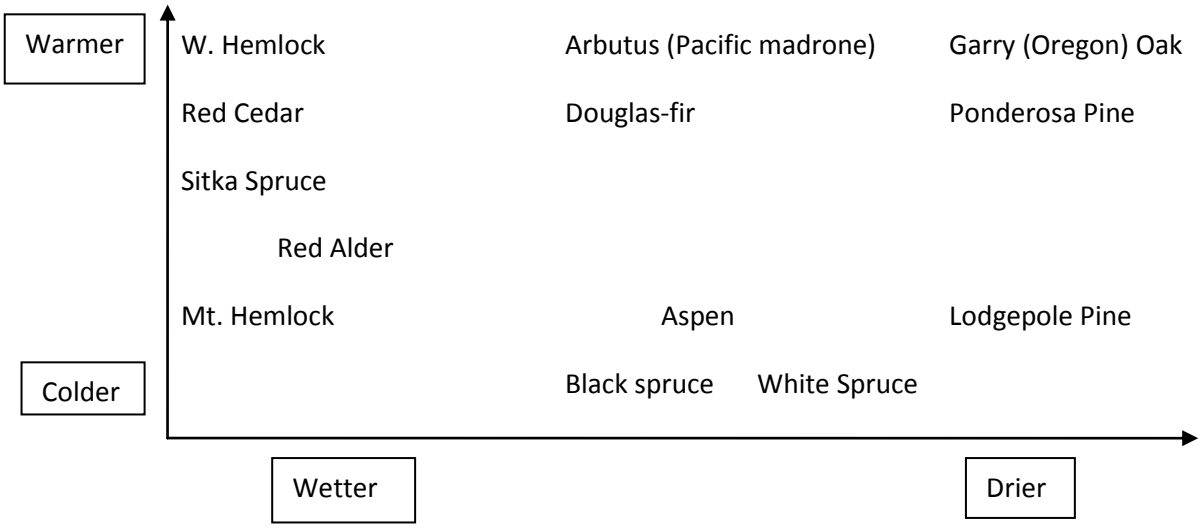
REM 475—Forest Ecology

Forests cover approximately 66% of British Columbia. Of this 83% is primarily coniferous forest. BC has the highest diversity in Canada of tree species.

TREE SPECIES IN BC

Tree communities vary dramatically across British Columbia. The location of these different communities is strongly influenced by gradients of precipitation and temperature. In addition, other factors such as logging selectivity and fire regimes influence tree distributions.



W. Hemlock—extremely tolerant of shade and moisture. Finely furrowed bark, drooping branches. Wood is not very strong, used for paper.

Red Cedar—needs lots of water, can tolerate wet soils. Wood in older trees is rot and insect resistant.

Sitka Spruce—Big. Gray scaly plated bark. Co-occurs with W. Hemlock. Light and strong.

Red Alder—Deciduous. Early succession species ('pioneer' species) in W. BC. A nitrogen fixer, so does well on new soils (rich in P and low in N) and is important for ecosystem development.

Mt. Hemlock—Does well in wet snowy ecosystems like found in mid-elevation of SW BC.

Douglas-fir—Tends to dominate in slightly drier conditions than W. Hemlock, R. Cedar, S. Spruce. Strong wood often used in construction.

Lodgepole Pine—A "pioneer species", often growing quickly after disturbance. Important in fire-prone ecosystems.

Garry Oak—Found in drier "savannahs" in the rain shadows in SW BC. Deciduous. One of the most endangered ecosystems in the world. Fire adapted.

Arbutus—also known as Pacific madrone, this beautiful evergreen broadleaf is found is similar habitats as the Garry Oak.

Ponderosa Pine—Found in interior versions of the Garry Oak—open woodlands and are fire tolerant. Bark smells like vanilla.

FORESTS AND DISTURBANCE REGIMES

Disturbance regime: The severity, frequency, and extent of disturbances through time.

Disturbance: A discrete event that removes or kills species.

Landscape mosaic: The size and age of differently aged patches. This is controlled by the disturbance regime.

Rainforests

- Maritime forests in BC are wet and temperate
- Trees can achieve enormous sizes
- High structural complexity
- Up to 97% of seedlings grow on decaying "nurse" logs
- Strong selective pressures to rainforest trees include:
    - Shading
    - Damp soils
    - Rotting
- Historic disturbance regime
    - Fires were rare, and likely only occurred during long-term drying/warming periods (~every 500+ years). When fires occurred they were likely catastrophic, creating massive burned areas.
    - Smaller disturbances were likely more important:
        - Blow-down. E.g., Stanley Park
        - Tree fall
        - Other: landslides in mountainous regions, flooding in lowland riparian ecosystems.
    - This disturbance regime drove small-scale heterogeneity, with small patches of differently-aged trees. This small-scale heterogeneity occurs within large tracts of contiguous forest.
    - When there is disturbance, alder trees are often the first to colonize. These are N-fixers.

Interior forests

- Interior forests in BC are generally colder and receive less precipitation.
- Strong selective pressures to interior forests include:
    - Fire
    - Snow/cold
- Historic disturbance regime:
    - Disturbances were likely historically more important for these interior systems, with more frequent fires and insect outbreaks.
        - Fire
            - Resistance (thick bark, etc.)—e.g., ponderosa pine, Garry Oak
            - Resilience (fire-induced seed germination)—e.g., lodgepole pine
        - Pine beetle
    - This disturbance regime drives larger-scale heterogeneity, with larger areas of same-aged trees.

Trees impact forest communities via multiple pathways:

- Physical habitat template
    - Woodland caribou and wolves

- Food
    - Direct: Red crossbills eat pine tree seeds

    - Indirect: Flying squirrels each lichen/fungi that flourish in forests

- Climate
    - e.g, Lungless salamanders and moisture

- Shelter
    - Nest hole “webs”
    - Cockle et al. 2011