

Chapter 7

MEASURES OF PROGRESS FOR PROJECT PERIOD

Whereas dredging occurs on an annual basis, the amount of sediment delivered to the harbor in any one year is highly variable and dependent the magnitude of storm events in that given year. Table 5 gives long term records of water and sediment discharge for the Maumee River based on gauge data at the Waterville station. Note the extreme annual variability from year to year based on the severity of storm events and mean annual flow.

The demonstration project period 1995-1997 contained some of the both the highest and lowest sediment discharge amounts on record. **For this reason a change in land cover on the landscape may not be immediately evident in the corresponding gauge data at Waterville, or in short term dredge quantities.**

Much remains to be learned about sediment transport in the basin. What is known, however, is that the sediment originates as cropland erosion from the uplands, and that stopping the sediment at its source will in time result in less sediment that can be delivered to the basin's streams and rivers and ultimately to the harbor.

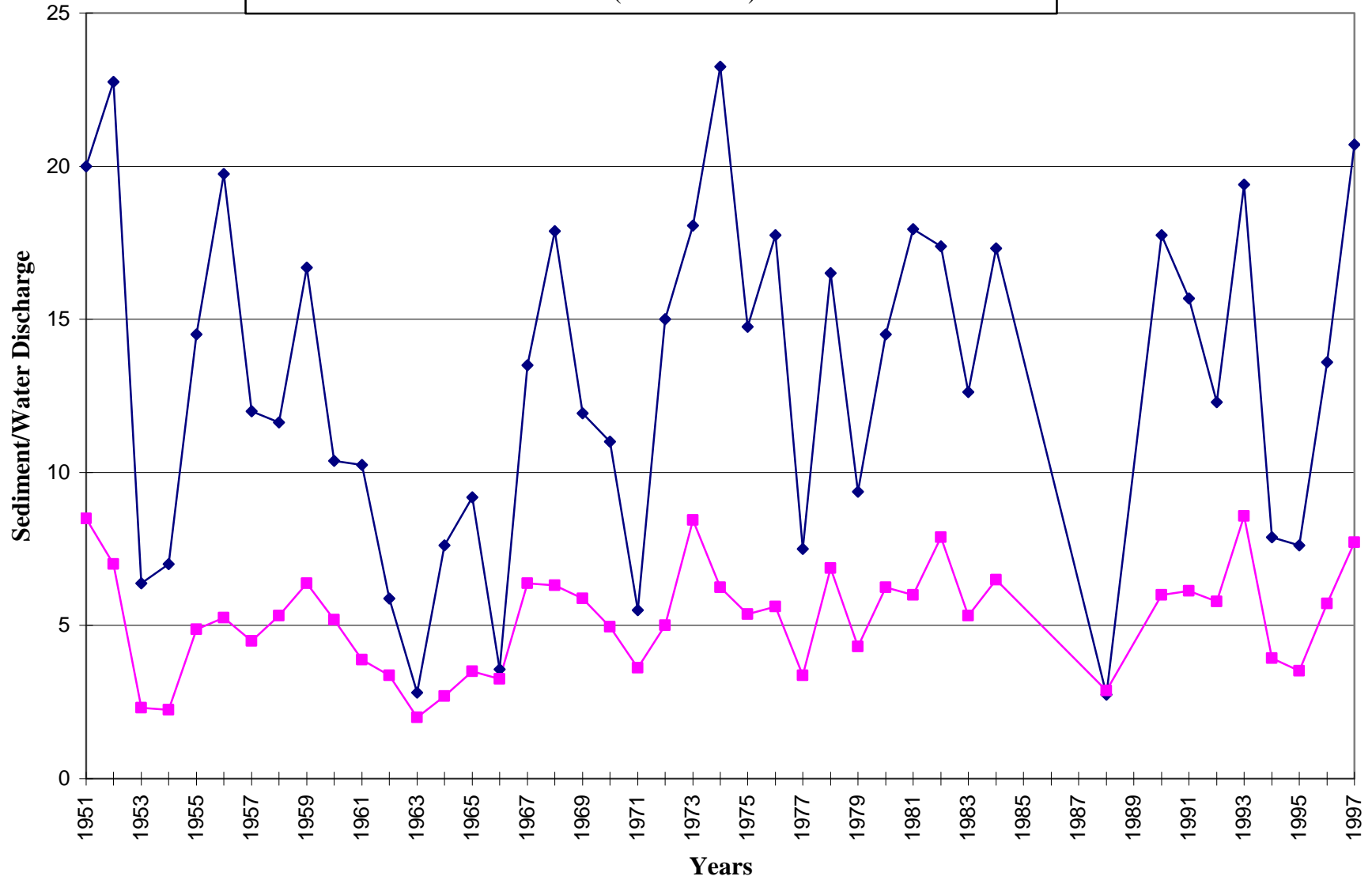
Since the pilot project period was too short to actually measure long term effects in the harbor, other means were employed to measure progress. Three measures were employed to evaluate the effect of project activities on sediment reduction in the harbor. These include:

1. Measurements of Conservation Tillage Trends Within the Maumee Basin.
2. Measurements of Long Term Sediment Monitoring by Heidleberg College and Case Western Reserve University (Lake Erie Agricultural Systems for Environmental Quality Study).
3. Estimates of Gross Erosion within the Watershed

Water and Sediment Discharge for Maumee River Basin

◆ Total Annual Sediment Discharge (Tons X 100,000)
■ Mean Annual Flow (CFS X 1000)

Note: No data available for 1985, 1986, 1987 and 1989



Measurements of Conservation Tillage Trends

Conservation tillage is one of the single most important factors in influencing the rate of erosion on Corn and Soybean fields. *Collectively, these fields represent the largest land use in the watershed.* Erosion calculations substantiate that these corn and soybean fields contribute the largest single source of sediment to the harbor.

Conservation tillage is the single most important practice in preventing the soil erosion that is the source of this agricultural sediment. The extent to which this practice is applied to the land influences the rate of sediment delivery to the harbor more than any other human influence in the watershed.

Conservation tillage acres are measured each year by the NRCS using county transects which collect data at sample points over predetermined routes. This data is extrapolated into a statistically accurate measure of the acres in each county by crops grown and tillage types. Since the same procedure is used each year the data can give accurate trends over time.

As part of this report for the NRCS pilot project, the tillage transect data for the Ohio Counties in the watershed was analyzed for the following purposes:

- To quantify watershed trends by tillage type for the project period.
- To compare the compare the rate of conservation tillage adoption in the Toledo Harbor Project Counties to Non Toledo Harbor Project counties.
- To compare the rate of conservation tillage adoption in other conservation tillage enhancement projects to similar non-project counties.

Conservation Tillage Trends in the Toledo Harbor Counties

The Toledo Harbor Demonstration Project covered the crop years 1996 and 1997. Chart 4 shows the conservation tillage trend for corn and soybean acres in the Ohio counties in the project, up to and including the two year project time period. The same graph shows the trend for all Ohio counties for the same time period. The trendline indicates the conservation tillage acres within the project increasing during the project period. The same date shows that while the acres within the Toledo Harbor Project counties continued to increase, the acres in the state as a whole peaked in 1994 and have held flat or declined since then. **The data also shows that at the end of the project period the Toledo Harbor counties had a 9% greater rate of conservation tillage adoption than the state as a whole.**

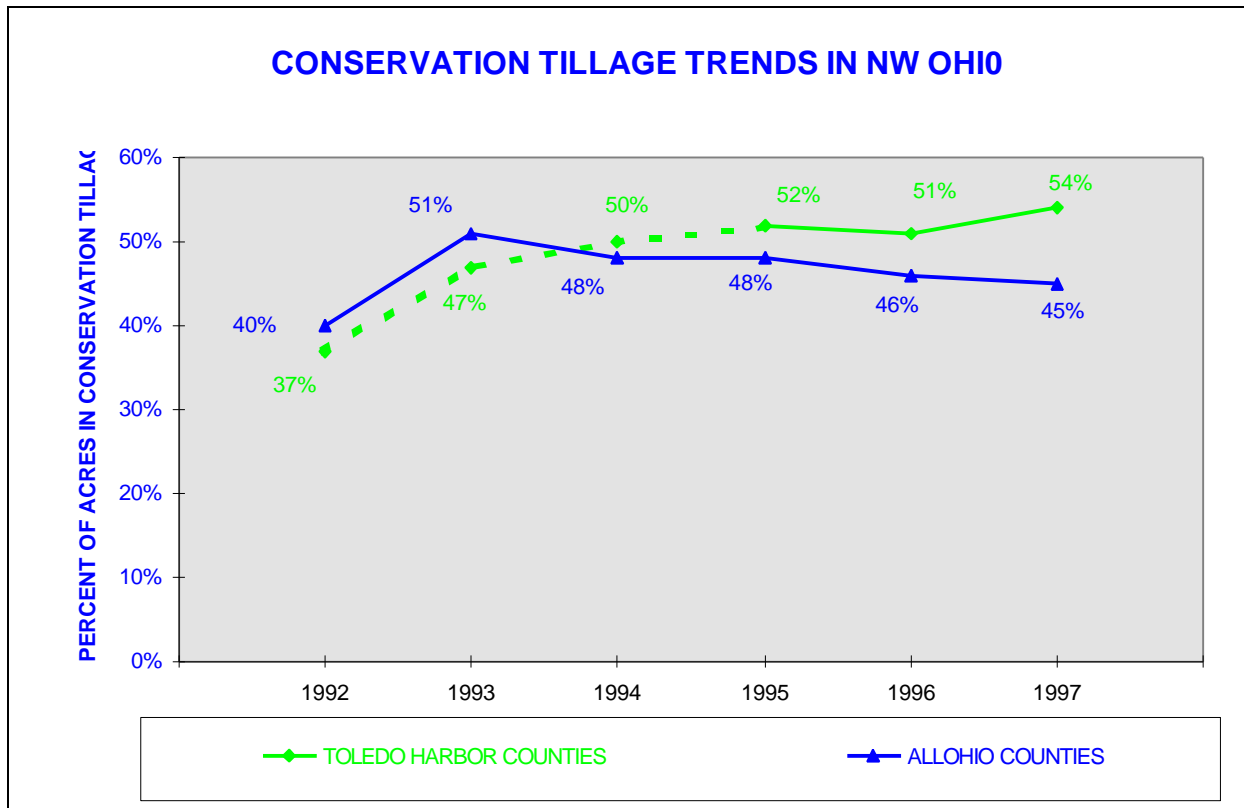


Chart 4 Conservation tillage trends in Toledo Harbor counties (Ohio).

Conservation Tillage Trends of Other Projects

Some Counties in the Maumee Watershed have been the recipient of other tillage demonstration project funds in previous years. The question often asked is “Are these projects effective?” In order to further test the theory that these projects have a positive impact, additional comparisons were made using the rates of conservation tillage adoption in project and non-project counties. The two programs tested were the Section 319 Equipment Buydown Program and the Conservation Action Project (CAP).

The section 319 program provided U.S. EPA funds in the early 90's to some counties in the Maumee watershed which were passed on to farmers to lower the cost of procuring conservation tillage equipment (Equipment Buydown Program). Not all counties in the watershed received funds before the project funding ran out. Chart 5 shows the growth of conservation tillage adoption in the 319 funded counties as compared to the similar non-funded counties in the Maumee and Sandusky watersheds. The data again shows that the trend of conservation tillage in the targeted counties was continuing to rise, whereas the non targeted counties leveled off in 1993 and have held flat or slowly declined since then. At the end of the 1997 crop season the targeted counties had a 9% greater rate of conservation tillage adoption.

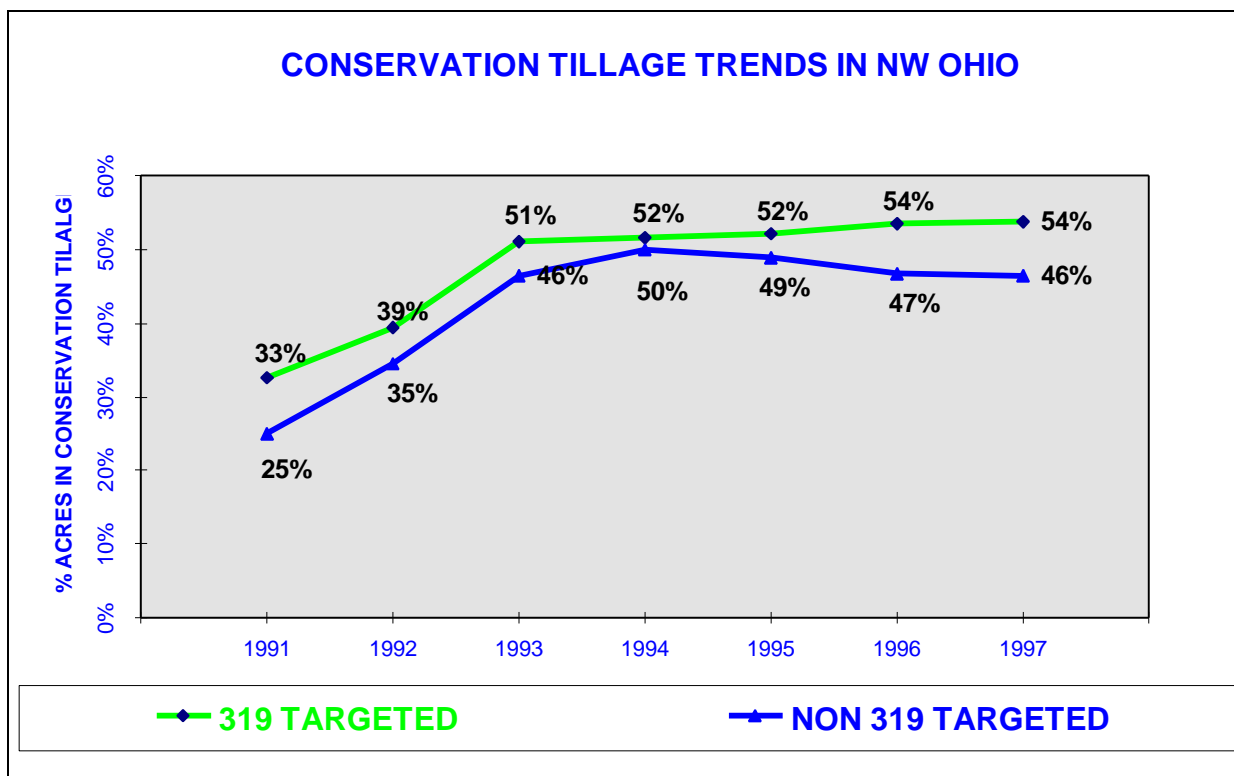


Chart 5 Conservation tillage trends in 319 targeted counties versus non targeted counties.

The Conservation Action Project (CAP) is a long term conservation tillage promotion program that is a public- private partnership in 6 counties at the mouth of the Maumee River Watershed. The rate of conservation tillage adoption in this project area was compared to the rate of adoption in the non CAP counties in the Maumee and Sandusky watersheds (Chart 6).

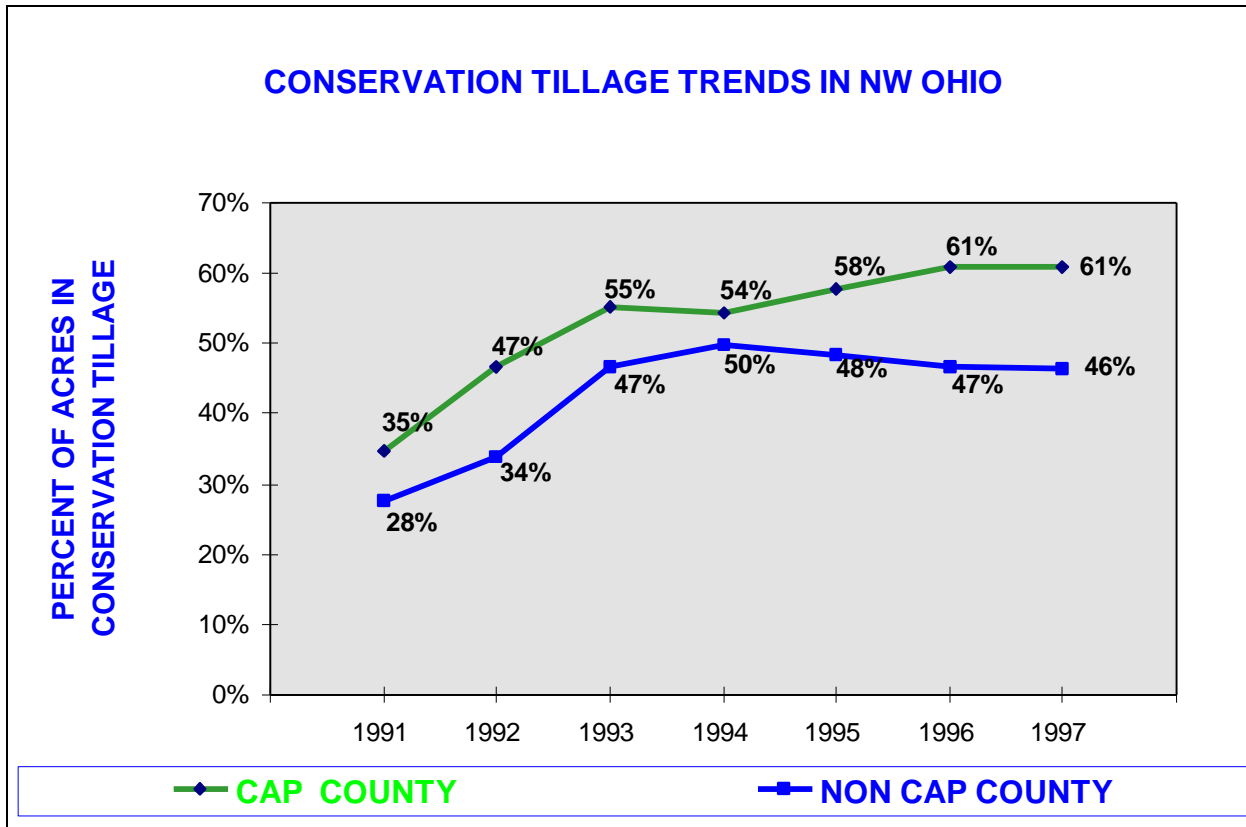


Chart 6 Conservation tillage trends in CAP versus non-CAP Counties

Chart 6 shows a similar trend as the previous two comparisons. The rate of conservation tillage adoption has continued to climb in the CAP counties when compared to the non CAP counties in the watershed. At the end of 1997 the CAP counties had a 63 percent conservation tillage adoption, compared to 46 percent for non CAP counties!

The rate of adoption for the CAP counties is the highest for any of the groups in any comparison. Two reasons are given for this. One, the soils are more conducive to conservation tillage. But secondly, and more important, the CAP counties as a group have received the most incentives of any of the counties, being in the CAP, Section 319, and the Toledo Harbor Project areas.

Clearly the data shows that where conservation tillage incentives are offered, farmers will accelerate the rates at which they adopt and stick with the erosion control practice!

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Lake Erie Agricultural Systems For Environmental Quality

The Lake Erie Agricultural Systems for Environmental Quality Study (Appendix 3) is a retrospective evaluation of the changes in land management and water quality of the Maumee and Sandusky River Basins for the period 1991 to 1995. This study was carried out by Heidelberg College, Case Western Reserve University, and The Ohio State University. It is based on data from 20 years of monitoring, beginning in 1975, which has produced daily and more frequent observations of sediment concentrations in the Maumee and Sandusky Rivers.

The study of these two rivers concludes that for this time frame **“Sediment concentrations are down by about 20%. The magnitude of these changes and their timing relative to changes in tillage and fertilizer use demonstrate that they are largely due to improved agricultural stewardship of the land and water resources of the Lake Erie Basin”** (Baker, Calhoun, and Matisoff, 1998).

This recently released study provides clear and irrefutable evidence that increasing conservation tillage in the Maumee River Basin will decrease sediment concentrations in the river and delivery to the Toledo Harbor!

It is important to note that while the LEASEQ Study looked at a twenty year data , the bulk of the conservation tillage practice increases came about in the last 5 years of the study. If in fact there is a lag time between when erosion control is applied to the land and when the changes show up in stream flows at the mouth, additional benefits may be yet to be measured.

Watershed Gross Erosion Estimates

The third measure of project success is the yearly changes in gross erosion in the watershed. Gross erosion is influenced by the following factors:

- Acres of Conservation Tillage Practiced
- Yearly Mix of Row Crops, Small Grains & Meadow Crops Grown
- Acres Enrolled in the Conservation Reserve Programs
- Acres of Conservation Buffers added to the Watershed

As reported above, acres of conservation tillage increased within the watershed during the project period. Acres enrolled in the conservation reserve have held reasonably steady. Acres of conservation buffers increased during the project period. **All of these factors are serving in a positive fashion to reduce gross erosion and bring about sediment reduction.**

In addition, the mix of crop acres in the basin has very recently begun to change. Changing commodity programs and lower market prices are resulting in a shift to more corn and soybean crops, at the expense of wheat, oats, hay and traditional setaside acres. This shift has the potential to increase erosion and sediment production if these new row crop acres are farmed using conventional farming methods. It will not have a significant impact if conservation tillage is used on these acres. Thus, the shifting crop acres is increasing the importance of widespread adoption of conservation tillage in achieving sediment reduction goals.

At the same time commodity market prices are dropping. Low market prices may entice more farmers to enroll in the Conservation Reserve Program (CRP) and/or install Conservation Buffer Practices under the continuous Signup Provisions of the CRP. These actions will have a positive effect on sediment reduction.

It is impossible to predict in advance the land cover decisions which farmers will make in any future year. However, annual land cover data is collected and can be analyzed and converted to yearly gross erosion estimates to quantify annual trends. NRCS is in the process of analyzing the most recent data to develop updated gross erosion estimates for the watershed for the project period 1996-1997 and also for the 1998 crop year. This data will be provided in the near future as an addendum to this report.

A preliminary estimate, extrapolated based solely on the increased conservation tillage and conservation buffer data from the Ohio Counties in the watershed, would suggest that at the end of the project in 1997, progress towards sediment reduction had been 53 percent towards the annual goal of 130,000 cubic yards of sediment reduction.

Chart 7 shows the progress that has been made towards the annual goal of 130,000 cubic yards of reduction during the two years of the project. This data is based on the trends in conservation tillage and buffers in the Ohio portion of the watershed. Data from Indiana and Michigan is expected to be similar.

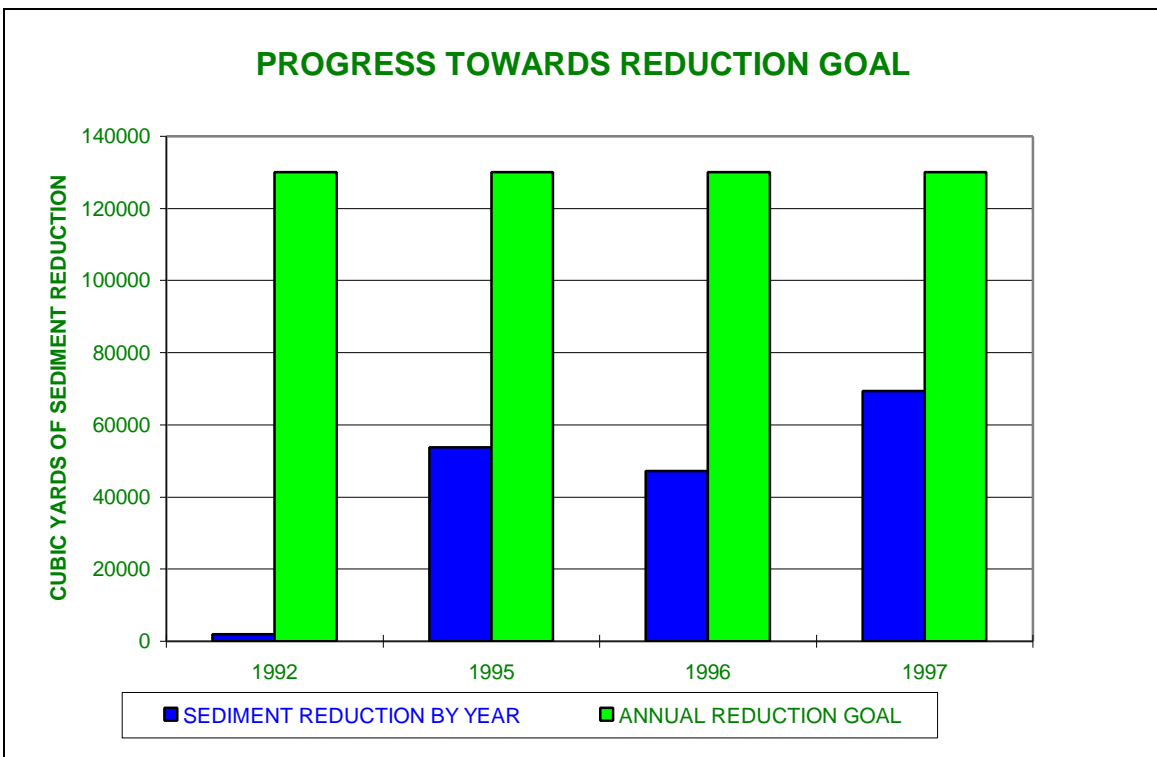


Chart 7

Progress towards sediment reduction goal

Cost Effectiveness of the NRCS Soil Conservation Project

During deliberations for the Phase III report, one of the questions often raised concerned the cost effectiveness of the Soil Conservation Program. Economists at The Ohio State University recently completed a case study (Soil Erosion in the Maumee River Basin: A Case Study Using Market Methods to Value Environmental Externalities, Draft Report, Sohngren and Rausch, June, 1998) which estimated the benefits of reduced dredging costs in Toledo Harbor if the goal of reducing dredging by 15% is reached.

In the case study the authors used standard market techniques to measure the benefits of reduced dredging costs which would arise from soil erosion reductions. **The authors concluded that a 15% reduction in dredging would provide present value benefits to the US Army Corps of Engineers of \$1.3 million dollars per year.**

In the above referenced study the authors concentrated solely on benefits due to reduced dredging costs and increased life of the Confined Disposal Facility. No data was included to measure benefits from improved water quality, improved fish and wildlife habitat, the environmental benefits of not disturbing contaminated sediments, etc. The addition of these benefits would increase the value of the Soil Conservation Program.