

Objective

- Clarify the effects of two river channel modifications (channelization and levee construction) on floodplain forest composition, diversity, structure, productivity, surface hydrology, and leaf and soil nutrient pools

Expected Results

- I.** Hydrologically, we expected that channelization could result in one of two outcomes:
 - 1) lowered water table levels, or
 - 2) higher water table levels.
- II.** In leveed systems, we anticipated that levees had cut off river inputs and converted these sites to rain-fed systems
 - 1) drier
 - 2) lower levels of soil nutrients? Or higher...
- III.** Expected that changes in hydrology and nutrient availability would result in structural and compositional differences of floodplain forest communities

Experimental Design - Split-plot Design

Main Plot = Treatment Subplot = Location
 Three levels = C, CL, U Two levels = D, ND

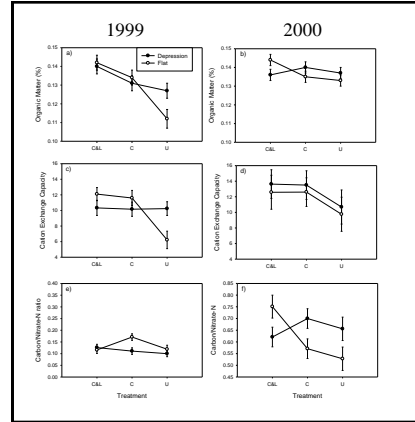
| River Type | % Basin Wetlands | % Basin Ag | Study Section Length (km) |
|----------------------|------------------|------------|---------------------------|
| Channelized | 19 | 59 | 4 |
| Channelized & Leveed | 15 | 83 | 4.5 |
| Unchannelized | 46 | 41 | 6.5 |

Treatments confounded by additional anthropogenic factors

Midcanopy Trees (2.54-9.9 cm dbh)

| Species | CL, N | CL, D | C, N | C, D | U, N | U, D |
|-------------------------|-------|-------|------|------|------|------|
| <i>T. distichum</i> | 0 | 20 | 8 | 3 | 29 | 61 |
| <i>N. aquatica</i> | 0 | 0 | 0 | 27 | 0 | 0 |
| <i>Quercus</i> spp. | 7 | 15 | 8 | 67 | 5 | 18 |
| <i>F. pennsylvanica</i> | 123 | 90 | 92 | 7 | 11 | 0 |
| <i>A. rubrum</i> | 253 | 265 | 588 | 73 | 529 | 325 |
| <i>Betula nigra</i> | 0 | 15 | 27 | 0 | 58 | 7 |
| Total Density | 683 | 970 | 1400 | 770 | 1129 | 1171 |
| Richness | 2.53 | 2.40 | 3.92 | 2.93 | 4.74 | 2.88 |
| Evenness | 0.49 | 0.66 | 0.65 | 0.70 | 0.84 | 0.52 |

Seems to be a strong hydrologic control of regeneration in connected sites.



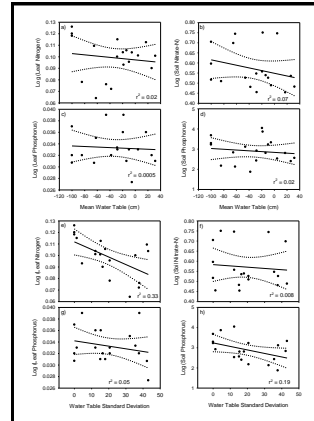
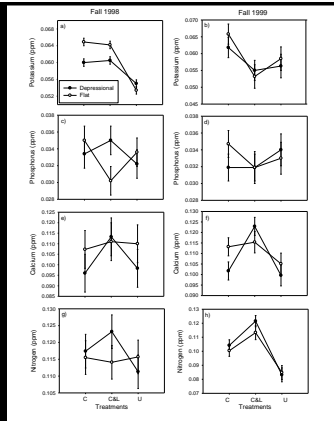
Soil Nutrient Pools

Significant TRT*TOPO

For example, C:N ratio greater in D versus ND in connected stream sections, 1999.

Leaf Fall Nutrient Pools

- Year to year variation
- River variation
- Significant TRT*TOPO P, 1998
- C&L typically greater



No relation between nutrient pools and mean water tables

Negative relationship between Leaf N/ Soil P and water table variation

Conclusions

- Channelized streams had higher mean water tables and lower soil redox potentials than non-channelized or channelized and leveed streams.
 - Hydrology most strongly connected when unchannelized
 - Such variability tied to nutrient pools
- Leveed systems appeared to have mostly oxidized soil conditions, similar to uplands.
- Leaf and soil nutrient pools were generally higher in channelized and leveed sites.
 - Flood pulse versus sediment pulse, even when unchannelized
- Overstorey vegetation composition a combination of past disturbance and hydrologic regimes.
 - Midcanopy more closely associated with current hydrology

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