

## Lab 4: Application to Minnesota Rivers

Objectives:

- familiarization with using model as forecasting tool
- analyzing impacts of development on pristine and moderately impacted rivers

If bank erosion along the Rum River doubled TSS, what would be the impacts? Use **Lab4\_Rum R MN.aps**.

If summer houses with septic tanks doubled TP in the Crow Wing River, what would be the impacts? Use **Lab4\_Crow Wing R MN.aps**.

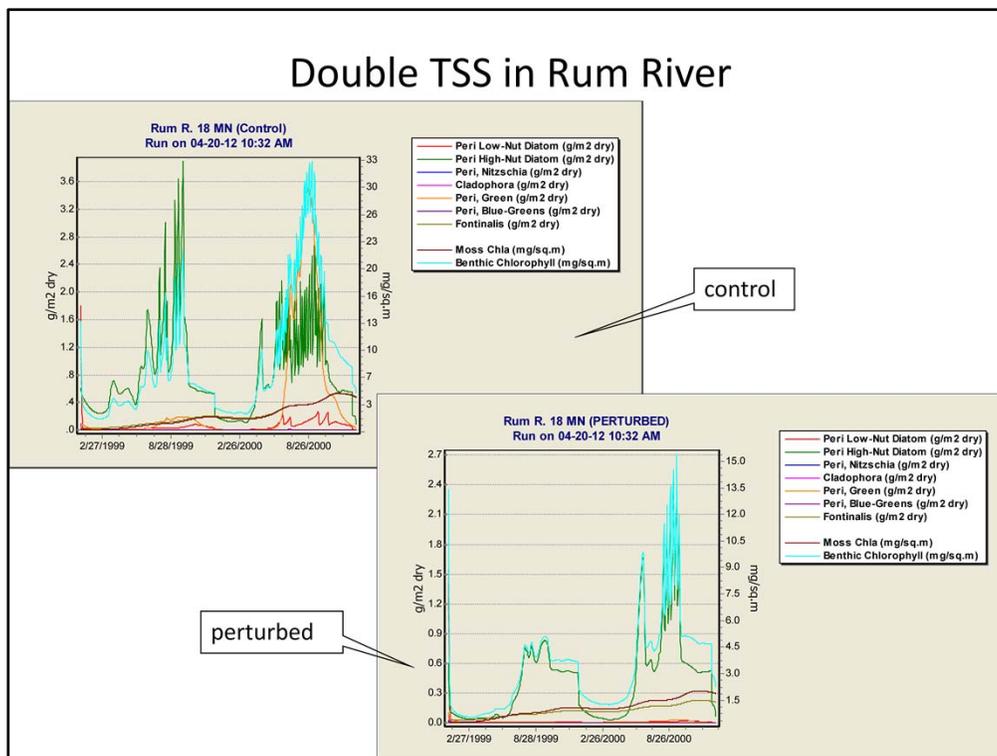
You can set up the simulations and let them run during the next lecture, then we will discuss the results.

The Rum River is a wild and scenic waterway with smallmouth bass and walleye fishing within commuting distance to St. Paul. Dairy farms are predominant.

The Crow Wing River is a broad, shallow river that is popular for float trips. The watershed is forested with numerous small lakes.

*If the simulations take too long to run, open **Lab4\_Rum R MN 2X TSS.aps** and **Lab4\_Crow Wing R 2X TP. MN.aps**.*

## Double TSS in Rum River



Doubling TSS without changing the nutrients could occur if there were increased bank erosion.

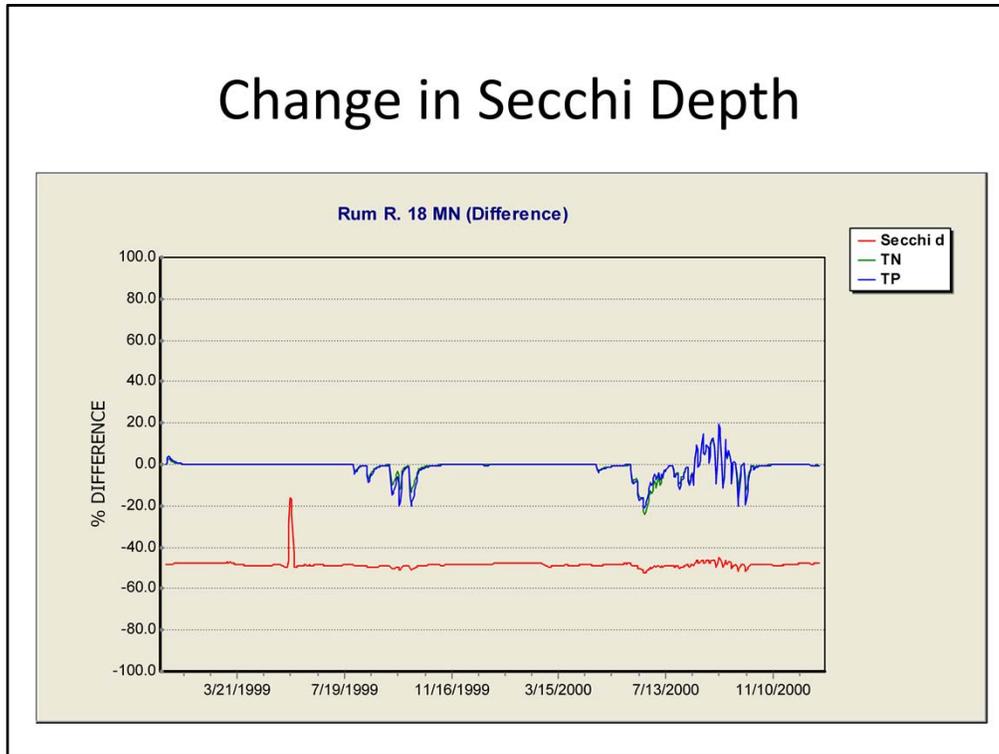
What happens to the chlorophyll in the water column?

How has the Secchi depth changed?

How has the fishing changed?

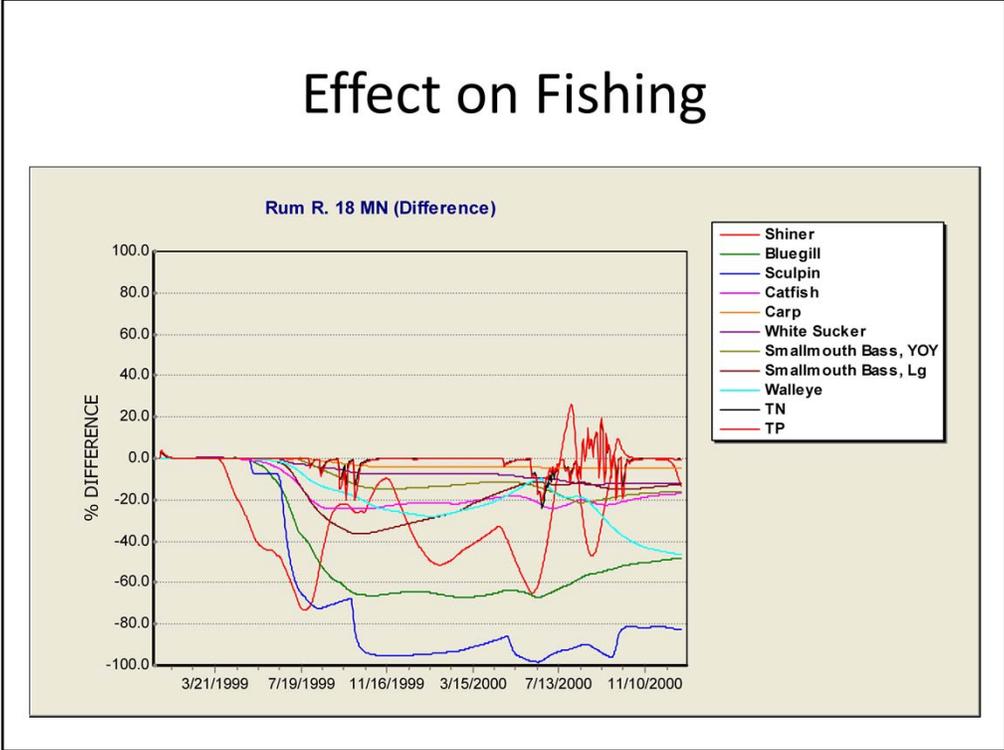
Any other impacts?

# Change in Secchi Depth



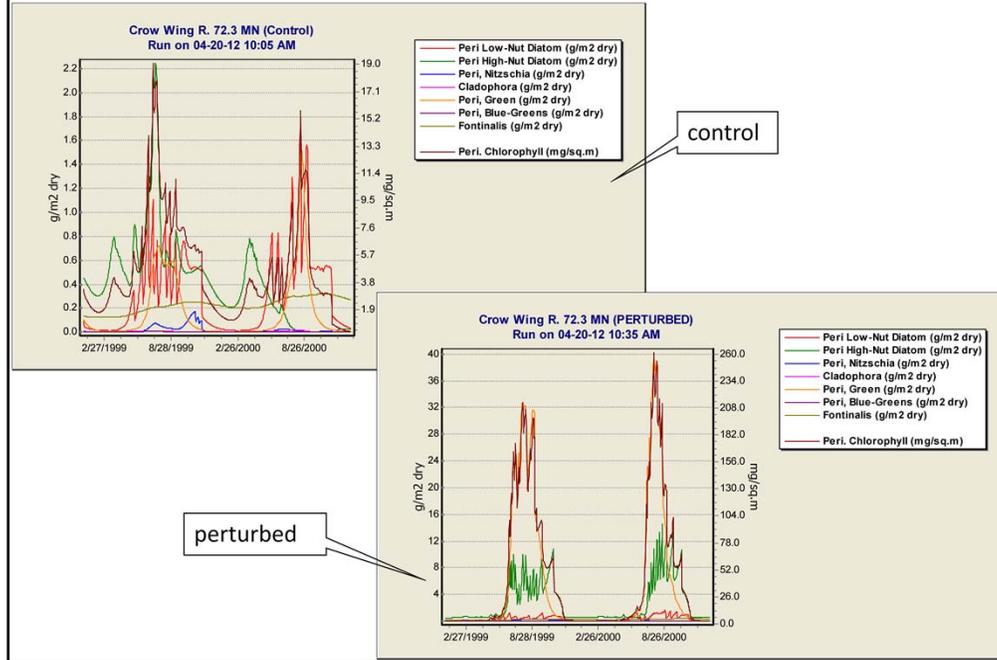
Doubling the TSS reduces the Secchi Depth by ~ 50%

# Effect on Fishing



Although most of the game fish will not be affected, large reductions in Sculpin, Bluegill, and Walleye are predicted.

## Double TP in Crow Wing River



Why is the biomass greater than in the control? Keep in mind that ordinarily TN and TSS would also change.

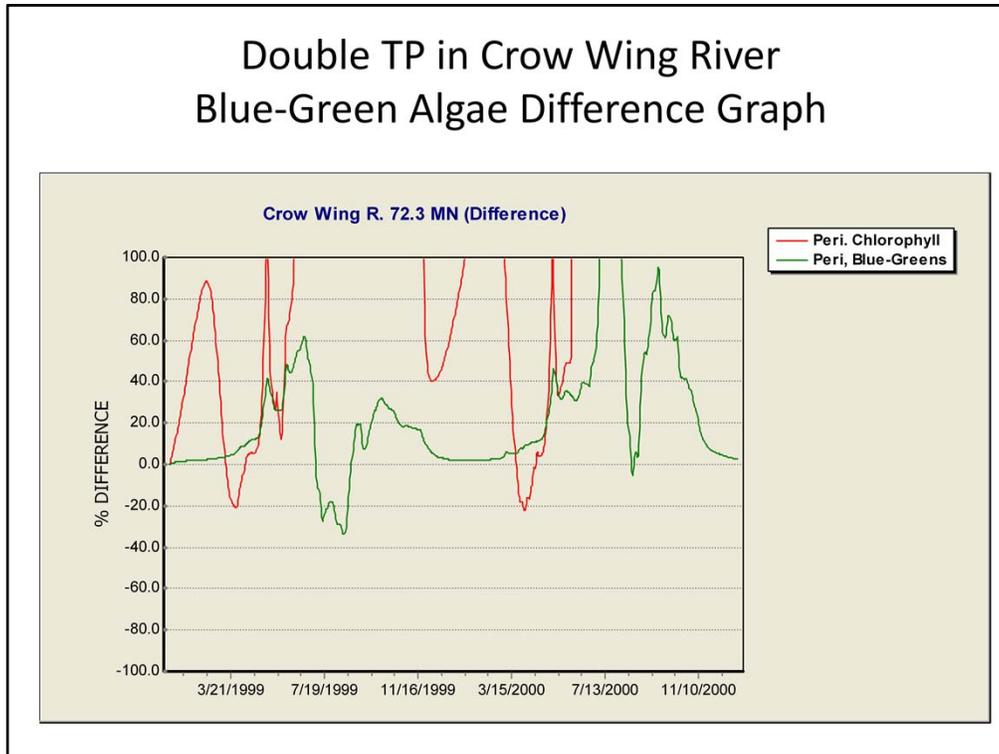
What is impact on nuisance algae?

What is impact on phytoplankton?

How has the fishing changed?

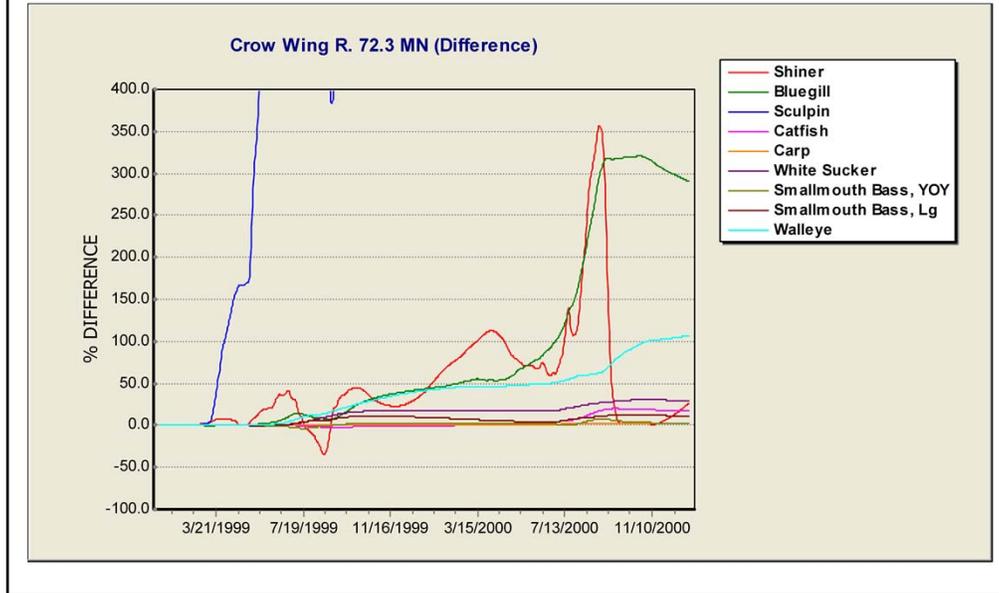
Any other impacts?

## Double TP in Crow Wing River Blue-Green Algae Difference Graph



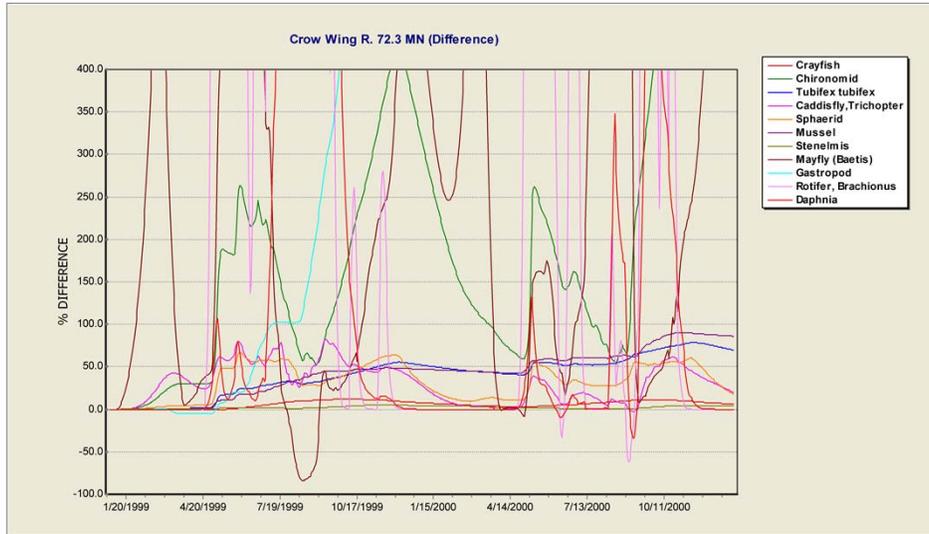
This slide illustrates the impact of doubling total Phosphorus on nuisance algae (Blue-Greens). By doubling the total phosphorus, the blue green algae, both periphyton and phytoplankton are increased. Even though the blue-greens may double, results indicate that even doubling the TP doesn't lead to much blue green biomass.

## Double TP in Crow Wing River Fish Biomass Difference Graph



The fishing has changed – there are more small fish and a smaller increase in game fish.

## Double TP in Crow Wing River Invertebrate Difference Graph



Other impacts include large increases in Mayflies and Gastropods/Rotifers.