COON CREEK WATER QUALITY PROJECT

Iowa- Allamakee and Winneshiek Soil and Water Cons. District
1995

Final Report - Executive Summary

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I. PROJECT BACKGROUND

STREAM SIGNIFICANCE AND USAGE

The water resource addressed by this project is Coon Creek, a cold water trout stream in Allamakee and Winneshiek counties of northeast Iowa. The Iowa Department of Natural Resources (IDNR) currently owns the last mile and a half of stream and since 1972 has managed it as a stocked trout fishery.

WATERSHED CHARACTERISTICS

Coon Creek watershed includes 12,670 ac. with 9,070 ac. in Allamakee county and 3,600 ac. in Winneshiek county. The watershed contains 7,240 ac. of cropland, 775 ac. of CRP land, 1,855 ac. of pastured woodland, 860 ac. of protected woodland, 840 ac. of open pasture land, and 300 ac. in buildings, lots, and roads. In addition to this, the IDNR owns 800 acres of protected woodland, prairie grasses and wildlife food plots. A map of watershed land uses is given in appendix A.

Farming operations in the watershed are typically livestock, or a combination of livestock and cash grain. The major livestock enterprises include dairy, beef, and hogs in that order. Cropland is managed in a corn, oats, and hay rotation on steeper slopes, with more continuous row crops on the flatter slopes. Contouring and strip cropping are used on most cropland, with straight row patterns used on some of the flatter soils. Minimum tillage is used on most row crop land, while hay ground is typically moldboard plowed. The majority of operations are owner-operator, with family ownership for more than one generation.

WATER QUALITY PROBLEMS

The water quality problems addressed by this project are directly related to the agricultural uses of the watershed. Specifically the problems addressed are sedimentation of the stream, organic pollution caused by improper handling of livestock manure, and the disturbance of stream banks and substratum by livestock.

II. DESCRIPTION OF PROJECT

SPONSORSHIP

The Coon Creek watershed project was sponsored by the Allamakee and Winneshiek Soil and Water Conservation Districts (SWCD) with funding from the U.S. Environmental Protection Agency (EPA) under the Federal Nonpoint Source Management Program (Section 319 of the Clean Water Act). The three year project (1992-94) addressed three major concerns: 1)sedimentation of the stream, 2)feedlot runoff

into the stream, and 3)livestock disturbance of stream banks and substratum.

ADDRESSING SEDIMENT CONCERNS

To effectively impact the sediment load entering Coon Creek, incentives needed to be targeted toward steep, erodible cropland with potential for high sediment delivery rates. An inventory of the cropland was made, identifying fields with the greatest potential to deliver sediment to the stream. These fields can generally be described as cropland with slopes in the 8 to 14 percent slope class with limited grass filtration of sediment once it leaves the field. A map showing this high priority cropland (HPC) can be seen on appendix A. Cost share incentives of 75% were offered to landowners within this HPC for installation of structural practices to reduce sedimentation of the stream.

MANURE MANAGEMENT

In developing the work plan for the manure management segment of the project, the livestock operations in the watershed that were having an impact on the stream were identified. Of particular concern to the project were four feedlots right on the stream itself, and two dairy operations located within 1/8 mile of the stream corridor. "319" incentives included 75% cost share for the installation of feedlot settling basins, manure storage facilities, and clean water diversions.

LIVESTOCK EXCLUSION ON THE STREAM CORRIDOR

The third primary objective identified for the project was to reduce livestock access to the stream while maintaining livestock numbers in the watershed. To accomplish this, incentives were made available at 90% cost share for the installation of fencing, off-site watering, seedings and tree plantings which are directly related to removing livestock from the stream corridor. The second year of the project saw these cost share rates reduced to 75% to meet EPA requirements.

PROJECT COMPONENTS

The implementation of the Coon Creek project can readily be divided into four main components: 1)Information and Education, 2)BMP Implementation, 3)Nutrient and Manure Management, and 4)Stream Monitoring. Each component is an integral part of the overall project. The educational component was used to evaluate landowner concerns and interest in the project, inform farmers and the general public in progress being made in the project, and to educate landowners and the general public in the proper management of livestock wastes. BMP implementation was used to reduce sediment and feedlot runoff entering the stream. Nutrient and manure management plan development was used to educate farmers in the proper use of livestock wastes to reduce stream degradation and lower commercial inputs of

fertilizer. The biological monitoring of the stream was used to show what impact the project was having on the stream's quality.

AGENCY COOPERATION

Cooperation of several agencies and organizations helped to make the project successful. These included EPA, IDNR Fisheries and IDNR "319" staff, Luther College biology dept., Resource Conservation and Development for Northeast Iowa, Natural Resources Conservation Service (NRCS), Iowa Division of Soil Conservation and the Winneshiek and Allamakee SWCDs.

III. PROJECT ACTIVITIES AND RESULTS

A. PUBLIC INFORMATION AND EDUCATION

PUBLICITY

The Information and Educational component is an important part of any project. Correspondence was sent to watershed landowners even before the project was initiated to receive their input and gauge their acceptance of BMPs at various cost share levels. Yearly newsletters to watershed residents kept them informed of progress being made in the watershed, as well as opportunities to participate in the project. News articles were also presented to county wide audiences through Soil Conservation Districts' annual reports and newsletters. In September of 1993, Ubba Agena, "319" coordinator for the Iowa DNR, submitted an article in the Iowa Conservationist outlining Iowa's Non Point Source pollution program which highlighted much of the work being done in the Coon Creek watershed.

BUS TOUR OF MANURE MANAGEMENT SITES

On June 15, 1993, a bus tour of manure management facilities was attended by 54 farmers and agency people from EPA, Iowa DNR, Natural Resources Conservation Service, ISU Extension, and the Division of Soil Conservation. During the tour, two settling basin sites and two manure storage facilities were viewed. At each site, farmers were able to visit with the land owners to obtain first hand information of what concerns went into the design and construction of the facilities as well as operation and maintenance considerations. At lunch, presentations were made by Gaige Wunder, Iowa DNR fisheries biologist; Vince McFadden, ISU Extension engineer specializing in manure management facilities; and Gina Hanson, manure nutrient utilization specialist with the North East Iowa Demo Project.

SELF GUIDED TOUR

As an educational component of this project, a self guided tour was developed to enable interested landowners to

come into the field office, receive specific information regarding several completed manure management facilities, and then follow up with visits to specific sites of interest where they could view the installed practices and talk with the landowners about their systems. The tour highlighted a cluster of manure management systems cost shared through the Coon Creek project. Six cooperating producers volunteered to participate in the tour which includes three manure storage facilities and five settling basins. A sample of the tour guide is included in the appendix M.

B. EROSION CONTROL

PRIORITIZING PROJECT WORK

As the Coon Creek project was being developed at the initial planning stages, we established priorities and parameters for BMP installation which would be addressed by the project, and tried to estimate additional BMPs which would be accomplished in the watershed without project money assistance.

With regard to the sediment reduction objectives, it quickly became obvious that the project would need to concentrate on BMPs that would trap sediments above and beyond the practice application that the 1985 farm bill would accomplish, and that these BMPs would need to be limited to cropland that had a high potential to deliver sediment to the stream. In essence, the 1985 farm bill would likely reduce soil losses to 7 to 10 ton on most of the watershed, and most of this would likely be accomplished through management practices such as contouring, strip cropping, minimum tillage, and use of more hay in rotations. Providing incentives for these management practices would likely not have a significant impact on soil losses and sediment delivery above the accomplishments expected through 1985 farm bill compliance plan implementation. To have an impact on sediment delivery to the stream, we felt that structural practices such as terraces, sediment basins, erosion control structures and diversions would need to be positioned on steep cropland close to the stream. In addition to reducing soil losses within the field, these practices effectively trap about 95% of the sediment which drains to these structures.

To prioritize the location of these structural BMPs, an area of High Priority Cropland, "HPC", was established for the watershed. 1,830 acres of "C","D" and "E" slope cropland located within 1/4 mile of major drainages of Coon Creek were designated as "HPC". See appendix A. 75% cost share incentives were offered to construct terraces, erosion control structures, sediment basins and diversions on this high priority cropland.

STRUCTURAL PRACTICE APPLICATION

15,175 ft. of terraces, three erosion structures, and 400 ft. of diversions were installed with "319" cost share to reduce sediment load to Coon Creek. Other soil conserving practices were installed in the watershed during the three year project using state or federal cost share programs, or were completed without cost share incentive. These included 13,275 ft. of terraces on 95 acres, 1247 acres of minimum tillage, 727 acres of contouring, 182 acres of strip cropping, and 1016 acres of increased hay in rotations. A GIS map showing locations of BMPs installed during the project is given on appendix B.

SOIL LOSS AND SEDIMENT REDUCTIONS

588 tons of sediment were kept out of the stream annually using '319' structural practices on 143 acres. An additional 369 tons of sediment were reduced annually with other structural practices applied 1992-1994. (See appendix G). The application of management practices from 1992 to 1994 reduced sediment to the stream by 2945 tons annually. (See appendix H).

The implementation of the 1985 Food Security Act (FSA) provided a unique opportunity to monitor the total soil loss reductions for the Coon Creek watershed. A summary of the total soil loss and sediment reductions from 1985 to 1995 (FSA implementation), is given in appendix I. Total sediment reduction in the watershed for this ten year period was 9445 tons annually or a 38% reduction. Overall soil loss for the entire watershed decreased from about 10.6 ton to 6.5 ton per acre annually. Sediment reductions per acre on the 'high priority cropland' totaled 1.8 tons per acre compared to 0.68 tons per acre on other cropland. See appendices B and C for GIS maps outlining reductions in soil loss and current soil losses for the watershed.

In summary, the management practices applied had very significant impacts on sediment reductions, but were applied due to FSA regulations and '319' funding was not required to achieve this sediment reduction. Structural practices such as terraces, sediment basins and ponds provided sediment reductions beyond the capability of what the 1985 Food Security Act could accomplish.

C. LIVESTOCK WASTES

PRIORITIZING PROJECT WORK

This project targeted practice installation to farmsteads which we felt were having an impact on water quality, specifically livestock operations within 1/2 mile of major drainages into the stream, with highest priority given to feedlots directly on Coon Creek.

or all of their farm. For the most part, overall commercial fertilizer inputs did not change significantly, but their placement was used more efficiently with less over-application. Sixty percent of the participants reported that they felt their yields improved as a result of these nutrient plans while 20% reported lower yields.

E. CORRIDOR MANAGEMENT

ACCOMPLISHMENTS

Our final area of BMP implementation involved the management of stream corridors. EPA "319" funding was used to cost share 1400 ft. of corridor fencing, five ac. of grass seeding and one off-site watering system to limit livestock access on about 1400 ft. of stream corridor previously used as feedlot.

F. STREAM MONITORING

SELECTING THE STREAM SEGMENT FOR MONITORING

Coon Creek provides a unique opportunity to monitor the water quality of a cold water stream segment which has the public perception of being poor in water quality. The initial 1 1/2 miles of Coon Creek in sections 26, 23, and 22 of Union Prairie twp. was selected because it is a small stream segment with high livestock concentrations; very little animal waste treatment in place prior to project implementation; and a high rate of manure management BMP installation after project completion. This stream segment has been a highly visible water quality concern and initial analysis of the stream in June of 1992 showed the stream to be rated "poor" due to organic pollution using the Hilsenhoff Biotic index (Rapid field assessment of organic pollution with a family-level biotic index. Journal of North American Benthological Society. 7(1):65-88). Flowing water can be difficult to document improvement in due to the flushing and dilution effect of streams, however this initial segment of Coon Creek seems well suited to document the effect of intensive manure management efforts on stream water quality.

ADVANTAGES OF THE BIOLOGICAL INDEX

The Hilsenhoff biotic index was chosen to monitor stream improvements because of its low cost, and ability to reflect stream quality with a minimum amount of sampling compared to chemical analyses. The Hilsenhoff index measures stream quality based on the prevalence of various stream arthropods which are rated by their tolerance to lowered dissolved oxygen levels which directly relate to organic pollution.

SUMMARY

Eight sample sites were selected along a 1 1/2 mile segment of Coon Creek (see Appendix E). NRCS field office staff from Waukon collected invertebrates from these eight sites on 6-27-92, 6-28-93, 6-27-94, and 6-27-95. The analyses of Hilsenhoff index shows a definite trend toward improved water quality with a rating of 6.85 in 1992 (poor), and 5.76 in 1994 (at the break between fair and fairly poor). The 1994 samples included mayfly and caddis fly nymphs for the first time since sampling began. This increased diversity of arthropod families found in the stream is also a good indication of improving water quality. Results of the 1995 sampling have not been completed at this time.

IV. PROJECT FUNDING

EPA FUNDING

Total EPA '319' project money used for the three year project was $206,284.97 of which $175,083.97 was spent on BMP installation. Expenditures for the entire watershed project were $315,010.75.

$10,000 of '319' project money was allocated to the Natural Resources Conservation Service (NRCS) each year of the project to offset the time put in by NRCS personnel. In addition, state employees funded through the Iowa Division of Soil Conservation contributed many hours to the success of the project. Total hours worked on the project averaged about 1000 hours per year.

A summary of project expenditures and funding sources is outlined in Appendix L for each year of the project and summarized for the entire three year project.

OTHER FUNDING

In 1993, the project received a $900 grant from the Resource Conservation and Development for Northeast Iowa, (RC&D) to help defray the cost of sampling and analyzing soil samples for the nutrient management plans.

The NRCS public affairs staff at the Des Moines state office covered the cost of printing and copying 200 sets of the self-guided manure management pamphlet. Total cost incurred was $200. NRCS also provided vehicles and office space for the project.

State and Federal cost shares other that "319" project money totaled $19,268.01 for BMPs.

V. CONCLUSIONS, ADDITIONAL WATERSHED PROGRAM DEVELOPMENT AND IMPLEMENTATION NEEDS, AND RECOMMENDATIONS

SEDIMENT REDUCTION

The implementation of FSA compliance plans has had a tremendous impact on sediment delivery to Coon Creek, however in order to achieve sediment reductions beyond FSA accomplishments in this or any watershed, the use of structural practices applied to critically eroding slopes appears to have the most potential to further reduce sediment delivery to the stream. The cost shared structural practices which were installed reduced sediment delivery to the stream by over four ton per acre annually. This compares to less than one ton per acre for management practices installed to meet 1985 and 1990 Food Security Act (FSA) requirements. It is recommended that both the Allamakee and Winneshiek Soil and Water Conservation Districts give priority to state cost share for projects in the designated 'High Priority Cropland' of Coon Creek.

MANURE MANAGEMENT ACCOMPLISHMENTS

The Coon Creek watershed accomplished many of its goals, particularly in the area of manure management. Project work was prioritized toward the most serious pollution problems, and the water quality of the stream has been documented as showing improvement based on biological monitoring. With a few exceptions, we were able to work with and show improvements on all of the feedlots that we considered a major priority. Any future manure management projects done in the watershed should be prioritized using the list shown in Appendix J.

STREAM FENCING

The success of the stream corridor work was very good for areas where feed lots were directly on the stream, however landowner interest was low for fencing stream corridors receiving seasonal grazing. Financial benefits to the farmer for fencing stream corridors is perceived as being very low and maintenance concerns with fencing on flood plains is enough to keep most land owners from considering such work. Cost sharing of rotational grazing systems in conjunction with stream corridor fencing is an approach which should be considered in future watershed work.

STREAM MONITORING

Stream monitoring conducted from 1992 to 1994 indicates that the initial mile of stream segment has improved using the Hilsenhoff biotic index. Stream conditions are likely to continue to improve for at least one more year. Use of the biotic index demonstrates that this procedure has

considerable utility for use in stream monitoring where feedlot pollution is a major concern.

It would need to be demonstrated whether or not the family level biotic index would be sensitive enough to monitor subtle changes in large watersheds that have only moderate pollution levels prior to the project. Monitoring samples which were taken on French Creek in 1993 demonstrate that the index is capable of detecting very good water quality when present, and real improvements in stream quality should be detected using the index. To reliably and scientifically document subtle stream improvements, the sampling schemes would need to be carefully planned and carried out to allow statistical analyses of the results. A species specific index applied to biological monitoring would probably detect subtle stream improvements better than the family level biotic index, but would require a higher level of taxonomic knowledge for the sampling and analyses personnel.

EDUCATION AND INFORMATION

Much of the educational emphasis of this project dealt with proper manure/nutrient management. The bus tour of manure facilities was a complete success, and should be considered as an educational tool for other watershed work. The self guided tour should help the Coon Creek project fulfill its educational potential for several years to come. The nutrient management plans were very well received by the watershed participants and will in all likelihood impact neighboring farms as landowners share knowledge with each other.