Podophyllum peltatum: Relationship of Colony Size and Age

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Introduction

A 2008 forest restoration on Calvin's campus, located at the Burton St. entrance, was developed in a way that allowed for research to assess the relative success of several different native species that were included. One of the planted species was *Podophyllum peltatum* commonly known as May Apple.

May Apples grow as perennial spring colonies using underground rhizome networks. As they age they increase in size, but the exact relationship between this increase and colony age has not been documented.

The initial plantings on Calvin's campus, each beginning with a single transplant, provided knowledge of the exact location, age, timing, and shoot number so that research into growth dynamics could be investigated.

Methods

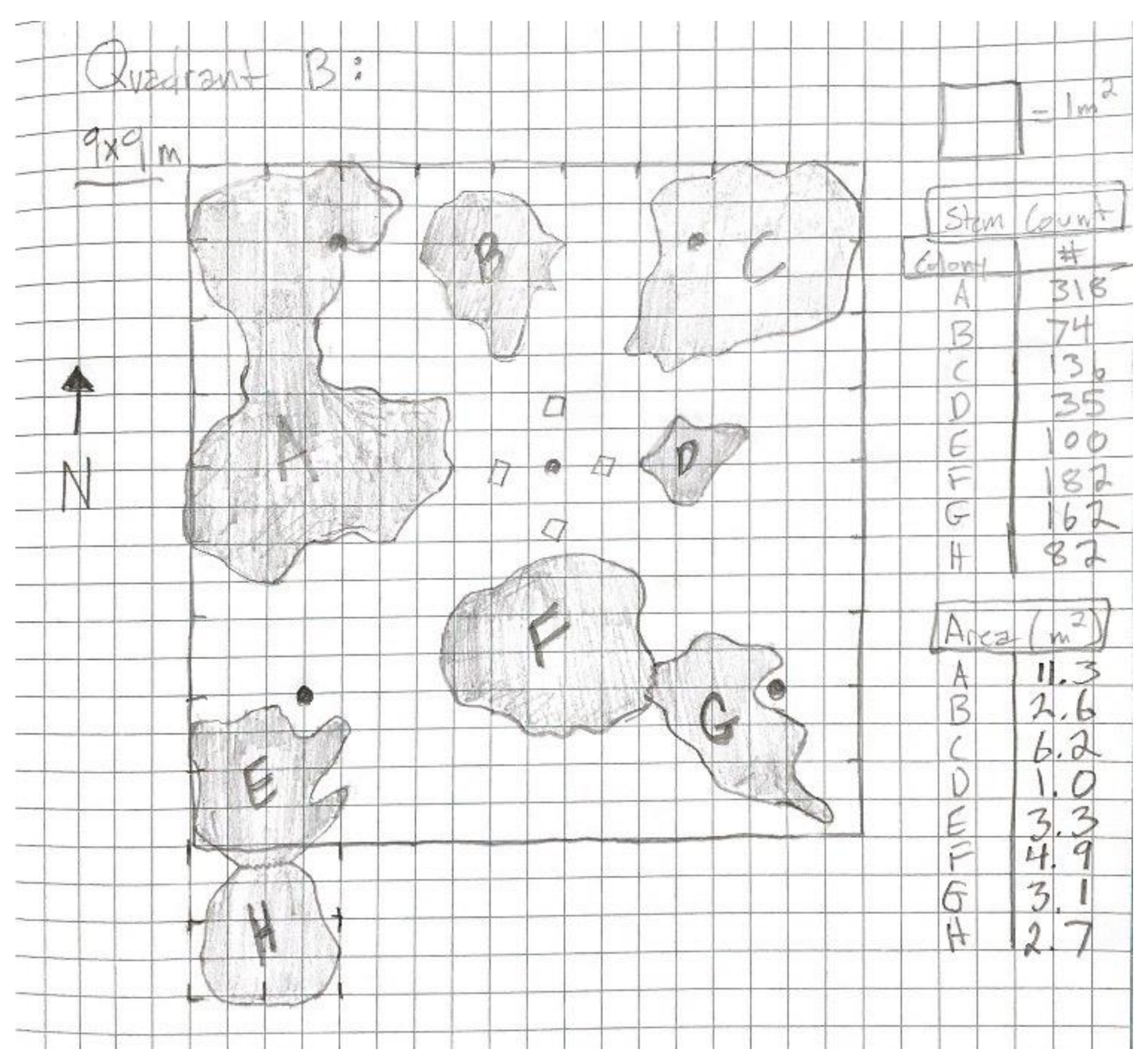

Figure 1: Map of quadrant B; location, size, stem count, and colony identification recordings present.

As established in 2008, there are six quadrants each planted and mapped out in order to accurately follow the progress of the restoration. Data from 2015, 2017, 2018, and 2019 have been compiled for this analysis.

During the height of the species vegetative presence (spring), each of the 6 quadrants are measured and gridded out. A map of colony location and area is created, and the stems are counted by hand for each colony.

Results

Over the duration of this study, the May Apple clones have all been increasing in the area of ground that they occupy, as well as in total stem count. Unlike mushroom colonies, these clones do not appear to die out or thin out in the middle, they just seem to keep expanding outwards. The rate of expansion has been somewhat variable for each individual clone, but when averaged across clones, a remarkably consistent and linear relationship emerges – both for stem count (increase of around 25 stems/year) and for area (increase of about 1 square meter/year).

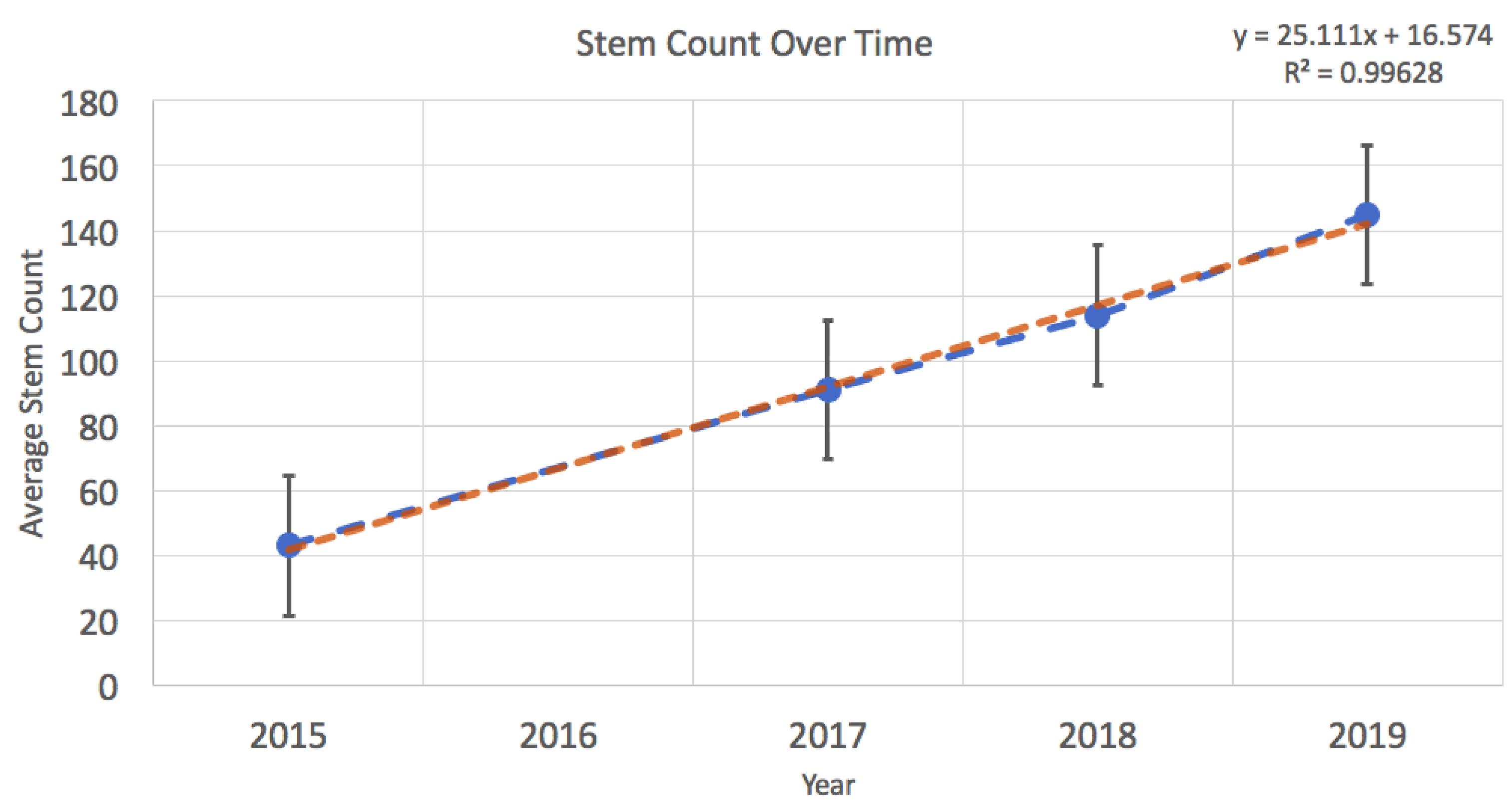

Figure 2: *Average stem count over time; In blue, the average stem count/colony each year of data collection. In orange, a linear trend line of this stem count data with an* R^2 *value of 0.996 and an equation of y=25.11x + 16.57*

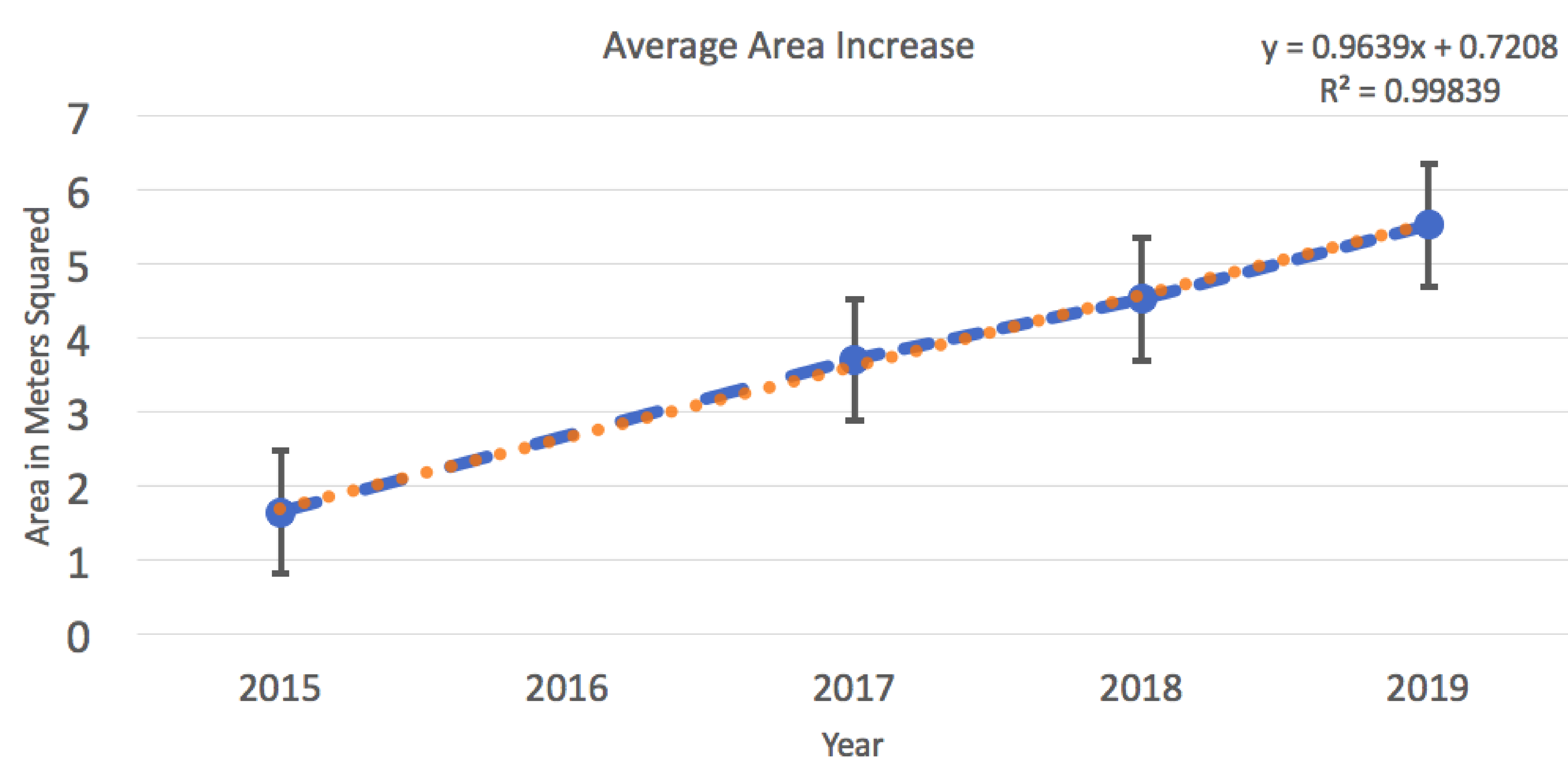

Figure 3: *Average colony are* (m^2) *over time; In blue, the average area of each colony is given for each year of data collection. In orange, a linear trend line of this stem count data with an* R^2 *value of 0.998 and an equation of y=0.964x + 0.721*

Figure 4: Photograph of research site

Ongoing Research

These averages across colonies and quadrants show a remarkably linear relationship between age and size. When separated out into quadrants or individual colonies, however, there is a great deal of variation. We would like to learn what factors contribute to that variation.

Research and analysis into the variables affecting growth in terms of rate, direction, and density is ongoing. One question of particular interest is what happens when clones intersect one another.

Summary Points

- There is a nearly linear relationship between the age of a May Apple colony and the area it covers.
- There is a nearly linear relationship between the age of a May Apple colony and it's stem count
- There are likely many potential variables (light, neighboring species, soil nutrients, soil compaction, etc.) that influence variation between individual colonies

Acknowledgements

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