

# Watershed-Scale Evaluation of Selected Soil and Water Conservation Practices in the Goodwater Creek Watershed

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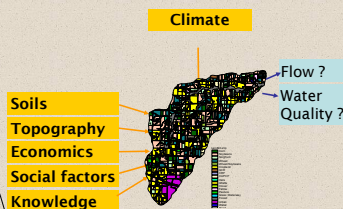
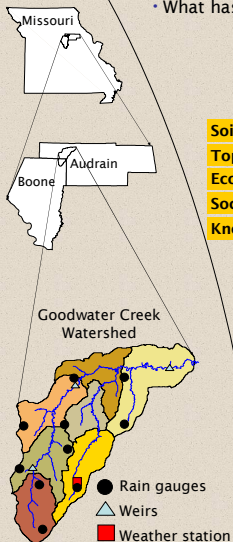
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## Project Objectives

### Questions:

- Has atrazine concentration decreased in the Goodwater Creek Watershed?
- What has caused the trends?



- 7,250 ha
- Claypan 13 to 46 cm below surface
- 0-3% slopes
- Land use
  - 70% Row Crops
  - 10% Woodland
  - 10% Grassland
  - 10% Urban

**Objective 1:** Analyze the trends in atrazine concentrations measured in Goodwater Creek and in the loadings derived from concentrations and flow values.

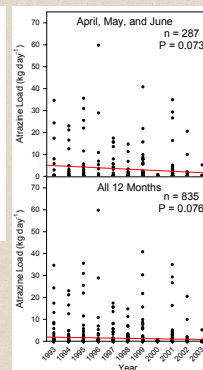
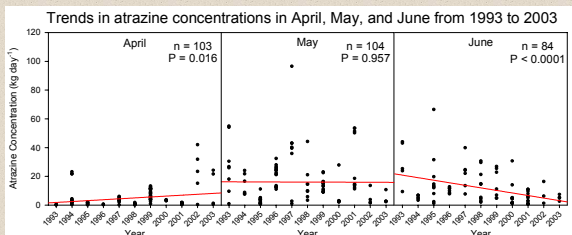
**Objective 2:** Determine by statistical analyses whether the soil conservation practices implemented in the watershed explain these trends.



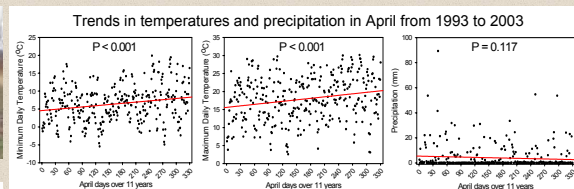
## Data and Data Analysis



An ISCO sampler has collected water samples on a flow basis since 1992. Grab samples were collected weekly during the growing season and every two weeks in winter. Atrazine concentrations were determined in auto samples from 1993 to 2001 and in all grab samples from 1992 to 2003. Atrazine concentrations were analyzed using regression analysis by month and by season.



- The increase of April concentrations is statistically significant.
- No trend was observed in May.
- The decrease of June concentrations is statistically significant.
- The decrease of spring concentrations is statistically significant.
- The decreases in spring and whole year daily loads are statistically significant.

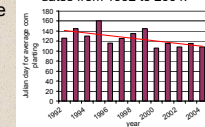


- A statistically significant increase of minimum and maximum temperatures exists in April.
- A small decrease of April precipitation is observed.
- No precipitation or temperature trend was observed in May or June (not shown).

## Discussion

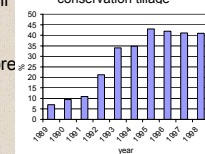
• Part of the explanation for an increase of atrazine concentrations in April and a decrease in June is that farmers took advantage of the warmer and drier weather in April and planted corn earlier in the later years compared to the early 1990s. By analyzing the National Agricultural Survey Service planting progress data and taking into consideration the precipitation in Goodwater Creek, we estimated an average planting date for each year.

Estimated average corn planting dates from 1992 to 2004.



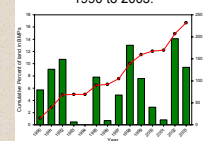
• The amount of conservation tillage and no-till corn increased in the early 1990's. This may have also contributed to earlier applications of atrazine because weeds need to be killed before planting through herbicide applications rather than by tillage.

Percent of corn in no-till or conservation tillage



• Finally the implementation of best management practices (BMP) such as grassed waterways, filter strips, and terraces and the education efforts realized in the watershed may have contributed to a reduction of atrazine transport from the field to the stream. This variable was found to be significant but the correlation was weak. Additional research is needed.

Percent of land with BMPs from 1990 to 2003.



## Conclusion

Regression analyses have shown that trends can be detected in atrazine concentrations in the Goodwater Creek watershed between 1993 and 2003. During that period, the percent of land with BMP has increased from 5% to 15%, and the amount of corn in no-till and conservation tillage has increased from 34% to 41%. Corn planting dates, and therefore atrazine application dates, have been significantly earlier. A SWAT model is being developed to verify the impact of these factors and determine how further improvements can be achieved.

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