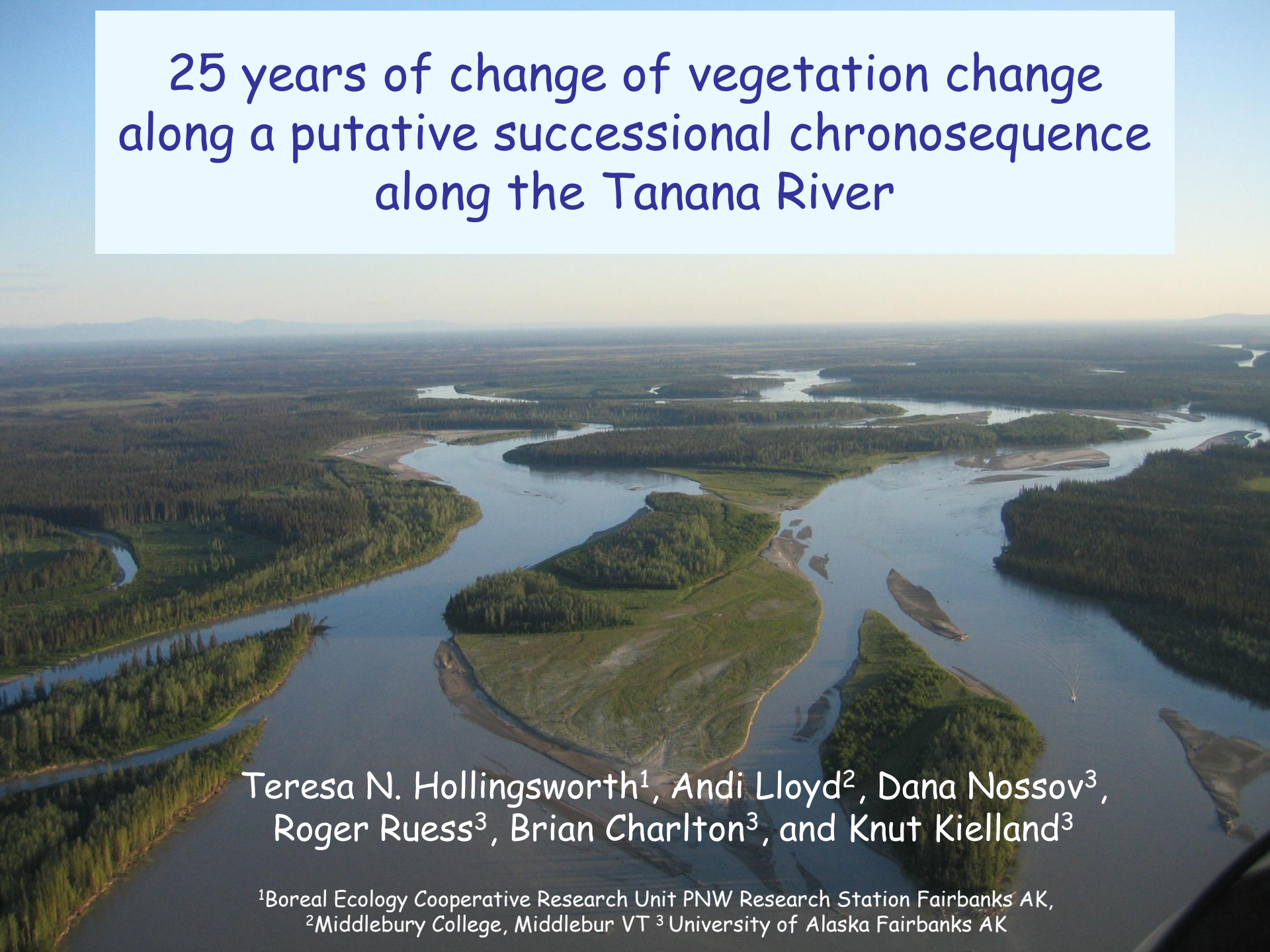
25 years of change of vegetation change along a putative successional chronosequence along the Tanana River



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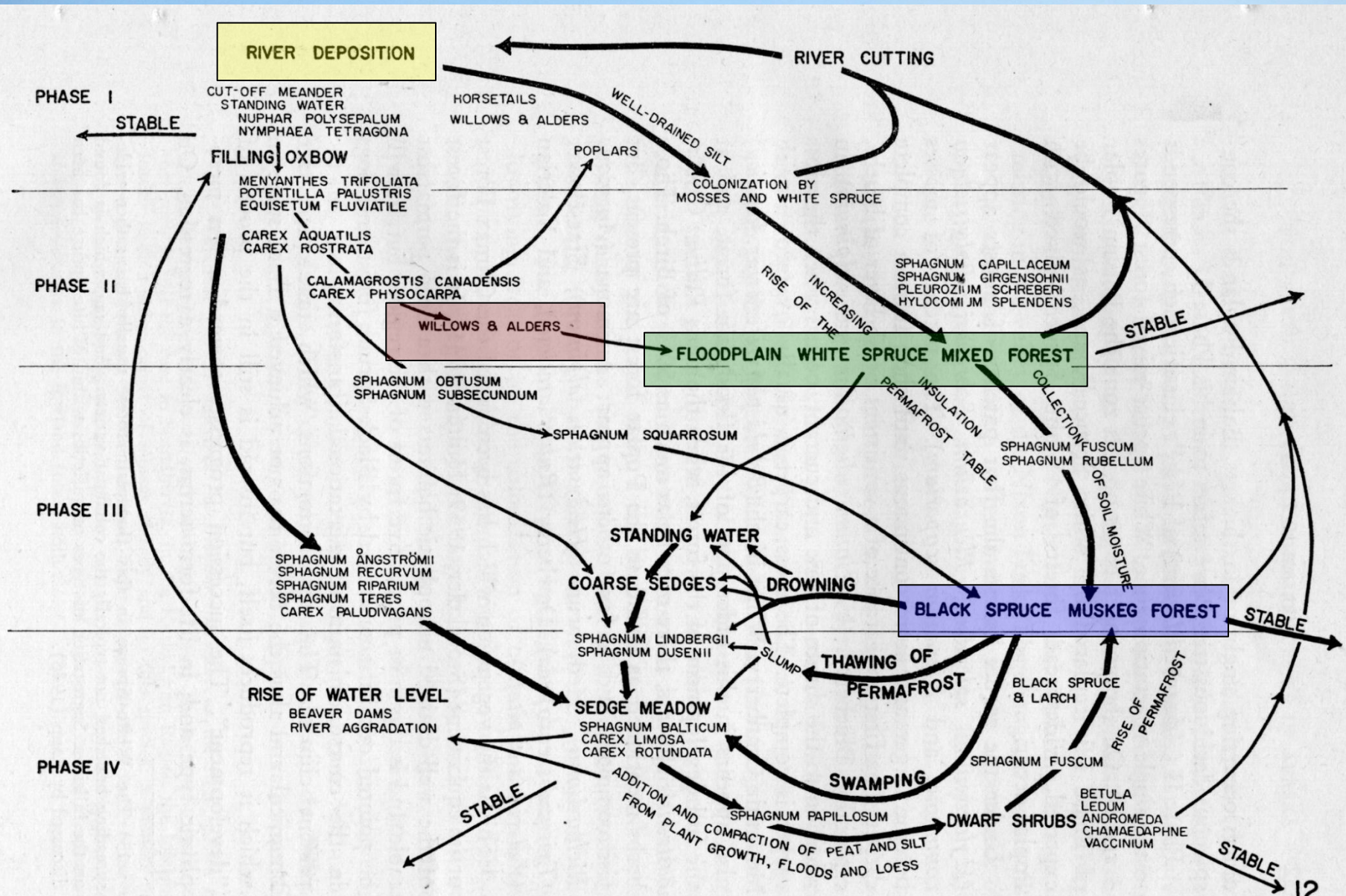
RIVER DEPOSITION
RIVER CUTTING
PHASE I
STABLE
CUT-OFF MEANDER
STANDING WATER
NUPHAR POLYSEPALUM
NYMPHAEA TETRAGONA
FILLING OXBOW
HORSETAILS
WILLOWS & ALDERS
WELL-DRAINED SILT
POPLARS
COLONIZATION BY
MOSSES AND WHITE SPRUCE
MENYANTHES TRIFOLIATA
POTENTILLA PALUSTRIS
EQUISETUM FLUVIATILE
CAREX AQUATILIS
CAREX ROSTRATA
PHASE II
CALAMAGROSTIS CANADENSIS
CAREX PHYSOCARPA
SPHAGNUM CAPILLACEUM
SPHAGNUM GIRGENSOHNII
PLEUROZIUM SCHREBERI
HYLOCOMIUM SPLENDENS
INCREASING
RISE OF THE
WILLOWS & ALDERS
FLOODPLAIN WHITE SPRUCE MIXED FOREST
STABLE
SPHAGNUM OBTUSUM
SPHAGNUM SUBSECUNDUM
SPHAGNUM SQUARROSUM
INSULATION
PERMAFROST
TABLE
COLLECTION
OF SOIL MOISTURE
SPHAGNUM FUSCUM
SPHAGNUM RUBELLUM
PHASE III
STANDING WATER
SPHAGNUM ÅNGSTRÖMII
SPHAGNUM RECURVUM
SPHAGNUM RIPARIUM
SPHAGNUM TERES
CAREX PALUDIVAGANS
COARSE SEDGES
DROWNING
BLACK SPRUCE MUSKEG FOREST
STABLE
SPHAGNUM LINDBERGII
SPHAGNUM DUSENII
SLUMP
THAWING OF
PERMAFROST
BLACK SPRUCE
& LARCH
RISE OF
PERMAFROST
RISE OF WATER LEVEL
BEAVER DAMS
RIVER AGGRADATION
SEDGE MEADOW
SPHAGNUM BALTICUM
CAREX LIMOSA
CAREX ROTUNDATA
PHASE IV
SWAMPING
SPHAGNUM FUSCUM
STABLE
ADDITION AND COMPACTION OF PEAT AND SILT
FROM PLANT GROWTH, FLOODS AND LOESS
SPHAGNUM PAPILLOSUM
DWARF SHRUBS
BETULA
LEDUM
ANDROMEDA
CHAMAEDAPHNE
VACCINIUM
STABLE
12

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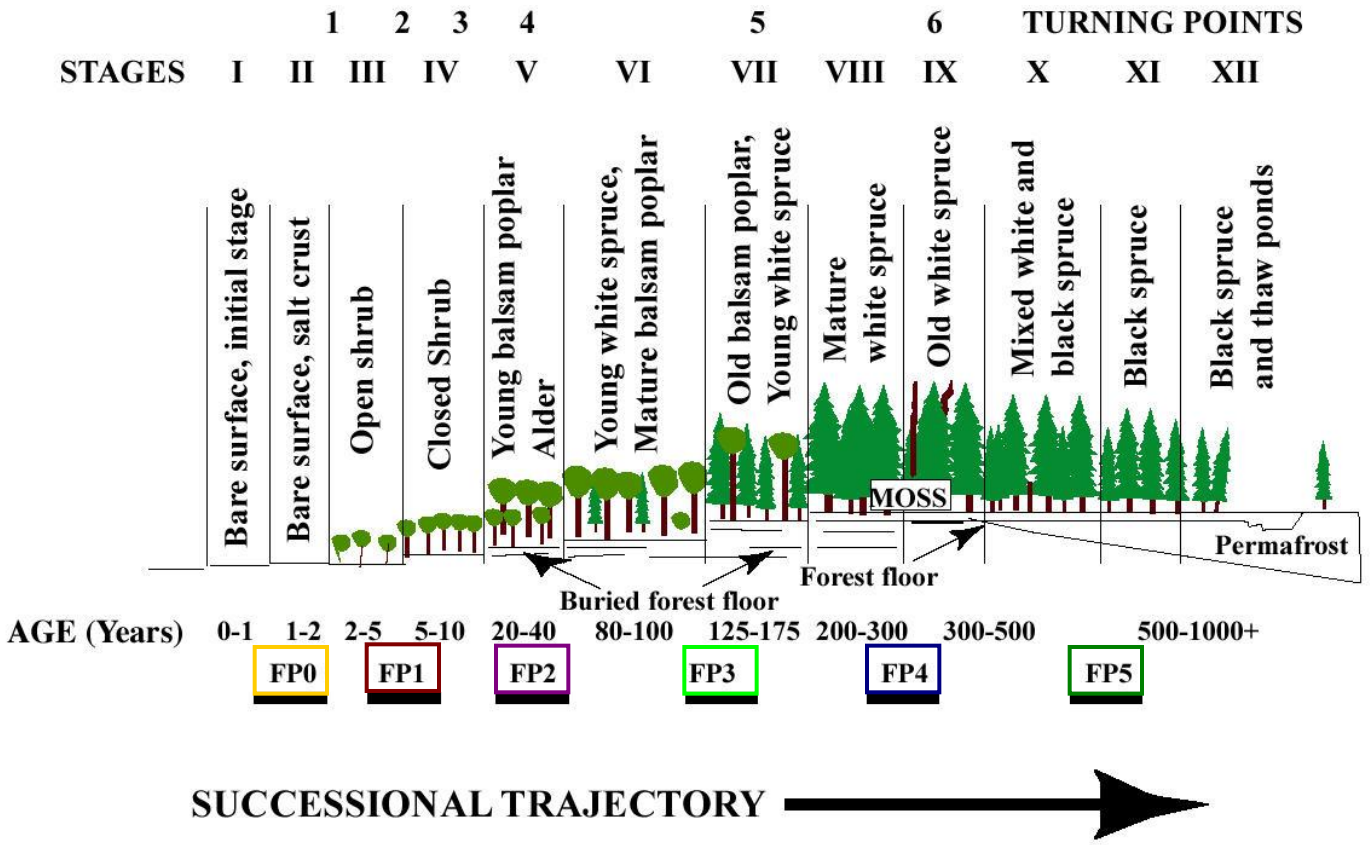
FLOODPLAIN PRIMARY SUCCESSION

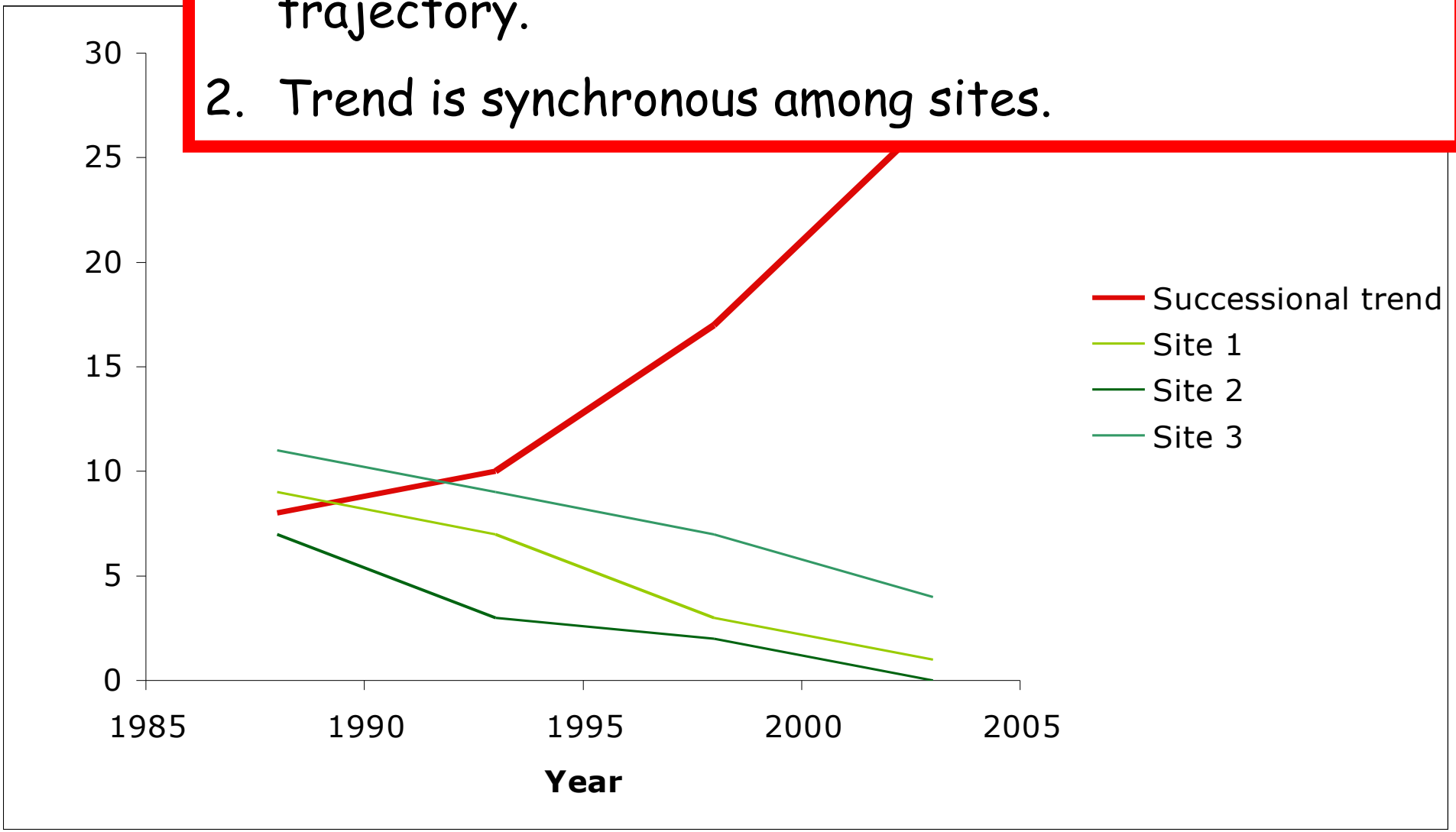


Research Question

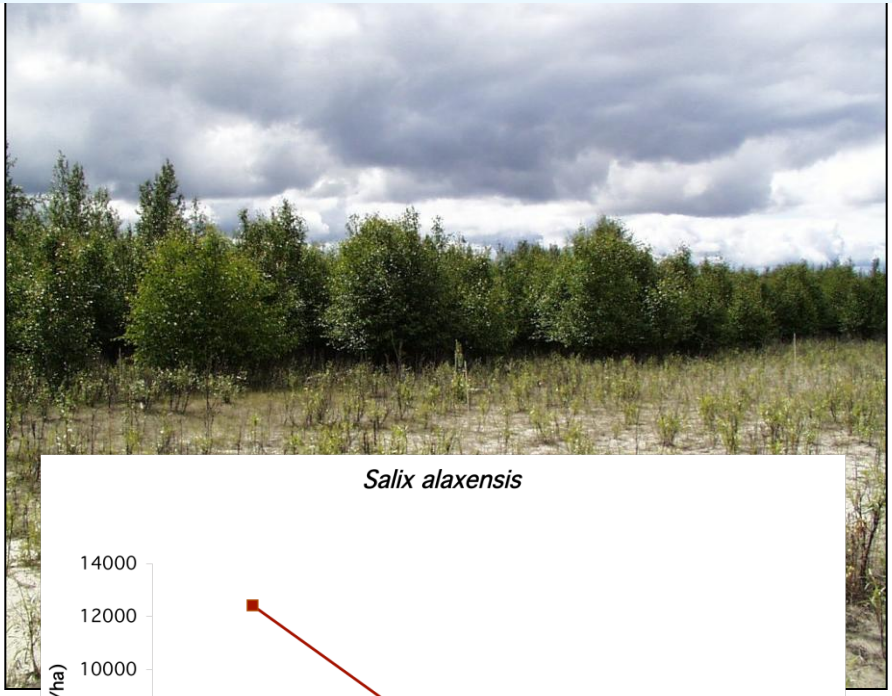
- Are the hypothesized turning points manifested in changes in vegetation, both overstory and understory?

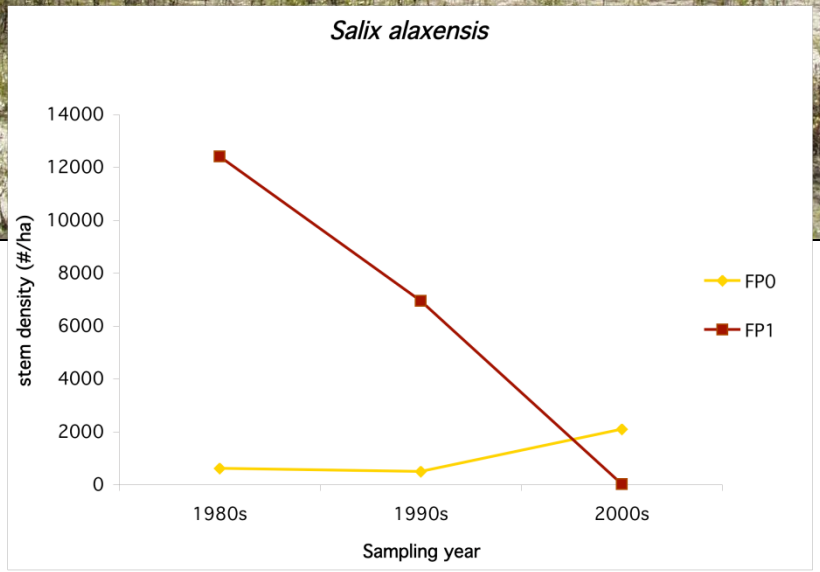
- Does our chronosequence accurately defined the vegetation change observed?

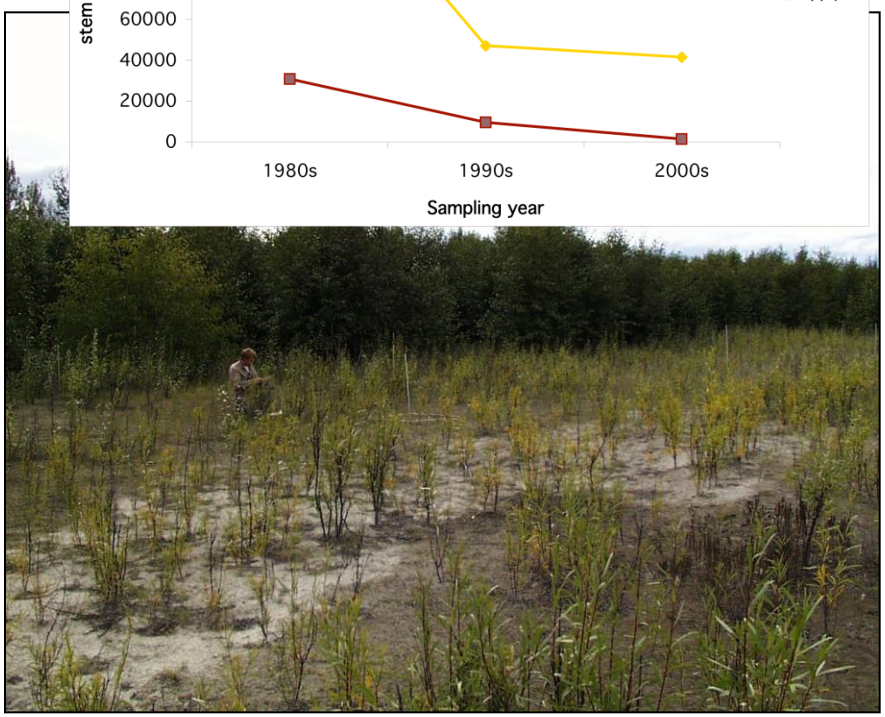
1. Trend differs than expected successional trajectory.
2. Trend is synchronous among sites.



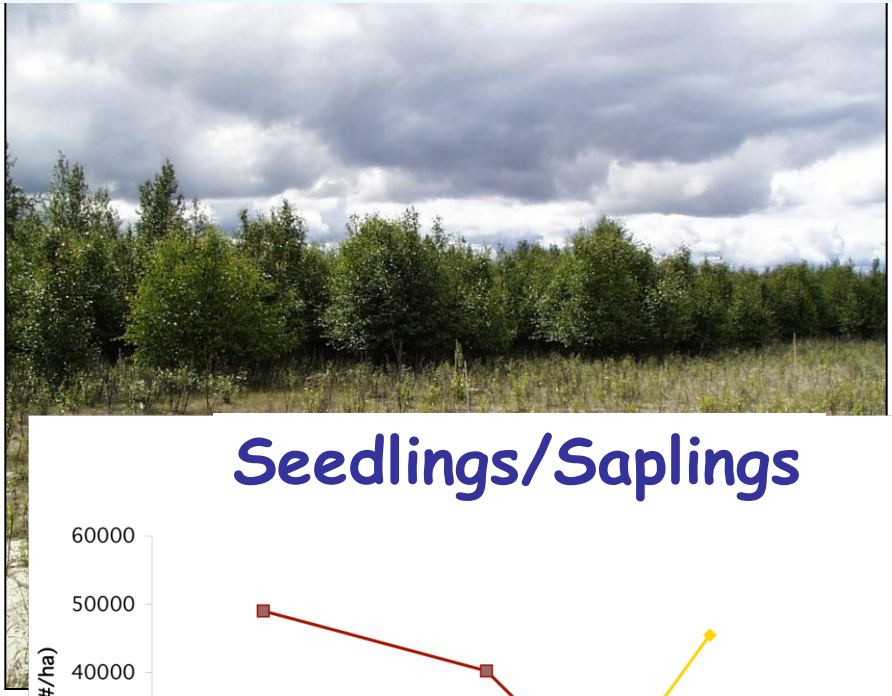
Results: Species density (Willows)



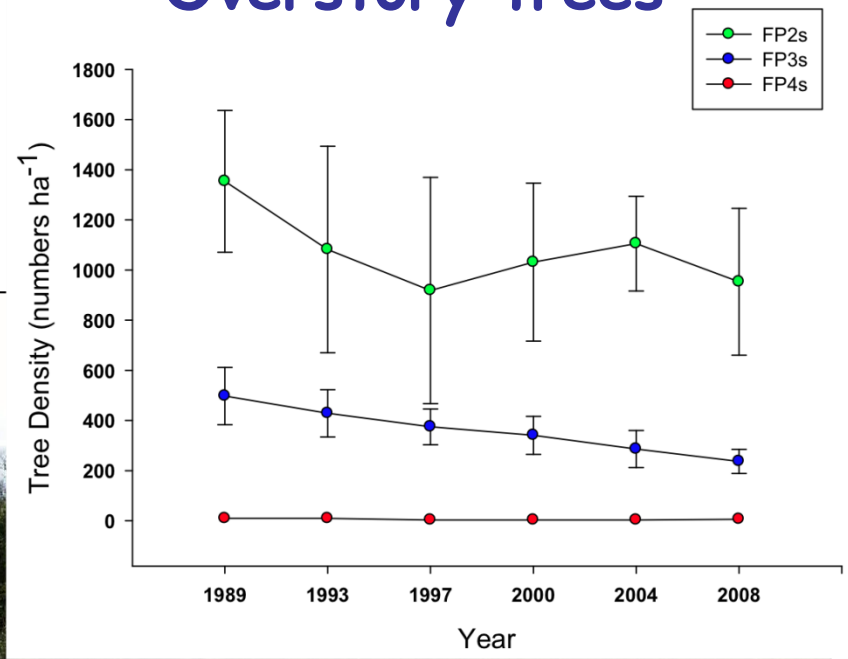




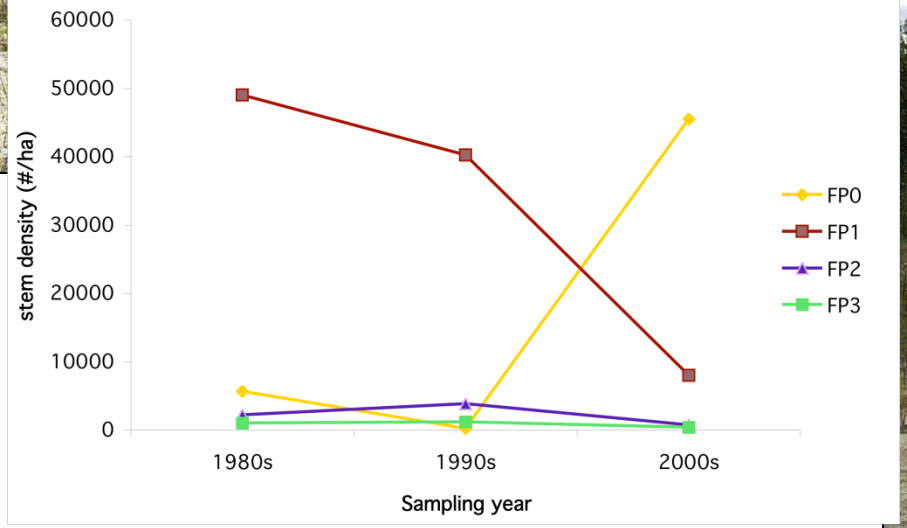
Results: Species density (*Populus Balsamifera*)



Overstory trees

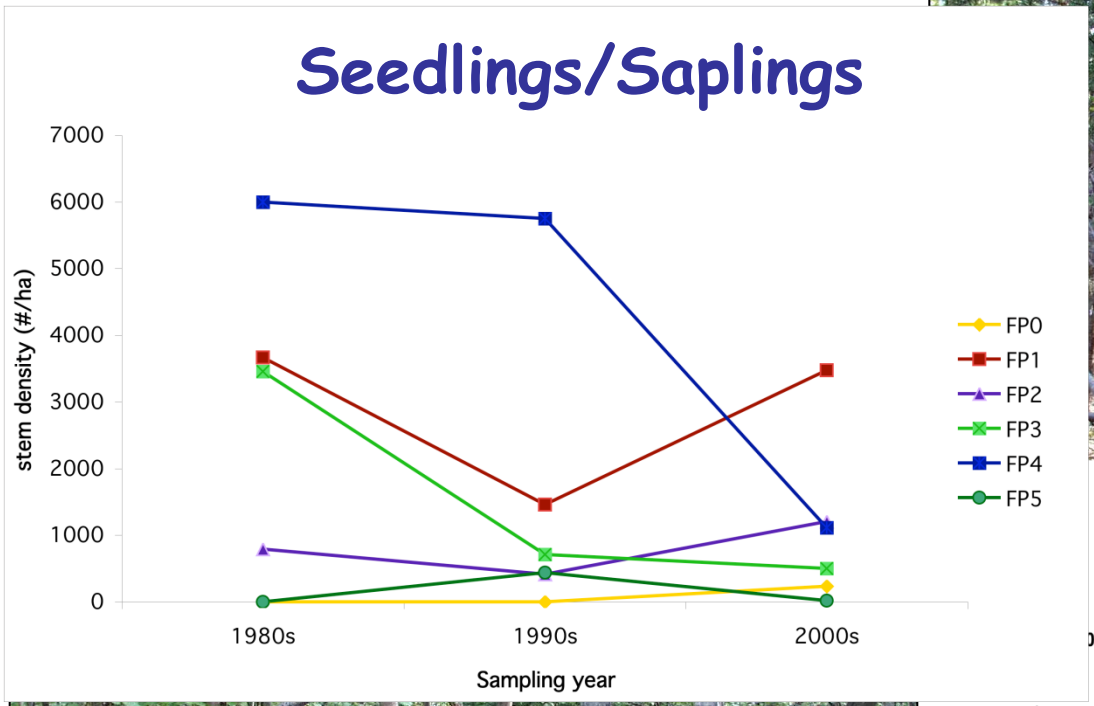


Seedlings/Saplings

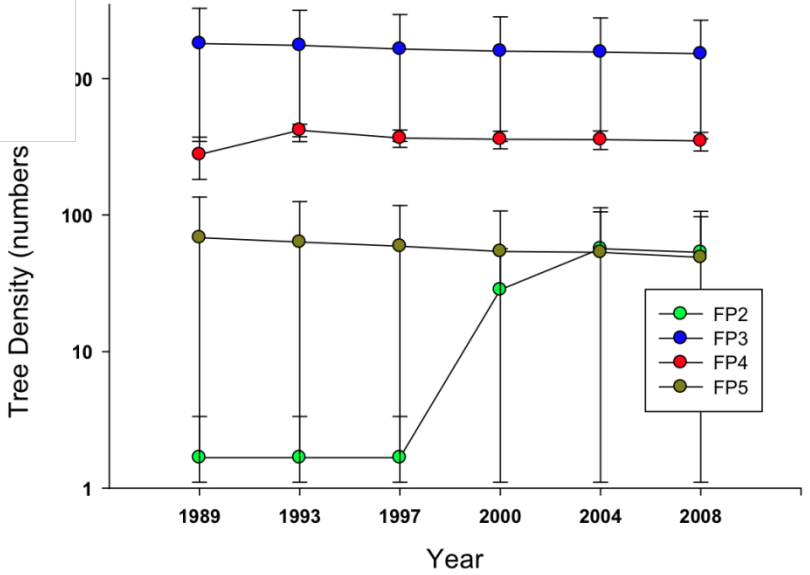


Results: Species density (*Picea glauca*)

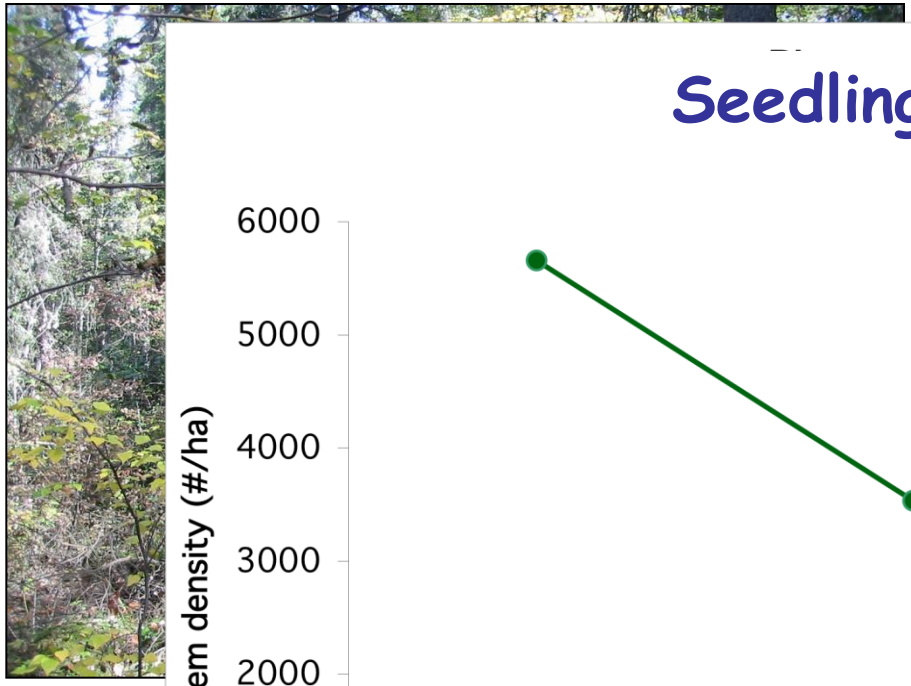
Seedlings/Saplings



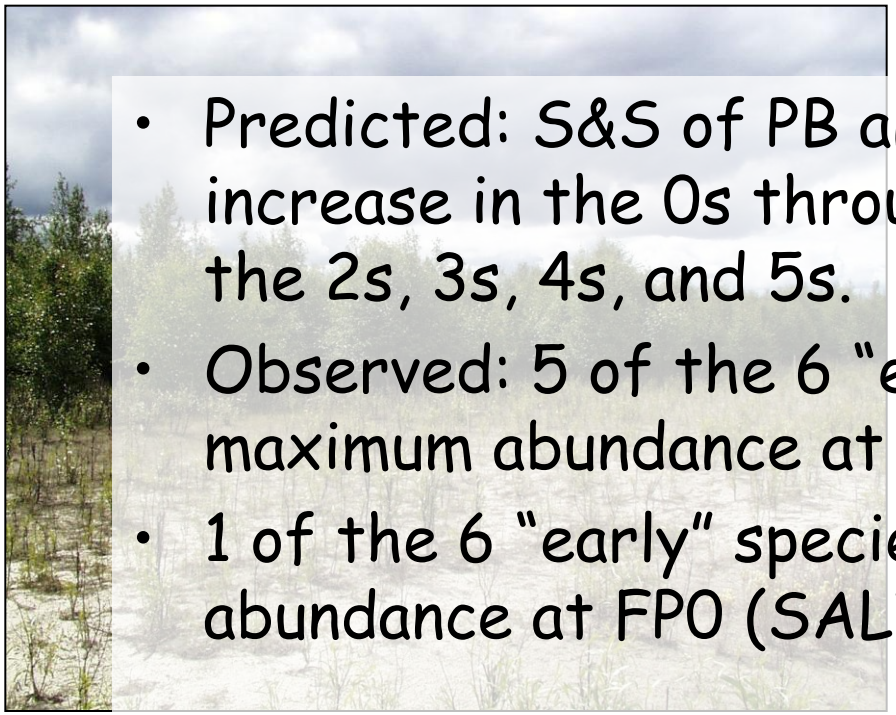
Overstory trees



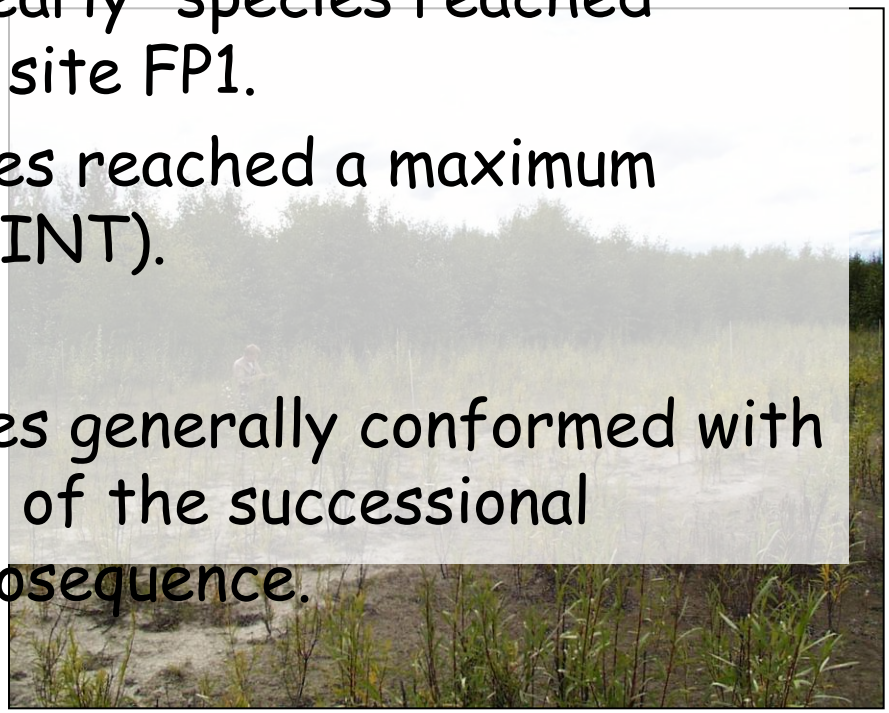
Results: Species density (*Picea mariana*)



Results: Early succesional species density

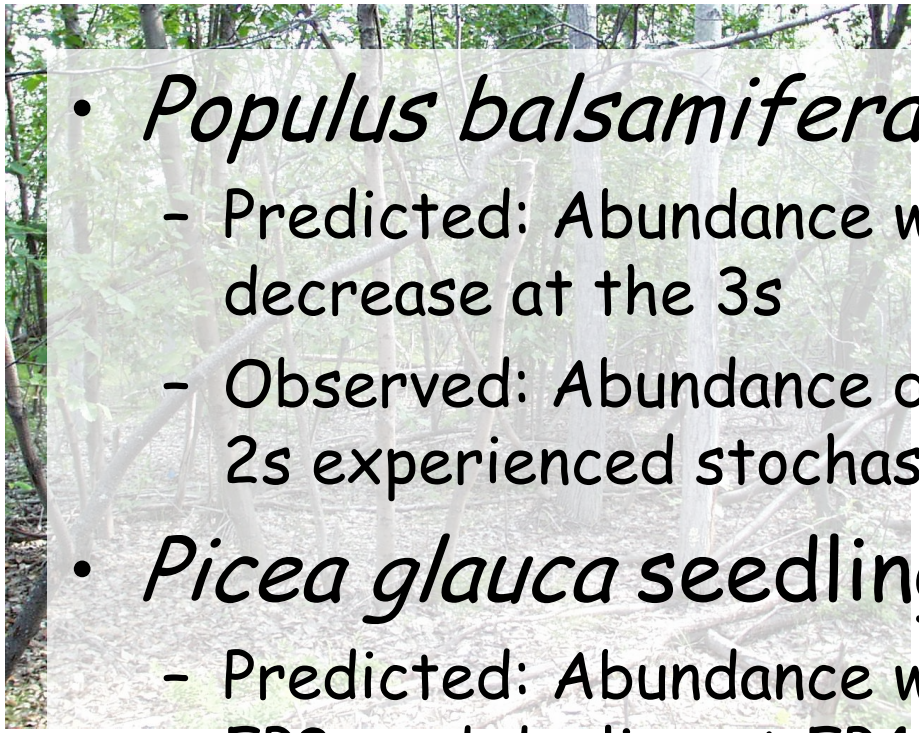


- Predicted: S&S of PB and Willow densities will increase in the 0s through the 1s and decrease in the 2s, 3s, 4s, and 5s.
- Observed: 5 of the 6 "early" species reached maximum abundance at site FP1.
- 1 of the 6 "early" species reached a maximum abundance at FP0 (SALINT).

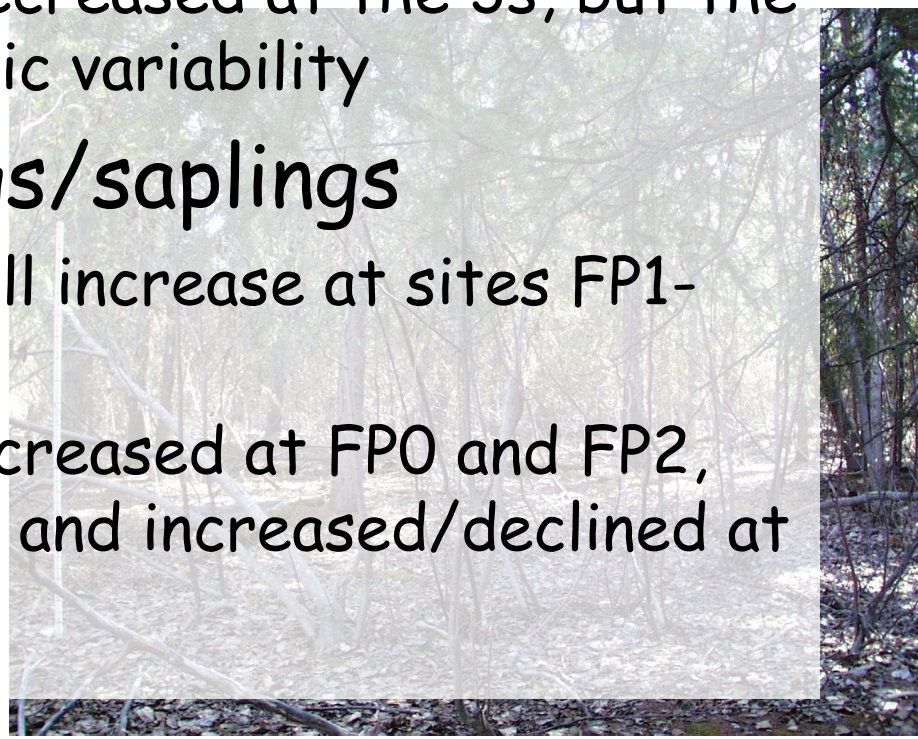


Overall, then, early species generally conformed with the predictions of the successional chronosequence.

Results: Mid successional species density

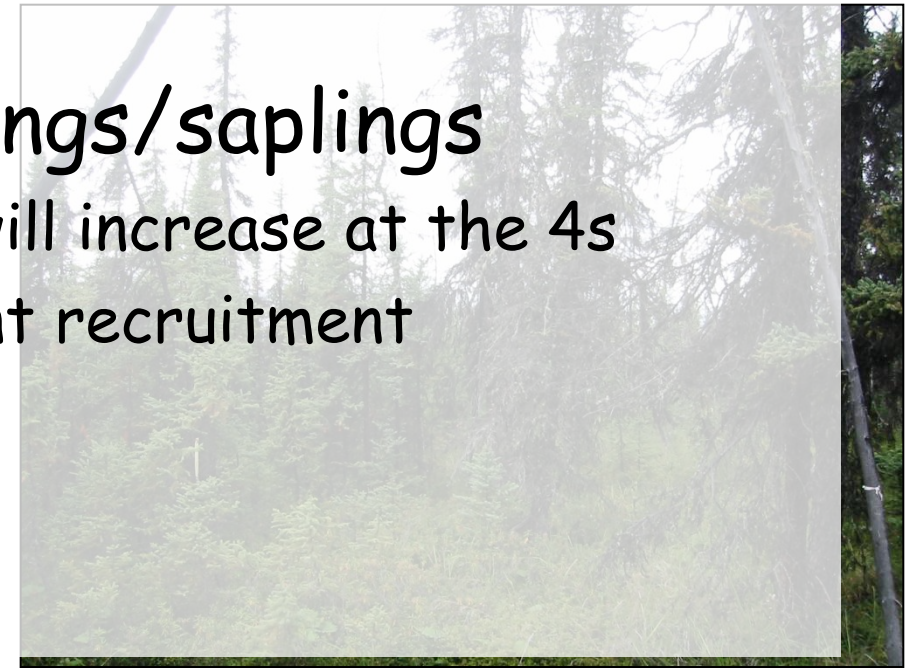


- *Populus balsamifera* trees
  - Predicted: Abundance will increase at the 2s and decrease at the 3s
  - Observed: Abundance decreased at the 3s, but the 2s experienced stochastic variability
- *Picea glauca* seedlings/saplings
  - Predicted: Abundance will increase at sites FP1-FP3, and decline at FP4.
  - Observed: Abundance increased at FP0 and FP2, declined at FP3 and FP4, and increased/declined at FP1.

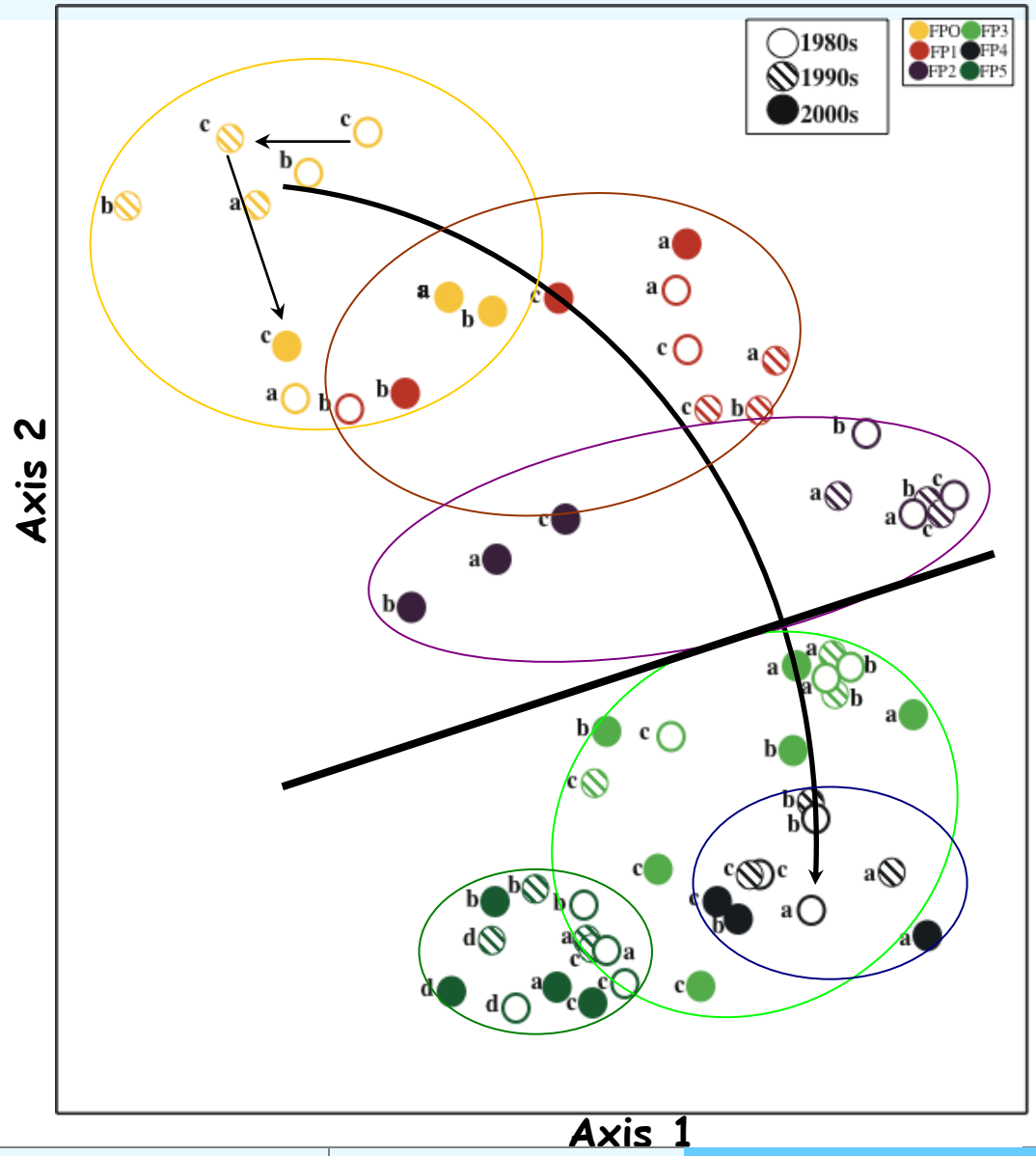


Results: Late successional species densities

- Picea glauca trees
  - Predicted: Abundance will increase at the 3s and decrease at the 4s
  - Observed: No significant change in density at the 3s or 4s
- Picea mariana seedlings/saplings
  - Predicted: Abundance will increase at the 4s
  - Observed: No significant recruitment



Results: Species composition



Conclusions

- Early successional understory species (woody and nonwoody) by and large ***conform*** to our expectations. However, late successional understory species ***do not.***
- There have been significant declines in tall woody plants and forbs in the late stages of recent years, which have not been compensated for by new arrivals and are, therefore, potentially becoming ***less abundant*** on the landscape than they were.
- Black spruce is not recruiting in mature white spruce stands, and doesn't appear to be a "final" stage of floodplain succession. Only some of the "turning points" in succession are actually succeeding in a predictable pattern

Conclusions

There is a large amount of variability in species composition that is ***not explained*** by the traditional successional paradigm.