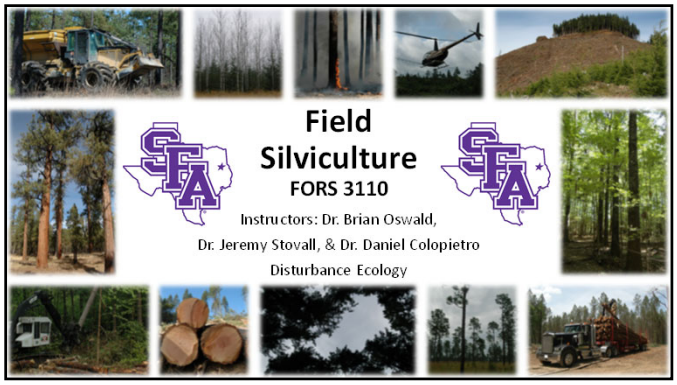
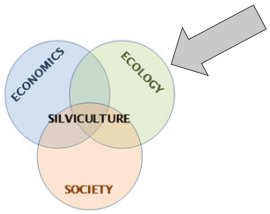


Role of Stand Dynamics in Silviculture



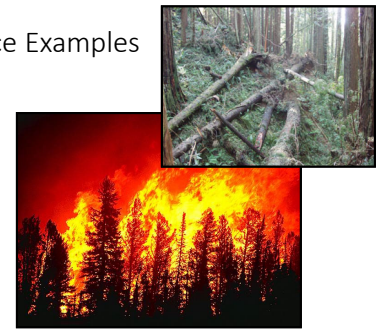
What Is A Disturbance?

- A disturbance is any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

  Picket & White

Classic Disturbance Examples

- Mount Saint Helens
- Siberian Meteor Strike
- Glaciers
- Landslide / Avalanche
- Floods
- Fire suppression / Yellowstone
- Fine-scale Windfall
- Tornadoes
- Ice Storms
- Gypsy Moth
- Southern Pine Beetle
- Herbivory

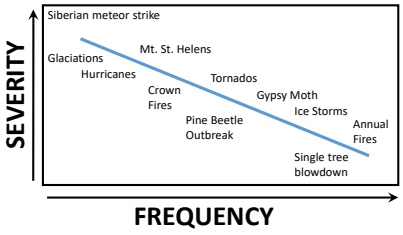


How Do We Quantify Disturbance?

-see online textbook section 2.2.-

- **Distribution**: spatial pattern (patchy vs. clumped)
- **Frequency**: (Events / Time) in a specific area
- **Return Interval**: (1 / Frequency) or (Time / Events)
- **Rotation Period**: Years to disturb entire area
- **Predictability**: inverse variance in return interval
- **Area or Size**: how big
- **Intensity**: Force / Area / Time
- **Severity**: Impact on structure (e.g. BA removed)
- **Synergism**: Effects on other disturbances

Severity Frequency Inversely Related

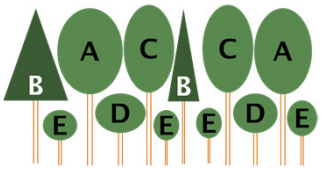


Stand Initiating Disturbances & Succession

Fig. 485 — The Siberian forest devastated by the blast from the meteorite of 30 June 1908.

Linking Disturbance & Succession

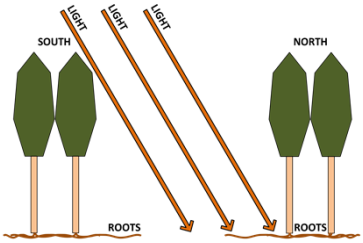
- What characteristics are important to consider when determining the potential effect of a disturbance on a stand? Consider characteristics of both the stand and the disturbance.



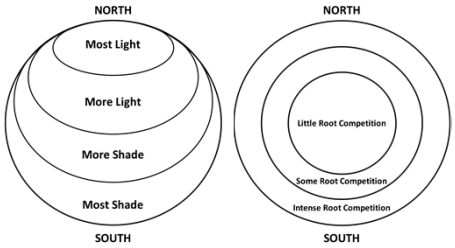
What Do We Need to Know?

- What is the existing stand structure?
  - Young stand? Old stand?
  - Dense stand? Sparse stand?
- What are the silvics of the species in the stand?
  - Fire tolerance? Fire Ecology?
  - Crown morphology
  - Wind-firmness?
  - Mode of reproduction?

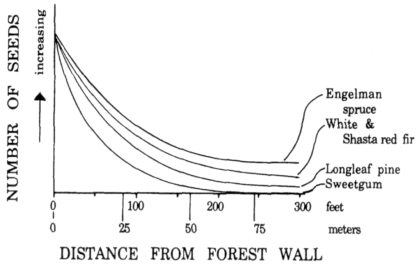
Spatial Variability in Gap Dynamics



Spatial Variability in Gap Dynamics



Spatial Variability In Gap Dynamics

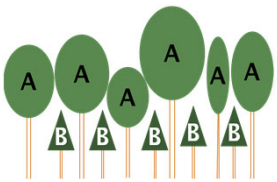


Spatial Variability In Gap Dynamics

Spatial Variability In Gap Dynamics

Example Using Shade Tolerance

- Hypothesize what might happen to this stand over the coming years in the event of 1) a severe fire, 2) a severe wind storm, 3) a severe ice storm.



Hugo Case Study

- Category 4 Hurricane
- Hit Charleston, SC
- Sept 21, 1989
- 138 mph winds
- 150 miles of coastline
- Dumped 10” of rain
- Storm surge 5-20 feet
- 82 lives lost

Hugo Damage

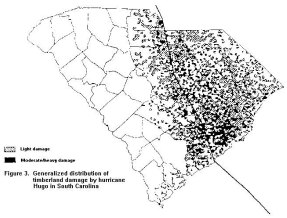


Figure 3. Generalized distribution of timberland damage by hurricane Hugo in South Carolina

- Did significant damage as far as 200 miles inland
- In NC & SC, did damage over ~11 M acres
- Damaged or destroyed **21.4 BILLION** board feet of timber

Vortices

~3,000 ‘Tornadoes’ Imbedded in Hurricane

Pine Stands: Lob & Longleaf

Killed 67% of RCW in Frances Marion NF

Bottomland Hardwoods

Destroyed Trees

Separation of annular rings: only good for pulpwood

Destroyed Whole Stands

Your Task

- You are a silviculturist for a large forest products company in SC
- Your company owns ~1M acres of affected timberland in SC coastal plain
- 50% Pine (lob & longleaf), 50% Hardwood
- Mix of uplands & bottomland sites for both
- Where do you start the next morning? Discuss and answer:
  - What are your top 3 priorities?
  - How will you accomplish each?
  - What challenges will you face?