CSREES National Water Quality Program

Title: Improving Water Quality for Salmon Restoration through Integrated Research, Education and Extension

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Organization: Washington State University

State: WA **Region:** Pacific Northwest **Year of Funding:** 2000

Theme: Watershed Management

Situation: The decline in salmon resources in the Pacific Northwest has become a priority issue in the region. High levels of stream sediments and high temperatures are two habitat parameters contributing to salmon decline in almost all areas of the Northwest. Agriculture is a potential major contributor to habitat deterioration, primarily by delivering sediment and reducing summer in-stream flow. The loss of soils not only reduces the productivity of the agricultural land, but also creates problems for fish habitat. Both dryland and irrigated agriculture contribute directly to the sediment and temperature problems. In particular, surface irrigation has been identified as one of the main sources of excess sediments in central Washington where the soils are easily eroded by furrow irrigation and the suspended particulates in return flows are carried to the river via drainage ditches. The target audiences of this project were farmers, governmental agencies, and scientists who have interests in the related areas.

Objectives: The goal of this three-year project is to improve, evaluate, and promote the adoption of best management practices leading to water quality improvement for salmon restoration through integrated efforts of research, education and extension. Specific objectives include (1) conducting research on effectiveness of no-till farming for sediment reduction and groundwater recharge; (2) evaluating the feasibility of integrating existing irrigation technology to further reduce sediment and nutrient loads from furrow irrigation; (3) assessing the cost/benefit ratio of these management practices; (4) incorporate the research activities into the college curriculum; and (5) disseminating the research results to farmers, land managers and governmental personnel.

Methods: The objectives of the project were achieved through field studies, modeling, producer involvement, education and outreach activities. Various field experiments were conducted to understand major hydrological, erosion, and sediment transport processes, and to obtain related parameters. Computer models were developed to describe these processes, and to predict the environmental benefits of conservation tillage system at the watershed level. The results of the research have been incorporated into curriculum. The information obtained has also been disseminated to farmers and agency personnel through workshops, field days and publications. Various publications of different types were developed, including conference paper, fact sheets, and refereed journal articles.

Partnerships: Farmer collaborators who provided field sites for the studies and who became advocate for the stewardship land management practices studied.

Conservation district that organized field days and communicated with farmers. The Farming and Environment, a non-profit organization working toward farm profitability while protecting the environment. This organization helped to getting private funding to the project and to disseminate the results. The Water Quality Management Team that conducts water quality related outreach and extension.

Research: This project addresses an important issue that not only possesses scientific challenges but also has significant practical implications. The project team integrated the research, education, and outreach activities by focusing on specific topics that were interested in all scientific communities, students, and producers, although these interests were from different perspectives. For example, a producer had noticed that a small stream on his watershed had much longer period of flow in recent years after several years of no-till practice and he really wanted to know why. The research team implemented field measurement devices to measure the related parameters including infiltration rate, frost depth, and runoff rate. The field data demonstrated that long term no-till practice allowed more water infiltrating into the ground that contributed to in-stream flow. The research team then developed a mathematical model to describe the process, the model was used to educate the students and both of the model results and the field data were used in outreach activities to explain to the farmers why the stream flow had increased.

Resources: Additional funding from Kellogg Foundation for expanding the project activities. Additional funding from Washington Department of Ecology through the Conservation District for water quality monitoring. Field instrument from Forest Services. Technician support from the university.

Results: Outputs - Site visits, workshops and field days participated by farmers; Kellogg Foundation highlighted project in their annual report. Presentations were made to the Farming and Environment Group who are representatives of farmers. Outcome - Greater awareness on environmental benefits of no-till practice has been created since the start of the project; more acreage of land on the watershed has been switched to no-till system during the project period.