

SBEADMR Science Team update –Summer 2016

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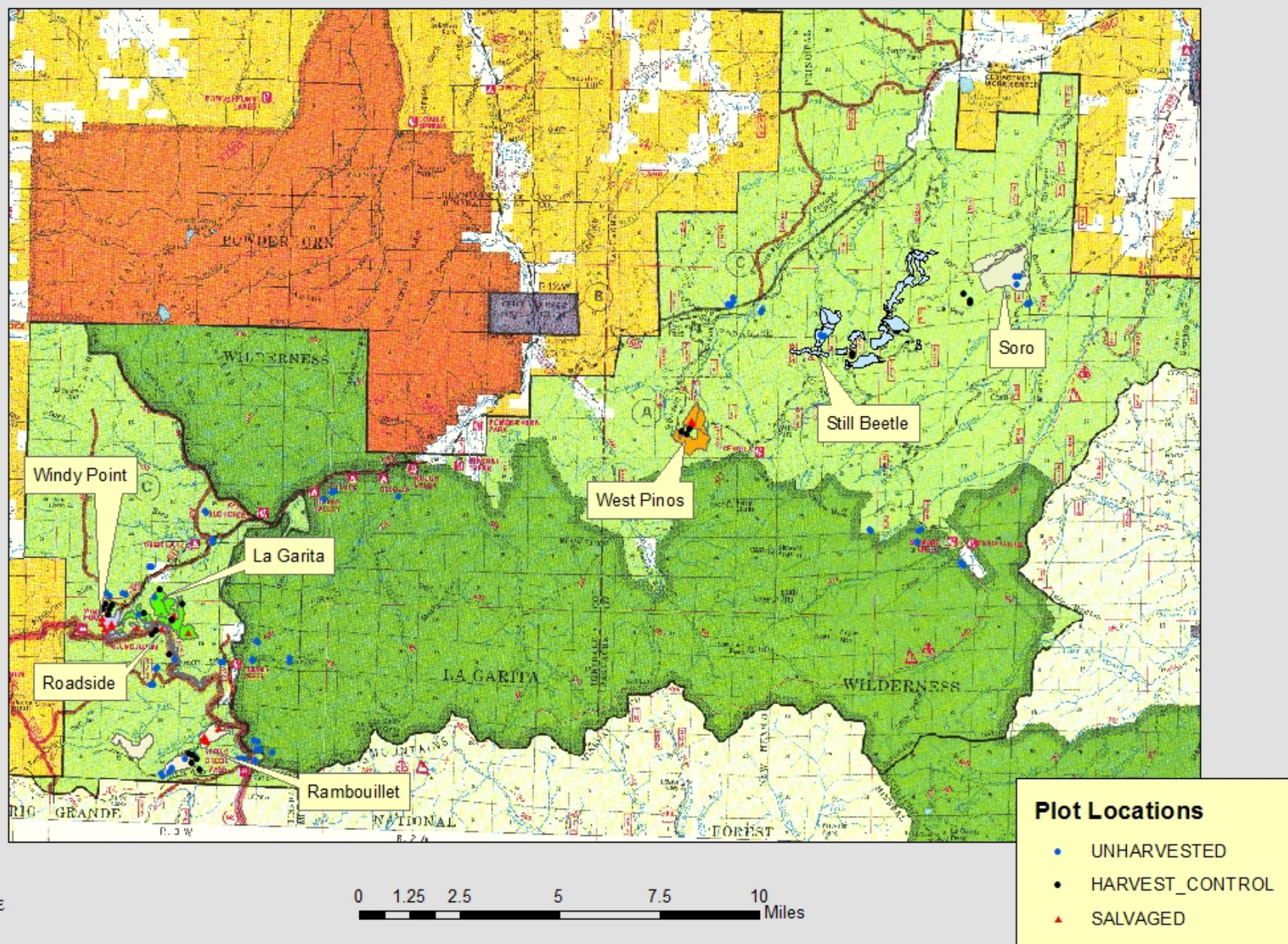
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Tony Cheng and Kevin Barrett, CSU/CFRI

January 25, 2017



2015/2016 SBEADMR Monitoring Units



Current Research Topics

- Comparison of salvaged, previously harvested stands, and unharvested stands
 - Tree Mortality
 - Post-beetle stand structure
 - Tree regeneration
 - Regeneration survival
 - Tree growth
 - Air temperature

Spruce dominated – plots installed 2015 or 2016

Treatment	2015	2016 remeasured	2016 added	Total
Control	41	4	0	41
Harvest Control	14	13	5	19
Pre-Salvage	15			15
Post-Salvage	8	6	7	14 (8 more to be salvaged)

Spruce-aspen plots installed 2015 or 2016

Treatment	2015	2016 remeasured	2016 added	Total
Control	7	2	3	10
Harvest Control	0		5	5
Pre-Salvage	1		6	7
Post-Salvage				7 (6 more to be salvaged)

Plot set-up and Measurements

Full plot size: 0.05 Hectare (0.12 acres)

Coarse Wood Transects and Forest Floor depth

Trees > dbh

On entire plot

- Species
- Diameter
- Status (live/dead)
- Agent of death
- Cone presence
- Subset of ages

Seedlings (< dbh)

On NE and SW quadrat of plot

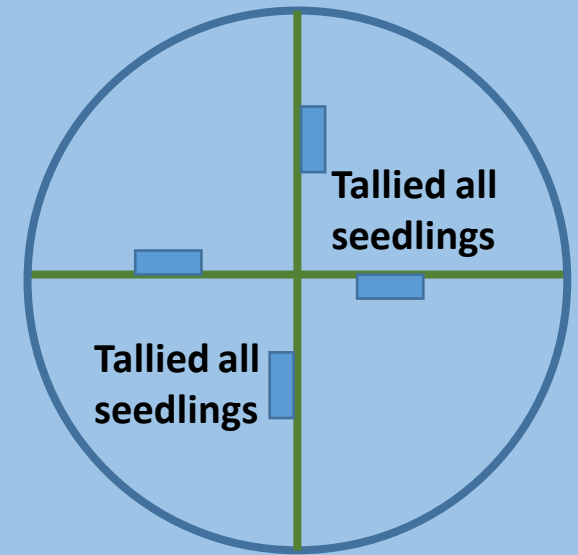
- Species
- Height class
- Age category (<5 yrs or >5 yrs)
- Damage
- Cull/not cull

Microsite for seedling establishment

15 Spruce seedlings per quadrat

Same categories as substrate subplots

Distance and identification of 'nurse' objects



Substrate subplot

- Litter
- Rock
- Woody material
- Soil
- Moss
- Stump
- Vegetation

Plot set-up and Measurements

Temperature

- Installed pendant dataloggers aboveground
- Plan to install belowground (summer 2017)

Tree growth and survival

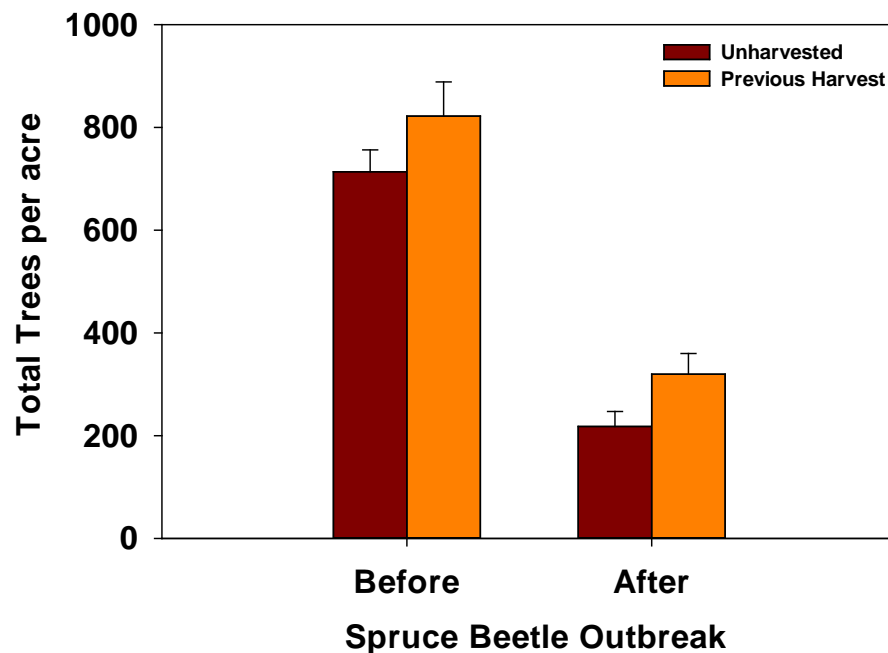
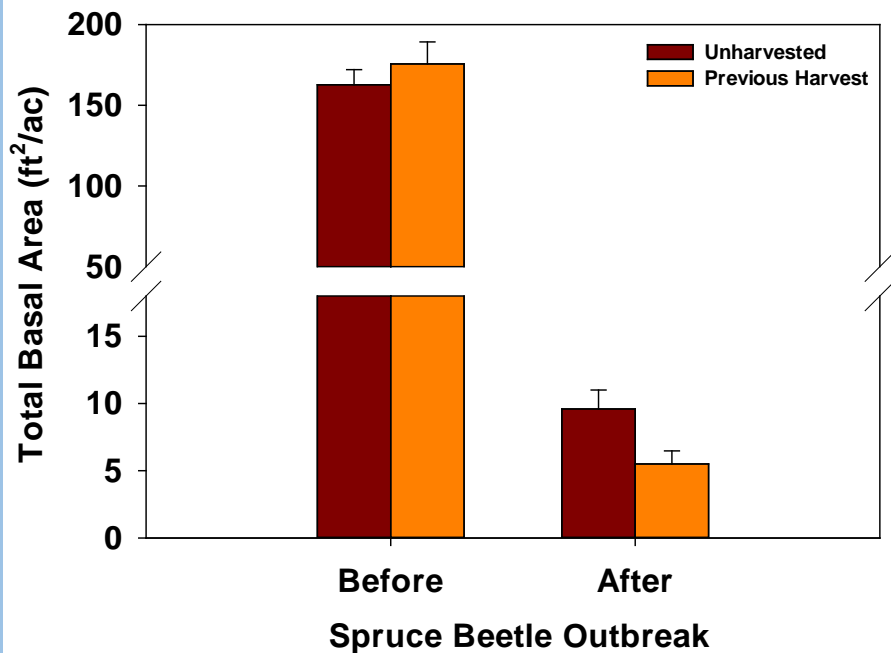
- Tagged subset of trees (seedlings to mature trees)
 - Diameter
 - Height



Spruce – dominated



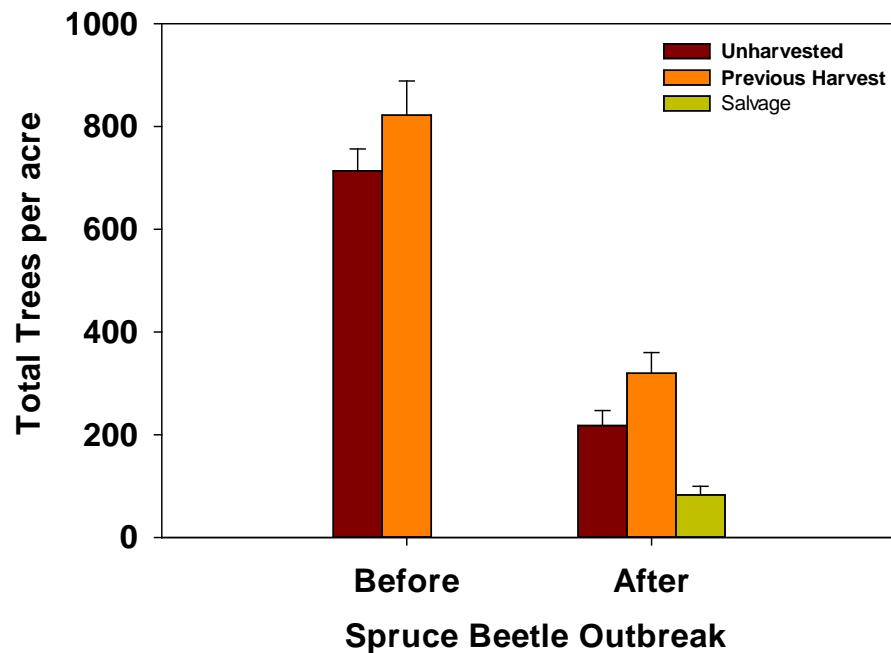
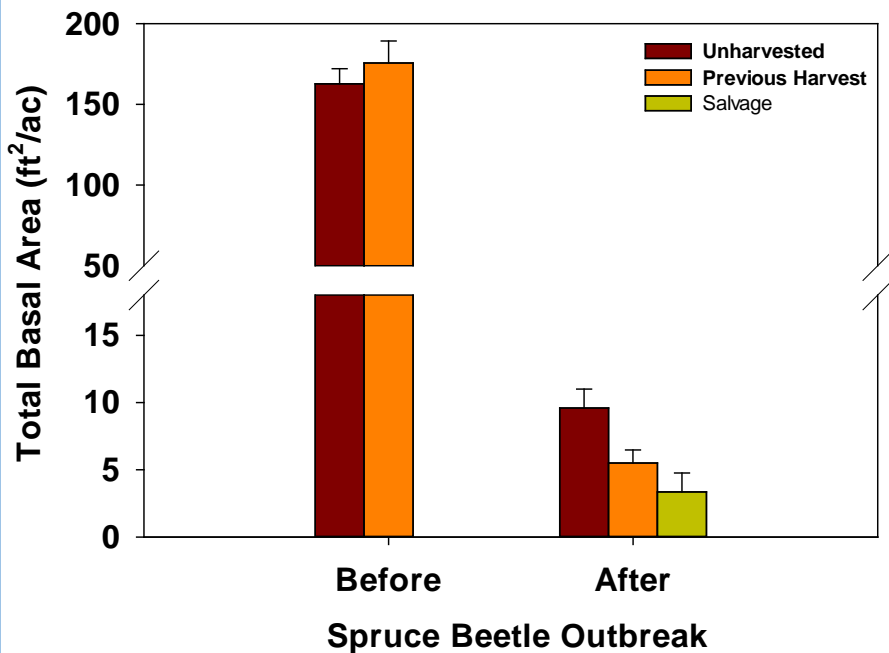
Spruce dominated stands: High spruce beetle induced mortality



Percent Mortality

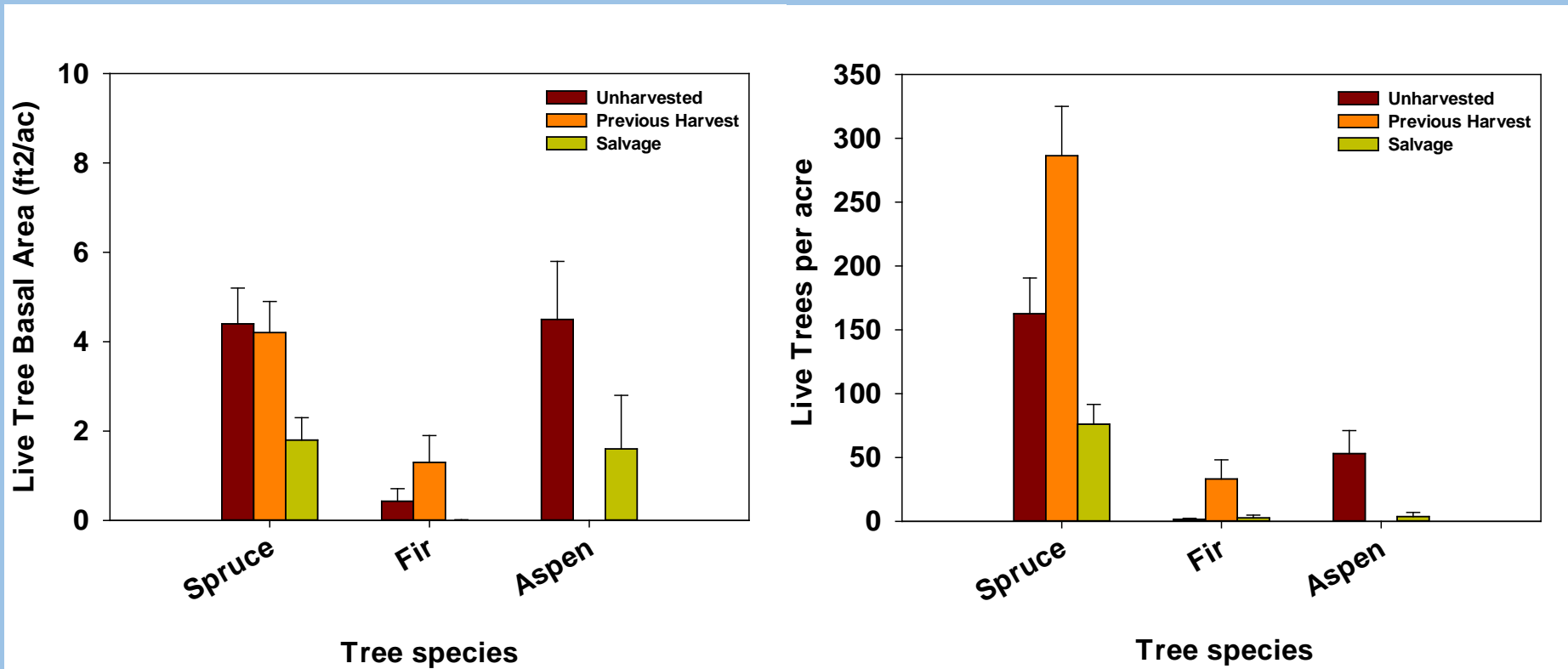
Stand Characteristic	Unharvested	Previously harvested
Basal Area	94%	97%
Trees per acre	70%	61%

Spruce dominated stands: Salvage reduced overstory BA and TPA



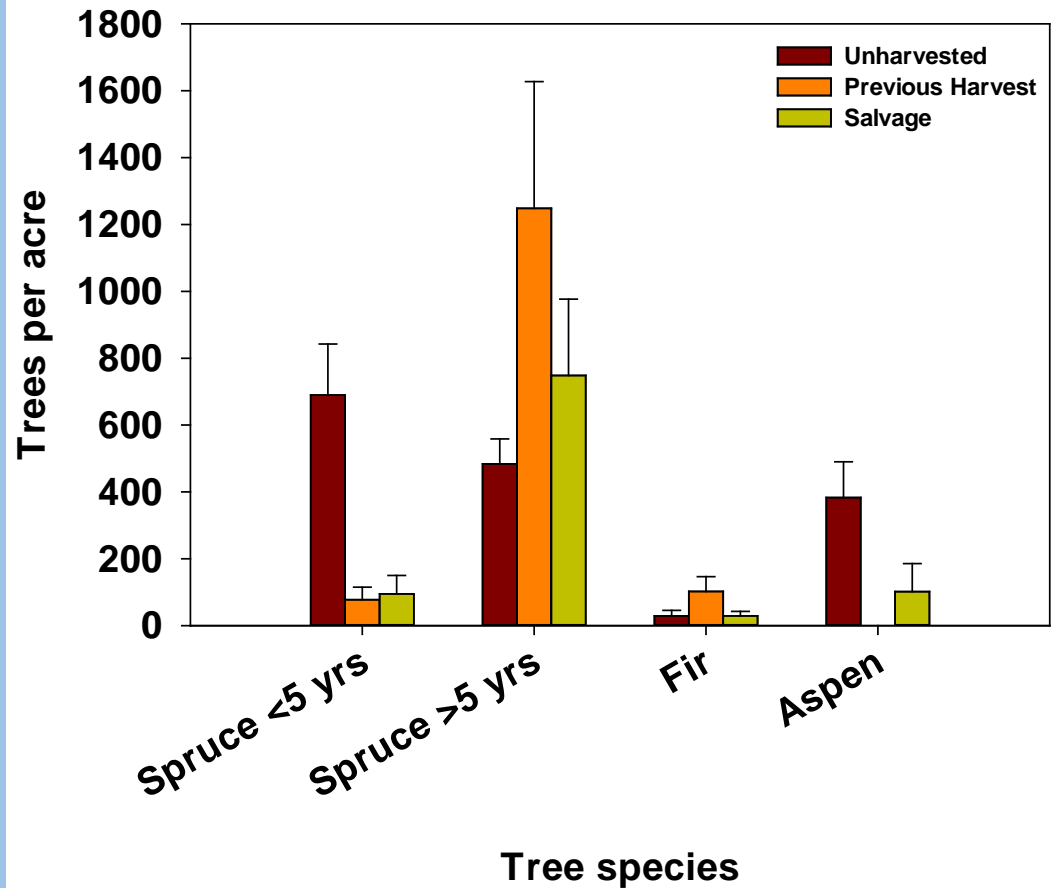
Post-beetle / Salvage	Basal Area (ft ² /ac)	Trees per acre
Unharvested	9.6	218
Previously harvested	5.5	319
Salvaged	3.4	83

Spruce dominated stands: Overstory species composition post-beetle and post-salvage



- Unharvested: Mix of Spruce and Aspen
- Previously Harvested: Mostly spruce, with a little subalpine fir component
- Salvaged: Spruce and small amount of aspen

Spruce dominated stands: Regeneration <4.5 feet tall



Post-beetle / Salvage	Spruce (TPA)	Subalpine Fir (TPA)	Aspen (TPA)
Unharvested	1161	29	383
Previously harvested	1327	102	0
Salvaged	846	29	102

**Spruce
dominated
stands:
Cull percentages
of regeneration
<4.5 feet tall**

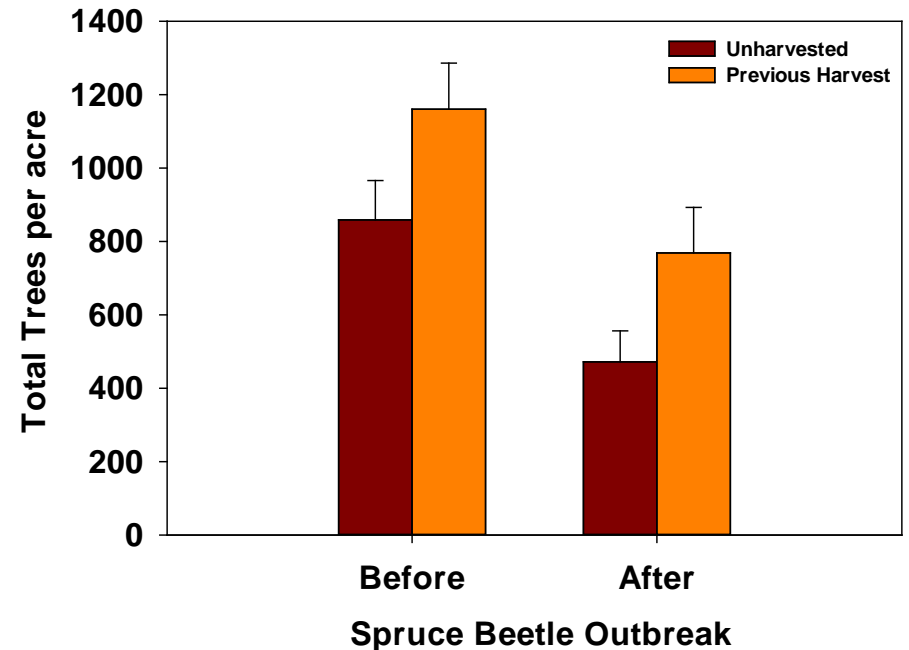
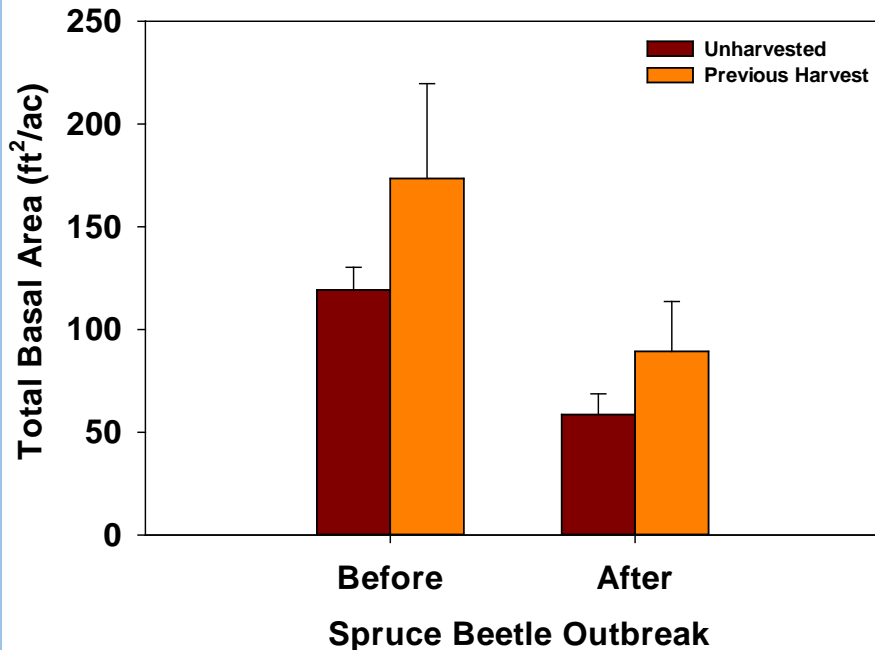


Post-beetle / Salvage	Spruce	Subalpine Fir
Unharvested	20%	0
Previously harvested	14%	24%
Salvaged	14%	10%

Spruce – Aspen Mix



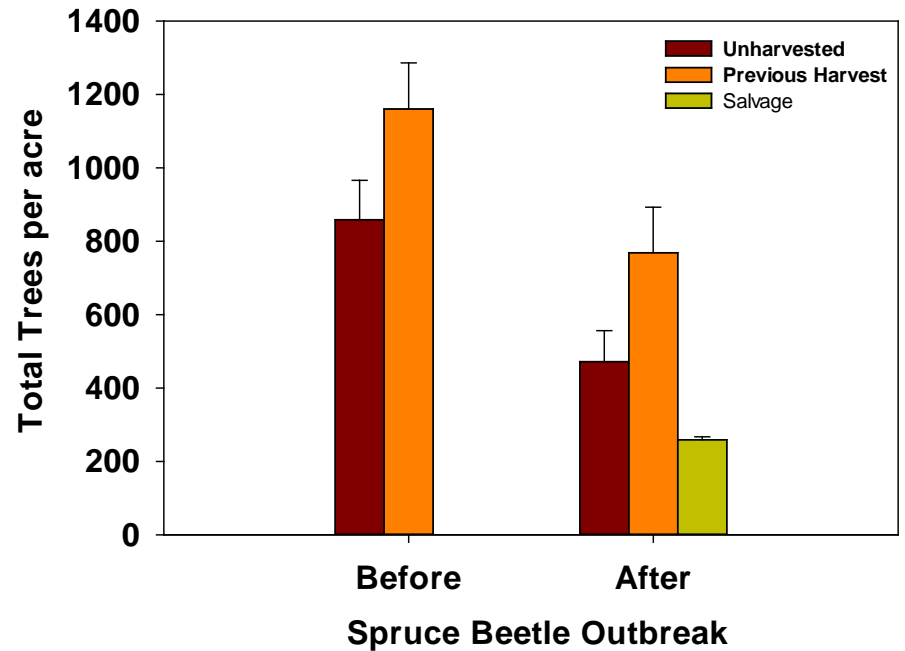
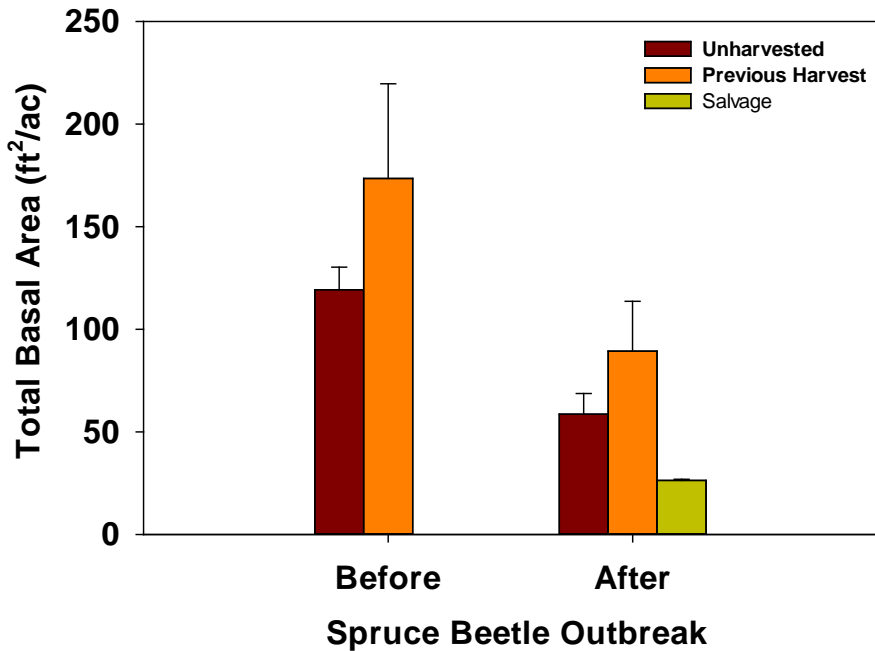
Spruce/Aspen stands: Spruce beetle induced mortality still occurred, but at lower levels



Percent Mortality

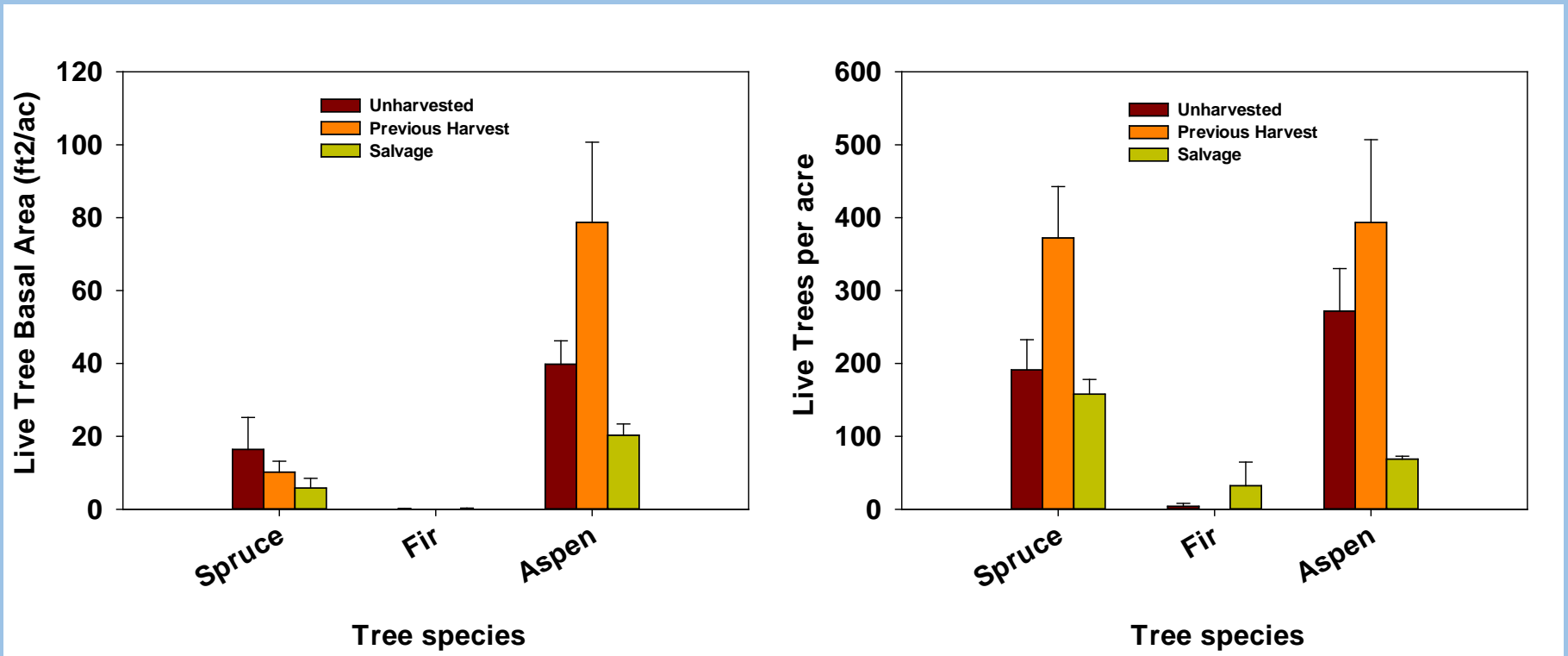
Stand Characteristic	Unharvested	Previously harvested
Basal Area	45%	66%
Trees per acre	51%	48%

Spruce/Aspen stands: Spruce beetle induced mortality still occurred



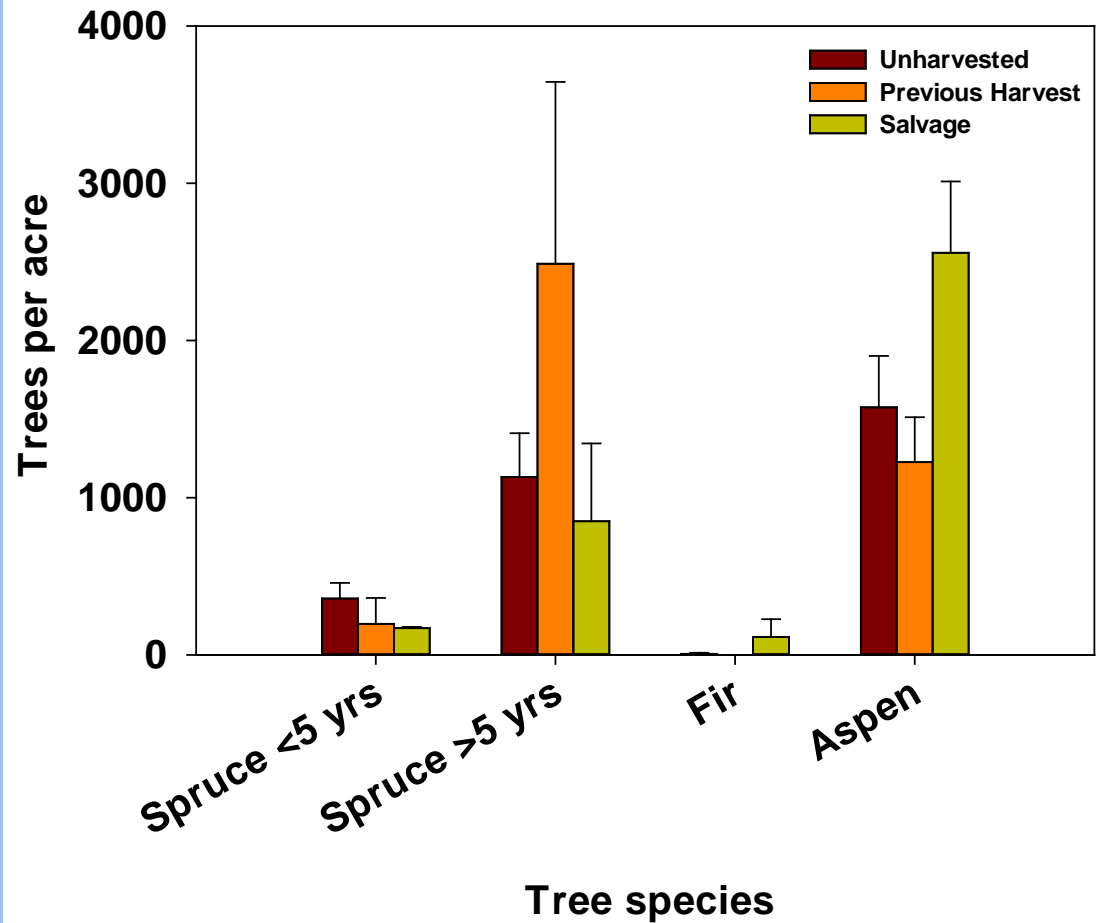
Post-beetle / Salvage	Basal Area (ft ² /ac)	Trees per acre
Unharvested	59	472
Previously harvested	89	769
Salvaged	26	259

Spruce/Aspen stands: Overstory species composition post-beetle and post-salvage



- **Unharvested and Previously harvested: Aspen overstory dominated with abundant smaller spruce and aspen.**
 - **Previously harvested substantially more aspen overstory**
- **Salvaged: Less overstory, but smaller spruce, some fir, and aspen**

Spruce/Aspen stands: Regeneration <4.5 feet tall



Post-beetle / Salvage	Spruce (TPA)	Subalpine Fir (TPA)	Aspen (TPA)
Unharvested	1488	7	1574
Previously harvested	2686	0	1225
Salvaged	1020	113	2559

Spruce/aspen stands:

Cull

percentages of regeneration
<4.5 feet tall



Post-beetle / Salvage	Spruce	Subalpine Fir
Unharvested	6.5%	n/a
Previously harvested	9%	n/a
Salvaged	4%	0%

Take home messages – Spruce dominated stands

- Extremely high overstory mortality, but abundant small diameter trees
- Unharvested stands – Spruce and Aspen overstory with abundant spruce regeneration
- Previously harvested stands – Dominated by Spruce
- Salvaged stands – Dominated by Spruce with some aspen
 - Regeneration is happening and exceeds minimum targets

Take home messages – Spruce/Aspen stands

- Total overstory mortality 40 to 60%
- Unharvested stands – Aspen dominates the overstory, but there is abundant small diameter and regeneration of spruce and aspen
- Previously harvested stands – Similar to the unharvested stands but with more spruce
- Salvaged stands – Mostly small diameter spruce, aspen, and fir left. Lots of Aspen sprouting!
 - Spruce regeneration is happening and exceeds minimum targets

Summer 2017

- Revisit Summer 2016 plots
 - Seedling survival
 - Remeasure newly salvaged areas
 - Advanced regeneration growth release
 - Set up seed traps
 - Hare pellet counts
- Stakeholder input