

Effects of Riparian Zone Fragmentation on Primary Productivity and Fish Growth Rates

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STREAM HABITAT FRAGMENTATION

What is stream habitat fragmentation?

lack of connectivity between upstream and downstream populations

What causes fragmentation?

Human interference--agriculture, pollution, industry, forestry, erosion

Outcome of Fragmentation

- Less than 1% of original landscape remains in Illinois
- **Distinct patch formation may occur within a stream**

EFFECTS OF FRAGMENTATION

ABIOTIC

Increased amounts of sedimentation, siltation, chemical runoff, and pollution

↓
Changes in dissolved oxygen, temperature, and pH

BIOTIC

Negative affects upon diversity, richness, mortality and reproductive success

↓
Disruption of habitat equilibrium

SINCE

Stream Habitat Fragmentation can cause changes to in abiotic environment of a stream, one would also expect to see

- Changes in primary productivity which may lead to
- Changes in growth rates of fish at various trophic levels

OBJECTIVES

- * Determine if habitat fragmentation exists in stream environments
- * Discover if primary productivity is different between patches
- * Determine if growth rates of fish are affected by differences in primary productivity between patches
- * Observe the consistency of energy distribution between trophic levels in comparison to varied growth rates

Methods

Sites

7 sites were sampled for fish and productivity along Polecat Creek, a 4th order tributary of the Embarras River.

Reaches

Reaches were 300 ft and contained at least one riffle/pool sequence when possible.

Sampling techniques

Electroshock, collect, identify, and measure fish; choose fish for growth determination.

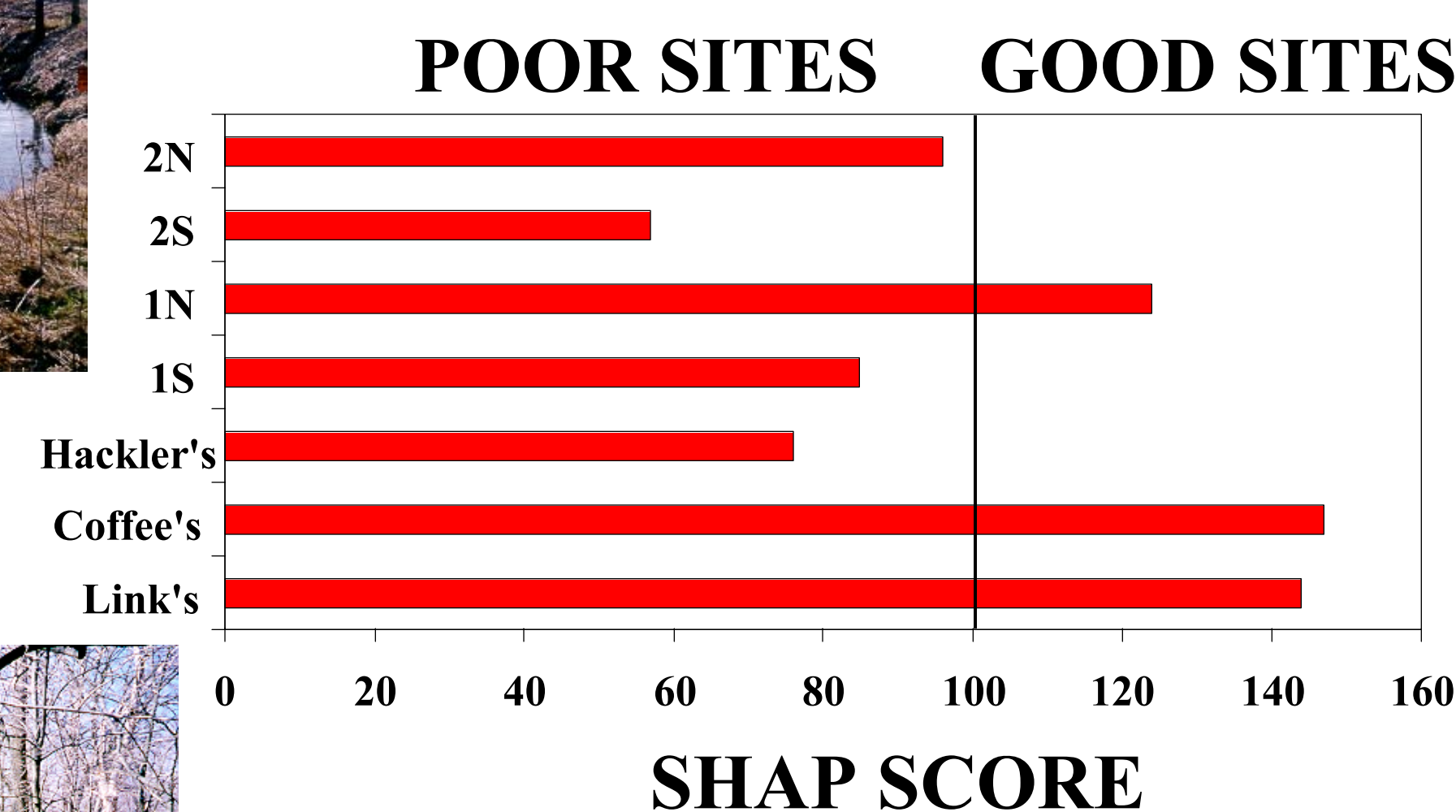
Results

Habitat Assessment

Used Stream Habitat Assessment Procedure (SHAP)

-Assessment based on 15 habitat metrics associated within the following three broad categories:

- substrate and instream cover
- channel hydrology and morphology
- riparian and bank features

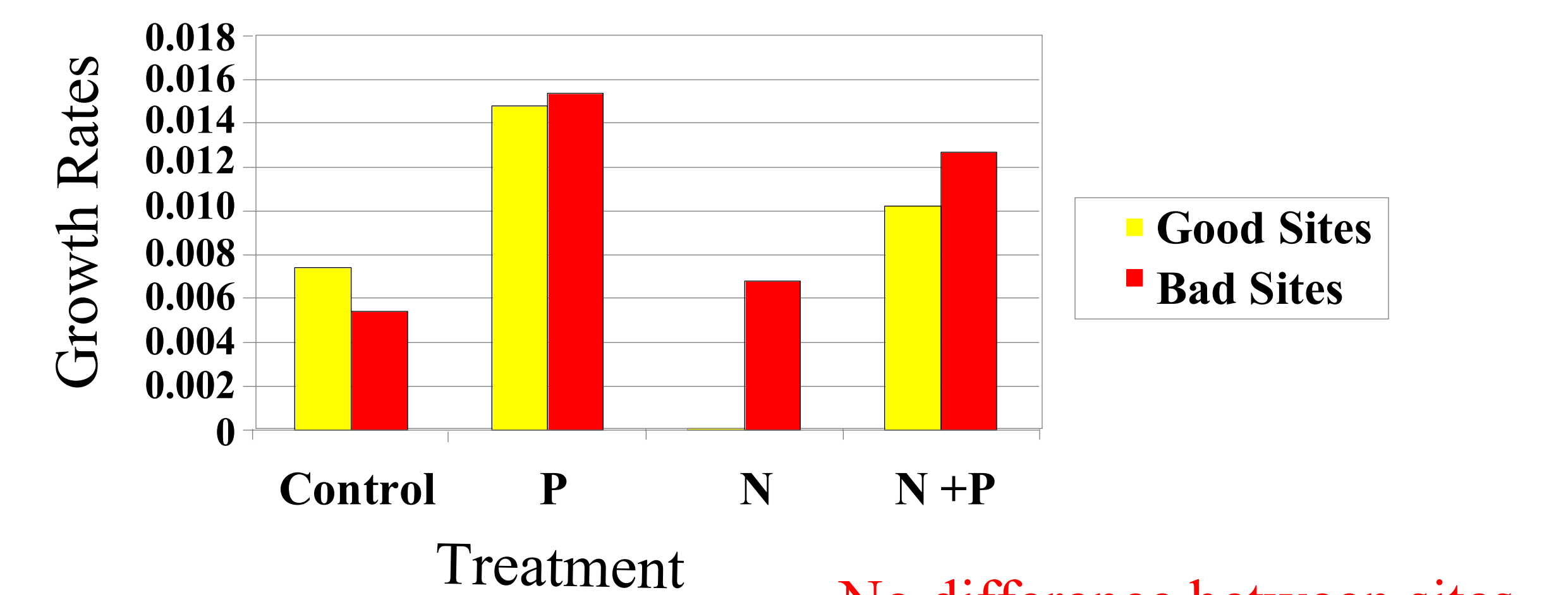


- Significant difference between sites ($p < 0.0001$)

Productivity Assessment

Biostimulation technique

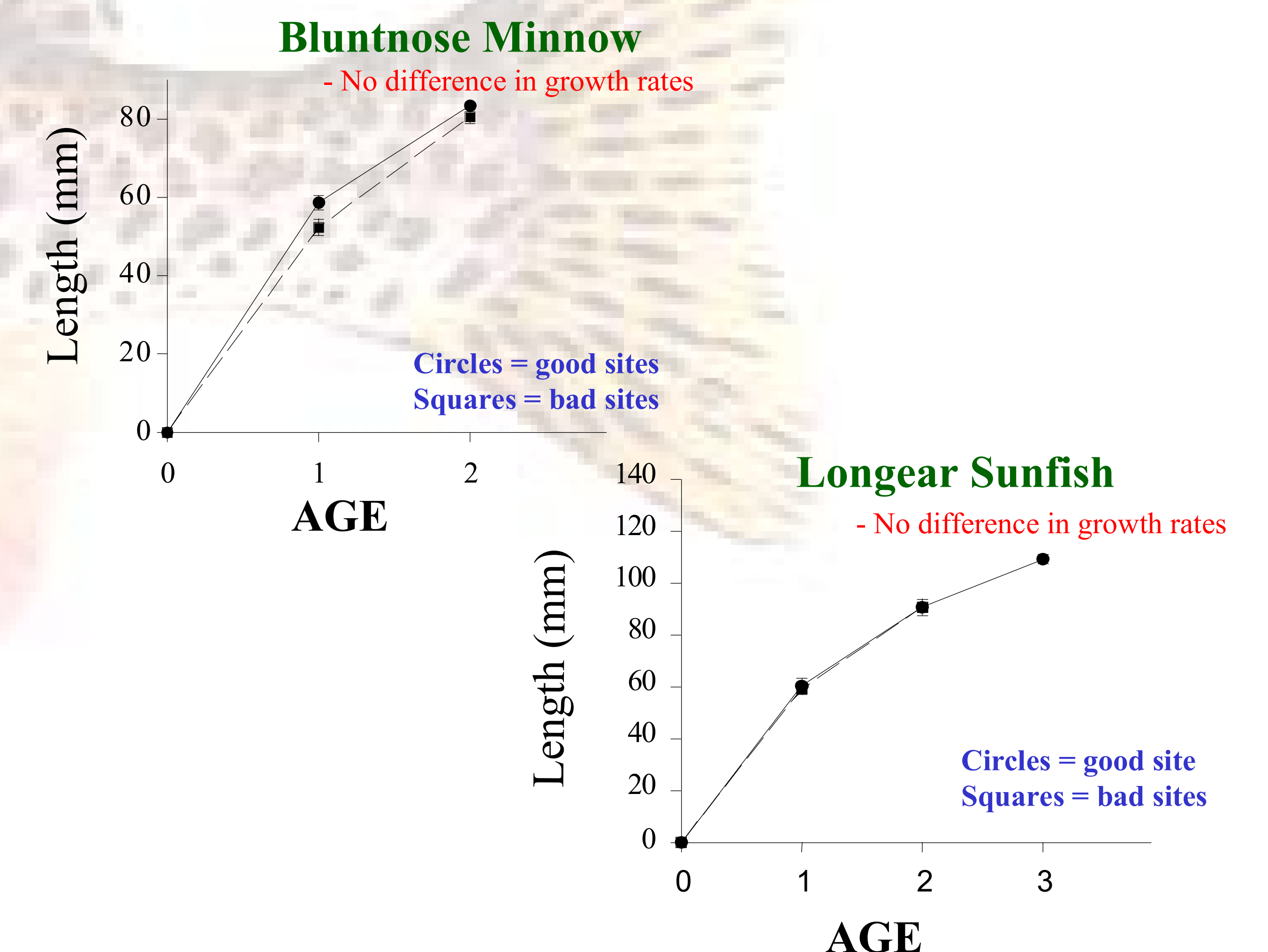
Test for the growth of *Selenastrum capricornutum* in the presence of turbidity



- No difference between sites

Growth Rate Determination

Determined using the back calculation technique



CONCLUSIONS

- *Distinct patches can be formed in stream habitats in response to land use.
- *All sites in Polecat Creek showed limited productivity due to nutrient deficiency
- *Additional productivity analysis showed phosphorus to be the limiting nutrient
- *Growth rates of fish at different trophic levels in each patch were not affected by productivity differences