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# Textural Beaver Repellent for Tree Protection

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## Purpose

Coexisting with beavers has been identified as a management option in the Fish Creek Provincial Park Beaver Management Plan. Within Fish Creek Provincial Park there is a current need for tree protection from beavers. There is a moderate to low tolerance level for tree damage/felling in parts of this urban and highly visited provincial park.

The purpose of this research is to evaluate the efficacy of a textural repellent (sand and paint mixture) on tree damage caused by beaver and beaver tree felling in Fish Creek Provincial Park.

## Overview

The Miistakis Institute and Cows and Fish have an ongoing project, *Putting Beavers to Work for Watershed Resiliency and Restoration*, that aims to foster coexistence with beavers so that watershed benefits afforded by beavers can be realized. As part of this project, we research the use of coexistence tools and host skills development workshops on how to install and use these tools.

The use of a textural repellent protects trees from beavers as beavers avoid trees with the repellent due to the combination of taste/texture of the repellent. The repellent is comprised of a sand and paint mixture that is visually discrete. This method has anecdotal evidence from other projects of successfully repelling beavers from damaging and felling trees.

The collaborative has produced a short video on the use of this textural beaver repellent technique in hopes that it can be applied and researched at other beaver conflict sites (<https://youtu.be/iXc8cCFZqUw>).

## Research Area

### Marshall Springs

Textural repellent application date: August 6, 2020

Location: Marshall Springs – Fish Creek Provincial Park

Dominant tree species: Aspen



## Votiers Flats

Textural repellent application date: September 28, 2020

Location: Votiers Flats – Fish Creek Provincial Park

Dominant tree species: Aspen with willow mix

## Research Methods

Ecology staff responsible for Fish Creek Provincial Park were consulted to select trees to be painted (trees requiring protection from current beaver activity in the area). Some tree take is tolerable at the site therefore a selection of trees remained unpainted and were used as control plots and for providing food/building materials for the beavers.

A grid pattern of four 10m by 10m cells were used for the research area as seen in Figure 1.

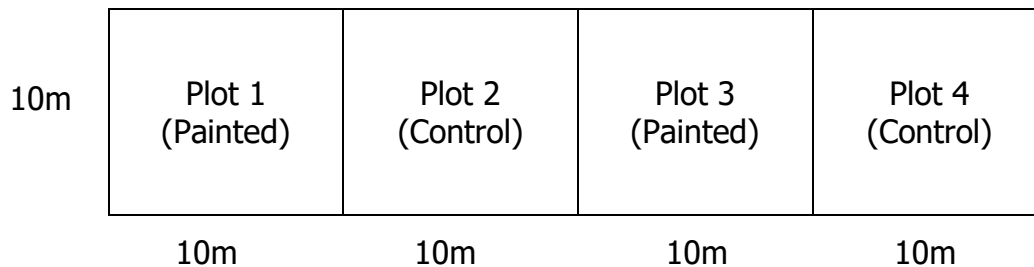


Figure 1: Marshall Springs Study area grid system

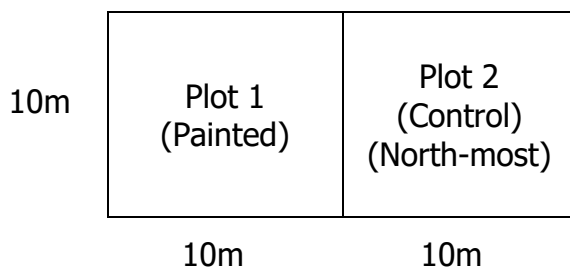


Figure 2: Votiers Flats study area grid system

On the day of installation, baseline data of the number of trees was collected in each plot using four different damage categories: Sapling under 6' tall, no damage, some damage, stump. Photos were taken of each of the plots.

The textural repellent was applied to both living and dead trees (only a handful of dead trees were present within the plots) in two categories: no damage, and some damage. It was applied from the base of the tree to 4' up the trunk. Saplings less than 6' tall were not painted.

Sand/paint Mixture: approximately 140gm sand per liter of paint (20oz sand per gallon of paint) was applied at the Marshall Springs site. At Votiers Flats site we applied 80oz of sand per gallon of paint.

1. Paint: 100% Acrylic latex paint (exterior), tinted to match colour of tree trunk (Behr Premium Plus Exterior Paint and Primer in One, exterior flat). Please see 'Home Depot Chemical Strategy' and SDS sheets for details on toxicity. The base colour was selected based on the best match to tree colour, then tinted to match more closely.
2. Play sand (Quickrete Playsand). Please see SDS document for details on toxicity

A follow-up monitoring site visit was conducted in December 2020 where trees were recounted in all plots.

## Results

The pilot site at Votiers flats was untouched by beaver in both the control and painted plots. We believe the beaver(s) moved their harvesting activities to a different area therefore this site is excluded from results as no comparison can be made.

At the Marshall Spring Pilot site (Figure 3), the change in the number of stumps before and after treatment was analyzed. The number of stumps increased in all plots, however, plots that remained unpainted (control) experienced an 88.5% increase in the number of stumps and plots that were treated with the textural repellent (sand/paint mixture) experienced a 15.5% increase in number of stumps (Table 1). There were very few trees in the 'some damage' category therefore only the 'stump' category was used for analysis.

Table 1: Marshall Springs Pilot Plot Results

Site ID (treatment type)	Change in number of stumps (increase)	Percent Change (percent increase)	Average percent change (percent increase) by treatment type
Plot 1 (Painted)	6	9%	15.5%
Plot 3 (Painted)	10	22%	
Plot 2 (Control)	24	77%	88.5%
Plot 4 (Control)	62	100%	



Figure 3: Marshall Springs site- from Pathway, looking eastward from Plot 4 (foreground) to Plot 1 (background)

Due to the small sample size ( $n=2$ ) we could not run a statistical test to determine if there was a statistical difference between the treatment and control plots. Instead, we used an R-script to create a box plot of the change in the number of stumps for the research plots (Figure 4). Assumptions to developing box plot: plots are the same size; and plots have similar number of trees for beavers to fell.

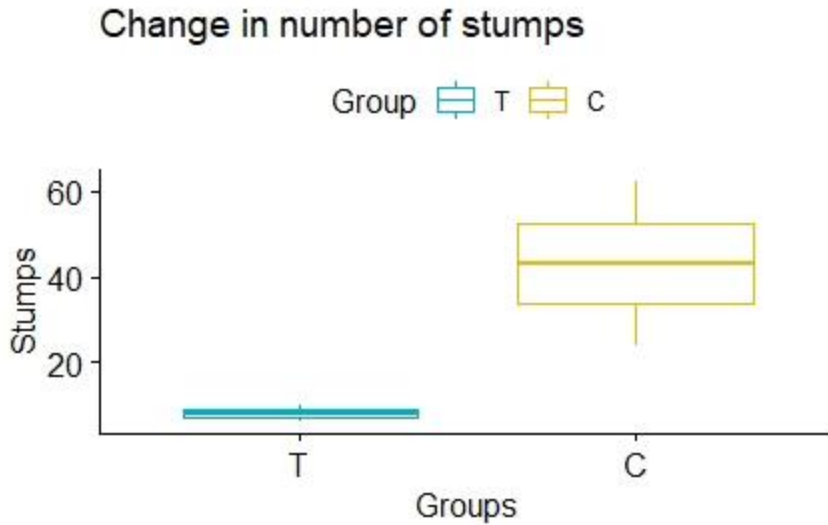


Figure 4: Marshall Springs boxplot of means and stand deviation for treatment (T) and control (C) groups

The boxplot shows that we have strong indication that the treatment was effective for this study in Fish Creek Provincial Park.

Potential sources of error in this pilot include snow conditions limiting visibility of stumps and human error while counting. We also did not test in areas where forage for beavers is limited.

## Conclusion

This pilot project indicates that the sand and paint textural repellent treatment was effective for this study in Fish Creek Provincial Park. These results support the need for more in-depth study. The R-script can later be expanded to include more sample plots and statistical tests should more plots be added in the future.

Additionally, further research should be conducted in areas with different amounts of available forage, and in different climates. A long-term study could evaluate how often the textural repellent needs to be applied in a specific climate. Different ratios of sand to paint could also impact results. Research into the toxicity of paint to beavers should also be conducted as it was out of scope for this pilot project.

It is important to note that the application of this tool is most effective for areas where some level of tree take by beavers is acceptable.

## Supporters

*Putting Beavers to Work for Watershed Resiliency and Restoration* would not be possible without the generous support of the Alberta Environment and Parks' Watershed Resiliency and Restoration Program (WRRP), and The Calgary Foundation.

## Appendix 1: Plot Data

Table 2: Marshall Springs Pilot Plot

	Damage Category	Number of Trees - Baseline	Number of Trees - Monitoring Visit
Plot 1 (Painted)	Sapling under 6' tall	37	34
	No damage	57	54
	Some damage	0	0
	Stump	67	73
Plot 2 (Control)	Sapling under 6' tall	14	13
	No damage	42	20
	Some damage	1	0
	Stump	31	55
Plot 3 (Painted)	Sapling under 6' tall	26	16
	No damage	41	39
	Some damage	1	1
	Stump	46	56
Plot 4 (Control)	Sapling under 6' tall	6	1
	No damage	27	1
	Some damage	0	1
	Stump	31	62

Table 3: Votiers Flats Pilot Plot

	Damage Category	Number of Trees - Baseline	Number of Trees - Monitoring Visit
Plot 1 (Painted)	Sapling under 6' tall	1	NA
	No damage	67	NA
	Some damage	1	NA
	Stump	0	0
	Unpainted/flagged (Ran out of paint so left unpainted-removed from analysis)	9	NA
Plot 2 (Control (Northern-most))*	Sapling under 6' tall	10	NA
	No damage	63	NA
	Some damage	1	NA
	Stump	1	1

\* Plot had a lot of clumped trees, if they came from the same trunk we counted as one tree

\* we did not include bushes/shrubs in the counts or painting