |
| Fort Union Trading Post NHS     | 0                                                 | 0                                      | 1                                    | Yes                  |
| Jewel Cave N.M.                 | 0                                                 | 0                                      | 1                                    | Yes                  |
| Knife River Indian Villages NHS | 0                                                 | 0                                      | 1                                    | Yes                  |
| Mount Rushmore N.M.             | 1                                                 | 0                                      | 2                                    | Yes                  |
| Scotts Bluff N.M.               | 0                                                 | 1                                      | 1                                    | Yes                  |
| Theodore Roosevelt N.P.         | 0                                                 | 0                                      | 1                                    | Yes                  |
| Wind Cave N.P.                  | 1                                                 | 0                                      | 1                                    | Yes                  |

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

**Table 7. Research – 2014**

| Park                            | Are research needs identified in FMP or Monitoring Plan? (yes or no) | # of Proposals Submitted in 2014 | # of Proposals Funded in 2014 | # of Research Projects Supported in 2014* | Additional Comments |
|---------------------------------|----------------------------------------------------------------------|----------------------------------|-------------------------------|-------------------------------------------|---------------------|
| Agate Fossil Beds N.M.          | no                                                                   | 1                                | 0                             | 0                                         |                     |
| Badlands N.P.                   | no                                                                   | 1                                | 0                             | 0                                         |                     |
| Devils Tower N.M.               | no                                                                   | 1                                | 0                             | 0                                         |                     |
| Fort Union Trading Post NHS     | no                                                                   | 0                                | 0                             | 0                                         |                     |
| Jewel Cave N.M.                 | no                                                                   | 0                                | 0                             | 0                                         |                     |
| Knife River Indian Villages NHS | no                                                                   | 0                                | 0                             | 0                                         |                     |
| Mount Rushmore N.M.             | no                                                                   | 1                                | 0                             | 0                                         |                     |
| Scotts Bluff N.M.               | no                                                                   | 1                                | 0                             | 0                                         |                     |
| Theodore Roosevelt N.P.         | no                                                                   | 0                                | 0                             | 0                                         |                     |
| Wind Cave N.P.                  | no                                                                   | 1                                | 0                             | 0                                         |                     |

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

#### **Reserve Fund Research:**

Research Reserve Funding was used on the project titled “Strategies to Quickly Find Invasive Plant Outbreaks after Prescribed Fire in Black Hills Ponderosa Pine Forest” that was carried out at Wind Cave N.P., Jewel Cave N.M., and Devils Tower N.M. from 2010-2012. A journal article was produced in April 2014 in *Forest Ecology and Management* from this project. In addition a *RX Effects* article was written for the Fall 2014 edition.

### C. Fire ecologist accomplishments and areas of focus

Dan co-wrote an article in the Fall *RX Effects*, “*Essential Fire Ecology*”, with NPS Fire Ecologists and a Lead Fire Effects Monitor which was a discussion topic that emphasized the importance that the fire ecology program has to fire management operations, park natural resource monitoring programs, and management decisions that are based in sound science. He also co-wrote an article with Amy Symstad, Research Ecologist, and West Newton, Statistician, at the Northern Prairie Wildlife Research Center on “*Strategies to Quickly Find Invasive Plant Outbreaks after Prescribed Fire in Black Hills Ponderosa Pine Forest*”. This three-year research reserve funded project was conducted at Wind Cave N.P. and Jewel Cave N.M. from 2010 to 2012. The goal of the research project was to help natural resource managers target their search areas of particular invasive plant species based on fire-related conditions and environmental attributes of the landscape. The fact that post-fire invasive cover tended to be higher in higher-severity areas does suggest that fire and resource managers need to consider the risk of invasive plants when planning prescribed fires. However, if measures to reduce these outbreaks (perhaps pre-fire treatment, or post-fire seeding with desired native species) are economical, then including a mixture of fire severities in burn prescriptions could be a useful tool for restoring a more heterogeneous, pre-suppression-like structure to Black Hills ponderosa pine forest.

Dan also inputted/edited all NFPORS fire effects monitoring activities for the ten parks in the NGP park group. He continues to be the primary FFI database manager for the fire ecology program and works closely with the NGP I&M database manager throughout the year ensuring the shared FFI databases are accurate and up to date.

Dan travelled with the monitoring crew to all ten parks this field season as a crew supervisor since the lead monitor left for the U.S.F.S. in mid-April. Due to vacancies in the lead and assistant lead monitor positions he has had to enter/check more data into FFI following the field season as well as wrap-up any loose ends before he can begin analyzing the data and writing reports.

**Table 8. Fire Ecologist 2014 Accomplishments/Focus Areas**

| Category                  | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                               |
|---------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning                  | 7%           | Determining fire effects travel costs to area parks, training of field crew in FFI. Developing burn unit objectives for area parks                                                                                                       |
| Presentations             | 6%           | Scientific meetings, park staff, public, etc. Co-wrote two articles “Strategies to Quickly Find Invasive Plant Outbreaks after Prescribed Fire in Black Hills Ponderosa Pine Forest” and “Essential Fire Ecology” in <i>RX Effects</i> . |
| NPS Meetings/ task groups | 4%           | Park & I&M meetings; NGP Technical Committee meeting;                                                                                                                                                                                    |
| Interagency work          | 1%           | Black Hills Area Ecologist & Botanist Workshop;                                                                                                                                                                                          |
| Wildfire assignments      | 0%           |                                                                                                                                                                                                                                          |
| Prescribed fire projects  | 4%           | FEMO on AGFO-Daemonelix and River Middle/South RX fires, WICA-Cold Brook RX, JECA-Canyon RX, CSP-Pleasant Valley RX, CSP-South Fork RX (7 operational periods). Prep for Cold Brook RX                                                   |
| Non-fire fuels            | 0%           |                                                                                                                                                                                                                                          |

|                                             |     |                                                                                                                                                                |
|---------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| projects                                    |     |                                                                                                                                                                |
| Research                                    | 1%  | Provided comments/input to Natural Resource Technical Report “Two Approaches for Planning Natural Resource Management in a Changing Climate at Wind Cave N.P.” |
| Data collection                             | 21% | AGFO, SCBL, BADL, DETO, MORU, WICA, JECA, THRO, KNRI, & FOUS fire effects plot work;                                                                           |
| Data entry, check                           | 4%  | JECA & WICA data entry; SCBL, BADL, THRO, JECA, WICA, & THRO data checking                                                                                     |
| Data management & analysis                  | 32% | Northern Great Plains area parks fire effects database management and analysis                                                                                 |
| Supervision/Admin                           | 15% | Hiring, supervision, payroll, travel authorization/vouchers, etc.                                                                                              |
| Training                                    | 3%  | Botany, Supervisory, EEO training                                                                                                                              |
| Travel out-of-park for plot or project work | 2%  | Travel to AGFO, SCBL, BADL, KNRI, & THRO for monitoring and RX fires                                                                                           |

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

**Table 9. Fire Effects Crew 2014 Accomplishments/Focus Areas**

| Category                                    | Percent Time | Notes                                                                                                                                                                                                                 |
|---------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FMH plots                                   | 0%           | Re-reading of FMH plots (Forest, Grass, and Brush)                                                                                                                                                                    |
| NGP plots                                   | 1%           | Re-reading of burn-unit specific plots (FFV (Forest, fuels, and veg), photo points)                                                                                                                                   |
| I&M plots                                   | 45%          | Installing & rereading I&M-style plots. These plots are installed/read within active burn units in each park to address project objectives.                                                                           |
| Wildfire assignments                        | 6%           | Ellery details with the Black Hills Wildland Fire Module on the Staley Complex & Muskrat WF                                                                                                                           |
| Prescribed fire projects                    | 8%           | Ellery: FFT2 THRO-Beef Corral Wash RX, AGFO-Daemonelix RX, AGFO-River Middle/South RX, Valena: AGFO-River Middle/South RX William: AGFO-River Middle/South RX. Valena, Ellery, and Bill: Prep-work for Cold Brook RX; |
| Non-fire fuels projects                     | 0%           |                                                                                                                                                                                                                       |
| Travel out-of-park for plot or project work | 4%           | Travel to AGFO, SCBL, DETO, BADL, THRO, FOUS, & KNRI for monitoring and RX fires                                                                                                                                      |
| Data entry                                  | 15%          | 100% of plot data entered & 100% checked in FFI as of 11/21/14                                                                                                                                                        |
| Data analysis                               | 0%           |                                                                                                                                                                                                                       |
| Supervision/Admin                           | 11%          | Travel, payroll, field season preparation, equipment upkeep and repair, end of season closeout                                                                                                                        |
| Training                                    | 6%           | Valena and Ellery took botany and WFA training. William field sampling training.                                                                                                                                      |
| Miscellaneous                               | 4%           | physical training, fuel sampling, herbarium updates.                                                                                                                                                                  |

## E. 2015 Direction

The NGP fire ecology program has begun retiring many of the older and “outdated” FMH plots throughout the park network. Since 2009, the NGP fire ecology program has been installing new plots using a sampling design and protocols consistent with the NGPN. The monitoring protocols are more stream-lined than FMH which allows more plots to be installed and read than older FMH-style plots. Over the past six years our program, along with our collaboration with NGPN efforts, have been able to install the newer I&M-style plots throughout our park network’s burn units. After the 2014 field season most of the FMH-style plots have reached sensible retirement points in time after year 5 or year 10 reads. The retirement of these plots will enable our program to maximize our plot monitoring efficiency. In the future we will have to prioritize which burn units are monitored and the degree of that monitoring if budget cuts hit our seasonal workforce, and we aren’t able to refill the lead/assistant lead monitor positions.

## G. Metadata and FFI Database Update on NPS Data Store

All ten park FFI databases will be uploaded to the NPS Data Store by February 2, 2015. All databases include NGP Fire Ecology and NGP I&M program data since we share databases for each park.



Dan Swanson, Valena Perreault, and Ellery Watson doing nested frequency frames at THRO in July following the May 2014 Beef Corral Wash RX.



Purple coneflower