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BIS 241

Personal Logistics Plan

May 15, 2018

## Forest Team 2 Biological Interactions Logistics Plan

10:30 Make sure that everyone is on site and accounted for

10:40 Start: Introductions & Topic Areas; Warnings about the park (bikes, uneven landscape, nettles)

### Site 1: Trailhead

- N/A

### Site 2: Whispering Firs Trail Branch Off

- **Competition** between ferns
  - **Competition:** A biological interaction in which participating organisms involved are harmed (-/-)
  - Ferns are all using the same resources: light (which there is little), water (which there is plenty!), nutrients in the soil. Sometimes it can be for one key resource, like a certain chemical needed to grow
  - These factors limit how many ferns can be supported in any one place. More resources = more ferns and vice versa.
- Tree Age: ask participants to guess tree age, explain the rings, etc... (tree is 37-40 yrs)

### Site 3: Indian Plum Plaque

- **Herbivory:** Branching off Will talking about deer eating plants in the area
  - **Herbivory:** Consumer/Resource interaction in which animals eat plants. One organism benefits, the other suffers (+/-)
  - Deer are primary consumers because they are eating primary producers (plants). They take in the nutrients the plants have from the sun, water, and dirt. They have to eat a lot of plants because much of the energy of the plant is expelled during cell respiration. The plant only passes on about 10% of the energy it takes up. This process is also known as a food web, trophic levels
- **Mutualism** between Trillium and Ants
  - **Mutualism:** Biological interaction where participants benefit each other (+/+)
  - Trillium need to disperse their seeds, but they don't want them too close, so they don't have to compete for resources
  - Ants need food
  - Trillium seeds have *elaiosomes* on them which are rich in proteins and fats
  - Ants take the seeds to feed to larvae, then dispose of them in the places where they take their poop and dead ants, so there are lots of decomposed nutrients that the seed needs to grow.
  - Process is called *myrmecochory* (ant seed dispersal)
- **Mutualism:** Supplementing Christopher talking about Holly Tree

- Birds eat Holly berries; Holly tree seeds get dispersed. Single trees are good indicators of bird seed dispersal

#### Site 4: Fallen Log

- N/A

#### Site 5: Western Hemlock Plaque

- **Carnivory:** Supplement Will talking about Bears
  - **Carnivory:** Consumer/resource interaction in which animals eat other animals. One organism benefits, the other suffers (+/-)
  - Bears are *Omnivorous*, meaning they eat both plants and meat.
  - Bear Creek is a spawning ground for salmon; bears will eat the salmon
  - Bears will ingest nutrients the salmon gain from the ocean. These nutrients are left in the forest when the bear leaves the salmon carcass, when it poops, and when it dies.
  - Bears sit in multiple places in the food web. Sometimes they are primary consumers, sometimes they are secondary or tertiary consumers

#### Site 6: Vine Maple (should get here between 11:10-11:20; Midpoint)

- **Mutualism & Nitrogen Fixation** with Lichens & Vine Maple:
  - **Mutualism** in Lichen: Lichen is made up of algae and fungus. The algae provide photosynthesis to the fungus, giving it sugars to live. The fungus gives the algae water and living space
  - **Nitrogen Fixation:** if the Lichen contains blue-green bacteria and green algae along with the fungus it is called a cyanolichen. Cyanolichens take Nitrogen from the air (N<sub>2</sub>) and convert it to nitrogen that can be used by plants (NH<sub>4</sub><sup>+</sup>). Bathtub metaphor from class—water going into tub. Sensitive to urban air pollution—if cyanolichens die, other parts of the forest will die too.
  - **Mutualism** between Lichen and Vine Maple: Lichens are *epiphytes*. The tree gives them space to live on. They collect water because they are spongy and absorbent. The water drops to the roots of the tree with the nitrogen it fixes from the air, benefiting the tree. Everyone wins! Yay!

#### Site 7: Douglas Fir Plaque

- **Nitrogen Cycling:** Supplement Will talking about shrub layer habitats
  - Animals Poop
  - Nutrients that they get from eating plants and bugs get broken down again by decomposers and are put back into the soil to be used by plants again. Remember the bathtub metaphor from class—this is the water staying in the tub.

#### Site 8: Fork in Trail Salal Plaque

- **Competition** between Salal; **Herbivory** with berries

#### Site 9: Witches Broom

- **Parasitic** Witch's Broom:
  - **Parasitism:** Consumer/Resource interaction in which one organism is a host to a parasitic organism. The parasite uses the host to support itself, generally to the harm of the host (+/-)
  - Witch's Broom is an abnormal growth of twigs in woody plants caused by reaction to fungus
  - No benefit to the tree; no cure.

#### Site 10: Stump

- **Nutrient Cycling:** Fungus is permeating the dead stump, breaking down the woody debris back into the nutrients for the soil, along with other bugs and bacterial decomposers
- **Mutualism** between fungus and Red Huckleberry:
  - Red Huckleberries love dead wood! It is rich in nutrients being broken down that the tree no longer needs (cause it's dead).
  - Fungus is living in the stump as well, breaking it down over time.
  - **Mycorrhizal Interaction:** Fungal hyphae (which make up most of the fungus; it's not just the mushroom you see) in the stump is twining with the roots of the Huckleberry. The Huckleberry gives the fungus photosynthesis sugars, while the fungus gives the huckleberry nitrogen and phosphorus.
- Bigger stump just down the trail- **Competition** between Red Huckleberry and Western Hemlock for stump/mycorrhizal resources

#### Site 11: Big Leaf Maple?

- **Herbivory:** Squirrels and Mice will eat the helicopter like seeds; deer and elk eat twigs

#### Site 12: Nurse Log

- **Mutualisms, mycorrhizal interactions, competitions, nutrient cycling**
  - Very important to sustaining life in the forest!
- 3-5 minutes for participants to look at log, ask questions, identify species we have pointed out

#### Site 13: Pacific Yew

- English Ivy **Invasive Competition**
  - Ivy will cover all the ground and choke out anything else around it; “Ivy Desert” dense monoculture; reduces diversity wherever it grows
  - Ivy will grow up trees and smother them and prevent light from getting to leaves/needles; trees die
  - People will use it in gardens for quick ground cover—it spreads very quickly and is hard to remove.
- Dead tree stands & **Failed Competition**
  - Point out several dead trees; they lost the competition for some vital resource

#### Site 14: Trailhead (End by 12:10)

- **Nitrogen Fixation & Mutualism** in Red Alder:
  - Red Alder grow quickly in recently disturbed areas
  - Leaves are elliptical, sharp point, saw-tooth like edges
  - Filamentous bacteria make their homes in the roots of the Red Alder; bacteria act as nitrogen fixers, taking the nitrogen out of the air and converting it into the soil, Red Alder gets nitrogen from the bacteria. Part of the reason why they pop up so fast after disturbance and can stay around after succession has begun.
  - Red Alders are massive nitrogen providers—stands can produce up to 320 kg/ha of nitrogen per year.
- Creeping Buttercup **Competition:**
  - Non-native species that kill other plants to gain more resources; **Contest Competition**
  - Pass to Devoni to explain the adaptation of the roots to kill other competing species