Developing a Performance Indicator for Restoring Fire to Parks Canada Ecosystems

Victor Kafka, Parks Canada Agency
Wildland Fire Canada Conference
October 25-27, 2016
Outline

1) Background

2) Performance Indicator

3) Two examples and target calculation

4) Results

5) Implications / next steps
Background

- Beginning of fire restoration program at PCA (1980s)
- Banff Bow Valley Study (1996)
- Panel on the EI of Canada’s National Parks (2000)
- Fire Management Strategy (2005)
- Auditor’s report (2013)
- New detailed Performance Indicator (2015)
- First assessment of Performance Indicator (2016)
Performance Indicator

National Fire Restoration Target (NFRT)

“On an annual basis, the Parks Canada Agency will ensure a minimum of 60% of appropriate national parks maintain or restore area burned over the last 20 years to levels that meet or exceed 20% of the area that would have burned given the park’s reference fire cycle was met “
Performance Indicator

60% of appropriate national parks (THE TARGET)

- Few constraints to landscape-level restoration
- Good knowledge of fire regimes
- Reference fire cycles are evaluated to be below 300 years for at least one ecosystem

Banff
Glacier
Jasper
Kootenay
Mont Revelstoke
Waterton Lakes
Yoho

Elk Island
Grasslands
Riding Mountain
Prince Albert
Wood Buffalo
La Mauricie
Pukaskwa
Terra Nova
20% of area burned over the last 20 years (THE THRESHOLD)

- Minimum for fire to play a role while realistic
- Prescribed fire and wildfire area burned
- Yearly basis, moving window
- Area burned consistently mapped
- Minimum threshold, higher objectives in some national parks
**STEP 1:** Review reference Fire Cycles (rFC) in each Reference Fire Regime Areas (RFRA).

**Two RFRAs & rFC**

- **Interior Cedar Hemlock:** 250 years
- **Engelman Spruce / Subalpine Fir:** 150 years

Mount Revelstoke and Glacier NPs

**STEP 2:** For each RFRA, calculate expected annual area burned \((eAAB)\), using \(rFC\) and Area \((A)\). If more than one RFRA, add all \(eAABs\) to obtain park total \((Total \ eAAB)\).

\[
eAAB = \frac{A}{rFC}
\]

\[
Total \ eAAB = 104 + 548 = 652 \text{ ha}
\]
STEP 3: Assemble the last 20 years of area burned data for the park (new protocol). Obtain total actual Area Burned (aAB) in the last 20 years (aAB20).

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Type</th>
<th>Action</th>
<th>Area Burned</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>100</td>
<td>01/01/2000</td>
</tr>
<tr>
<td>2001</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>200</td>
<td>01/01/2001</td>
</tr>
<tr>
<td>2002</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>300</td>
<td>01/01/2002</td>
</tr>
<tr>
<td>2003</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>400</td>
<td>01/01/2003</td>
</tr>
<tr>
<td>2004</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>500</td>
<td>01/01/2004</td>
</tr>
<tr>
<td>2005</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>600</td>
<td>01/01/2005</td>
</tr>
<tr>
<td>2006</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>700</td>
<td>01/01/2006</td>
</tr>
<tr>
<td>2007</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>800</td>
<td>01/01/2007</td>
</tr>
<tr>
<td>2008</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>900</td>
<td>01/01/2008</td>
</tr>
<tr>
<td>2009</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>100</td>
<td>01/01/2009</td>
</tr>
<tr>
<td>2010</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>110</td>
<td>01/01/2010</td>
</tr>
<tr>
<td>2011</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>120</td>
<td>01/01/2011</td>
</tr>
<tr>
<td>2012</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>130</td>
<td>01/01/2012</td>
</tr>
<tr>
<td>2013</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>140</td>
<td>01/01/2013</td>
</tr>
<tr>
<td>2014</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>150</td>
<td>01/01/2014</td>
</tr>
<tr>
<td>2015</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>160</td>
<td>01/01/2015</td>
</tr>
<tr>
<td>2016</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>170</td>
<td>01/01/2016</td>
</tr>
<tr>
<td>2017</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>180</td>
<td>01/01/2017</td>
</tr>
<tr>
<td>2018</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>190</td>
<td>01/01/2018</td>
</tr>
<tr>
<td>2019</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>200</td>
<td>01/01/2019</td>
</tr>
<tr>
<td>2020</td>
<td>Lightning</td>
<td>WD</td>
<td>Full Repair</td>
<td>210</td>
<td>01/01/2020</td>
</tr>
</tbody>
</table>

\[ \text{aAB20} = 1808 \text{ ha} \]

STEP 4: Divide aAB20 by \( \text{Total eAAB} \times 20 \) and multiply by 100 to get Percent Fire Restoration (PFR). If PFR \( \geq 20\% \), threshold is met.

\[ \text{PFR} = \left( \frac{\text{aAB20}}{\text{Total eAAB} \times 20} \right) \times 100 \]

\[ \text{PFR} = \frac{1808 \text{ ha}}{(652 \text{ ha} \times 20 \text{ years}) \times 100} \]

\[ \text{PFR} = 14 \% \]
Example in La Mauricie National Park

STEP 1: Two RFRAs & rFC

Valleys: 100 years
Hills: 250 years

STEP 2: Total eAAB = 110 + 147 = 257 ha

STEP 3: aAB20 = 1788 ha

STEP 4: \[ PFR = \frac{1788 \text{ ha}}{(257 \text{ ha} \times 20 \text{ years})} \times 100 \]

\[ PFR = 35\% \]
STEP 5: Calculate whether the NFRT of 60% has been met (equal to or greater than 60%).

\[
NFRT(\%) = \frac{\text{# of appropriate national parks that meet 20% threshold}}{\text{total number of appropriate national parks}} \times 100
\]
Results

<table>
<thead>
<tr>
<th>National Park</th>
<th>20-year Percent Fire Restoration</th>
<th>2015 NFRT Threshold Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>BANFF</td>
<td>49%</td>
<td>✓</td>
</tr>
<tr>
<td>ELK ISLAND</td>
<td>81%</td>
<td>✓</td>
</tr>
<tr>
<td>GLACIER</td>
<td>14%</td>
<td>□</td>
</tr>
<tr>
<td>GRASSLANDS</td>
<td>11%</td>
<td>□</td>
</tr>
<tr>
<td>JASPER</td>
<td>29%</td>
<td>✓</td>
</tr>
<tr>
<td>KOOTENAY</td>
<td>82%</td>
<td>✓</td>
</tr>
<tr>
<td>LA MAURICIE</td>
<td>35%</td>
<td>✓</td>
</tr>
<tr>
<td>M. REVELSTOKE</td>
<td>11%</td>
<td>□</td>
</tr>
<tr>
<td>PRINCE ALBERT</td>
<td>34%</td>
<td>✓</td>
</tr>
<tr>
<td>PUKASKWA</td>
<td>5%</td>
<td>□</td>
</tr>
<tr>
<td>RIDING MOUNTAIN</td>
<td>33%</td>
<td>✓</td>
</tr>
<tr>
<td>TERRA NOVA</td>
<td>7%</td>
<td>□</td>
</tr>
<tr>
<td>WATERTON LAKES</td>
<td>23%</td>
<td>✓</td>
</tr>
<tr>
<td>WOOD BUFFALO</td>
<td>109%</td>
<td>✓</td>
</tr>
<tr>
<td>YOHO</td>
<td>8%</td>
<td>□</td>
</tr>
</tbody>
</table>

2015 NFRT = 9/15 = 60%

- Clear guidelines, simple and coarse measure
- General indication of program performance in the recent past
- Maintaining the 60% will be a challenge
- Area burned revised and mapped consistently
- More than 1.5 M hectares burned in these 15 NPs in the last 20 years
Results

Threshold variation in Banff NP since 1980
Results

Threshold variation in Wood Buffalo NP since 1980
Implications

- How ambitious is 60% and 20%?
- Impact of fire activity and reference fire cycles
- Impact of past fire management decisions and onset of prescribed fire activities
- Mapping area burned in a consistent manner
- Funding and support for small scale fire restoration
- Continue with condition monitoring and ecosystem monitoring
Next Steps and Questions

- Get Performance Indicator officially approved
- Update and achieve Performance Indicator yearly
- Support parks to increase %
- Fund Fire history studies
- Include more parks into the set