**SBEADMR Summer fieldwork 2019 summary report**

**What did we do in Summer 2019?**

1) Impacts of spruce bark beetle and subsequent salvage in Engelmann spruce and Engelmann spruce-aspen forests on forest structure and tree regeneration.

* Sampled 45 plots.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Control | Harvest-Control | Salvage | Total |
| Spruce | 7 | 11 | 9 | 27 |
| Spruce/Aspen | 4 | 9 | 5 | 18 |

* Snowshoe hare scat
* Downloaded temperature sensors (belowground, ground-level, above-ground)
* Installed 3 new salvage plots in spruce/aspen
  + Overstory trees and regeneration
* Collected Seed traps collected from 20 of those 45 plots

**New results**

* Spruce dominated stands
  + Seed production
    - Previously managed sites averaged 61 seeds per plot, unmanaged 28 seeds per plot, and salvage 33 seeds per plot in 2019
    - No statistically significant differences between treatments in 2019
    - Seed production higher in 2019 than 2018
  + Snowshoe hare density
    - highest in unmanaged (0.18 hare/ha), followed by previously managed (0.15 hare/ha), and salvaged (0.04 hare/ha)
    - No statistical differences between treatments
    - Similar to 2018 results
* Spruce-aspen dominated stands
  + Seed production
    - Previously managed sites averaged 49 seeds per plot, unmanaged 33 seeds per plot, and salvage 40 seeds per plot
    - No statistically significant differences between treatments in 2019
  + Snowshoe hare density
    - Mean hare density in 2019 highest in unmanaged stands (0.51 hare/ha), followed by previously managed (0.10 hare/ha), and salvage (0 hare/ha)
    - Unmanaged statistically different from salvaged (p < 0.01) and previously harvested (p < 0.01)
    - Hare density increased in the unmanaged stands between 2018 and 2019

2) Landscape-scale impacts of spruce bark beetle and climate on forest change

* Installed temperature sensors at 40 Forest and Inventory Analysis (FIA) plots with a Engelmann spruce component
* 68 intensive plots installed within the Elk/West Elk study area to document pre-outbreak forest conditions and link it to LIDAR data.
  + Tree inventory
  + Dense horizontal cover
  + Snowshoe hare scat
  + Installed temperature sensors
  + Installed seed traps

**New results**

* Starting to observe subalpine fir mortality in the Elk Mountains.
* No results yet since we just installed in 2019

**Recommendations to Forest Leadership Team**

* In salvage units, protect the advanced regeneration.
* Treatments in green stands to resist the beetles is futile. Instead, these treatments should focus on silvicultural systems that establish new regeneration.
* Promotion of mixed stands, through species composition and size structure aids in resilience.
* Explore options to mitigate impacts to dense horizontal cover during salvage. It is critical to continue to steer salvage away from high-quality Canada lynx habitat.
* Subalpine fir decline in the Elk Mountains might impact important Canada lynx habitat.
* Identifying species to replant following salvage should take into account other topographic variables instead of elevation. Specifically, replanting spruce on lower-elevation sites with moderately steep north-facing aspects is likely to be successful and help maintain spruce on the landscape in an era in which it is projected to see significant declines in extent.
* Longer-term monitoring of vegetation is needed to understand the full impacts of salvage on understory vegetation species composition and cover.