Quarrybrook
EXPERIENTIAL EDUCATION CENTER

Program Title: **Where Can I Grow?**

Theme: Trees grow and adapt to their environment based on its topography and available resources, causing differences even between individuals of the same species.

Audience: 3rd grade students

Next Generation Standards:
3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.
3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Goals: Students will gain an awareness and understanding of the environmental factors which impact trees (their growth, size, height, longevity, etc.). Students will be able to identify what trees need to survive and be healthy. Investigations will cover classification based on opposite or alternate branching, comparing the physical characteristics of white pines growing in different environments, and the conditions necessary for seeds to grow.

Objectives:

- **What are the objectives?** Students will know the difference between opposite and alternate branching patterns in deciduous trees. Students will be able to identify the environmental impacts on tree growth by observing one species in three different locations. Students will know the favorable conditions needed for seeds to sprout and grow.
- **How will they be measured?** Students will be able to distinguish between opposite and alternate branching patterns by classifying sample branches. Students will record their tree growth observations by sketching white pines found in three locations, and noting the differences. Students will experience a simulation activity that illustrates the chance of a seed growing into a seedling and surviving.

Program Outline:
Activity 1: GOING *MAD* FOR TREES (30 min.) – Split into sub-teams, students will be given the task of classifying a collection of branches. Their sorting strategies will emerge as the result of free exploration and active discussions within the teams. Instructors will not give any restrictions, as the intention of this activity is to focus on the process of classifying objects based on observable characteristics. There are no wrong answers as long as the teams can demonstrate the logic of their classification schemes. Once the sub-teams have had the opportunity to share their sorting strategies, we will focus our classification on opposite and alternate branching patterns. Students will learn about the acronym MAD (Maple, Ash, Dogwood), which aids us in remembering which deciduous trees have an opposite branch arrangement. Next in our introduction, we will take a closer look at our focus species for the day, the white pine tree. Students will make sensory observations of white pine needle bundles through sight, scent, and touch,

then speculate on possible adaptations these trees have. This will set up the field investigation that follows.

Teachers will be asked to separate students into sub-teams. Each adult will work with a team to help them stay on task and work effectively together in their discussions and classification schemes.

Activity 2: WHITE PINE FIELD STUDY (60 min.) – Next, we will walk to three different locations in the Quarrybrook woods where white pine trees grow. Students will make direct observations, record their data, and draw illustrations of the white pines at each of the three sites. Data will include factors such as tree height, trunk diameter, population density, and details about their location (including the presence or absence of water bodies, the sun exposure, the slope and aspect, the tree canopy, etc.). Then they will compare the data from the three different sites and begin to identify influencing factors and environmental pressures, natural and man-made, which drive some of the similarities and differences found between the individual trees they have observed in the study.

Quarrybrook staff will lead the woods walk and explain the observations to be recorded by students on their datasheets. Teachers are encouraged to interject with questions and any connections to classroom learning, while they help guide student teams through the observations at each study site.

Activity 3: SEED SCRAMBLE (30 min.) – Where did those white pines come from? How did they start to grow in those three sites? Students will engage in a simulation activity illustrating the environmental challenges faced by new seeds looking for the space and nutrients they need to become established and grow. Students will take on the roles of seeds, the favorable conditions needed for growth (good soil, sunlight, warm days, and water), and the hazards that prevent growth (poor soil, drought, hungry deer, lawnmowers!, etc.). Over several rounds, students will experience the randomness of chance that a dispersing seed faces in landing in a location that has the right balance of favorable conditions and relative freedom from hazards that it needs to survive.

Quarrybrook staff will explain the procedures of the activity to the students. Teachers are asked to assist students with staying focused, following the procedures, and deciding if they've found the right combination of factors needed to survive.

Conclusion/Wrap-up: Students will summarize the environmental factors impacting tree growth, and explain the favorable conditions necessary for a seed to sprout into a new tree.