An Update of The North American Long-Term Soil Productivity Study

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Interactions

Current legislation

- National Forest Management Act of 1976.
  - Requires the USDA Secretary to ensure, through research and monitoring, that forest management practices do not permanently impair the productivity of the land.

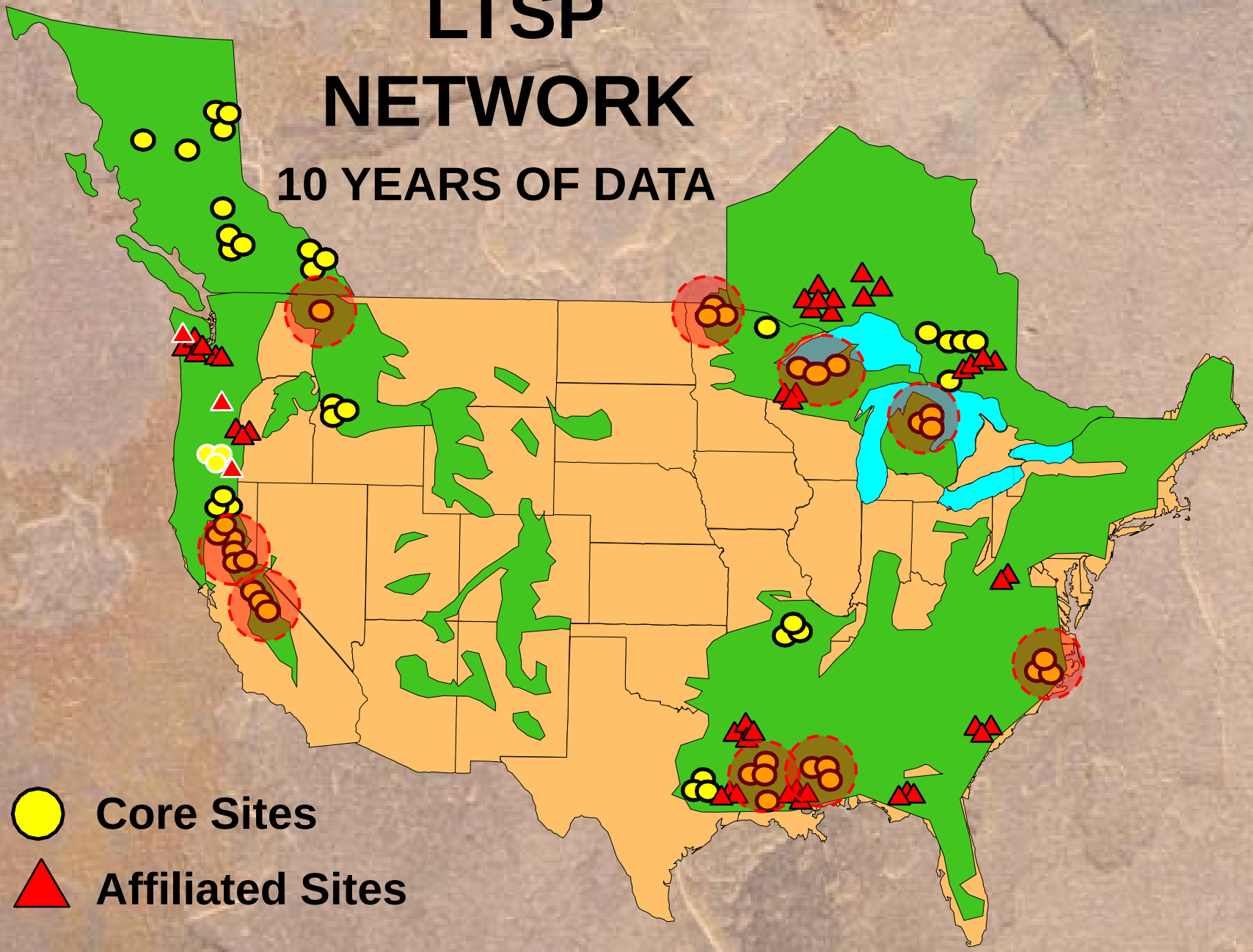
Defining “land productivity”

- A site’s capacity to produce a cornucopia of timber, wildlife, fish, aesthetics, etc.
- How do you tangibly measure all these?
- US Office of General Council: land productivity is the carrying capacity of a site for vegetation

Andic surface horizon

LTSP NETWORK

10 YEARS OF DATA



Objectives

- **Know a site's productive carrying capacity**
- **Understand how OM, soil porosity changes affect this.**
- **Validate soil-based indices. Improve if needed.**
- **Construct and validate a comprehensive model**

Hypotheses

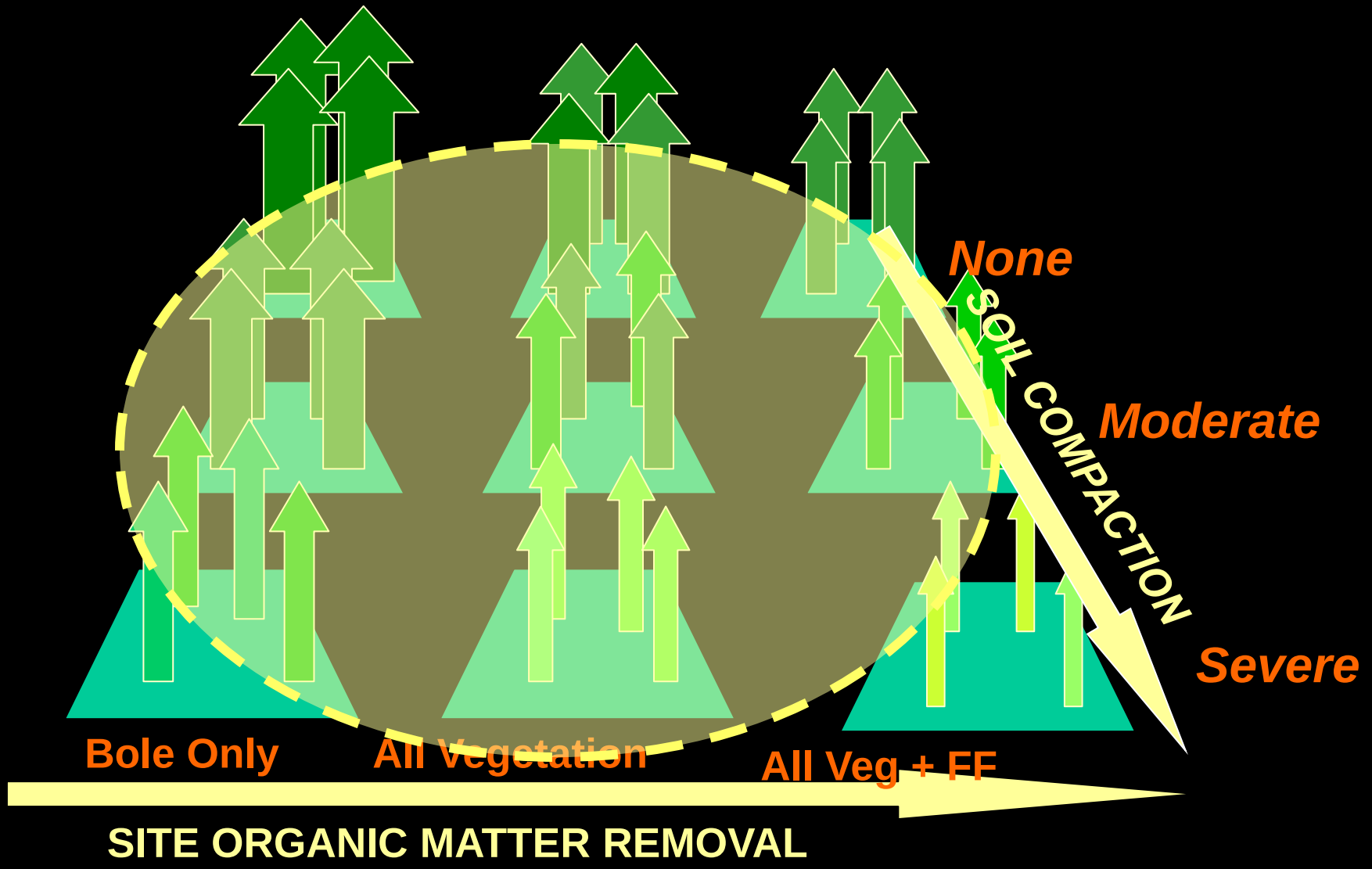
RESEARCH

- **Pulse changes in site OM or soil porosity will not affect a site's long-term productivity.**
- **If impacts do occur, they are universal.**
- **If impacts occur, they are irreversible.**
- **Plant community diversity has no impact on long-term productivity.**

MANAGEMENT

- **How much harvesting/grazing, etc. before permanent impacts occur?**
- **Which sites are sensitive?**
- **How/when can I use amelioration?**
- **Multiple use issues**

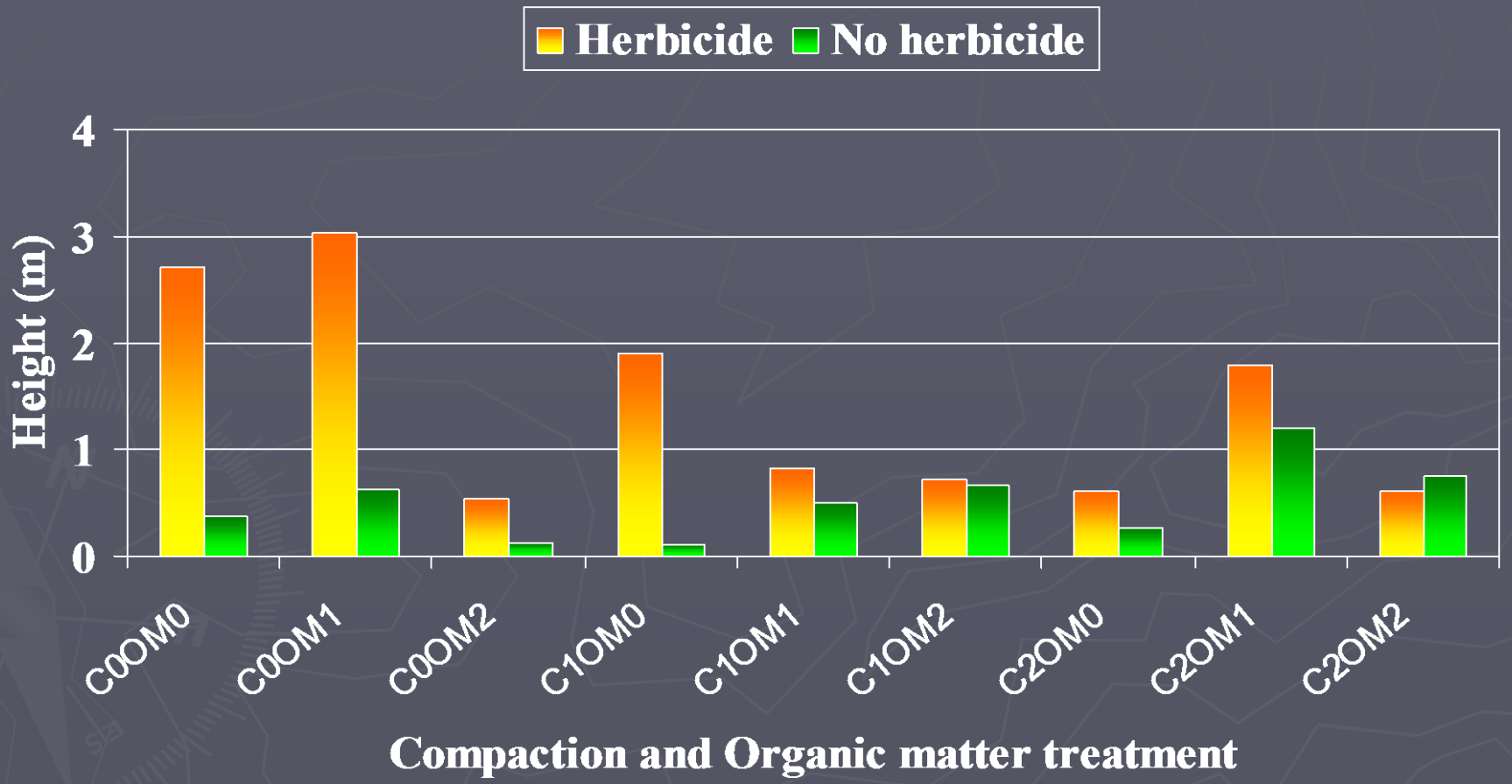
LTSP TREATMENTS ENCOMPASS THE OPERATIONAL ENVIRONMENT



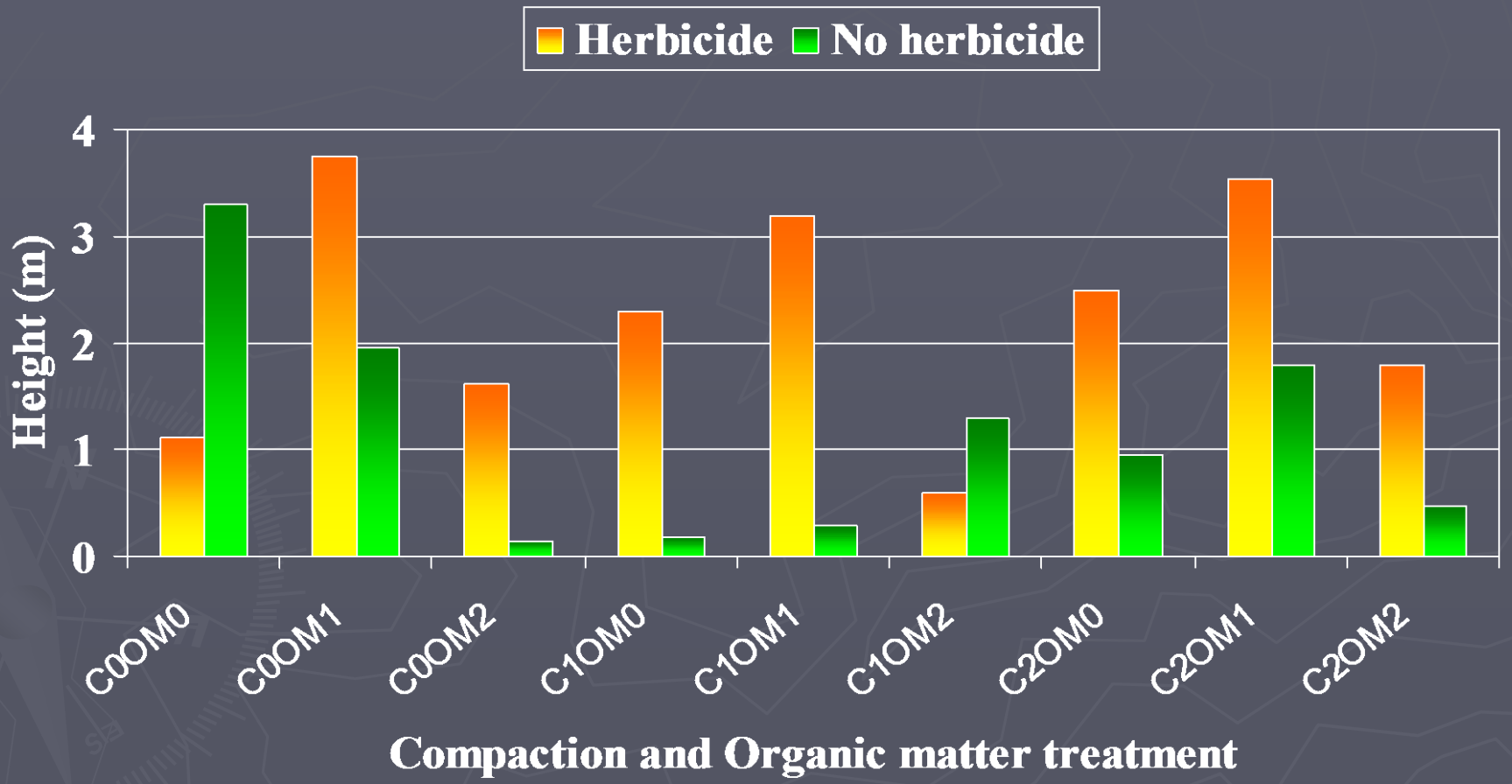
Fundamental Productivity **vs.** **Stand Productivity**

Some local (northwestern) results

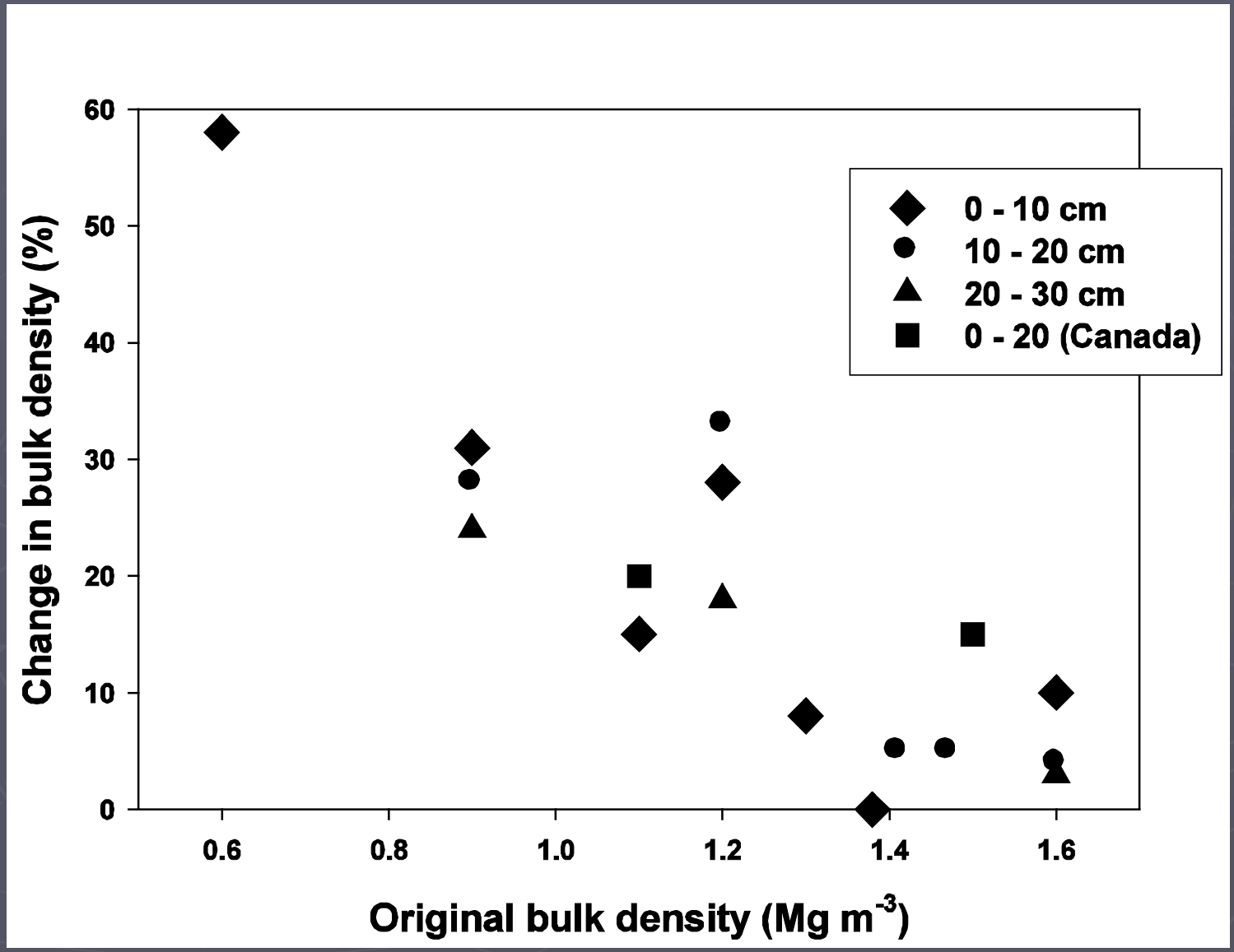
White pine height growth after 10 years – Priest River



Douglas-fir height growth after 10 years – Priest River



Influence of soil texture



Effect of Compaction on Seedling Roots

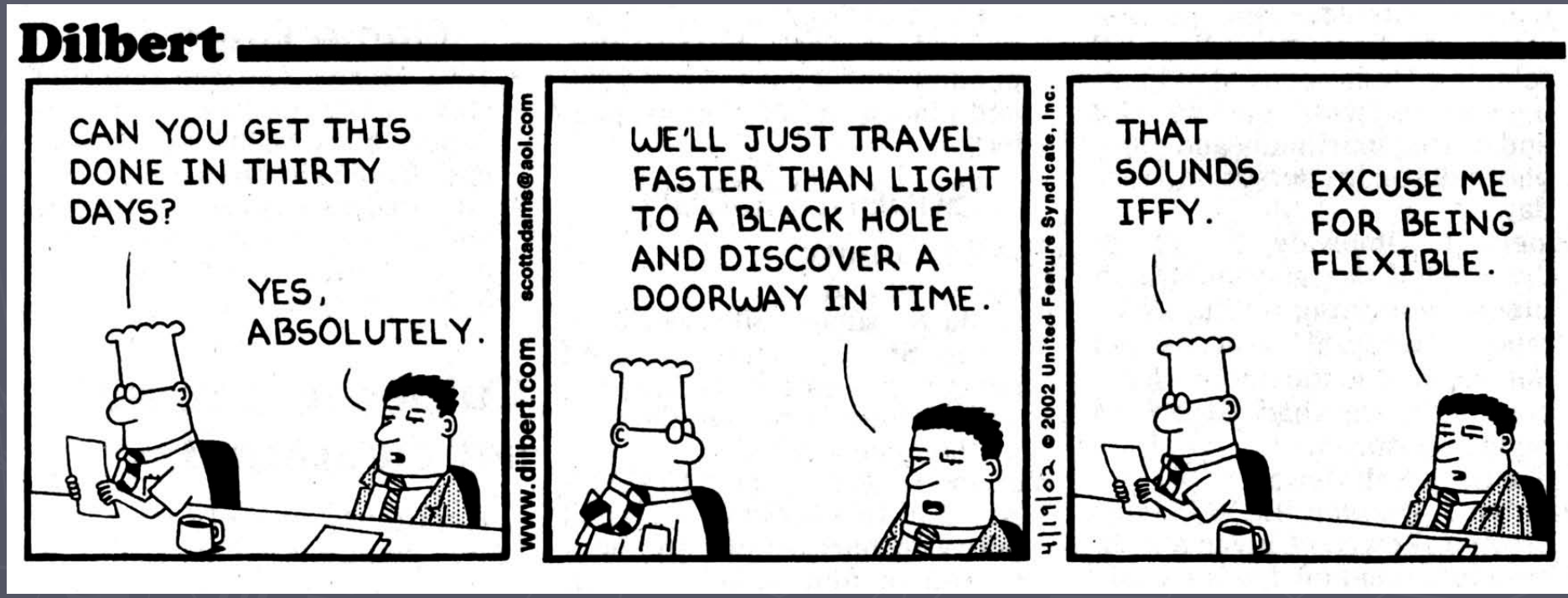
	No Compaction	Severe Compaction
Root Tips	77	28
Ectomycorrhizal tips	55	75

North America-wide at 5 years

- Whole tree harvesting had limited effects on planted seedling performance (compared to stem only harvest)
- Increases in survival offset decreases in growth (with WHT)
- Forest floor removal improved seedling survival and growth in CA (low productivity), but reduced growth in productive areas.

North America-wide at 5 years

- Compaction with intact forest floor usually benefited conifer survival and growth (regardless of climate or species)
- Vegetation control benefited seedling growth in all treatments.
- Soil compaction change was related to original bd and texture



Traveling faster than the speed of light…

North America-wide at 10 years

- Removal of the forest floor led to declines in C concentration
- Whole tree harvesting had no influence on tree growth
- Bulk density recovery is slow, particularly in soils with a frigid soil regime
- Forest productivity response to soil compaction depended on soil texture and understory competition