United States
Department of
Agriculture

Natural Resources
Conservation Service

Weiser River Soil
Conservation District

Weiser Irrigation District

Washington County Commissioners

Idaho Soil Conservation Commission

Idaho Department of
Environmental Quality

Watershed Protection Plan–Environmental Assessment

Accelerated Land Treatment For Water Quality

Southern Washington County Watershed

Washington County, Idaho

May 2006

SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT
WASHINGTON COUNTY, IDAHO
WATERSHED PROTECTION PLAN - ENVIRONMENTAL ASSESSMENT

May 2006

This document describes a plan for accelerated land treatment for water quality on irrigated cropland and pasture in Southern Washington County in the state of Idaho. This project has an estimated cost of $17,938,100. Of that amount, $7,518,300 would be Public Law-566 (PL-566) funds, $3,531,300 would be from other financial assistance (FA) funding sources, and $6,888,500 would be from private funds.

Ongoing FA has been provided from the USDA-NRCS Environmental Quality Incentive Program (EQIP), and from the Environmental Protection Agency's (EPA) 319 Non-Point Source Program (319 NPSP).

The resource protection alternatives include Future Without Project (No Action), and a Resource Protection (RP) plan (the Proposed Action). The Future Without Project alternative is based on the implementation of the current EQIP, 319 NPSP, Resource Conservation and Rangeland Development Program (RCRDP) and private funds. The RP plan alternative adds to ongoing work to provide resource protection throughout the entire project area. In 2001, this area was designated as the first- ranked priority concern for nitrates in ground water by the state of Idaho and continues to remain a priority. This designation emphasizes the need for funding. Ground water quality monitoring (1991-present), conducted by the state of Idaho has revealed an increasing trend in water quality impairments.

Reduced ground water contamination, improved irrigation delivery systems, protection of long-term soil productivity, and reduced sediment, nutrients, pesticides and pathogens delivered to the Weiser and lower Snake Rivers and tributaries (four other 303(d) listed stream tributaries) are primary objectives for this watershed protection plan. The Total Maximum Daily Loads (TMDLs) for phosphorus, sediment and coliform-bacteria have been, or are being, developed for these streams/rivers.

Project funding will be provided through PL-566, EQIP, Idaho Water Quality Program for Agriculture (WQPA), 319 NPSP, and private sources. The following table illustrates the breakdown of funding sources.

Funding Source	
PL-566 Funds	$7,518,300
Other FA Funds (1)	$3,531,300
Private Funds (2)	$6,888,500
Totals	$17,938,100

(1) Other FA funds include: EQIP, WQPA, RCRDP, and 319 NPSP.
(2) Private funds include: Producer's Share.

Distribution of PL-566 funding is as follows:

PL-566 Funds	
Financial Assistance	$4,919,400
Technical Assistance	$2,063,200
Project Administration	$535,700
Totals	$7,518,300

Land treatment enduring project measures include: irrigation system - gated pipe (with surge), micro (drip) irrigation, tail water recovery systems, sprinkler re-nozzle, sprinkler systems, irrigation water management (moisture sensors and meters) and sediment basins. Management practices include: conservation crop rotation, irrigation water management, nutrient management, use of Polyacrylamide (PAM), pest management, prescribed grazing, residue management (mulch till and seasonal), and straw mulch. These measures will be applied to 75% of the areas identified as needing treatment.

This document fulfills requirements of the National Environmental Policy Act, the Water Resource Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and the Natural Resources Conservation Service National Watersheds Manual. It also serves as the basis for authorization of Public Law 83-566 funding.

This document was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008) and in accordance with the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4321et seq.).

Prepared By:
United States Department of Agriculture
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WATERSHED AGREEMENT

Between the

Weiser River Soil Conservation District
The Sponsoring Local Organization

Weiser Irrigation District
Local Organization

Washington County - County Commissioners
County Organization

Idaho Department of Environmental Quality
State Agency

Idaho Soil Conservation Commission
State Agency

and the

Natural Resources Conservation Service
United States Department of Agriculture
(Referred to herein as NRCS, formerly known as the Soil Conservation Service)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsors for assistance in preparing a plan for works of improvement of water located in the Southern Washington County Watersheds, State of Idaho, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and NRCS a plan for works of improvement for the Southern Washington County Watershed, State of Idaho, hereinafter referred to as the Watershed Plan-Environmental Assessment, which plan is annexed to and made part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS and the sponsors, hereby agree on this plan and that the works of improvement for this project will be installed, operated and maintained in accordance with the terms, conditions and stipulations provided for in this watershed plan and including the following:

1. All **financial assistance** funding will be supplied through PL-566, Environmental Quality Incentive Program (EQIP), Idaho Water Quality Program for Agriculture (WQPA), and the Environmental Protection Agency 319 Non-Point Source Program (NPSP). All cost-share funding will follow the respective program guidelines to honor planned treatment practices as outlined in each individual long-term contract approved by the sponsors. The estimated total financial assistance (construction) cost for all practices, using a

participation rate of 75%, is $14,327,200. The following are installation costs by program that will apply to this project.

INSTALLATION	Totals
PL-566	$4,919,400
Other FA Funds (1)	$2,520,500
Private Funds (2)	$6,888,500
Totals	$14,328,400

(1) Other FA funds include: EQIP, WQPA, RCRDP and 319 NPSP.
(2) Private funds include: Producer's Share.

Surface Irrigated Cropland Practices (Treatment Unit 1)[5] Remaining Work	Unit Measure	Units Needed	PL-566 Funds (1)	Other FA Funds (2) & (4)	Private Funds (3)	Total Cost Dollars
Conservation Crop Rotation	Acre	13,480	0	0	0	0.00
Irrigation System, Gated Pipe w/ Surge	Acre	5,390	1,455,300	566,000	2,021,300	4,042,600
Irrigation System, Micro Irrigation (Drip)	Acre	2,690	1,452,600	564,900	2,017,500	4,035,000
Irrigation System, Sprinkler	Acre	3,370	1,364,900	530,800	1,895,600	3,791,300
Irrigation System, Tail water Recovery	Acre	2,030	219,200	85,300	304,500	609,000
Irrigation Water Management (IWM) Meters and Moisture Sensors	Acre	13,480	242,600	94,400	337,000	674,000
Nutrient Management	Acre	13,480	0	55,800	0	55,800
PAM	Acre	5,055	0	189,600	0	189,600
Pest Management	Acre	13,480	0	0	40,400	40,400
Residue Management	Acre	13,480	0	20,200	0	20,200
Sediment Basins						
Small	No.	50	16,200	6,300	22,500	45,000
Medium	No.	50	32,400	12,600	45,000	90,000
Large	No.	50	48,600	18,900	67,500	135,000
Straw Mulch	Acre	5,055	0	284,300	0	284,300
Treatment Unit 1 Totals			**4,831,800**	**2,429,100**	**6,751,300**	**14,012,200**

(1) The cost share rate for PL-566 practices is 50%.
(2) Other FA funds include: EQIP, WQPA, RCRDP and 319 NPSP.
(3) Private funds include: Producer's Share.
(4) Management Practices paid through Other FA Funds.
(5) See Page 32 for description of Treatment Units (TUs).

Sprinkler Irrigated Cropland Practices (TU 2) Remaining Work	Unit Measure	Units Needed	PL-566 Funds (1)	Other FA Funds (2) & (4)	Private Funds(3)	Total Cost Dollars
Conservation Crop Rotation	Acre	3,675	0	0	0	0.00
Irrigation System, Re-nozzle Sprinkler	Acre	3,675	11,300	4,400	15,600	31,300
Irrigation Water Management (IWM) Meters and Moisture Sensors	Acre	3,675	66,200	25,700	91,900	183,800
Nutrient Management	Acre	3,675	0	15,200	0	15,200
Pest Management	Acre	3,675	0	0	11,000	11,000
Residue Management Seasonal or Mulch Till	Acre	3,675	0	5,500	0	5,500
TU 2 Totals			**77,500**	**50,800**	**118,500**	**246,800**

Irrigated Pastureland Practices (TU 3) Remaining Work	Unit Measure	Units Needed	PL-566 Funds (1)	Other FA Funds (2) & (4)	Private Funds(3)	Total Cost Dollars
Sprinkler Irrigated Pasture						
Irrigation System Improvement Re-nozzle Sprinkler	Acre	120	400	100	500	1,000
Irrigation Water Management (IWM)	Acre	120	0	3,400	0	3,400
Nutrient Management	Acre	120	0	500	0	500
Pest Management	Acre	120	0	0	400	400
Prescribed Grazing	Acre	120	0	0	100	100
Surface Irrigated Pasture						
Irrigation Water Management (IWM)	Acre	1,005	0	28,600	0	28,600
Nutrient Management	Acre	1,005	0	4,200	0	4,200
Pest Management	Acre	1,005	0	0	3,000	3,000
Prescribed Grazing	Acre	1,005	0	0	1,100	1,100
Sediment Basins						
Small	No.	5	1,600	600	2,300	4,500
Medium	No.	5	3,200	1,300	4,500	9,000
Large	No.	5	4,900	1,900	6,800	13,600
TU 3 Totals			**10,100**	**40,600**	**18,700**	**69,400**

Total Watershed	**4,919,400**	**2,520,500**	**6,888,500**	**14,328,400**

(1) The cost share rate for PL-566 practices is 50%.
(2) Other FA funds include: EQIP, WQPA, RCRDP and 319 NPSP.
(3) Private funds include: Producer's Share.
(4) Management Practices paid through other FA Funds.

2. The NRCS will assist the sponsors in providing **technical assistance** to the landowners and/or operators to plan and install land treatment practices shown in the plan.

   Percentages of technical costs to be borne by each program are as follows:

TECHNICAL ASSISTANCE	Totals
PL-566	$2,063,200
Other TA Funds (1)	$802,500
Totals	$2,865,700

(1) Other TA Funds include EQIP and WQPA.

3. The sponsors will obtain applications from owners of not less than 75% of the land identified as needing treatment in the problem area, indicating they will carry out the planned land treatment measures. Applications will be obtained before the first long-term land treatment contract is executed.

4. The sponsors will obtain agreements with landowners or operators to apply and maintain the conservation or land treatment practices for the protection and improvement of the watershed.

5. The NRCS and the sponsors will each bear the cost of project **administration** that they incur.

PROJECT ADMINISTRATION	Totals
PL-566	$535,700
Other Administration (1)	$208,300
Totals	$744,000

(1) Other Administration Funds include all other programs (EQIP, 310 NPSP, RCRDP and WQPA) and are based on a percentage of the estimated installation costs associated with these programs. Administration Funds associated with these other programs will be the responsibility of the administering agency, based on level of participation in each individual program. Actual availability and participation in these programs is unknown.

6. The sponsors will acquire, or will ensure that land users or operators have acquired, with other than P.L. 83-566 funds, such real property as will be needed in connection with the works of improvement. No real property costs are expected.

7. The sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as implemented by 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the sponsors are legally unable to comply with the real property acquisition (requirements of the Act), then they agree that, before any federal financial assistance is furnished, they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the sponsors agree that they will reimburse owners for necessary expenses as specified in 7 CFR 21.1006 (c) and 21.1007.

	Sponsors (%)	NRCS (%)	Estimated Relocation Payment Costs ($)
Relocation Payments	100	0	0 (1)

(1) Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary later, the cost of relocation assistance and payments will be cost-shared in accordance with the percentages shown.

8. The sponsors will acquire, or ensure that the landowners or water users have acquired, such water rights pursuant to State law as may be needed for the installation and operation of the works of improvement.

9. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the average costs incurred in the installation of works of improvement or an approved variation.

10. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

11. A separate agreement will be entered into between NRCS and sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

12. This plan may be amended or revised only by mutual agreement of the parties hereto, except that the NRCS may de-authorize or terminate funding at any time it determines that the sponsors have failed to comply with the conditions of this agreement. In this case, NRCS shall promptly notify the sponsors in writing of the determination and reasons for the de-authorization of project funding together with the effective date. Payments made to the sponsors or recoveries by NRCS shall be in accord with the legal rights and liabilities of the parties when project funding has been de-authorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsor(s) having specific responsibilities for the measure involved.

13. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

14. The program conducted will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975 and in accordance with regulations of the Secretary of Agriculture (7 C.F.R. 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin,

sex, religion, age, disability, political beliefs and marital or familial status be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

15. Certification Regarding Drug-Free Workplace Requirements (7 CFR 3017, Subpart F).

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C.812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of sub-recipients or subcontractors in covered workplaces).

Certification:

A. The sponsors certify that they will or will continue to provide a drug-free workplace by:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition:

(2) Establishing an ongoing drug-free awareness program to inform employees about:

(a) The danger of drug abuse in the workplace;

(b) The grantee's policy of maintaining a drug free workplace;

(c) Any available drug counseling, rehabilitation and employee assistance programs; and

(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Making it a requirement that each employee engaged in the performance of the grant be given a copy of the statement required by paragraph (1);

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will:

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4)(b), with respect to any employee who is so convicted:

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State or local health, law enforcement or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5) and (6).

B. The sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

16. Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds $100,000).

(1) The sponsors certify to the best of their knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The sponsors shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, subgrants and contracts under grants, loans and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

(2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

17. Certification Regarding Debarment, Suspension and Other Responsibility Matters-Primary Covered Transactions (7CFR 3017).

(1) The sponsors certify to the best of their knowledge and belief, that they and their principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in Paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

Signature pages follow:

Weiser River Soil Conservation District

By: _____
Mike Hartnett
Board Chairman

847 East 9th Street
Weiser, Idaho 83672

5-3-06
Date

The signing of this plan was authorized by a resolution of the governing body of the Weiser River Soil Conservation District adopted at a meeting held on 5-3-06
Date

_____
Tracy Nakamura, Secretary/Treasurer

847 East 9th Street
Weiser, Idaho 83672

5-3-06
Date

Washington County Commissioners

By: Diana L. Thomas

Diana Thomas
Chair

P. O. Box 670
Weiser, Idaho 83672

5/8/06
Date

The signing of this plan was authorized by a resolution of the governing body of the Washington County Commissioners adopted at a meeting held on: 5/8/06
Date

Sharon S. Widener
Sharon Widener, County Clerk

Courthouse
256 E. Court
Weiser, Idaho 83672

5/9/06
Date

Weiser Irrigation District

By: _____
Vern Lolley
President

124 E. Main
Weiser, Idaho 83672

5/2/06
Date

The signing of this plan was authorized by a resolution of the governing body of the Weiser Irrigation District adopted at a meeting held on: May 2, 2006
Date

_____
Jay and Jenna Edwards, Secretary

124 E. Main
Weiser, Idaho 83672

5-2-06
Date

RECEIVED JUN 06 2006

Idaho Soil Conservation Commission
By: Jerry Nicolescu

Jerry Nicolescu
Administrator

2270 Old Penitentiary Road
Boise, Idaho 83720-0083

5/23/06
Date

The signing of this plan was authorized by a resolution of the governing body of the Soil Conservation Commission adopted at a meeting held on:_____
Date

Gary Grindstaff

Gary Grindstaff, Secretary

2270 Old Penitentiary Road
Boise, Idaho 83720-0083

5-25-06
Date

Idaho Department of Environmental Quality

By: _____

Toni Hardesty
Director

1410 N. Hilton
Boise, Idaho 83706-1255

7/5/06
Date

United States Department of Agriculture
Natural Resources Conservation Service

By: Richard Sims

Richard W. Sims
State Conservationist

9173 W. Barnes Drive, Suite C
Boise, Idaho 83709

07/12/06
Date

SUMMARY

Project Name: Southern Washington County Water Quality Project

Location: The majority of agricultural land located in Southern Washington County within the nitrate priority area.

Primary Sponsor: Weiser River Soil Conservation District (WRSCD)

Other Sponsors: Washington County Commissioners
Weiser Irrigation District
Idaho Soil Conservation Commission
Idaho Department of Environmental Quality

Participating Agencies:
Idaho Department of Agriculture (state agency)
Idaho Department of Fish and Game (state agency)
Idaho Department of Water Resources (state agency)
Idaho State Historic Preservation Office (state agency)
USDA - Farm Service Agency (federal agency)
USDA - Natural Resources Conservation Service (lead agency)
USDI - Fish and Wildlife Service (federal agency)
USDI - Geological Survey (federal agency)
USEPA - Environmental Protection Agency (federal agency)
UICES - University of Idaho Cooperative Extension Service – Washington County

The Washington County watershed-planning efforts are administered by the WRSCD board of supervisors. The USDA-NRCS provides local work group meeting facilitation and technical assistance. Currently the local work group membership is moderate in size with new members joining periodically. The local work group consists of:

- 5 row crop farmers and 1 stockman
- Farmers Coop. Supply
- Simplot Soil Builders
- USDA Forest Service
- USDA-NRCS
- Washington County Commissioners
- Washington County Farm Service
- Washington County University of Idaho Extension
- Washington County Weed Board
- Weiser Area Groundwater Advisory Committee

Table A. Land Use and Ownership:

Land Use	Acres		Landowner	Acres
Cropland				
Surface Irrigated	19,460		Private	33,650
Sprinkler Irrigated	4,900		BLM	360
Irrigated Pastureland	1,500		City of Weiser	1,790
Other Lands	9,940			
Total Size of Watershed	**35,800**		**Totals**	**35,800**

Project Beneficiary Profile:

Washington County's population was 9,977 according to the 2000 U.S. Census. This is a 16.7% increase since 1990. The majority of the population is Caucasian at 87.6% of the county. The remainder of the population is 0.1% African American, 0.7% American Indian/Alaska Native, 1.0% Asian/Pacific Islander, and 10.6% mixed race/other. Hispanic or Latino heritage accounts for 13.8% of the total population, and 80% of these are of Mexican descent. The age of the population is 6.7% preschool (0-5 years), 23.3 % school age (5-19), 52% adult (19-65), and 18.0% senior (65 and above).

Farm statistics provided by the Idaho Department of Commerce (IDC) (County Profiles of Idaho) state that the average farm size has decreased in the years 1987-1997. Average farm size in 1997 was 906 acres, a decrease of 157 acres in 10 years. The number of farms decreased by three in the same time period, indicating that farmland has undergone a change to other land uses. The county experienced a 43% increase in the number of farms less than 10 acres in size, and an 85% increase in the number of 10-49 acre farms during this period. These farms represent nearly 37% of the total number in Washington County. The occupational status of farm operators is indicative of the trend to move to the country. IDC statistics show that 41% of the farm operators in Washington County list something other than farming as their principal occupation.

Major Agricultural Products:

The major agricultural products include dairy and beef cattle, a small amount of milk and dairy products and 16 crops including winter wheat, barley, corn, alfalfa hay, onions, dry beans, potatoes, sugar beets and pasture. Winter wheat, onions and sugar beets are the primary crops in rotation within the area.

Prime Farmland (Irrigated):

Baldock silt loam, Bissell loam, Clems fine sandy loam, Jenny clay, Moulton fine sandy loam, Moulton loam and Power-Purdam silt loams are the majority of the Prime Farmland soils found within the project area. There are approximately 30,770 acres of Prime Farmland in the project area.

Listed Threatened and Endangered Species:

Bull trout (*Salvelinus confluentus*): Listed threatened (LT)
Canada Lynx (*Lynx canadensis*): Listed threatened (LT)
Bald Eagle (*Haliaeetus leucocephalus*): Listed threatened (LT)

The bald eagle is listed as threatened in the watershed. Consultation with the US Fish & Wildlife Service (FWS) will need to occur before implementation of project actions. No other listed threatened or endangered species are assumed to inhabit the project area.

Purpose of and Need for Action:

The purpose of the proposed action is to improve the quality of ground and surface water. The need for the action is to reduce excessive nutrients, pesticides, bacteria and sediments that are delivered annually to the Lower Weiser River and area tributaries as well as the Snake River via agricultural surface drains and overland flow, and to reduce nitrates and pesticides entering ground water and contributing to groundwater degradation.

Water Resource Problems Identified:

- Elevated nitrate levels have been on an increasing trend since ground water quality monitoring began in 1991.
- Ground water quality impairments due to nitrates and bacteria.
- Surface water quality impairments include sediment, nutrients (including nitrogen and phosphorus), dissolved oxygen, temperature and bacteria.
- Arsenic levels above drinking water standards (natural source).

Water Quality Limited Stream Segments:

The Snake River, Weiser River and tributary streams in the project area, including Cove, Hog, Jenkins, Scott and Warm Springs Creeks, are listed as Water Quality Limited Stream Segments by the Idaho Department of Environmental Quality (IDEQ). Pollutants of concern include:

- Sediments
- Nutrients
- Bacteria
- Temperature
- Dissolved oxygen

Designated beneficial uses of project area surface waters include:

- Cold water aquatic life
- Primary contact recreation
- Domestic water supply
- Salmonid spawning

Total Maximum Daily Load (TMDL) Reductions:

The following water bodies have Total Maximum Daily Loads (TMDLs) developed for total phosphorus:

- Hog, Jenkins, Scott, and Warm Springs Creeks
- Lower Weiser River
- Snake River

The following water bodies have TMDLs developed for sediment:

- Scott, Jenkins and Warm Springs Creeks
- Lower Weiser River
- Snake River

Ground Water Quality Problems:

Arsenic in ground water exceeds the drinking water standards. Idaho DEQ attributes the elevated levels to the geology of the project area and considers the arsenic to be at natural or "background" levels for the area.

This area ranks as the number 1 priority concern for nitrates in the state. Trends from water quality testing conducted since 1991 indicate the problem is increasing and IDEQ considers the present ground water quality problems as a serious threat to the domestic drinking water supply for the project area residents who rely on private wells. The 2004 monitoring results indicate 53% of the 38 wells consistently sampled in the project area exceed 10 mg/L with a maximum value of 41 mg/L. The drinking water standard is 10 mg/L. The highest concentrations are northwest of Weiser and between Weiser and Crystal (Appendix A, Map 7).

The most likely sources of nitrogen within the project area are presented in Table B.

Table B. Major Sources of Total Nitrogen Input and Loss in the Project Area

Total N Source	Estimated Percentage	Total N Loss	Estimated Percentage
Precipitation	1	Crop Uptake	52
Fertilizer	54	Beef & Dairy Manure	31
Septic Systems	< 1	Decomposition	17
Legumes	4		
Beef & Dairy Manure	40		
Total N Input	**6,977,130 lbs.**	**Total N Loss**	**5,733,869 lbs.**
Net Increase = 1,243,261 lbs.			

Based on methods described by Rupert (1996) with data from producers, Idaho State Department of Agriculture, South West District Health, and Ag Statistics Service website.

Goal and Objectives:

The Weiser River Soil Conservation District has established the following goal and objectives for the Southern Washington County Water Quality Project.

Goal:

To protect and improve the quality of both surface and ground water resources in the Lower Weiser and Snake Rivers and the Western Snake River Plain Aquifer (Southern Washington County).

Objectives:

- To improve and further protect the quality and quantity of surface and ground water within the project area
- To identify the major non-point pollution sources in the area, as well as their origin
- To determine the water quality effects on the project area from implementation of planned conservation measures
- To develop a program to accelerate the transfer of knowledge and technology to the agricultural producers within the project area

- To develop a water quality program promoting voluntary cooperation in solving water quality problems

http://www.deq.state.id.us/water/data_reports/ground_water/weiser_mgmt_plan.pdf

Ground water is extremely difficult to clean up after contamination has occurred. Accelerated implementation of the planned conservation practices is essential for treating the current problems. While nitrate levels are already above safe drinking levels in some of the wells in the project area, it is expected that nitrate levels will eventually rise to unsafe levels in the majority of wells unless the trend is reversed or stabilized.

Water Quality Monitoring:

Progress toward the project's water quality goals will be measured through long-term water quality trend monitoring programs already in place. Idaho Department of Water Resources (IDWR) monitors water quality in area wells through the Idaho Statewide Ground Water Quality Monitoring Program. More intensive ground water monitoring is performed by the Idaho State Department of Agriculture (ISDA) Southern Washington County Monitoring Project. Surface water monitoring is performed by Idaho Department of Environmental Quality (IDEQ).

Alternatives Considered:

- No action - Future Without Project Condition
- Alternative 1 - Resource Protection Plan (Land Treatment of TUs 1-3)

Recommended Plan - Selected Alternative: Alternative 1 - Resource Protection Plan (Land Treatment of TUs 1-3).

Table C. Project Costs and Proposed Funding Sources (Dollars)

Item	PL– 566	Other FA Funds (1)	Private (2)	Totals
Financial Assistance	$4,919,400	$2,520,500	$6,888,500	$14,328,400
Technical Assistance	$2,063,200	802,500	0	2,865,700
Administration	$535,700	208,300	0	744,000
Totals	$7,518,300	$3,531,300	$6,888,500	$17,938,100

(1) Other FA funds include: EQIP, WQPA, RCRDP and 319 NPSP.
(2) Private funds include: Producer's Share.

Estimated Annual Benefits:

- Reduction in sediment yield – 50,180 tons/year (66%)
- Reduction of sediment delivered to the Weiser and Snake Rivers – 47,580 tons/year (66%)
- Reduction of leached nitrate nitrogen by 475,910 lbs/year (59%) and reduced bacteria and pesticides in ground water
- Reduction in the amount of irrigation water applied to cropland; this will reduce the amount of nitrate nitrogen, bacteria and pesticides leached to ground water
- Reduction of phosphorus delivered to the Weiser and Lower Snake Rivers by 44,343 lbs/year (62%)
- Reduction of bacteria and pesticides delivered to the Weiser and Lower Snake Rivers

Environmental Values Changed:

- Air Quality – Positive effect from tillage systems due to reduced suspended dust from wind erosion.
- Cultural Resources - No effect. Existing sites and unknown sites will be protected. The NRCS National and State Agreement will be followed.
- Fisheries - Positive effect on cold water fisheries in the Snake and Weiser Rivers and smaller tributaries.
- Floodplains - Positive effect due to decreased sedimentation in riparian zone.
- Human Health and Safety – Positive effect of reduced contaminants in drinking water. Positive effect of meeting the primary and secondary contact recreation standards for surface water.
- Prime Farmland - Positive effect on retaining 30,770 acres of prime farmland in production.
- Water Quality - Positive effect on ground water due to reduced nitrate and pesticide contamination of aquifer. Positive effect on surface water due to reduction of sediment, nutrients, bacteria and pesticides entering surface waters.
- Wetlands - Positive effect from enhancing water quality and reducing sedimentation.

INTRODUCTION

The Weiser River Soil Conservation District (WRSCD) was established December 22, 1941, pursuant to the Idaho Soil Conservation Districts Law, Senate Bill 136, Chapter 200, Idaho session for 1939. From that day forward the WRSCD has been promoting conservation practices and good land stewardship management.

By 1966 there were 498 cooperators covering 228,000 acres on 65% of the private land[1] and the fertile soils were producing 28 tons/acre of corn with no fertilizers. Based on these results, the signing of new cooperator agreements was at a rate of 25 a year.

Working cooperatively with other agencies and groups has been the policy of the conservation district since it was established. The success of the WRSCD accomplishments can be attributed to the original philosophy adopted on that first day of establishment.

The Weiser River Soil Conservation District (WRSCD) requested assistance from the Natural Resources Conservation Service (NRCS) to assess how land use activities, including irrigation and agronomic practices, have impacted the beneficial uses of surface and ground water within the Southern Washington County Water Quality Project area (project area). Not all conservation practices applied by producers in the project area have met minimum requirements of the NRCS Field Office Technical Guide (FOTG). These findings are based on evaluations conducted to help determine what practices or combinations of practices are not being applied according to the FOTG. Other alternatives could also be identified to address project resource concerns. A Preliminary Investigation Report completed by the NRCS in 2000 identified several pollutants and their sources contributing to the degradation of both surface and ground water quality.

Over 90% of rural residents in southern Washington County get their drinking water from ground water sources. However, it appears that area ground water has been impaired and that nitrate concentrations in area wells are increasing. The Weiser area ranks first on Idaho's list of ground water areas impacted by nitrates. The area is particularly vulnerable to ground water contamination due to shallow sub-surface alluvial deposits and shallow ground water conditions. Early monitoring studies identified ground water concerns within the project area: 1) Idaho Department of Water Resources (IDWR) Statewide Monitoring Program initiated in 1991 indicated elevated nitrate levels in some Weiser area wells; 2) results from the more intensive Idaho Private Wellhead Sampling program in Weiser conducted in 1995 showed that 30% of 89 wells tested had nitrate levels exceeding drinking water standards (10 mg/L) and 70% of wells showed levels exceeding background values (2 mg/L) (University of Idaho 2003).

The project area is adjacent to the Snake River and encompasses portions of the lower Weiser River sub-basin. The Weiser Flat portion and portions of Sunnyside drain directly to the Snake River. Water is reused many times before eventually draining to the Snake or Weiser Rivers through canals, drains, tributaries and as ground water inflows. Surface water quality problems are also a resource concern in the project area. The Weiser River and project area streams (Hog, Warm Springs, Jenkins, Scott and Monroe Creeks) are impaired by a variety of pollutants (nutrients, sediment, temperature and/or bacteria), and contribute to non-support of beneficial

[1] 1941 – 25 Years of Progress – 1966 , Published by the Weiser River Soil Conservation District

uses within the sub-basin and the Snake River. The Total Maximum Daily Loads (TMDL) have been, or are being, developed for the impaired streams and rivers in the project area.

With little or no industrial development in the project area, urban/suburban and agriculture are the targeted sources. Rural subdivisions and single homes scattered throughout the project area have septic tanks for human waste disposal. A number of these are located in areas of shallow ground water. No nutrient management practices meeting the 1999 and subsequent Idaho nutrient management standards have been applied, and water management practices for improving irrigation efficiencies by reducing runoff and deep percolation have not been implemented. There are also several AFO/CAFO feedlot operations located in the project area ranging in size from 2-animal hobby farms to several hundred animal commercial feeding operations. Not all of these have adequate containment systems or nutrient management plans.

Potential alternative solutions to water quality degradation include land treatment approaches and other conservation practices such as improved irrigation systems (e.g., sprinkler, drip and surge). The recommended plan selected for implementation includes improved irrigation systems, irrigation water management, pest management, nutrient management, improvements to confined animal feeding operations and pasture improvement practices.

There are sufficient resource, water quality and environmental concerns to merit implementation of the planned practices described in this report. Once a method of implementation has been selected, a strategic plan will be developed for implementation in collaboration with the Weiser Ground Water Committee. The committee has developed a Ground Water Management Plan which will be utilized in future implementation activities. Additional implementation, information and education grants will be pursued from various federal and state sources.

The producers' willingness to participate contractually has been verified in recent years by the WRSCD. This has been determined from the 64-year relationship with the local producers and recent 319 NPSP and EQIP programs. Before any project activity begins, the board will review the project at its regular monthly meetings.

This report was developed as a Watershed Protection Plan and Environmental Assessment for USDA's Small Watershed Program (PL– 566). The WRSCD has made steady progress on conservation problems over the past decade with the help of a variety of cost-share programs; however, the WRSCD considers PL–566 funding essential for reaching conservation goals in the watershed. In the Weiser River SCD 5-year plan, water quality has been designated as the #1 priority. Implementation funds are to be used for improving water quality using the conservation practices developed for this Plan/EA. PL-566 funding will be partnered with additional federal (EQIP and 319 NPSP) and state funds (WQPA). Collaboratively, this effort will address the water quality degradation in Southern Washington County.

PROJECT SETTING

Location

The project area is located in southwestern Washington County and extends from approximately 10 miles west of the city of Weiser, east to the Galloway diversion dam and south of Weiser to the county line. It includes all the irrigated area from the Weiser River system, Lower Mann Creek and the area south of Weiser to the Payette County line, as well as the north and south sides of the Weiser River to its confluence with the Snake River, and the Weiser Flat located west of town (Appendix A, Map 1and 3).

Land Use History

The land relief within the project area has nearly level to moderate slopes surrounded by rolling foothills. Surface irrigation is used on the nearly level land and portions of the foothills have been converted to sprinkler systems.

Over the past 30 years, the agricultural trend has changed from small dairies with pasture and hayland to intensive row cropped farming systems. Winter wheat, onions and sugar beets are the primary crops in rotation. Other crops produced include beans, silage corn, sweet corn and potatoes. Pesticide and fertilizer use has steadily increased due to these changes.

Climate

Climate is characterized as semi-arid. Average air temperatures range from 20° F. in winter to 90° F. in the summer. Average annual precipitation ranges from 10 -12 inches a year.

The following analysis is based on the National Weather Service Weiser 2SE weather station for 1961-1990. A complete data record for the 1971-2000 periods is not currently available. Average daily high temperature in July and August is 91° F., while average daily low temperature is 51° F. Winter average daily maximum temperature is 35° F. in December and January, while average daily minimum temperature is 18° F. Extreme temperatures recorded for this station are 107° and -29°.

Average annual precipitation for the Weiser weather station, located two miles southeast of town, is 11.68 inches. Two years in ten will have greater than 12.92 inches or less than 7.88 inches. The wettest months are November, December and January with about 1.6 inches of precipitation falling each month. Nearly 70 percent, or almost 8 inches, of the annual precipitation falls during the October - March period. Average annual snowfall is about 25 inches. Winter rains and warm temperatures can cause rapid melting of low elevation snow resulting in accelerated runoff. The maximum daily precipitation amount measured was 2.55 inches on February 19, 1986. However, most daily maximum precipitation amounts are in the 0.5 to 1.5 inch range. The driest months are July and August with less than 0.5 inches each month. Only about 3.8 inches of moisture falls during the growing season. The average consecutive frost free period (above 32°F.) is 129 days in Weiser. The average date of the last spring frost is May 17, with the first fall frost occurring around September 24.

Land Ownership

Private ownership (Table D) makes up the majority of land holdings within the project area with 5% located in the City of Weiser and 1% of the project area under the control of the Bureau of Land Management.

Table D. Land Ownership in the Southern Washington County Watershed

Land ownership	Acres	Percent
Private	33,650	94
BLM	360	1
City of Weiser Municipality	1,790	5
Totals	**35,800**	**100**

Land Use

Detailed land use is described in Table E., and illustrated in Appendix A. Map 2)

Table E. Land Use in the Southern Washington County Watershed

Land Use	Acres	Watershed Percentage
Surface Irrigated Cropland (0-4% slope)	18,560	52
Micro irrigation systems (drip)	900	2
Sprinkler Irrigated Cropland	4,900	14
Irrigated Pasture	1,500	4
Subtotal Acres	25,860	72
Dry Pasture	360	1
Animal Feeding Operations		
Dairies, 3 units, 20-150 Head		
AFO/CAFO, 22 units, 750-5,000 Head	500	1
Rangeland	920	3
Wildlife Habitat	720	2
Other (Urban, Roads etc.)	6,570	19
Non-Cropland (CRP)	870	2
Totals	**35,800**	**100**

Subwatersheds

There are approximately 79 operating units in the project area. The average size operation is 385 acres. There are three distinct subwatersheds (or communities) within the project area:

- Weiser Flat
- Sunnyside
- Weiser Cove

Surface irrigation is used in the majority of the project area, and most of the sprinkler irrigated acres are found in Weiser Cove. The sprinkler irrigated acres are managed differently than the surface irrigated ones. Cropland and pasture are the main land uses. There are approximately three dairies and 22 Animal Feeding Operations (AFO/CAFO).

Geology/Topography

The Weiser River valley is a broad, terraced alluvial plain with a gently rolling surface that slopes gradually westward. It is in the Boise-Malheur-King Hill section of the Snake River Plain geomorphic sub province of the Columbia Plateau geomorphic province. The valley is a structural basin filled with sedimentary and volcanic deposits. Present topography reflects meandering river channels and alluvial deposits superimposed on lakebed and volcanic uplands.

Bedrock at depth and in the surrounding mountains is Tertiary and Quaternary age lake and stream sediments interbedded with Columbia River Basalt. Dissected volcanic, stream and lake deposits of clay, shale, ash, siltstone, sandstone, limestone, diatomite and gravel of the Glenns Ferry Formation/Idaho Group form the low rolling hills south and east of the area. The hills to the north are formed in Tertiary age sedimentary arkosic sandstone with some volcaniclastic rock and basalt mixed in. The more recent hill slope deposits include Quaternary age pediment gravels and landslides. The Idaho Group deposits were formed in lake and stream deposits influenced by dams formed by basalt flows and other volcanic activity. The pediment gravels are Pleistocene (ice-age) deposits from large volume runoff events originating with melt waters from the glaciated highlands.

The valley fill is recent stream alluvium in the Sunnyside and south Weiser Cove areas; mixed sediments of alluvium, terraces and fan deposits in the Weiser Flat and north Weiser Cove areas; and scattered windblown silt and sand loess deposits throughout the area. These sediments overlie Idaho Group sediments. A distinctive, thick layer of “blue clay” is found within the Glenns Ferry Formation sediments throughout the project area.

The north side of the Weiser River valley is formed by east-west trending fault zones.

Hydrogeology

Ground water in the area exists in three distinct hydrogeologic units: 1) the "shallow" aquifer, composed of recent fluvial, colluvial and eolian sand and gravel deposits; 2) the intermediate aquifer, composed of sand and gravel lenses (located within the Tertiary/Quaternary age fluvial and lacustrine sediments of the Glenns Ferry Formation/Idaho Group); and 3) fracture zones within local basalts of the Columbia River Basalt Group.

The "shallow" aquifer, which is unconfined to semi-confined, is the primary water source used for agricultural and domestic activities. The aquifer is composed of sand and gravel derived from previously reworked Snake River and Weiser River deposits. A silt and clay layer within the first 20 feet of the aquifer is believed to be 'slackwater' Bonneville flood deposits. The thickness of this water-bearing unit is variable throughout the Weiser Valley ranging from 5 - 70 feet (20 feet average thickness). Recharge in the form of seepage and percolation is derived from irrigation of fields and irrigation canals/ditches. Significant perennial recharge may also occur in areas adjacent to the Weiser River. Precipitation is considered a minor recharge component locally due to low precipitation levels and high evapotranspiration.

The intermediate aquifer is confined and also used for agricultural and domestic uses. The top of the aquifer can be identified by characteristic "blue clay," an indicator of the upper Glenns Ferry Formation. The aquifer is highly variable with an average thickness of 12 feet and

composed of unconsolidated fine-sand to gravel and sandstone interbedded with silt and clay lenses. Recharge from overlying water-bearing strata is assumed.

The basalt aquifer underlies the Idaho Group and crops out north and east of Weiser in the uplands. The aquifer is also productive, but its use is limited due to depth. Recharge is derived predominantly from precipitation in the uplands. Lesser recharge from overlying water-bearing zones occurs through percolation.

Risk of contamination is considered to be greatest for the shallow aquifer due to its unconfined to semi-confined nature. Recent nitrate detection in some domestic wells of Sunnyside and Weiser Flat exceed the maximum contaminant level of 10 parts per million. These detections are evidence that this aquifer is vulnerable to present and future pollution sources. Within the Weiser Valley, the Sunnyside and Weiser Flat areas are at greater risk of contamination because they lack an apparent perennial recharge mechanism, which would act as a dilution or flushing factor. Potential for contamination in the Weiser Cove area may be reduced by the perennial flushing mechanisms related to the Weiser River and uplands precipitation recharge.

Surface Water Resources

Water resources in the project area represent a relatively unique agricultural region consisting of several small streams and multiple sources for irrigation water. The five major sources of irrigation water in the project area are the Weiser River, Crane Creek, Payette River, Snake River and ground water. Water from the Weiser River and Crane Creek Reservoir is diverted into the Galloway and Sunnyside canals. These canals provide irrigation water to the eastern, western and central part of the project area. Payette River water is used to irrigate the southern end of the project area. Water pumped from the Snake River and the shallow aquifer irrigates the southwest portion of the project area.

There are five creeks in the foothills north of the project area that flow from north to south and discharge into the Snake River. From west to east, these are Hog, Warm Springs, Scott, Jenkins and Monroe Creeks. The creeks flow only during the winter and spring and are usually dry by early June. During irrigation season, they are fed by irrigation return flow which allows re-use of water throughout the project area. Monroe Creek stream flow was measured periodically during the 1940's. Historic data indicates Monroe Creek was occasionally dry during the summer.

Mann Creek is a larger drainage and flows into the Weiser River east of the town of Weiser. The lower watershed of Mann Creek is in the project area. Mann Creek stream flow is regulated by Mann Creek Reservoir which has a capacity of 11,100 acre-feet. A small amount of this water is diverted for irrigation in the project area; however, most of it is used upstream of the project boundary.

The US Geological Survey maintains a long-term stream flow gauging station on the Weiser River near Weiser dating back to the 1890s. The average annual stream flow in cubic feet per second (cfs) averages 1,109 cfs and ranges from 136 to 2,016 cfs. Average annual stream flow in acre-feet is 808,200 for the 1971-2000 periods. Approximately 53% of the average annual stream flow for the Weiser River occurs during the March-May period and 77% occurs February-June. Typically, the Weiser River is at its minimum yearly level during the July - November period with each month accounting for less than 3% of the average annual flow.

The majority of annual discharge for most streams in the Weiser River basin occurs during a short-duration, high-flow runoff season. This is especially true in the low elevation streams and low precipitation areas in the southern part of the basin. Typically, the peak runoff for streams in this area occurs in March or April from a combination of snow melt and rain.

Drainages such as Weiser River basin, in which 80% of the basin is below 5,000 feet in elevation, are susceptible to rain-on-snow events. Winter floods in this area may occur December - February. Winter floods are a result of rain-on-snow precipitation events and/or unseasonably warm temperatures that produce rapid runoff. Floods also occasionally occur as a result of river ice. As river ice starts flowing, ice jams are created causing the stream to overflow its banks.

The agricultural water supply for irrigators in the project area is adequate in most years. During low snowfall and runoff years, water supply shortages may occur for some water users that utilize Weiser River or Crane Creek waters due to low stream flow volumes or reservoir water. Irrigators in the project area who use the Payette reservoir system water have adequate water supplies even during low snowfall and runoff years.

County Farm Demographics

Washington County is growing in population as are most of the other communities in the Treasure Valley. Several industries established around Weiser and Ontario, Oregon have contributed to the rise in population. These include a mobile home factory, two lumber planing mills, an onion processing plant and a prison.

Washington County's population is 9,977 according to the 2000 U.S. Census. This is a 16.7% increase since 1990. The majority of the population is Caucasian at 87.6% of the county. The remainder of the population is 0.1% African American, 0.7% American Indian/Alaska Native, 1.0% Asian/Pacific Islander, and 10.6% mixed race/other. Hispanic or Latino heritage accounts for 13.8% of the total population, and 80% of these are of Mexican descent. The age of the population is 6.7% preschool (0-5 years), 23.3 % school age (5-19), 52% adult (19-65), and 18.0% senior (65 and above).

Farm statistics provided by the Idaho Department of Commerce (IDC) (County Profiles of Idaho) state that the average farm size has decreased in the years 1987-1997. Average farm size in 1997 was 906 acres, a decrease of 157 acres in 10 years. The number of farms decreased by three in the same time period, indicating that farmland has undergone a change to other land uses.

Overall, nearly 8,000 acres of farmland within Washington County were converted to other uses between 1987-1997. Irrigated crop farms decreased 6,660 acres in the same period, but nearly the same numbers of farms are in operation. The proliferation of smaller farms in the county is similar to the trend in the rest of the Treasure Valley.

The county experienced a 43% increase in the number of farms less than 10 acres in size, and an 85% increase in the number of 10-49 acre farms during this period. These farms represent nearly 37% of the total number in Washington County. The occupational status of farm operators is indicative of the trend to move to the country. IDC statistics show that 41% of the farm operators in Washington County list something other than farming as their principal occupation.

The rural population is dependent upon private wells and bottled water for household drinking water supplies. No rural water system exists, and nothing is planned in the foreseeable future. According to 1990 figures, 1.2% of the housing in the county lacks some or all plumbing. Mobile homes and trailers comprise 13.9% of housing, and owner occupancy exists in 67% of the cases. The 1999 income level in Washington County was 70% of the state's average and 56% of national. In 1990, 10% of the population held a bachelor's degree, a 3% decrease since 1980.

These demographics and trends will affect conservation program delivery to the Southern Washington County area. Nearly 14% of the population is of Hispanic heritage. Spanish language publications and media announcements will be helpful in reaching the target audience. The lower income levels and rental property circumstances will impact the willingness of potential participants to implement conservation.

The expected off-farm income for the 41% of farm operators with other principal occupations might increase the ability of those people to implement conservation improvements. However, the off-farm work will make this segment of the population harder to reach, necessitating evening contacts and farm tours. Direct mail may be a better method of reaching this target audience.

County Agricultural Statistics

Table F. Estimated Value of Major Agricultural Commodities in Southern Washington County

Crop	Price/Unit Received	Total Value for Washington County
Total Crop Sales (1)		$19,876,000
Dry Beans	$20.30/cwt	$18,879
Cereal Grains	$3.20/cwt	$20,160
Sugar Beets	$45/ton	$89,595
Alfalfa Hay	$109/ton	$514,480
Livestock Sold (1)		$25,169,000
Onions (2)	N/A	N/A
Potatoes	$4.70/cwt	$216,200
Milk	$12.50/cwt	870,291

Source: Idaho Agricultural Statistics, 1999
(1) NASS Census of Agriculture, 2002
(2) Not available in Idaho Census of Agriculture

WATERSHED PROBLEMS AND OPPORTUNITIES

Problem Statement

Excessive nutrients, pesticides, bacteria and sediments are delivered annually to the Lower Weiser River and area tributaries as well as the Snake River via agricultural surface drains and overland flow. In addition, nitrates and pesticides are entering the ground water and contributing to groundwater degradation. Agricultural contaminant sources include irrigated cropland, irrigated pastureland and animal wastes from AFO/CAFOs.

Water:

Three regionally important water resources are seriously impacted by pollution from agricultural sources in the project area. These are:

- **The Lower Weiser River**
  - Total Maximum Daily Load (TMDL) Allocation for suspended sediment, total phosphorus, temperature and bacteria.
  - Impaired Beneficial Uses: cold water aquatic life, primary contact recreation, wildlife habitat, aesthetics and domestic agricultural and industrial water supplies.
- **The Snake River (River Mile 409-335)**
  - Designated by Idaho Department of Environmental Quality (IDEQ) as “Special Resource Waters”.
  - Impaired Beneficial Uses: cold water aquatic life, primary contact recreation, wildlife habitat, aesthetics and domestic agricultural and industrial water supplies.
- **Western Snake River Plain Aquifer (So. Washington County)**
  - High levels of nitrates are a specific concern as determined by the Idaho Department of Environmental Quality (IDEQ).
  - Detections of low-level pesticides

Soil:

Soil erosion on surface irrigated project area soils reduces productivity and the value of the soil resource base, as well as contributing to sedimentation of the Lower Weiser and Snake Rivers. Crop rotations and tillage practices that decrease soil condition are a resource concern in the project area.

Air:

Odors from land applied animal wastes and from AFO/CAFOs reduce the local quality of life. Some crop residues are burned in the spring and fall.

Animals:

Excess nutrients and sediment from agricultural sources originating in the project area have degraded the habitat for aquatic wildlife and fisheries in the Weiser and Snake Rivers. There are 4 species in Washington County that are Listed Threatened, and only 1 of these, the bald eagle is assumed to inhabit the project area. Water quality problems in the project area have had a negative effect on the bald eagle’s prey base of fish.

Plants:

There are 4 species of plants in Washington County that are listed as Species of Concern by the IDFG, and none of these are assumed to inhabit the cropland and pasturelands in the project area. Project actions will occur outside the habitat associated with these plants.

Water Resource Problems Identified

Surface Water:

- Degradation of water quality in the Weiser and Snake Rivers and area tributaries due to excessive sediment, nutrients and bacteria reaching these streams via surface irrigation return flows to agricultural drains.

Surface Water Quality Limited Stream Segments for Southern Washington County

The Snake River, Weiser River and tributary streams in the project area, including Cove, Hog, Jenkins, Scott and Warm Springs Creeks, are listed as Water Quality Limited Stream Segments by the Idaho Department of Environmental Quality (IDEQ). Pollutatnts of concern include:

- Sediments
- Nutrients
- Bacteria
- Temperature
- Dissolved oxygen

Impacts to the designated beneficial uses include:

- Cold water aquatic life
- Primary contact recreation
- Domestic water supply
- Salmonid spawning

Total Maximum Daily Load (TMDL) Reductions

The following water bodies have Total Maximum Daily Loads (TMDLs) for total phosphorus:

- Hog, Jenkins, Scott, and Warm Springs Creeks
- Lower Weiser River
- Snake River

The following water bodies have TMDLs developed for sediment:

- Scott, Jenkins and Warm Springs Creeks
- Lower Weiser River
- Snake River

Ground Water:

- Degradation of water quality in the Western Snake River Plain Aquifer due to leaching of nitrates and pesticides caused in part by inefficient irrigation systems and inadequate nutrient and pest management.

Table G. Summary of ISDA monitoring results from 1996 to 2004 [1]

Nitrate [2] Concentration Range (mg/L)	Spring 1996 % of Wells	Spring 2000 % of Wells	Spring 2002 % of Wells	Spring 2004 % of Wells
0 - 1.9	26	26	32	23
2.0 - 4.9	13	13	8	11
5.0 - 9.9	29	19	13	13
10.0 – 19.9	29	34	42	42
≥ 20.0	3	8	5	11
Mean value	7.0	8.3	8.2	10.5
Median value	7.2	8.2	8.3	11
Maximum value	23	27	30	41

[1] (ISDA Website, April 2005)
[2] Nitrate-nitrogen results are based on 38 wells (consistently sampled) that fall within the project area.

Sources of Pollutants to Surface and Ground Water

Many of the pollutants contributing to the water quality problems in the project area originate from non-point agricultural sources. These are primarily surface irrigated cropland, irrigated pastures and animal feeding operations (AFO/CAFOs). Additional non-point and point source pollution includes grazing, septic systems, rural sewage systems and application of nutrients and pesticides to urban areas and roadways. The aquifer is impacted by nitrates and pesticides from several agricultural sources. Beneficial uses of the Weiser and Snake Rivers, such as recreation and aquatic life, are impaired from agricultural pollutants (sediment, phosphorus and bacteria), some of which originate in the Southern Washington County project area.

AFO/CAFOs and Dairies:

There are 22 AFO/CAFO operations and 3 dairies in the project area. Refer to the AFO/CAFO location map (Appendix A, Map 3). By Idaho Code, the dairy operations must meet state CAFO guidelines for containment, and have certified nutrient management plans. Only a few of the AFO/CAFOs have a waste management system. Improper animal waste management (including improper land application of wastes) is a resource problem in the project area with consequences for both surface and ground water quality. The resource concerns associated with land application of waste occur in TUs 1-3, in conjunction with other poor management such as IWM.

The proximity of AFO/CAFOs to soils with high water tables and surface water bodies is illustrated in Appendix A, Map 3. In close proximity to dairies and large feedlots, waste application rates may exceed crop uptake when using phosphorous as the limiting nutrient. In areas with high water tables or on sandy soils, many older AFO/CAFOs may have unlined waste treatment ponds that may allow nutrients and pathogens to enter ground water. The presence of ammonia (a highly unstable form of nitrogen in an oxygenated environment) in ground water in the project area indicates a direct route for animal wastes into the aquifer, such as leaky lagoons.

Nutrient and Irrigation Water Management:

The presence of high concentrations of available nutrients in the soil profile is a major contributor to nutrients entering both surface and ground waters. In the project area, both nitrogen and phosphorus present environmental nutrient risks. The risk is associated with nutrients being present in excess of crop uptake and surface irrigation water as an off-site transport mechanism. The combination of complex hydrogeology, highly permeable soils, shallow water tables, intensive cropping and high fertilizer inputs has resulted in considerable environmental risk.

The use of conservation practices which restrict surface runoff will reduce the risk of off-site surface water quality impacts. This can be accomplished by changing irrigation methods or by utilizing runoff control structures which limit water movement off the fields. However, if surface runoff is restricted without improved irrigation water management, the risk shifts to a ground water environmental risk. Nutrient management and irrigation water management (IWM) become the primary focus of optimizing nutrient applications, while maintaining adequate moisture for crop production.

Soil Erosion:

Soil erosion degrades the soil resource base as a medium for plant growth. Erosion results in a loss of soil, organic matter and commercial fertilizer. The effectiveness of pesticides is reduced along with the ability of the soil to intake and hold water. These effects are reflected in reduced yields, increased production costs and a loss of income.

The majority of the soils in the project area have a “T” value of 5 tons/acre/year. These erosion rates are not considered greatly accelerated from typical “natural” erosion rates for the area. However, soil erosion is considered a resource concern, since most of the sediment generated from this treatment unit is delivered to local water bodies.

Rural – Urban Development:

The physical boundaries of Weiser are relatively stable. However, expansion has occurred throughout the project area as a result of rural subdivisions. These rural homes have septic tanks and filter fields for disposal of human waste. Some of them are located in areas with high water tables.

Impacts to private and domestic ground water supplies are the most significant potential water quality concern in the project area because they directly impact human health. To date, ground water pollution has exceeded drinking water quality standards in some cases. Nitrate levels rise sharply in a down-gradient pattern beginning at the edge of the rangeland, on the east side of the project area, where nitrate levels are well below 0.5 mg/l, to the southwest corner of the project area where nitrate levels typically exceed 10 mg/l. The Washington County Commissioners and the public are concerned about the quality of drinking water in the area, all of which comes from the Weiser and Snake Rivers and local aquifer. If nitrates continue to increase at the current rate, concentrations will eventually rise to unsafe levels in the majority of wells unless the trend is reversed. Application of high rates of fertilizer to cropland and deep percolation from surface irrigation continues to impact both surface and ground water through runoff and deep leaching.

Agricultural Causes of Pollution

- Inadequate irrigation water management and nutrient management
- Inefficient irrigation systems
- Irrigation-induced erosion
- Cropping sequences
- Management of irrigated pastures
- AFO/CAFOs that lack adequate waste storage and handling facilities
- Improper animal waste utilization on cropland and pastureland

Effects of Pollution

- Deterioration of ground water quality impacting domestic wells
- Risk to human health from ground water and surface water contaminants
- Impairment to fisheries populations, especially cold water sport fish
- Loss of recreation opportunities due to bacteria exceeding contact recreation standards
- Loss of recreation opportunities and habitat due to excess macrophytic plant growth
- Reduction in aquatic coldwater biota diversity in the Weiser River and tributaries
- Siltation of wetlands and salmonid spawning habitat in the Weiser and Snake Rivers and tributaries.

Goal and Objectives

The Weiser River Soil Conservation District has established the following goal and objectives for the Southern Washington County Water Quality Project.

Goal:

To protect and improve the quality of both surface and ground water resources in the Lower Weiser and Snake Rivers and the Western Snake River Plain Aquifer (Southern Washington County).

Objectives:

- To improve and further protect the quality and quantity of surface and ground water within the project area
- To identify the major non-point pollution sources in the area, as well as their origin
- To determine the water quality effects on the project area from implementation of planned conservation measures
- To develop a program to accelerate the transfer of knowledge and technology to the agricultural producers within the project area
- To develop a water quality program promoting voluntary cooperation in solving water quality problems

RESOURCE INVENTORY and FORECASTING (SCOPE)

Scoping of Concerns

During the watershed planning process, input was solicited from the public and a steering committee made up of local land users, Soil Conservation District supervisors and local agricultural professionals. Resource data, problems and objectives were reviewed and the following major concerns (Table H) were identified:

1. Crop rotations with tillage practices that tend to decrease overall soil condition
2. Irrigation-induced erosion
3. Ground water quality impairments
   - Nitrate concentrations exceeding drinking water standards in domestic wells
   - Pesticides detected in domestic wells
4. Degraded surface water quality in streams and water bodies due to increased levels of nutrients and sediment
5. Inefficient on-farm irrigation systems and inadequate irrigation water management
6. Inadequate nutrient and pesticide management practices
7. Inadequate AFO/CAFO waste containment

Table H. Significance of Identified Concerns

Concerns	Degree of Significance	Remarks
Animal Waste (Nutrients & Bacteria)	High	17 AFO/CAFO Concerns for ground and surface water quality
Cultural Resources	High	Several known sites
Economics	High	High costs; depressed farm economy
Fisheries	High	Weiser River and Snake River
Highly Erodible Cropland	Moderate	Most based on sheet and rill erosion
Human Health & Safety	High	Nitrate and bacteria levels in wells are a concern. Trend is upward for nitrates
Land Use	Moderate	Cropland loss; county concerned
Nutrients	High	Ground and surface water quality
Odors and flies from animal waste	Moderate	Dairies, beef and dairy heifer feedlots
Prime Farmland	Moderate	Cropland loss; county concerned
Recreation & Aesthetics	Moderate	Weiser and Snake Rivers protection
Sediment Delivery to both Rivers	High	Impacts Surface Water Quality
Erosion of Cropland and Productivity Loss	High	Loss of soil base; increased fertilizer and water use
Sedimentation	Moderate	Sediment removal costs to Canal Co.
Soil Condition	High	Crop rotations and tillage practices that decrease soil condition are a concern
Soil Erosion & Sediment Delivery	Moderate	Irrigation-induced erosion
Threatened and Endangered Species	High	Several species listed
Water Quality, Surface	High	Impacts to 303(d) listed rivers and streams with TMDLs in place
Water Quality, Ground	High	Upward trend for nitrate and bacteria levels. Eleven small PWS in area
Wetlands	Moderate	Water quality problems degrade wetlands and habitat
Wildlife Habitat	High	Water quality impacts to habitat, prey base
Wildlife Habitat - Aquatic	High	Habitat loss due to poor water quality

Cultural Resources

Cultural resource sites are known to exist in the project area and include historic and prehistoric sites. Engineering plans and construction will be designed to avoid or minimize impacts to known sites to the extent possible. A potential for encountering unknown cultural resource sites during planning and construction activities exists in the watershed.

Practices such as buried pipelines and sediment basins have the greatest potential for ground disturbing activities which may impact cultural resources. To ensure that the effects of conservation activities on historic properties are thoroughly considered and that cultural resource protection is accomplished efficiently, procedures contained in the NRCS National Programmatic Agreement, GM-420, Part 401 and the Idaho NRCS State Level Agreement will be followed for all planning and installation of conservation practices.

Crops

Washington County is one of the largest onion producing counties in Idaho. This project area has an agricultural economy based chiefly on row crops, hay and livestock. The major crops grown in the area are hay, silage, onions, wheat, sugar beets, potatoes, corn, barley, beans and specialty crops. Minor crops include oats (mainly a nurse crop for alfalfa) and seed crops. Irrigation is required to produce all major crops.

Most cropland receives commercial fertilizer and some receives animal waste except for the row crop acres. Onions, potatoes and sugar beets are the most heavily fertilized crops and receive the largest amounts of pesticides. Onions, potatoes, sugar beets and alfalfa hay are the most economically important crops. Nearly all cropland includes either wheat or barley in the rotation. Table I illustrates crop yield and acreage for the project area.

Table I. Yields & Acres of Major Crops Grown in the Lower Weiser Watershed

Crop	Average Yield/Acre	Average Acres
Alfalfa	6.0 tons	4,700
Barley	100 bu.	2,100
Dry beans	23 cwt.	1,100
Corn (grain)	138 bu.	2,100
Corn (silage)	26 tons	(combined with grain corn)
Onions	600 cwt.	2,500
Pasture	4.0 tons	1,500
Poplar tree		110
Potatoes	450 cwt.	600
Sugar beets	31 tons	2,100
Wheat (spring)	110 Bu.	(combined with winter wheat)
Wheat (winter)	110 Bu.	4,200

Source: University of Idaho Cooperative Extension Service Washington County, 2001 Idaho Census of Agriculture, 2003

Fisheries

Fisheries management emphasis during the last decade or more in the Weiser River sub-basin and elsewhere in the region tended to be focused on salmonids due to their historic dominance, social value, and a general association with higher quality habitats. The presence of these species is generally considered an indicator of high quality aquatic ecosystems and habitats.

Assessments of native salmonids (steelhead trout, *Oncorhynchus mykiss*, Chinook salmon, *O. tshawytscha* and sockeye salmon, *O. nerka*) across watersheds throughout the Columbia River Basin (ICBEMP 1997) suggest that the Weiser River sub-basin contained anadromous salmonid habitat and a high proportion of species strongholds relative to other sub-basins in the region. Many of the sub-watersheds within the sub-basin supported strong populations of one or more native species of non-anadromous salmonids, including populations with large fluvial (migratory) adults. The installation of the Hells Canyon complex of dams from the late 1950s through the late 1960s effectively eliminated anadromous salmonids from the Weiser River. Anadromous Pacific lamprey are also thought to be present in the Weiser River sub-basin prior to construction of the Hells Canyon Dam complex (NWPPC 2002).

Native Fish:

Bull Trout (*Salvelinus confluentus*)
Bull trout have more specific habitat requirements than most other salmonids. Habitat components that are critical to bull trout distribution and abundance include water temperature, cover, channel form and stability, substrate for spawning and rearing, and migratory corridors. Bull trout prefer colder streams and require colder water than most other salmonids for incubation, juvenile rearing, and spawning. Spawning and rearing areas are often associated with cold-water in the hyporheic (bottom) zone of the stream. Bull trout prefer complex forms of cover, including large woody debris, undercut banks, boulders, and pools. Spawning and early rearing bull trout require loose, clean gravel relatively free of fine sediments. Bull trout use migratory corridors to move from spawning and rearing habitats to foraging and over-wintering habitats and back. Different habitats provide bull trout with diverse resources, and migratory corridors allow local populations to connect, which may increase the potential for gene flow between populations (FWS 2002).

Bull trout located in the Weiser River are primarily resident life history forms. Bull trout have been located in headwater streams of the Little Weiser River, in the Middle Fork Weiser River, the upper Weiser River and Hornet Creek (2000) watersheds. Bull trout were also found in areas of the Middle Fork Weiser River during surveys in 1997. Habitat fragmentations resulting from dams, irrigation diversions and road crossings have isolated fluvial bull trout into the headwater streams of the Weiser River system. Numerous land use alterations combined with the elimination of key ecological functioning species (i.e., anadromous fish) have changed the species composition of the lower Weiser River (FWS 2002). There is no evidence of bull trout in the Weiser River within the project area.

Redband/rainbow trout (*Oncorhynchus mykiss*)
Redband trout are defined as all wild native rainbow trout east of the Cascade Range in the Columbia Basin. In Idaho, all native rainbow trout (including steelhead) are considered redband trout (Behnke 1992). Redband trout are listed as a species of special concern by the State of Idaho (Idaho Code 13.01.06) and the U.S Fish and Wildlife Service (NWPPC 2002).

Trout are adapted to cold water and typically cease feeding when water temperatures exceed 22°- 25°C (72° - 77°F). However, native redband trout from northwest Nevada, southwest Idaho and southeast Oregon appear to be adapted to considerably warmer temperatures (Behnke 1992). Anadromous redband trout (steelhead) were eliminated from the project area by the construction of dams on the Snake River. Redband trout historically utilized the lower Weiser River during their spawning migration to sub-basin tributary streams. The installation of the Galloway Canal irrigation diversion dam in the early 1900's presented an obstacle for migrating trout. Anecdotal information from local residents suggests that each spring, migrating redband trout and sucker fish can be seen leaping over the Galloway diversion dam. Redband trout are known to be widespread and common throughout most of the Weiser River sub-basin (NWPPC 2002).

Largescale sucker (*Catostomus macrocheilus*)
The largescale sucker is a common species found throughout the Snake River drainage upstream to Shoshone Falls. The preferred habitat of these fish is cold, fast flowing water of small rivers with gravel to rocky substrate. Spawning takes place in the spring with the fish searching out sandy areas of the river. It is likely that the bridgelip sucker is also within the project area of the Weiser River as well as Hog Creek, Scott Creek, Jenkins Creek and Warm Springs Creek (Simpson and Wallace 1982).

Shorthead sculpin (*Cottus confuses*)
Shorthead sculpin inhabit cold, fast riffles in streams with gravel and rubble, but sometimes in slower water. In some localities, this species is more abundant in headwaters of drainages than other sculpin species; elsewhere, the pattern is the opposite (DRAFT Boise Payette Weiser Sub-basin Assessment 2/24/2004). It is likely that sculpin inhabit the Snake River and could be found in tributaries within the project area during the spring. Sculpin are prey species that would be targeted by redband trout (Simpson and Wallace 1982).

Mottled sculpin (*Cottus bairdi*)
Mottled sculpin are a common fish species, found in greatest abundance in riffle areas of fast-flowing streams with clear water and rocky (gravel or rubble) substrate. It is a bottom-dwelling species, often found under or between rocks. They tend to eat a variety of foods, including immature aquatic insects of at least six orders, crustaceans, small sculpin, fish eggs, annelids and plants. It is likely that sculpin inhabit the Snake River and could be found in tributaries within the project area during the spring. Mottled sculpin are prey for a number of salmonid species including redband trout (Simpson and Wallace 1982).

Longnose Dace (*Rhinichthys cataractae*)
Longnose dace are common throughout Idaho. They occur in moving water found within many rivers and creeks. Spawning takes place when water temperatures approach 50°F. Their diet consists primarily of bottom-dwelling aquatic insects or worms. Longnose dace are slow growing and average 4 – 5 inches in length. They are an important forage species of salmonids and bass (Simpson and Wallace 1982).

Non-native fish:

Bluegill (*Lepomis macrochirus*)
Bluegills are known to be in the project area of the Snake River. Generally favoring warm water, bluegill growth can be limited by the colder water found in much of Idaho. In the project

area, they can be found in the lower Weiser River and the pools of the Snake River complex dams (Simpson and Wallace 1982).

Black Crappie (*Pomoxis nigromaculatus*)
The black crappie, widely introduced throughout Idaho, is fished in the late spring to early summer. They feed on crustaceans, insects, minnows and small fish, are known to be in the Snake River system below Shoshone Falls, and are found within the project area (Simpson and Wallace 1982).

Smallmouth bass (*Micropterus dolomieui*)
First introduced into Idaho in 1905 by the U.S. Bureau of Fisheries, presently they are distributed throughout much of the Snake River and its tributaries. They prefer cool water in rivers with large riffle areas and clean gravel or rubble substrates. They are popular with anglers as excellent sport fish. They are known to be in the Snake River system below Shoshone Falls and are found within the project area (Simpson and Wallace 1982).

Largemouth bass (*Micropterus salmoides*)
The first recorded introduction of largemouth bass in Idaho occurred in 1887 when an individual stocked some private ponds in Boise. In 1892 the U.S. Fish Commission released over 1,500 fingerlings into the Boise River and they are currently found over much of the state. They prefer warmer water (above 60ºF) than salmonids. Being voracious feeders, they prey on numerous fish, amphibians and insects. They are popular with anglers as excellent sport fish. They are known to be in the Snake River system below Shoshone Falls and found within the project area (Simpson and Wallace 1982).

Human Safety and Health

Nitrate is the most widespread ground water contaminant found in the project area, with health concerns associated with elevated levels. Infants are susceptible to high nitrate levels in ingested water. Exposure can lead to methemoglobinemia ("blue baby syndrome"), an oxygen deficiency that can cause illness or death. Elevated nitrate levels in drinking water have potentially been linked to non-Hodgkin's lymphoma, gastric cancer, hypertension and thyroid disorders. The effects of chronic exposure to nitrate levels in drinking water are unknown. Elevated arsenic levels, which can cause skin damage and circulatory problems, have been identified in some area wells, but appear to originate from natural geologic sources. Microorganisms are also of concern when present in drinking water (and surface water where contact occurs), causing gastrointestinal illness and other diseases. A number of pesticides have also been detected in area wells. These pesticides can cause eye, liver, kidney, spleen, cardiovascular and/or reproductive problems and are associated with increased cancer risk. To date, only one pesticide detection exceeded the drinking water standard.

Irrigation

Irrigation is critical to the cropping culture and productivity of the project area. The area is favored with an adequate irrigation water supply in most years. As discussed in the Surface Water Resources section, there are many surface sources of irrigation water. The majority of irrigation water used within the project area is delivered through the Galloway and Sunnyside Canals which divert Crane Creek and Weiser River waters from the Weiser River on the east side of the project area. Crane Creek Reservoir, located outside the project area, provides

significant water during the peak use months of the growing season. The Lower Payette Ditch delivers water into the area from the lower Payette River to the south. In addition to those surface sources, irrigation water is also drawn from the streams to the north, the Snake River and from wells.

Given the relatively reliable and abundant water supply, water measurement in the project area is not extensive. Although in 1993 and 1994 the Weiser Irrigation District mandated the use of irrigation water measuring devices on those farms served by the Galloway Canal, much of the irrigated acreage in the project area is not measured "at the farm."

There are approximately 53 miles of constructed canals and 94 miles of natural streams and rivers in the watershed (Appendix A, Map 2). Many of these systems, especially the natural drainages and canals, convey irrigation return flows for downstream re-use. Some water is reused more than once.

It is generally accepted that the surface and ground water resource problems within the project area can be partially attributed to irrigation systems and management of those systems. Over-irrigation leads to deep percolation and translocation of mobile nutrients, like nitrate, and certain pesticides below the root zone. Impacts are exacerbated by the seasonal high water table and sandy soils in some areas.

Irrigation Types:

Surface, sprinkler, and micro irrigation systems are all utilized. The majority of cropland is surface irrigated with siphon tubes and efficiency is generally low on this acreage. Evaluations of irrigation practices on row crops show seasonal water application at 2 - 2.5 times the crop consumptive use requirement. Using "surge" irrigation techniques with gated pipe, are becoming more popular. Sprinkler systems are more common in the Weiser Cove area but are becoming popular throughout. Sprinkler irrigated cropland does not usually contribute runoff if the system is properly set up and maintained, but can contribute to deep percolation if not properly managed. Micro irrigation is also becoming more popular as onion growers realize economic benefits of larger, more uniform crops in addition to reduced water and fertilizer use. As noted earlier, very few onions are grown under sprinkler irrigation. Table J shows land use by irrigation type.

Table J. Irrigated Acres by Land Use and Irrigation Method in the Weiser and Lower Snake River Watersheds

Land Use	Surface Irrigation (including surge)	Sprinkler Irrigation	Micro Irrigation	Totals
Cropland	18,560	4,900	900	24,360
Pastureland	1,340	160	0	1,500
Totals	19,900	5,060	900	25,860

Surface Irrigation:

Surface irrigated lands predominate the Weiser Flat and Sunnyside areas and are basically managed the same. Approximately 85% of the surface irrigated acres have improved irrigation water distribution systems. Eighty percent of the total is irrigated with siphon tubes or gated pipe. Five percent are managed using surge valves leaving approximately 15% of the systems utilizing earthen ditches.

A typical surface irrigated farm is 385 acres in size and the crop rotation consists of winter wheat, sugar beets and onions. Other crops such as barley, beans and corn are raised occasionally and are not considered part of the regular rotation. When onions are grown, the growers prefer surface or micro irrigation since those raised under sprinklers have a greatly reduced storage life.

Irrigation water application efficiency under surface irrigation using siphon tubes or gated pipe, without surge controllers, is estimated at 40%. This is explained with approximately 30 - 50% of the water running off the end of the field, and 15 - 35% deep percolating through the root zone. The average tailwater loss of different furrow systems at different times during the irrigation season is 40%. (Trout and Mackey 1988). A furrow irrigator must generally have runoff for at least 30% of the irrigation time in order to supply adequate water to 80% of a field (Trout 1990).

Surface irrigation that runs off the end of the field (or even some of the deep percolation) is often captured in drains to become return flow. These return flows are then reused throughout the system, perhaps many times. Tail water recovery systems that capture runoff and then pump it back uphill to be reused have been introduced recently and are becoming more popular. However, most irrigation runoff enters the natural drains and eventually ends up in the Weiser or Snake Rivers.

Sprinkler Irrigation:

Sprinkler irrigation is more prevalent in the Cove area, although there is an increase in sprinkler installation occurring throughout the project area. A typical sprinkler irrigated farm is 385 acres in size and follows a two year winter wheat and six year alfalfa rotation. Crop management is intensive, providing 120 bushels to the acre for winter wheat and 6 tons to the acre for alfalfa during an average growing season. Most of these systems are hand or wheel lines so corn is not grown. Concerns with onions have already been mentioned.

The seasonal application efficiency of these systems runs from 50 - 85%; 10 - 35% of the applied water is deep percolated and 5 - 15% is lost to evaporation and wind drift. These figures are based on system evaluations conducted for a number of sprinklers located in the project area. Runoff may occur when these systems apply more water than can infiltrate. This might happen when nozzles become worn or when systems are not designed to field and soil conditions. Typically, runoff on these acres generally does not occur from snow melt or normal rainfall amounts.

Some producers are beginning to use soil moisture monitoring tools such as tensiometers, gypsum blocks, or Granular matrix sensors (Watermark soil moisture sensors) for irrigation scheduling. Most producers do not monitor soil moisture. They depend on a schedule established by the supply ditch or canal company.

Micro Irrigation:

Onions are more commonly being irrigated with subsurface drip irrigation (SDI). The tape is installed from 1 - 3 inches deep in most cases. With good design and product selection, micro irrigation can produce application efficiencies of 90% or better. In general, irrigation water management is much higher under this type of system. Many of the growers utilizing SDI also are using soil moisture monitors, data loggers and the Agrimet regional weather system.

Irrigation Water Budget:

Estimates of crop consumptive use[2] and net irrigation requirements (Table K) for the project area were developed with the NRCS computer program *Irrigation Water Requirements*. The Blaney-Cridle method[3] was utilized with climatological data based on the Weiser 2 SE weather station period of record 1961-90. Average effective precipitation was subtracted from the total crop consumptive use to arrive at net irrigation requirements.

Table K. Crop Consumptive Use and Net Irrigation Requirement

Crop	Average Annual Crop Area (acres)	Annual CU (inches)	Annual Effective Precipitation (inches)	Annual Net Irrigation Requirement (inches)	Annual On-Farm Net Irrigation Requirement (acre-ft)
alfalfa	5,400	33.6	2.5	31.1	13,995
small grains	7,200	17.8	2.2	15.6	9,360
onions	3,500	24.2	1.9	22.3	6,504
sugar beets	3,000	30.3	2.1	28.2	7,050
dry beans	1,500	18.4	1.1	17.3	2,163
corn	2,760	20.2	1.2	19.0	4,370
Miscellaneous (1)	1,000	22.5	1.8	20.7	1,725
pasture	1,500	30.0	2.9	27.1	3,388
Project	25,860				48,554

(1) Includes potatoes, truck garden crops and alfalfa and onion seed.

On-Farm Inefficiencies

On-farm inefficiencies associated with on-farm conveyance losses, runoff, deep percolation and evaporation/wind drift loss require more water be diverted onto the farm than the total Net Irrigation Water Requirement. Table L. summarizes water delivered to individual farms but not available to meet crop consumptive use demands. Inefficiency estimates are based on information from the 2000 NRCS Preliminary Investigation Report, interviews with operators in the project area, measurements and field trials from the area, analysis with NRCS surface irrigation simulation software SRFR and professional judgment.

Efficiencies in the project area are dependent upon crop and system types because irrigation water management tends to change with crop type. Further, certain systems are preferred for use with certain crops; for example, onions are normally either drip or surface irrigated, but not sprinkler irrigated.

[2] Also referred to as evapotranspiration (ET or Et), water use requirements, and CU
[3] See NRCS's National Engineering Handbook, Part 623, Chapter 2 and NRCS's Technical Release 21.

It must be pointed out that on-farm water use that addresses inefficiencies cannot, in summation, be translated directly into project area "losses." This is because much of the "loss" - primarily runoff but also deep percolation - in project acreage is recaptured in open drains and used on separate acreage (Table L.).

Off-farm Inefficiencies

An estimate of off-farm conveyance system efficiencies was not attempted for this project. Two primary reasons are: 1) although some data for on-farm and primary diversions are available, it was not considered extensive or accurate enough to use for a water balance calculation, and 2) the reuse of water with and among systems is a barrier to accurate calculations. It is assumed that relatively large losses, approximately 40 - 50% or more, may be experienced within the project area due to the relative abundance of water and the permeable soils through which the canal systems run.

Table L. On-Farm Irrigation Inefficiencies

System Type	Project Area (acres)	Crop	Annual Net Irrigation Requirement (inches)	Application Efficiency (% Runoff + % Deep Percolation + % Drift)	LOSSES: Water Used to Meet On-Farm Inefficiencies (acre-ft/yr)
Surface- earthen ditch w/ siphon tubes or other turnouts	3,420	Everything but onions	22.6	25% (50 + 25 + 0)	19,323
Surface- gated pipe or ditch w/ siphon tubes	15,900	Everything but pasture	22.2	40% (45 + 15 + 0)	44,123
Surface- gated pipe w/ surge controllers	580	Everything but pasture	22.2	75% (15 + 10 + 0)	358
Subtotal	**19,900**				
Center Pivot or Linear	1,000	Everything but onions	22.6	80% (0 + 15 + 5)	471
Solid Set Sprinkler	1,000	Everything but onions & corn	23.1	75% (0 + 15 + 10)	642
Periodic Move Sprinkler	3,060	Everything but onions & corn	23.1	65% (0 + 20 + 15)	3,172
Subtotal	**5,060**				
Micro	900	Onions	22.3	90% (0 + 10 + 0)	186
Total Irrigated Land	**25,860**				68,273

Land Use Management and Production - Treatment Units

Treatment units have been developed according to land use and method of irrigation (Appendix A, Map 4.). Four treatment units have been identified in the Southern Washington County Water Quality Project area, listed in Table M and discussed in the following section.

Table M. Treatment Units in the Southern Washington County Watershed

Treatment Unit	Acres	Percent of Project Area
TU #1 – Surface Irrigated Cropland on 0 - 4% slopes	19,460	54
TU #2 – Sprinkler Irrigated Cropland on 0 -10% slopes	4,900	14
TU #3 – Pastureland on 0 -10% slopes		
Surface irrigation	1,340	4
Sprinkler irrigation	160	.5
TU #4 – Animal Feeding Operations (AFO/CAFOs)	500	1.5
Other Lands	9,440	26
Total	**35,800**	**100**

The most significant difference between treatment units 1 and 2 is method of irrigation. Treatment units 1 and 2 have ground and surface water quality problems associated with a lack of nutrient management, inefficient irrigation systems, poor irrigation water management and irrigation induced erosion. Pasturelands have water quality problems associated with runoff to ditches, overgrazing, livestock watering and utilizing ditches to which they have free access. The following pages comprise a summary description of each treatment unit in the watershed.

Treatment Unit 1 -- Surface Irrigated Cropland on 0 to 4 Percent Slopes:

Acres: 19,460

Slopes: 0 - 4% (level to gently sloping)

Soils: Greenleaf silt loam, Baldock silt loam, Power-Purdum silt loam, Bissell loam, Jenny clay, Clems fine sandy loam, Moulton fine sand. Poorly drained soils and high water tables are present in the treatment unit.

Irrigation: Surface Irrigation: 19,460 acres (feed/earthen/cement ditch, gated pipe, gated pipe with surge and drip irrigation)

Tillage: Conventional: clean tillage with moldboard plow typical.
Some farmers use Residue Management – seasonal or mulch till

Nutrients: Commercial nitrogen/phosphorus with over-application and inefficient irrigation systems

All of the surface irrigated acres are typically managed the same. A typical surface irrigated farm is 385 acres, with a crop rotation consisting of winter wheat, sugar beets and onions.

Other crops such as barley, beans, corn and potatoes are raised occasionally and are not considered part of the regular rotation. The greatest market value for onions is dependent on uniform shape and a large size. They can be grown under sprinklers but storage life is greatly reduced. For optimum production, 30 inches of net irrigation water is typically applied to onions.

Soil Conditions: Soil Condition Index (SCI) ratings indicate the typical crop rotations and tillage management systems of winter wheat, onions and sugar beats with intensive inversion tillage for surface irrigated cropland have an overall negative effect on soil quality ratings. A value of 0 is indicative of soil maintenance and a positive score shows soil regeneration. The overall score was –0.51 which indicates that the current rotation and tillage system has an overall negative effect on soil condition. There are several options that could be considered which would change the index to a soil building or positive value. The option evaluated to represent the planned condition added a year of grain to the rotation, and converted the surface irrigation system to a drip irrigation system and reduced the number of onion cultivations. This scenario results in a positive soil condition index of 0.08. While positive, it is barely meeting minimum requirements. Some producers may be required to make more extensive changes in tillage or rotation in order to obtain a positive index.

Soil Erosion: Soil erosion was evaluated using three prediction models; the Revised Universal Soil Loss Equation (RUSLE2), the Wind Erosion Equation (WEQ) and the Surface Irrigation Soil Loss (SISL) model. RUSLE2 determines average annual erosion from natural precipitation and snowmelt while WEQ determines average annual soil loss due to wind erosion. The average soil erosion, using RUSLE2, resulted in a range from 0.1 tons/acre/year to 1.2 tons/acre/year. The average wind erosion using WEQ is 1.2 tons/acre/year. The average erosion from surface irrigation using SISL is 2.6 tons/acre/year. The soil resource concern is from the combination of all three types of erosion resulting in an average of 4 to 5 tons/acre/year. Soil loss tolerance levels for soils within the project area range from a “T” value of 3 to 5 tons/acre/year. The majority of the soils in the project area have a “T” value of 5 tons/acre/year. These erosion rates are not considered greatly accelerated from typical “natural” erosion rates for the area. However, soil erosion is considered a resource concern, since most of the sediment generated from this treatment unit is delivered to local water bodies.

TU 1: Erosion and Sediment Summary (annual)

Erosion	Rate tons/ac	Acres	Total Sediment Yield (tons)
Irrigation-induced	2.6	19,460	50,596
Sheet/Rill (averaged)	0.7	19,460	13,622
Wind	1.2	19,460	23,352
Totals			**87,570**

Nutrient Management: When soil tests for nutrient analysis are completed, samples are generally taken only from the first foot of the soil profile. Recommendations from the University of Idaho (U of I) and USDA – NRCS are to annually conduct soil nutrient testing at both the first and second foot of the soil profile. Fertilizer guides developed at the U of I may or may not be followed in the project area. In general, nutrient management techniques would not meet the current Idaho nutrient management standard (590). Fertilizer applications and use of pesticides have impacted the area’s aquifer. Activities of concern include use of pesticides with high risk potential, application of chemicals without validation of need, (no integrated pest management

IPM), over-application of fertilizer due to lack of a nutrient management plan (NMP) and/or replacement of leached nutrients for high nitrogen demand crops due to over-irrigation. Evaluations of fertilization and irrigation practices on row crops show high levels of fertilizer application, and irrigations at 2 - 2.5 times the crop consumptive use requirement.

Over-irrigation leads to deep percolation and translocation of mobile nutrients, like nitrate and certain pesticides, below the root zone. Impacts are exacerbated by the seasonal high water table and sandy soils in some areas. Inefficient application of irrigation water by surface or sprinkler irrigation systems is a problem, and irrigation does not generally meet NRCS standards. The majority of cropland is surface irrigated with siphon tubes and irrigation efficiency and irrigation water management (IWM) are low. It is estimated that 30-50% of surface applied irrigation runs off the end of fields and 15-35% deep percolates below the root zone.

Cultural Management – Surface irrigation: Fertilizer rates typically range from 275 lbs/acre of nitrogen on beets to 350 - 450 pounds/acre for onions. Onions are irrigated every 4 days on average during the peak consumptive-use period. Phosphorus application for both crops is typically 100 - 130 pounds. The potassium rate of application is 150-180 lbs/acre.

Water Quality Implications: Runoff from surface irrigated fields carries sediment, nutrients and pesticides off-site; most eventually end up in the Weiser and Snake Rivers. Over-irrigation causes deep percolation of water through the soil profile and into the shallow aquifer, carrying soluble nutrients and pesticides. Table N displays the typical pesticides used in crop production for TU 1. The table also identifies the surface and ground water quality risks of each product based on the WIN-PST program.

Critical Resource Problems: Irrigation-induced erosion has been identified as a primary resource problem on irrigated cropland in the Project area, and is supported by Idaho Department of Environmental Quality (IDEQ) monitoring data. The lack of irrigation water management, pest management and nutrient management on surface irrigated cropland are the other major resource problems in the project area. All surface irrigated cropland acres are considered critical for treatment.

TU 1: Critical Resource Problems, Symptoms and Causes

Resource Problems and Symptoms	Causes
Irrigation Induced Erosion:	
Sediment contamination of surface waters	Inefficient irrigation systems, clean tillage, surface irrigation
Nutrient/pesticide loading of ground/surface waters	Excess N & P applied from fertilizer and animal waste, surface irrigation, poor IWM
Reduced cropland productivity, increased production costs, crusting & poor emergence, decreased soil conditions or soil quality	Topsoil & organic matter loss Crop rotations and tillage practices are impacting soil quality

Table N. Hazard Ratings of Pesticides Typically Used in Treatment Unit 1

Common Name	Active Ingredient	Intermediate Hazard Rating (or greater) *Based on WIN-PST*		
		Leaching Risk	Runoff Risk	Erosion Risk
INSECTICIDES/NEMATICIDES/FUNGICIDES		**H = Hazard to Humans F = Hazard to Fish/Aquatic Life**		
Counter CR	Terbofos	H F	H F	F
Declare	Methyl parathion	H* F*	H F	
Dithane DF	Mancozeb	H* F*	H F	
Headline EC	Pyraclostrobin	F*	F	
Kocide	Copper hydroxide	F*	F	
Lannate LV, SP	Methomyl	F	F	
Lorsban 4E	Chlorpyrifos	H* F	H F	
Mankocide	Mancozeb + Copper hydroxide	H F	H F	
Mustang	Diquat bromide		H	
Orthene	Acephate	H*	H	
Parathion	Methyl parathion	H F	H F	
Penncap-M	Methyl parathion	H F	H F	
Ridomil Gold EC	Mefenoxam	F*	F	
Sul-Preme	Sulfur			
Telone C-15,C-17, C-35	1,3 – dicloropropene + Chloropicrin	H F*	H F	F
Temik 15G	Aldicarb	H F	H F	F
Vapam	Metam-sodium	H F*	H F	F
Warrior 1EC Zeon	Lambda-cyhalothrin	H* F	H F	
HERBICIDES				
Betamix	Phenmedipham + Desmedipham			
Bison	MCPA + bromoxynil	H* F*	H F	
Bronate 4,5 EC	Bromoxynil + MCPA	H* F*	H F	
Buctril	Bromoxynil	H* F*	H F	
Dual	Prometon			
Dual Magnum	S-metalochlor	F*	F	
Goal 2E	Oxyfluorfen	H*	H F	
Harmony	Thifensulfuron			
Poast	Sethoxydm			
Progress B	Betamix + Ethofumesate	F*	F	
Prowl 3.3 EC, DG	Pendimethalin	F*	F	
Puma 1 EC	Fenoxaprop	H* F*	H F	
Raptor	Imazomox			
Roundup, Pro	Glyphosate			
Stinger	Tetramethrin	F	F	F
Treflan HFP	Trifluralin	H F	H F	
Upbeet	Triflusulfuron	H*	H	

*** Hazard exists ONLY where a high water table exists for typical soils in the area.**

Treatment Unit 2 -- Sprinkler Irrigated Cropland on 0 to 10 Percent Slopes:

Acres: 4,900

Slopes: 0 – 10% (level to strongly sloping)

Soils: Greenleaf silt loam, Baldock silt loam, Power-Purdum silt loam, Bissell loam, Jenny clay, Clems fine sandy loam, Moulton fine sand. Poorly drained soils and high water tables are present in the treatment unit.

Irrigation: Sprinkler irrigation: 4,900 acres (hand lines, wheel lines and center pivots)

Tillage: Conventional: clean tillage with moldboard plow typical
Some farmers use Residue Management – seasonal or mulch till.

Nutrients: Commercial nitrogen/phosphorus – over-application

All of the sprinkler irrigated acres are typically managed the same. A typical sprinkler irrigated farm is 385 acres, with a crop rotation consisting of 6 years of alfalfa followed by two years of grain. Other crops such as barley, corn and potatoes are raised occasionally and are not considered part of the regular rotation.

Soil Conditions: Soil Condition Index (SCI) ratings indicate the typical crop rotations and tillage management systems for sprinkler irrigated cropland have an overall positive effect on soil quality ratings. The overall score was + 1.81. This soil condition index indicates that the cultural practices followed on this treatment unit have a positive impact on soil condition.

Soil Erosion: Sheet and rill erosion, wind erosion and irrigation induced erosion were evaluated and shown not to be a resource concern on this treatment unit.

Nutrient Management: Soil samples for nutrient analysis are generally taken from the first foot of the soil profile only. Recommendations from the University of Idaho (U of I) and USDA – NRCS are to annually conduct soil nutrient testing at both the first and second foot of the soil profile. Fertilizer guides developed at the U of I may or may not be followed in the project area. In general, nutrient management techniques would not meet the current Idaho nutrient management standard (590).

Cultural Management – Sprinkler irrigation: Fertilizer rates are typically 275 lbs/acre of nitrogen on beets, phosphorus typically 100 - 130 lbs/acre and potassium is 150 - 180 lbs/acre. Crop management is intensive providing 120 bushels/acre for winter wheat and 6 tons/acre for alfalfa during an average growing season.

Water Quality Implications*:* All sprinkler irrigated cropland in the area has the potential to impact ground water quality. Over-irrigation causes deep percolation through the soil profile and into the shallow aquifer, carrying soluble nutrients and pesticides. Improper application of animal waste to cropland is a potential water quality threat, especially on steep slopes subject to overland flow. Table O. displays the typical pesticides, used in crop production for TU 2. The table also identifies the surface and ground water quality risks of each product based on the WIN-PST program.

Table O. Hazard Ratings of Pesticides Typically Used in Treatment Unit 2

Common Name	Active Ingredient	Intermediate Hazard Rating (or greater) *Based on WIN-PST*		
		Leaching Risk	Runoff Risk	Erosion Risk
INSECTICIDES/NEMATICIDES/FUNGICIDES		**H = Hazard to Humans F = Hazard to Fish/Aquatic Life**		
Lorsban 4E	Chlorpyrifos	H* F	H F	
Mustang	Diquat bromide		H	
HERBICIDES				
2,4 D amine	2,4 -dichlorophenoxy acetate (amine)			
Ally	Metsulfuron			
Banvel + 2,4 D	Dicamba			
Bronate 4,5 EC	Bromoxynil + MCPA	H* F*	H F	
Gramoxone Extra, Max, Super	Paraquat dichloride	H	H	
Puma 1 EC	Fenoxaprop	H* F*	H F	
Raptor	Imazomox			
Roundup, Pro	Glyphosate			
Velpar	Hexazinone			
Velpar Alfamax	Hexazinone + Diuron	H* F*	H F	

*** Hazard exists ONLY where a high water table exists for typical soils in the area.**

Critical Resource Concerns: Nitrate contamination has been identified as a primary resource problem in the project area from improper waste utilization and over application of fertilizers.

All irrigated cropland acres are considered critical for treatment due to poor irrigation water management, pest management and nutrient management.

TU 2: Critical Resource Problems, Symptoms and Causes

Resource Problems and Symptoms	Causes
Nutrient/pesticide loading of ground waters Nitrate contamination of ground water	Excess N & P applied, inefficient irrigation systems, improper IWM

Treatment Unit 3 -- Surface and Sprinkler Irrigated Pastureland on 0 to 10 Percent Slopes:

Acres: 1,500

Slope: 0 – 10% (level to strongly sloping)

Soils: Greenleaf silt loam, Baldock silt loam, Power-Purdum silt loam, Bissell loam, Jenny clay, Clems fine sandy loam, Moulton fine sand. Poorly drained soils and high water tables are present in the treatment unit.

Irrigation: Surface irrigation - 1,340 acres (89%) (feed/earthen/cement ditch, gated pipe)
Sprinkler irrigation - 160 acres (11%) (hand/wheel lines)

Nutrients: Some dairies and AFO/CAFO operations over-apply waste to pastureland. There is some application of chemical fertilizer or agricultural chemicals to pastureland.

Management Practices: Overall, proper nutrient management may occur on 30% of the fields fertilized. Fertilizing pastures may be as high as 50% of the fields, although the actual rates will vary significantly. The average application rate is 80 units of nitrogen, typically applied in the spring.

Weed control varies particularly in Weiser Flat and the river bottoms of Weiser Cove. The pesticides of choice are 2,4-D or 2,4-D/Banvel, with some use of Ally where persistent perennial weeds are a problem. Table P displays the typical pesticides used in TU 3. The table also identifies the surface and ground water quality risks of each product based on the WIN-PST program.

Nutrient and pesticide applications are not excessive. Irrigation water may be over-applied in some locations but nutrient and chemical leaching are minimal. Due to long-term vegetative cover these sites have negligible soil loss from erosion.

Water Quality Implications: Improper application of animal waste to pastureland is a concern to ground and surface water quality, especially when the pasture is surface irrigated. Concentrations of soil nutrients, organics from animal wastes and fertilizer from irrigation runoff are the major resource concerns.

All irrigated pasture acres are considered critical for treatment due to poor irrigation water management, pest management, prescribed grazing and nutrient management.

Table P. Hazard Ratings of Pesticides Typically Used in Treatment Unit 3

Common Name	Active Ingredient	Intermediate Hazard Rating (or greater) *Based on WIN-PST*		
		Leaching Risk	Runoff Risk	Erosion Risk
INSECTICIDES/NEMATICIDES/FUNGICIDES		**H = Hazard to Humans F = Hazard to Fish/Aquatic Life**		
Furadan 4F	Carbofuradan	H F	H F	F
Lorsban 4E	Chlorpyrifos	H* F	H F	
Mustang	Diquat bromide		H	
Warrior 1EC Zeon	Lambda-cyhalothrin	H* F	H F	
HERBICIDES				
2,4 D amine	2,4 -dichlorophenoxy acetate (amine)			
Ally	Metsulfuron			
Banvel + 2,4 D	Dicamba			
Bronate 4,5 EC	Bromoxynil + MCPA	H* F*	H F	
Gramoxone Extra, Max, Super	Paraquat dichloride	H	H	
Puma 1 EC	Fenoxaprop	H* F*	H F	

*** Hazard exists ONLY where a high water table exists for typical soils in the area.**

TU 3: Critical Resource Problem, Symptoms and Causes

Resource Problems and Symptoms	Causes
Animal Waste Management	
Nutrient and organics loading and bacteria contamination of surface water	Cattle in or near ditches or other improper grazing; improper irrigation water management.
Nutrient loading and bacteria contamination of ground water	Improper irrigation, improper grazing, over-application of animal wastes

Sediment Delivery Ratios:

Sediment delivery ratios (SDRs) were estimated for treatment units (TU 1-3) based on proximity to surface water, density of surface drainage, irrigation return flows, relative topography and soil textures.

	Average SDR	Average SDR of Channels
TU 1	**25%**	**95%**
TU 2	**5%**	**85%**
TU 3	**15%**	**90%**

Treatment Unit 4 – Animal Feeding Operation – AFO/CAFO:

National Definition

AFO: The term "animal feeding operation" or (AFO) is defined in EPA regulations as a "lot or facility" where animals "have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility", and does not discharge to the "Waters of the U.S. and/or Waters of the State".

CAFO: Large:
A large CAFO is defined as a lot or facility where animals are confined more than 45 days, and have 700 or more dairy cattle, or 1,000 or more beef cattle or heifers or 10,000 or more sheep or lambs.

CAFO: Medium
A medium CAFO is defined as a lot or facility where: 1) animals are confined more than 45 days, 2) all or portion of the site does not support perennial vegetation or annually seeded cover, 3) there is a direct discharge to "Waters of the U.S. and/or Waters of the State", 4) there are 200-699 dairy cattle, or 300-999 beef cattle or heifers or 3,000-9,999 sheep or lambs.

CAFO: Small
A small CAFO is defined as a lot or facility where: 1) animals are confined more than 45 days, 2) all or a portion of the site does not support perennial vegetation or annually seeded cover, 3) livestock feeding operations are determined to be a "significant contributor" to "Waters of the U.S. and/or Waters of the State".

Numbers: 25 AFO/CAFOs (3 dairies and 22 beef feedlots)

Slope: 0 -10% (level to moderately sloping)

Soils: Greenleaf silt loam, Baldock silt loam, Power-Purdum silt loam, Bissell loam, Jenny clay, Clems fine sandy loam, Moulton fine sand. Poorly drained soils and high water tables are present in the treatment unit.

There are 3 dairies (20 -150 head) and 22 AFO/CAFO (sizes range from 50 – 5,000, with several smaller ones) within the project area. By law, CAFOs (as of 2005) and dairy operations should have certified nutrient management plans with appropriate animal waste management practices in place. The largest beef feedlot, the Mathews Sunnyside CAFO, has been proactive in installing an appropriate waste management system and associated conservation practices in response to citizen concerns. Other AFO/CAFOs in the project area do not have nutrient management plans and may not have sufficient waste containment. In corrals, ponding of water and preferential flow paths could allow transport of nutrients from AFO/CAFO yards. Field application of manure may be a concern due to high water tables and over application.

TU 4: Critical Resource Problems, Symptoms and Causes

Resource Problems and Symptoms	Causes
Animal Waste Management	
Nutrient loading and bacteria contamination of surface water	Inadequate waste storage and containment of runoff, cattle in or near water bodies
Nutrient loading and bacteria contamination of ground water	High water table, sandy soils, inadequate waste storage and waste utilization

Improper animal waste management (including improper land application of wastes) is a resource problem in the project area with consequences for both surface and ground water quality. The resource concerns associated with land application of waste occur in TUs 1-3, in conjunction with other poor management such as irrigation water management (IWM). The proximity of AFO/CAFOs to soils with high water tables and surface water bodies is illustrated in (Appendix A, Map 3). Animal wastes are land-applied in liquid and solid forms on cropland and pastureland in the project area. In close proximity to dairies and large feedlots, waste application rates may exceed crop uptake, when using phosphorous as the limiting nutrient.

Although AFO/CAFOs may have waste ponds, some of them have inadequate liquid and dry storage volume in their waste storage systems to meet the 6-month storage requirement. Consequently, in most years, they must apply liquid wastes to frozen or saturated soil outside the crop-growing season. AFO/CAFOs may also lack adequate solid waste storage facilities. Existing manure handling facilities are often too small and runoff from the manure piles may drain to ditches instead of containment ponds.

In areas with high water tables or on sandy soils, many older AFO/CAFOs may have unlined waste treatment ponds that could allow nutrients and pathogens to enter ground water. The presence of ammonia (a highly unstable form of nitrogen in an oxygenated environment) in ground water in the project area indicates a direct route of animal wastes into the aquifer, such as leaky lagoons.

All AFO/CAFOs are considered critical due to inadequate waste storage facilities and improper waste utilization for the application of nutrient management.

Treatment Unit 4 - Animal Feeding Operations (AFO/CAFOs) issues are contributing to surface and ground water impacts but will not be addressed in this project. Separate EQIP funds will address AFO/CAFOs on an individual-project basis.

Nutrient Management and Risk Analysis

Nutrient Management History:

Past tillage practices have had an impact on the water quality of the project area. Data indicates the presence of nitrogen in the form of nitrate (NO_3-N) and ammonium (NH_4-N) in the shallow alluvial aquifer (Tesch and Carlson 2003a, b). Nitrogen isotope studies indicate mixed sources of nitrate-N. Common sources are applied commercial fertilizers, animal or human waste, and organic nitrogen within the soil. ISDA recommends establishment of nutrient management plans with particular emphasis on growers and agrichemical professionals conducting nutrient, pesticide, and irrigation water management evaluations. Producers are

encouraged to implement the Natural Resources Conservation Service nutrient management standard (590). Nutrient management will have a positive impact on the water quality and overall environmental quality of the area.

The past history of nutrient management in an area under intensive row crop production can have an impact on the water quality. Three factors are involved in making this environmental risk statement and consist of crop rotation, multi-grower involvement and surface irrigation. The major crops of concern in the project area are onions, sugar beets, potatoes and winter wheat. Double the rate of crop uptake values for nitrogen fertilizers are often applied to these crops .

Additional nutrient risk is present if phosphorus fertilizer is applied as insurance even when soil tests show the presence of adequate soil phosphorus for optimum crop production. The fertility issue is further complicated when two or three commodity-oriented growers rotate farms. This multi-grower involvement on an individual farm can introduce additional nutrient management problems of over application due to timing and involvement of competing fertilizer dealers. The third factor is the history of surface irrigation technique and tendency for inefficient irrigation application and a greater potential for deep leaching.

NRCS Nutrient Management Standard (590):

The NRCS nutrient management standard (590) outlines the requirements for nutrient management planning. Plans developed from this standard will use the following objectives to help producers improve or maintain management of application of nutrients:

- Budget and supply nutrients for plant production
- minimize the potential for environmental damage including agricultural non-point source pollution of surface and ground water resources
- Maintain or improve the physical, chemical and biological condition of soil
- Properly use all sources of organic material, including animal waste, as a plant nutrient source
- Prevent or reduce excess nutrient concentrations in the soil

Several crop-specific crop rotations were screened using the environmental risk and nutrient management model in the Idaho OnePlan. This model considers the site or geographic specific risk of the farm location and evaluates the risk from production of the specific crop under an irrigation management system. Individual soil tests and fertilizer recommendations were used in development of the rotational crop-specific assessment.

These assessments evaluated the following crop rotations: 1) Sugar beets following winter wheat, 2) Sugar beets following onions, 3) Onions following winter wheat, 4) Onions following onions and 5) Beans following winter wheat. Each situation was assessed using four irrigation methods of 1) Furrow, 2) Furrow-surge, 3) Sprinkler and 4) Drip. Each of the assessments used actual soil test results taken from fields in the project area.

Results of Nutrient Risk Analysis:

The nutrient risk analysis is summarized in Table S. Soil test results from selected fields in the project area were used for comparisons between University of Idaho Fertilizer Guides and the fertilizer industry recommendations.

The soils of 54 selected fields from the project area were analyzed for pH, percent organic matter (OM), nitrate (NO_3-N) and ammonium-nitrogen (NH_4-N), Olsen extractable phosphorus (P) and potassium (K), percent lime ($CaCO_3$) and electric conductivity (salt). The data was grouped by current and previous crop and summarized by current crop. The data set for the nutrients of concern (nitrogen and phosphorus for the project area) are typical of fertility levels found under intensive farm agriculture. The range and average of available nitrogen (NO_3-N + NH_4-N) are reported in Table Q.

With the exception of onions, the industry recommendation was well within the 25% acceptable variability within the current Idaho OnePlan Nutrient Management planning module. Onions appear to be over-fertilized based on this group of soil samples. The current practice for growing onions, as reflected in the Northwest Onion Production Guide, assumes a 40 – 60% nitrogen loss during production. This assumption, justified as an adjustment in nitrogen application, is due to the practice of maintaining high moisture during seed germination. The assumption also allows for the inefficiency of furrow irrigation.

Research conducted by U of I Cooperative Extension Service, Washington County, has demonstrated that through improved monitoring of soil moisture, the frequency and duration of irrigation can be managed to minimize nitrate-nitrogen leaching to ground water, minimize irrigation costs and minimize spread of diseases associated with excessive irrigation (Reddy 2001). These projects have shown that converting onions to drip and surge irrigation with IWM can reduce the requirement for nitrogen from the current level, in excess of 200 lbs/acre, to the U of I fertilizer guide recommendation levels.

Irrigation water management (IWM), crop rotation and nutrient management (NMP) of the rotational crop following production of onions is also important. Surplus nitrogen in the profile could allow leaching during the winter months when there is the risk of a high water table. If excess

Table Q. Nitrogen Soil Test and Recommendation Analysis

Current Crop	Spring Soil Tests Available NO_3-N + NH_4-N (lbs/ac)			U of I Recommendation Nitrogen (lbs/ac)	Industry Recommendation Nitrogen (lbs/ac)	Difference Nitrogen (1) (lbs/ac)
	Average	Minimum	Maximum			
Barley	20	20	20	148	120	-28
Beans	96	88	112	0	0	0
Beets	44	24	92	190	191	1
Onions	40	20	156	138	244	106
Potatoes	132	132	132	80	90	10
All Crops	48	20	156	160	194	34

(1) Difference between University of Idaho and Industry

nitrogen is present in the field following production of the onion crop, the next crop in the rotation is important in utilizing the carryover nitrogen. Deep-rooted crops including winter grains, alfalfa or possibly canola can play a role in utilizing the carryover nitrogen. If a shallow-rooted crop is next in the rotation, then IWM is important in maintaining as much of the excess nitrogen near the surface as possible. The most significant practices are NMP and IWM. The first goal is to use nutrient management planning to determine the optimum nitrogen

requirement for the crop. The second goal is the use of irrigation water management to maintain adequate moisture for crop production while maintaining nitrogen in the active rooting zone.

The range and average of Olsen extractable soil phosphorus are reported in Table R. The data shows that the average soil test P for project fields exceeded the current P-Threshold standard as established in NRCS-Idaho nutrient management standard (590) of 40 ppm-P for southern Idaho soils. The maximum soil test P was 240 ppm-P with the minimum being 11 ppm-P for the project soil samples.

Table R. Extractable Olsen Phosphorus and Recommendation Analysis (1)

Current Crop	Soil Test P (ppm)			U of I - P_2O_5 Recommendation (2)	Industry Recommendation P_2O_5	Difference P_2O_5 (3)
	Average	Minimum	Maximum	(lbs/ac)	(lbs/ac)	(lbs/ac)
Barley	17	17	17	32	70	38
Beans	60	34	102	0	60	60
Beets	43	11	240	6	60	54
Onions	38	11	132	17	139	122
Potatoes	37	37	37	0	150	150
All Crops	41	11	240	9	87	78

(1) Sodium bicarbonate extractable
(2) NRCS Standard 590 is based on University of Idaho recommendations.
(3) Difference between University of Idaho and Industry.

As supported by the level of soil test P, excess phosphorus is and has been applied throughout the crop rotation. The phosphorus recommendations are not within the 25% variability that is allowed by the Idaho OnePlan nutrient management standard. The current cultural practice of applying additional phosphorus in vegetable crop production is often thought of as insurance to off-set rooting problems associated with root diseases. Although the excess P does not pose an environmental problem to ground water, it does present a problem if the phosphorus is carried off the field to surface water bodies through surface runoff or subsurface flow.

Table S. summarizes the Irrigation Risk Assessment for the selected fields in the project area. Based on the assumptions used in the OnePlan Nutrient Management Model, the irrigation risk assessment conducted on these fields show that furrow irrigation poses the greatest risk to off field and in field environmental concerns.

Adopting improved irrigation practices that decrease the potential for nutrient leaching reduces the risk from very high to low. Furrow irrigation has a very high risk assessment for nutrient leaching across all crops in the project area. Drip irrigation has a low nutrient leaching risk with surge and sprinkler irrigation having medium risks. Furrow irrigation presents the greatest challenge to the grower for uniformity in moisture distribution throughout the field. Not only is there a risk of over-irrigation from a volume and time relationship, but there is the issue of non-uniformity across the field. The head end is impacted by time and the tail end by potential ponding, especially if the grower is trying to prevent excess water from leaving the field. Surge and sprinkler irrigation are more effective irrigation methods to manage water volume and time. Drip irrigation, although expensive, presents the greatest opportunity for optimum control of water distribution.

Table S. Irrigation Risk Assessment

CROP	Irrigation Method	NITROGEN LEACHING RISK ASSESSMENT RISK RATING			
		Method	Runoff	Irrigation Efficiency	Leaching
Sugar beets Following Wheat	Furrow	Medium	Very High	High	High
Sugar beets Following Wheat	Surge	Very Low	Low	Low	Medium
Sugar beets Following Wheat	Sprinkler	Very Low	Low	Very Low	Medium
Sugar beets Following Wheat	Drip	Very Low	Low	Very Low	Low
Sugar beets Following Onions	Furrow	Medium	Very High	Very High	High
Sugar beets Following Onions	Surge	Very Low	Low	High	Medium
Sugar beets Following Onions	Sprinkler	Very Low	Low	Very Low	Medium
Sugar beets Following Onions	Drip	Very Low	Low	Very Low	Low
Onions Following Wheat	Furrow	Medium	Very High	Very High	High
Onions Following Wheat	Surge	Very Low	Low	High	Medium
Onions Following Wheat	Sprinkler	Very Low	Low	Very Low	Medium
Onions Following Wheat	Drip	Very Low	Low	Very Low	Low
Onions Following Onions	Furrow	Medium	Very High	Very High	High
Onions Following Onions	Surge	Very Low	Low	High	Medium
Onions Following Onions	Sprinkler	Very Low	Low	Low	Medium
Onions Following Onions	Drip	Very Low	Low	Low	Low
Beans Following Wheat	Furrow	Medium	Very High	Very High	High
Beans Following Wheat	Surge	Very Low	Low	Very High	Medium
Beans Following Wheat	Sprinkler	Very Low	Low	Low	Medium
Beans Following Wheat	Drip	Very Low	Low	Low	Low

Tables T. – W. summarize the Phosphorus Risk Assessment of typical crop fields in the project area. Based on the assumptions used in the OnePlan Nutrient Management Model, the highest overall phosphorus risk is associated with fields that have the highest phosphorus (P) soil test and the highest phosphorus (P) application rates. The fields which have soil P levels in excess of the 590 P-threshold levels pose the greatest risk from all methods of irrigation. The reason for these very high ratings is the presence of risk to surface run-off. The problem is further elevated by the fact that additional phosphorus is being applied to the field in the study area.

Table T. summarizes a typical field under furrow irrigation management. High soil test P and high fertilizer P application present the greatest risk.

Table U. summarizes a typical field under surge irrigation management. As with furrow irrigation high soil test P and high fertilizer P application present the greatest risk. High soil test P presents the greatest risk to surface runoff; however, by converting from furrow to surge the overall risk is lowered from high to medium in fields with soil test P lower than the P-Threshold. This lowering of risk assessment is related to the P-Threshold changing from the surface runoff related value (40 ppm) to the 18-24” leaching related value (20 ppm).

Table T. Phosphorus Risk Assessment Furrow Irrigation

CROP	Irrigation Method	PHOSPHORUS RUNOFF RISK ASSESSMENT						
		Overall Risk Rating By Method of Irrigation	Soil Test P		P-Threshold (1)		Phosphorus Fertilizer Application Rate (2)	
			0-12" ppm	18-24" ppm	ppm	Risk Rating	Application Rate (lbs P_2O_5 per acre)	Risk Rating
Sugar beets Following Wheat	Furrow	Very High	43	No Soil Test	40	Critical	60	Low
Sugar beets Following Onions	Furrow	High	40	No soil test	40	Very High	135	Medium
Onions Following Wheat	Furrow	High	40	No Soil Test	40	Very High	135	Medium
Onions Following Onions	Furrow	High	13	No Soil Test	40	Low	220	High
Beans Following Wheat	Furrow	Very High	60	No Soil Test	40	Critical	60	Medium

(1) Threshold follows the NRCS 590 Standard and University of Idaho recommendations
(2) Industry recommendation

Table U. Phosphorus Risk Assessment Surge Irrigation

CROP	Irrigation Method	PHOSPHORUS RUNOFF RISK ASSESSMENT						
		Overall Risk Rating By Method of Irrigation	Soil Test P		P-Threshold (1)		Phosphorus Fertilizer Application Rate (2)	
			0-12" ppm	18-24" ppm	ppm	Risk Rating	Application Rate (lbs P_2O_5 per acre)	Risk Rating Leaching
Sugar beets Following Wheat	Surge	Very High	43	10	40	Critical	60	Low
Sugar beets Following Onions	Surge	Medium	40	10	40	Very High	135	Medium
Onions Following Wheat	Surge	Medium	40	10	40	Very High	135	Medium
Onions Following Onions	Surge	Medium	13	10	40	Low	220	High
Beans Following Wheat	Surge	Very High	60	10	40	Critical	60	Medium

[1]Threshold follows the NRCS Standard 590 and University of Idaho recommendations.
[2]Industry recommendation

Table V. summarizes the fields under sprinkler irrigation. As with furrow irrigation, high soil test P and high fertilizer P application present the greatest risks. High soil test P presents the greatest risk to surface runoff; however, by converting from furrow to sprinkler lowers the overall risk from high to medium in fields with soil test P lower than the P-Threshold.

Table V. Phosphorus Risk Assessment Sprinkler Irrigation

CROP	Irrigation Method	PHOSPHORUS RUNOFF RISK ASSESSMENT						
		Overall Risk Rating By Method of Irrigation	Soil Test P		P-Threshold (1)		Phosphorus Fertilizer Application Rate (2)	
			0-12" ppm	18-24" ppm	ppm	Risk Rating	Application Rate (lbs P_2O_5 per acre)	Risk Rating Leaching
Sugar beets Following Wheat	Sprinkler	Very High	43	10	40	Critical	60	Low
Sugar beets Following Onions	Sprinkler	High	40	10	40	Very High	135	Medium
Onions Following Wheat	Sprinkler	High	40	10	40	Very High	135	Medium
Onions Following Onions	Sprinkler	Medium	13	10	40	Low	220	High
Beans Following Wheat	Sprinkler	Very High	60	10	40	Critical	60	Medium

[1]Threshold follows the NRCS Standard 590 and University of Idaho recommendations.
[2]Industry recommendation

Table W. summaries a typical field under drip irrigation. High soil test P and high fertilizer P application still present the greatest risk. However, the overall risk is reduced by the fact that the grower has the greatest control on the movement of salts including phosphorus.

Table W. Phosphorus Risk Assessment Drip Irrigation

CROP	Irrigation Method	PHOSPHORUS RUNOFF RISK ASSESSMENT						
		Overall Risk Rating By Method of Irrigation	Soil Test P		P-Threshold (1)		Phosphorus Fertilizer Application Rate (2)	
			0-12" ppm	18-24" ppm	ppm	Risk Rating	Application Rate (lbs P_2O_5 per acre)	Risk Rating Leaching
Sugar beets Following Wheat	Drip	Very High	43	10	40	Critical	60	Low
Sugar beets Following Onions	Drip	Medium	40	10	40	Very High	135	Medium
Onions Following Wheat	Drip	Medium	40	10	40	Very High	135	Medium
Onions Following Onions	Drip	Medium	13	10	40	Low	220	High
Beans Following Wheat	Drip	Very High	60	10	40	Critical	60	Medium

(1) Threshold follows the NRCS Standard 590 and University of Idaho recommendations.
(2) Industry recommendation.

Recreation/Aesthetics

Weiser is named after Sgt. Peter Weiser of the Lewis and Clark Expedition. It is a gateway to Hells Canyon, the deepest gorge in North America. Weiser is the county seat of Washington County. Agriculture dominates the landscape as you enter the town along US Highway 95. Agricultural activities include row crop production, fruit orchards and cattle ranching. Many homeowners have domestic livestock such as sheep, goats and horses.

Recreation along the Weiser River is limited due to the prevalence of private land and agriculture. Some landowners allow access to the Weiser and Snake Rivers for hunting and fishing. Boating is a favorite activity on the Snake River along with swimming and canoeing.

Idaho Department of Fish and Game (IDFG) manages several areas along the Snake River that provide access for fishing, boating, bird watching and picnicking. Upland game birds such as pheasant and quail are common throughout the area. Quiet activities such as bird watching and observing wildlife are always available. Local citizens spend much of their time hunting and fishing. In the winter, elk make their way out of the surrounding hills to forage on cropland.

Soils

The project area soils are very deep and nearly level to moderately sloping. They were formed in alluvium, mixed alluvium and lacustrine deposits, and consist of poorly drained, somewhat poorly drained and well drained soils. (Adams- Washington Counties Soil Survey).

Table X. Majority of Project Soils

Soil	Depth	Acres	% of Project Area
Greenleaf silt loam	Very deep	5,159	21
Baldock silt loam	Very deep with high water table within 24-36 inches from surface.	4,256	17
Power-Purdum silt loam	Very deep	3,919	16
Bissell loam	Deep coarse gravelly loams	3,068	12
Jenny clay	Very deep overlying silt loams at 30 to 60 inches.	1,570	6
Clems fine sandy loam	Very deep overlying silt loams at 50 to 60 inches.	1,566	6
Moulton fine sand	Loam below surface area. Overlying very coarse sand at 35 to 60 inches. A water table is present at 18 to 36 inches	1,314	5
The remaining soils are comprised of roads, water and urban areas. Refer to Appendix A, Map 6 for more information.			

The soils of the project area are typically in two permeability groups:

- Well drained, slow to moderately slow permeability and moderate to high water holding capacity**,** 61% of the project area. **(**Bissell loam, Jenny clay loam, Clems fine sandy loam (moderately rapid permeability), Greenleaf silt loam and Power-Purdam silt loam.)
- Somewhat poorly drained, moderate or moderately rapid permeability, moderate water holding capacity, water table depth ranges from 18 to 60 inches**,**25 % of the project area. **(**Baldock silt loam, Baldock clay loam, Falk fine sandy loam and Moulton loam.)

Threatened and Endangered Species

Animals:

Wildlife listed for Washington County, Idaho as threatened, endangered or a species of concern are noted below. Not all of these species are likely to occur within the project area. Not all of these species have status under the Endangered Species Act (ESA), but land management activities should consider impacts to their population status and long term viability.

Bull trout (Salvelinus confluentus)
Listed Threatened. See description in the fisheries section under native fish.
Bull trout located in the Weiser River are primarily resident life history forms. Bull trout have been located in headwater streams of the Little Weiser River, in the Middle Fork Weiser River, the upper Weiser River and Hornet Creek watershed. Bull trout were also found in areas of the Middle Fork Weiser River during surveys in 1997. Habitat fragmentation as a result of dams, irrigation diversions and road crossings have isolated fluvial bull trout into the headwater streams of the Weiser River system. Numerous land use alterations combined with the elimination of key ecological functioning species (i.e., anadromous fish) have changed the species composition of the lower Weiser River (FWS 2002a). There is no evidence of bull trout in the Weiser River within the project area.

Canada Lynx (*Lynx canadensis*)
Listed Threatened. The Canada lynx is a secretive, forest dwelling cat of northern latitudes and high mountains. The Canada lynx is a medium-sized cat, similar to the bobcat. It has longer legs and very large well-furred paws, adaptations for maneuvering through deep winter snow. It also has long tufts on the ears and a short, black-tipped tail.

Lynx have not been identified in the watershed. The project area is outside the range of suitable habitat for lynx. They are not assumed to be present in the watershed area.

Bald Eagle (*Haliaeetus leucocephalus*)
Listed Threatened. The decline of the bald eagle coincided with the introduction of the pesticide DDT in 1947. Birds of prey at the top of the food chain, such as eagles, ingested relatively high levels of the pesticide, which was concentrated in the fatty tissues of their prey. Eagles contaminated with DDT failed to lay eggs or produced thin eggshells that broke during incubation. In 1972, DDT was banned in the United States, and a slow recovery for the bald eagle began. Loss of nesting habitat due to development along the coast and near inland rivers and waterways also has resulted in decreasing numbers of them.

Bald eagles generally average 3 feet in length with a wing span about 7 feet wide. Their diet consists mostly of fish, water birds and amphibians. Bald eagles are magnificent fishers who generally forage around coastal areas, rivers and large water bodies. Mature trees and snags provide ideal nesting and roosting habitat for eagles (IDFG CDC Database 2004).

Bald eagles have been observed in the project area. The Weiser and Snake Rivers are considered wintering bald eagle habitat.

Animal Species of Concern:

The U.S. Fish and Wildlife Service (FWS) has concerns about the following species. These species have no status under the Endangered Species Act. However, FWS is concerned about their population status and threats to their long-term viability. In the context of ecosystem-level management, the habitat of these species should be considered and protected in project planning and review.

Interior Redband Trout (*Oncorhynchus mykiss*)
Species of Concern. See description in the fisheries section under native fish. Redband trout historically utilized the lower Weiser River during their spawning migration to sub-basin tributary streams. The installation of the Galloway Canal irrigation diversion dam in the early 1900's presented an obstacle for migrating trout. Redband trout are known to be widespread and common throughout most of the Weiser River sub-basin.

Northern Goshawk (*Accipiter gentilis*)
Species of Concern. The Northern Goshawk is a medium sized, broad-winged hawk with a long tail and a short hooked beak. Its length is approximately 19 inches with a wing span of 42 inches. Goshawks are sexually dimorphic with the female larger than the male.
The Northern Goshawk inhabits large expanses of forestland. Habitat fragmentation and land use changes have reduced the typical forested habitat that the goshawks prefer. Extensive logging within the forested areas of Idaho has removed many mature trees that goshawks seek for nesting and perches.

The project area is not considered suitable habitat for nesting and rearing for the goshawk. They may migrate through the area while moving to suitable summer and winter habitat, but the project will have no effect on them.

Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus*)
Species of Concern. The Columbian sharp-tailed grouse prefer shrub-steppe grassland and riparian areas to meet their life cycle demands. It is a chicken-like bird, the smallest of the seven sub-species of sharp-tailed grouse. The Columbian sub-species have darker gray plumage, more pronounced spotting on the throat and narrower markings on the underside than other sub-species of grouse.

Historically, the Columbian sharp-tailed grouse range extended westward from the continental divide in Montana, Idaho, Wyoming, and Colorado to northeastern California and eastern Oregon and Washington; southward to northern Nevada and central Utah; and northward through central and extreme southeastern British Columbia, Canada.

Excessive hunting in the mid-to-late 19th century is believed to be the major contributing factor to the early extermination of local populations and the initial reduction of the grouse's range. Conversion to agriculture of the grouse's preferred shrub-steppe, grassland and riparian habitat contributed to local population declines, along with habitat degradation caused by heavy livestock grazing.

Although there have been declines in the historic distribution of the Columbian sharp-tailed grouse, and some of the smaller, isolated populations are currently at risk of extermination, there are numerous large metapopulations that are relatively secure and possibly increasing.

These large groupings have persisted for the last several decades with no discernible downward trend, and recent information indicates that they may now be increasing, as are the habitats available to them.

Intensive grazing pressure can be detrimental to both nesting and wintering sharp-tailed grouse habitat. However the area currently occupied by them is not subject to such pressure. Protection can be afforded the sharp-tailed grouse by enrolling land into conservation programs such as the Conservation Reserve Program which would withdraw land from crop production and turn it into permanent herbaceous or woody vegetative cover (FWS, http://www.r1.fws.gov/news/2000/2000-166qa.htm).

Riparian areas and, to a lesser degree, pasturelands may provide limited seasonal habitat for the sharp-tailed grouse. The project actions related to prescribed grazing in upland and riparian areas and installation of tree and shrub shelterbelts may enhance areas for sharp-tailed grouse. No adverse impacts will occur to the sharp-tailed grouse.

Townsend's Western Big-eared Bat (*Corynorhinus townsendii*)
Species of Concern. Weighing 0.3 to 0.5 ounces with a wing span of 12 -13 inches, Townsend's western big eared bats are uncommon in the western U.S. They hibernate in caves and mines where temperatures remain around 54º F. Hibernation generally occurs in clusters of 100 individuals or more. Maternity colonies usually are located in warmer sections of the cave. Male bats are solitary and their summer range is not well documented. Townsend's western big-eared bat is not known to migrate long distances. Like many other bats, they are known to return each summer to the same roost sites. Mating begins in autumn and continues during the winter. Delayed fertilization occurs at the end of the hibernation period. Females generally have one offspring. Babies are big, often equaling 25% of the mother's size. Juveniles can fly in 2-3 weeks and are weaned by the 6th week. Townsend's western big-eared bats are known to live up to 16 years (Harvey and Altenbach 1999).

Townsend's bats may inhabit the watershed area. The project actions will not impact potential roosting or hibernaculas. No trees or caves/mines will be impacted with project actions. The addition of trees and shrubs in shelterbelts may have a minimal positive impact creating roosting and feeding sites.

Pygmy Rabbit (*Brachylagus idahoensis*)
Species of Concern. Pygmy rabbits are typically found in areas of tall, dense sagebrush (*Artemisia* spp.) cover, and are highly dependent on sagebrush to provide both food and shelter throughout the year. The winter diet of pygmy rabbits is comprised of up to 99% sagebrush, which is unique among Leporids. During spring and summer, their diet consists of sagebrush, grasses (particularly native bunch-grasses such as *Agropyron* spp. and *Poa* spp.), and forbs. There is evidence that pygmy rabbits preferentially select native grasses as forage during this period in comparison to other available foods. In addition, total grass cover relative to forbs and shrubs may be reduced within the immediate areas occupied by pygmy rabbits as a result of its use as a food source during spring and summer. The specific diets of pygmy rabbit populations likely change depending on the region occupied.

Pygmy rabbit is an obligate shrub-steppe habitat species. No observations of pygmy rabbit are documented in the watershed. Since a small percentage (<1%) of the watershed is shrub-steppe habitat, the pygmy is unlikely to occur in the area. Also, project actions will not convert

any existing shrub-steppe habitat and no activities are planned in these areas. The project will have no effect on the pygmy rabbit.

Southern Idaho Ground Squirrel (*Spermophilus brunneus endemicus*)
Candidate Species. The historic range of the southern Idaho ground squirrels covered much of the project area. However, today the known range is a 518,000-acre area in southwestern Idaho, including areas of Washington County. Surveys of southern Idaho ground squirrels by Yensen throughout the 1990's suggest a substantial decline in the total population of ground squirrels, the number of ground squirrels at individual sites, and the number of occupied sites since 1985. The project area includes the northern most historic range of these ground squirrels in an area that has shown a severe decline in their population. In numerous studies over the last decade, it has been documented that 85% of the known occupied sites were located on private lands, mostly ranches and farms.
Ground squirrels are often found on low, rolling hills between 2,150 ft and 3,150 ft elevation and valleys with pale-colored soils formed by granitic sands, silts, and clays from the Boise Mountains to the east and deposited by Pliocene Lake Idaho. Formerly dominated by big sagebrush, bitterbrush, and bunch grasses, the area is currently annual grassland dominated by medusa-head rye (*Elymus caput-medusae*) and cheatgrass (*Bromus tectorum*) with relict big sagebrush and bunch grasses.

The IDFG classified the southern Idaho ground squirrel as a "Species of Special Concern" in 1981. On October 30, 2001, the US Fish and Wildlife Service formally identified the southern Idaho ground squirrel as a candidate for listing under the ESA on October 30, 2001.

Threats identified as affecting the southern Idaho ground squirrels include: habitat deterioration, including fragmentation; shooting, trapping or poisoning by humans; predation; and intra-specific competition with Columbian ground squirrels (*Spermophilus columbianus*). These, along with the threat of diseases, are likely contributing to the decline of southern Idaho ground squirrel populations.

The project area is dominated by agricultural land. A small amount of shrub-steppe habitat occurs in the watershed. Since no project action has activities in rangeland it is assumed that the project will have no effect on the ground squirrel.

Plant Species of Concern:

Mulford's milkvetch (*Astragalus mulfordiae*)
Species of Concern. Plant surveys conducted in 1989 turned up 2 populations; one of 11-50 individuals, the other with 101-1,000. These populations were noted in soils containing higher clay size sediment than expected for Mulford's milkvetch. Plants have been documented north of the project area along ridge tops and east of the project area along the rail bed. Surveys of the Weiser area in1993 identified 2 colonies; one with 50 individuals, the other with 250-500, while surveys conducted in 1995 found 1,500-3,000 plants in numerous subpopulations with the potential for more. At that time, the population vigor was assessed as high. Idaho CDC conducted another survey in 2003 and recorded 1,900-4,600 individual plants in the population (IDFG CDC Database 2004).

Mulford's milkvetch is generally found on coarse sandy soil, primarily on south-southwest aspects, with a gentle to moderate slope. Where sandy substrate is available, plants are often

continuous from toe slope to near ridge positions. Habitat is extensive in the area, and estimated to be 600 acres in which sand substrate dominates. Mulford's milkvetch is primarily associated with the bitterbrush (*Purshia tridentata-Chrysothamnus spp.)* community types.

Project area has known sites of Mulford's milkvetch. Project actions. Project actions are proposed to be on crop and pastureland and will not impact known sites. No impact is assumed to occur.

Cronquist's Stickseed (*Hackelia cronquist*)
Species of Concern. Plants are often found on steep, north-facing hillsides associated with deep lacustrine (lakebed) sands and high vegetative cover. Cronquist's Stickseed is usually associated with other plants such as bitterbrush and Idaho fescue (*Purshia tridentata/Festuca idahoensis*), several species of rabbitbrush (*Chrysothamnus viscidiflorus, C. nauseosus*), Sandberg bluegrass (*Poa secunda*), tapertip hawksbeard (*Crepis acuminate*), miner's lettuce (*Montia perfoliata*), phlox (*Phlox longifolia*), and arrowleaf balsamroot (*Balsamorhiza sagittata*) (IDFG CDC Database 2004).

Project actions will occur in crop and pasturelands not associated with typical Cronquist's Stickseed habitat. No effect is assumed to occur to this species.

Aases Onion (*Allium Aaseae)*
Species of Concern. Aases onion is generally found in sand, on gentle, convex slopes with a south to west aspect, but can also be found on, or at the edge of, broad, rolling ridge tops. Individual plants are often seen associated with the following plant communities: native bunchgrass (*Stipa comata)*, big sagebrush (*Artemisia tridentata)* and bitterbrush (*Purshia tridentata)*. Documented plant occurrences in Washington County have been found at a minimum elevation of 2,300 feet and a maximum elevation of 3,300 feet above sea level (IDFG CDC Database 2004).

Project actions will occur in crop and pasturelands not associated with typical Aases onion habitat. No effect is assumed to occur to this species.

Snake River Goldenweed (*Haplopappus radiatus*)
Species of Concern. In 1992, 1,500-2,500 plants (with over 10% in flower to early fruit) were documented in Washington County. Many small plants were observed. The Idaho Department of Fish and Game determined that the population vigor was good. Plants occur intermittently in small (5 plants) to large (>100 plants) clusters. The size of the plants is highly variable in this population.

Surveys conducted in 1994 documented five permanent monitoring plots established by Bureau of Land Management (BLM) personnel along Sumac Creek contained between 8,000 – 12,000 flowering plants. Total number of individuals for this population is estimated to be 8,000-12,400 (IDFG CDC Database 2004). At lower elevations, it occurs almost exclusively on northerly aspects; at higher elevations, the plants occur on southern, southeastern, and western slopes.

Snake River goldenweed is found on lower, mid-slope, and ridge crest positions, often on very steep 40-50 degree slopes, with open light. Generally seen in openings within vegetation or slightly disturbed areas, such as the margins of slump areas. Elevation ranges are between 2,100 feet and 5,400 feet above sea level. The Snake River goldenweed is often found among

the following plant community groups: big sagebrush/bluebunch wheat grass (*Artemisia tridentata/Agropyron spicatum*); bluebunch wheat grass/Sandberg bluegrass/arrowleaf balsamroot (*Agropyron spicatum/Poa secunda/Balsamorhiza sagittata*); and bluebunch wheat grass/Idaho fescue/arrowleaf balsamroot (*Agropyron spicatum/Festuca idahoensis/Balsamorhiza sagittata*).

Project actions will occur in crop and pasturelands not associated with typical Snake River goldenweed habitat. No effect is assumed to occur to this species.

Water Quality – Ground Water

Both point (specific source of pollutant, usually localized) and nonpoint (more diffuse, multiple sources, usually widespread) sources of pollutants contribute to ground water quality degradation in the project area. Nonpoint sources are often associated with broad land use practices, such as crop production. Fertilizer and pesticide use and application of animal waste have contributed to degradation of the aquifer. Urban/suburban development and industrial uses may also put the aquifer at risk. Once degraded, it is very difficult to mitigate the effects of ground water pollutants. For this reason, many ground water quality programs emphasize the need for preventative practices.

Ground Water Vulnerability and Contamination Sources:

The primary land uses in the project area are agriculture, rangeland, and urban. A high seasonal water table is maintained by percolation of surface-applied irrigation water and seepage from associated irrigation canals and ditches and area streams and rivers. Permeable soils coupled with relatively shallow depth to ground water make the aquifer particularly vulnerable to contamination from a variety of sources (van Steeter et al. 1998, Parliman 2002). According to vulnerability mapping studies performed by USGS (Donato 2000), a large portion of the area is at high risk for contamination by nitrate and pesticides. A large portion of the project area falls with an IDEQ-designated nitrate priority area. Long-term and widespread use of agricultural fertilizers and chemicals has apparently impacted the shallow aquifer. However, urban/suburban sources have also contributed to the water quality problems. In recent years, development has increased in the area. Changes in land and water uses that accompany development (irrigation methods, domestic wells, septic tank drainfield densities, high stocking rates of animals) have the potential to affect ground water recharge and quality (USGS 1998) but type and degree of impact has not been quantified.

Pathways of contamination due to land use (as described by USGS 1998) include: 1) seepage, leakage, or dumping of contaminants at or near the land surface; 2) downward flushing of contaminants by infiltration of precipitation, floodwater, or applied irrigation water; 3) flushing of contaminants from soil and rocks by seasonal variation in the water table; 4) leakage around or into well casings or dumping of contaminants into wells; 5) back-flushing contaminants to wells through water supply systems; and 6) transport from up-gradient sources. Statewide, IDEQ has listed priority source categories for contamination of ground water, including animal feedlots, fertilizer and pesticide applications (urban and agricultural), land application of sludge/wastewater, underground storage tanks, landfills, septic systems, shallow injection wells/urban runoff, and industrial facilities. These source categories are based on health risk, amount of population exposed, risk to drinking water, size of source, hydrogeologic sensitivity, or other findings (Clark 1998), and are shown in Figure 1 when location is known.

Wells

Approximately 5,000 residents in the project area rely on the aquifer as their primary source of drinking water (IDEQ et al. 2003). Wells can be a potential source of aquifer contamination either through poor siting or construction or contaminant disposal in or around the well – each individual well is a potential conduit for contamination to reach the aquifer. Idaho Department of Water Resources is responsible for regulating well construction, and is in the process of updating well construction standards. Domestic wells in the project area are shown in Figure 1, although this probably represents only about half of the wells in the area (IDWR does not have locations of older wells). Of the domestic wells that have been sampled through various monitoring efforts, the majority have elevated levels of nitrate. Bacteria and low-level pesticides have also been detected in some wells. Abandoned wells may also be an issue in the project area (IDEQ 2003). The extent of threat due to abandoned wells is unknown - there has been no consistent enforcement of proper closure procedures. Shallow injection wells (such as those used for stormwater runoff installed for new urban developments) could allow contaminants to readily leach into the shallow aquifer without proper best management practices in place. Presently, there are no known injection wells in the project area. The Idaho Department of Water Resources (IDWR) oversees the permitting of injection wells and requires the use of appropriate best management practices to reduce risk to surface and ground water.

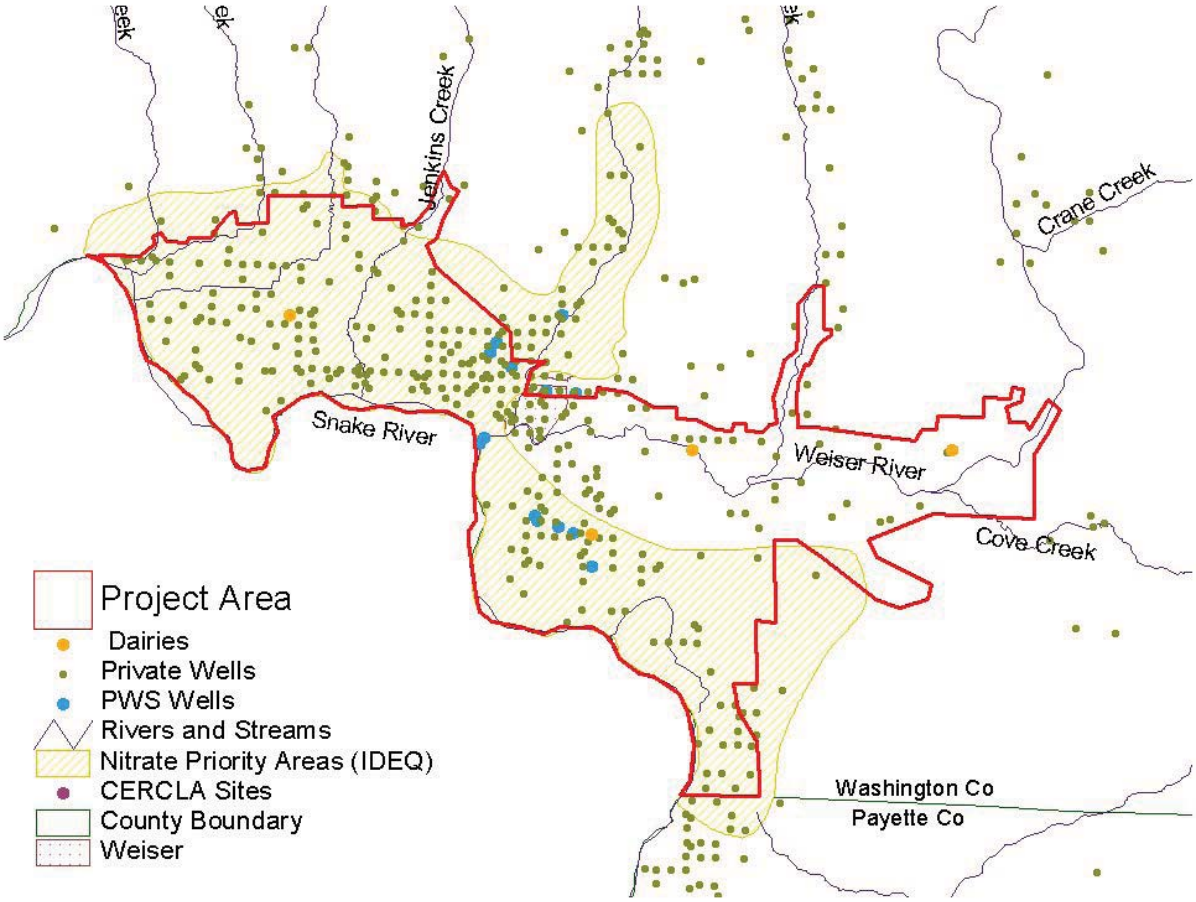


Figure 1. Location of Potential Pollutant Sources Within the Project Area

Septic Systems

Conventional septic systems are not efficient at removing nitrogen, and many systems may not be properly sized. Aging, inappropriate or poorly maintained systems create even greater risk. In areas subject to high water tables or soils with high infiltration rates (Appendix A, Map 5 and 6), pollutants from septic systems may be transported to ground water. Likewise, septic systems located near drains and ditches can directly contaminate surface water due to lateral flow to drains during periods of high ground water. The Southwest Health District is responsible for site evaluation and permitting of individual domestic septic systems in the Weiser area. The District has begun the process of spatial location of permitted septic systems (installed legally after 1976) but information is incomplete and currently unavailable. The District estimates that there are approximately 400 individual systems in Weiser Flat, 100 systems in Weiser Cove, and 220 systems in Sunnyside. There has been no work done to characterize older septic systems in the area with respect to improper siting or maintenance issues (SWHD, email communication, 3/4/2004). The District is addressing density and small acreage issues by requiring nutrient-pathogen studies prior to development, and is providing information on system maintenance and nitrate problems to area residents (IDEQ et al. 2003).

Commercial/Industrial Sites of Concern

Eight Resource Conservation and Recovery Act (RCRA) sites fall within the project area. These companies are permitted to handle hazardous waste regulated by EPA. Eleven leaking under ground storage tanks (LUSTs) are located within the project area, and all but three have completed clean-up per IDEQ's requirements under the LUST program (IDEQ 1996). CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) is an EPA program dealing with past hazardous waste locations. Three CERCLA sites within the project area have been investigated and are no longer active (EPA 2004b).

Potential Agricultural Sources of Pollutants

Agrichemicals and animal waste are the major sources of agricultural pollutants within the project area. The historic shift from small dairies with pasture and hayland to intensive row crop production was associated with increasing use of commercial fertilizers and irrigation over the last 30 years (USDA-NRCS 2000). This change is correlated with the increasing trend in nitrate levels since 1970 (Figure 2.). Trend analysis performed by USGS in support of nitrate priority evaluation indicated that while southern Washington County did not demonstrate the highest nitrate values observed, the samples were consistently high across the area, showing little variation between wells (Parliman 2002). This is indicative of a broad-scale land use issue, and points to agriculture as the major land use in the area. The EPA health standard (MCL) for nitrate in drinking water is 10 mg/L.

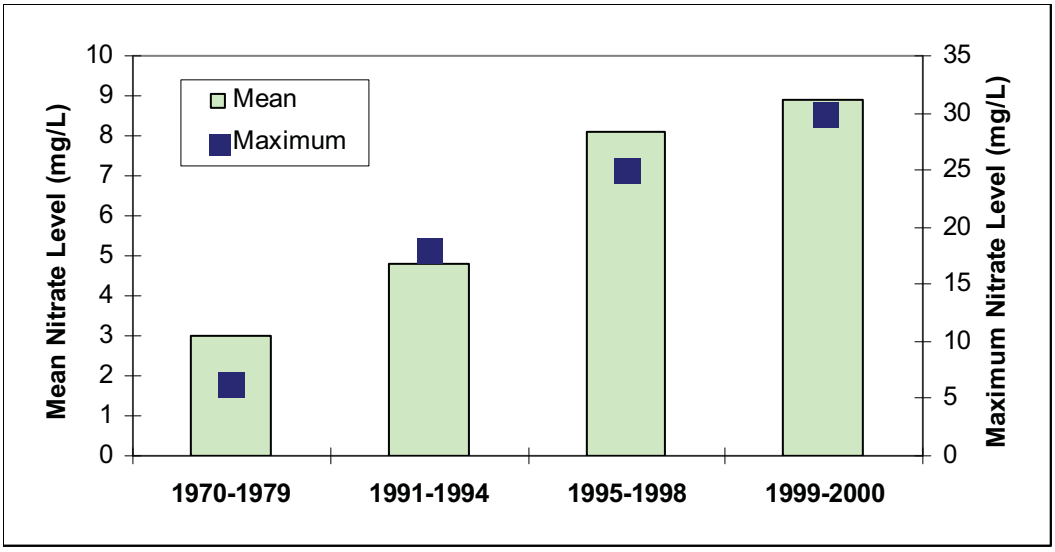
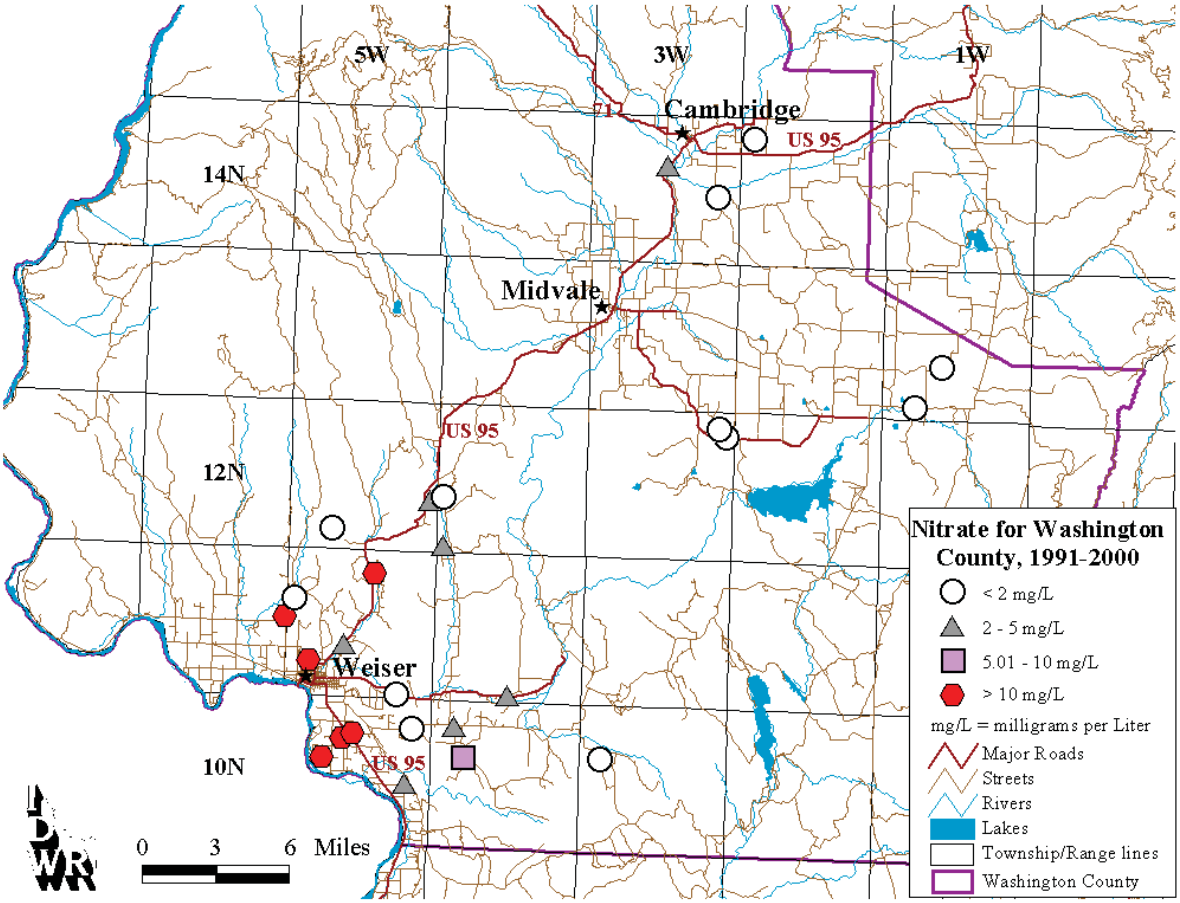


Figure 2. Nitrate Trends in the Weiser Area, 1970 – 2000 (from Parliman 2002).

Ground Water Monitoring Activities:

IDEQ is designated as the primary agency in Idaho to coordinate and administer ground water quality protection programs for the state (Idaho Code § 39-120). According to the Idaho Ground Water Quality Plan (GWQC 1996), IDWR is responsible for the statewide monitoring program, and has performed well monitoring in the project area since 1991. Figure 3 summarizes the nitrate results from IDWR's monitoring program in Washington County from 1991-2000. Where land use activities contributing to degraded ground water quality involve agricultural practices, Idaho State Department of Agriculture (ISDA) provides monitoring and assessment, and recommendations of needed conservation practices. ISDA ground water monitoring within the project area began in 1996 and is ongoing. Intensive monitoring in the Sunnyside area was initiated in 2000 in response to concerns regarding a large CAFO.



The high nitrate levels discovered in the Weiser area (indicated in red) triggered more intensive monitoring by ISDA and the development of a ground water quality management plan led by IDEQ

Figure 3. Nitrate Results from the Statewide Monitoring Program in Washington County Since 1991.

Ground Water Contaminants:

Results of statewide ground water monitoring (Neely 2002, IDWR Ground Water Quality database) for inorganic constituents are summarized for the Weiser area in Table Y. Well sample depths range from 25-180 feet. The depth to water ranges from 6 - 62 feet, and over half of sampled wells had depth to water of less than 25 feet. Positive detections were noted for a variety of pesticides, and 2 wells showed fecal coliform contamination (irrigation wells not used for drinking water). Arsenic is a constituent of concern detected in ground water, but is most likely related to natural sources or conditions. Likewise, radionuclides (alpha particles) attributed to natural sources exceeded the MCL in a number of wells. Levels of sulfates and iron are elevated and likely contribute to reduced aesthetic (taste) quality. Nitrates in ground water are the greatest concern in the project area (Neely 2002). More than half of the wells tested had nitrate levels in excess of 5 mg/L. Nitrate concentration values greater than 2 mg/L are considered impacted by a contaminant source.

Table Y. Inorganic Constituents in Wells in the Weiser area from 1990 to 2001 [1].

Constituent	Primary MCL	Minimum Value	Median Value	Maximum Value	Potential Health Risks (from EPA)
Arsenic (ug/L)	10	3.6	25.1	240	Skin damage, circulatory problems, may increase risk for cancer
Chloride (mg/L)	250	3.6	3.6	130	
Chromium (ug/L)	100	0	0.73	1.9	Allergic dermatitis
Fluoride (mg/L)	4.0	0.3	0.5	0.8	Bone disease
Iron (mg/L)	0.3	0	199.3	2000	
Lead (mg/L)	0.015[2]	0	0	0	Developmental problems in children
Nitrate (mg/L)	10	0	11.1	42.2	Serious illness in young infants
Selenium (ug/L)	50	0	1.29	5.0	Hair or fingernail loss; circulatory problems
Sodium (mg/L)	---[3]	18.0	169.9	521.0	
Sulfate (mg/L)	250[4]	45	259	730	
Alpha (pCi/L)	15	0	7.9	45.0	Increased risk of cancer
Beta (pCi/L)[5]	50	1.0	16.1	44.3	Increased risk of cancer

Well depths range from 25 to 180 (one unused well is at 945 feet).

[1] IDWR ground water quality database

[2] No MCL but regulated by Treatment Technique with an Action Level specified. Value presented is the action level.

[3] No primary MCL however once hypertension is diagnosed, less than 100mg/L is recommended.

[4] No primary MCL. Value presented is the Secondary MCL, which is a guideline (non-enforceable) to regulate contaminants for cosmetic or aesthetic effects.

[5] The Primary MCL is 4 millirems per year, which could be achieved by an average annual concentration of 50 pCi/l.

Nitrate

Nitrate is the most widespread, preventable contaminant in ground water. Major sources of nitrate in Idaho are inorganic fertilizers, decaying organic matter, waste matter, animal waste and human sewage (Neely and Crockett 1999). On a statewide basis, over 90% of nitrate contamination is associated with agricultural sources (IDEQ 2001). Twenty-five nitrate priority areas have been identified throughout Idaho. These areas have significant ground water quality impacts due to nitrate contamination. Nitrate priority areas have greater than 25% of their ground water wells over 5 mg/L. Southern Washington County has been designated the number one nitrate priority area by IDEQ (2002a). According to the Ground Water Quality Management Plan (IDEQ et al 2003) developed for southern Washington County, identified sources of elevated nitrate in the project area are irrigated agriculture, animal pastures and ranchettes, poor well construction, well abandonment, AFO/CAFOs, residential developments, and ground water/surface water connection issues.

Levels exceeding 10 mg/L can impact human health, and levels exceeding 20-40 mg/L can impact livestock (IDEQ 2001). Methemoglobenemia (Blue Baby Syndrome), which leads to an oxygen deficiency in infants, can occur from ingestion of water with elevated nitrate levels. Elevated nitrate levels may also pose problems for pregnant women and the elderly infirm.

Long-term effects of drinking nitrate-contaminated water are unknown (Neely and Crockett 1999, EPA 2004a).

Initial sampling for the Statewide Monitoring Program conducted from 1991-94 showed that four wells in the Weiser area had nitrate values greater than 10 mg/L, and 20% of all wells tested were considered impacted. The second round of sampling from 1995-98 showed an increase in the median nitrate value. A more intensive sampling effort led by the Farm Bureau in cooperation with the University of Idaho (Idaho Private Wellhead Program to examine nitrate concerns in rural areas of the state) found that 30% of wells sampled greater than 10mg/l, and 70% showed levels greater that 2 mg/l (U of I 2003).

Based on these early monitoring results, ISDA initiated the Southern Washington County monitoring project in 1996. Forty-one wells were consistently sampled between 1996 and 2004, and the results are shown on Appendix A, Map 7. By 2002, 47% of wells sampled were greater than 10 mg/L representing a 15% increase from 1996 sampling results. The 2004 monitoring results indicate 53% of wells exceed 10 mg/L, with a maximum value of 41 mg/L (Table Z). The highest concentrations are northwest of Weiser and between Weiser and Crystal (Appendix A, Map 7). Twenty-two wells located in the shallow aquifer had a median nitrate value of 9.75 while seven wells in the deep (regional) aquifer had median levels below the detection limit. The regional, deeper ground water aquifer is protected to some degree by a thick clay layer and has had very little impact thus far.

Nitrogen isotopes have been used to help identify sources of contamination, and results to date have been mixed. The isotope results show sources from fertilizer, mixed or organic sources, as well as animal/human waste. Isotope testing conducted by ISDA (Fox et al. 2002) indicated primarily fertilizer and mixed sources in Weiser Flat. The Sunnyside area had a large percentage of wells showing animal waste as a potential source of nitrogen (Tesch and Carlson 2003 a,b). Eighteen wells were tested for substances indicative of human sources or septic waste water (e.g. caffeine, disinfection products). The general indications from these samples were no human sources to very slight waste water influence. ISDA states that water quality monitoring results are typical of areas with high agrichemical use under furrow irrigation overlying shallow aquifers, and that leaching of applied commercial fertilizer is probably a major cause of nitrate entering ground water.

Table Z. Summary of monitoring results from 1996 to 2004 (ISDA website, April 2005).

Nitrate Concentration Range (mg/L)	Spring 1996 Percent of Wells	Spring 2000 Percent of Wells	Spring 2002 Percent of Wells	Spring 2004 Percent of Wells
0 - 1.9	26	26	32	23
2.0 - 4.9	13	13	8	11
5.0 - 9.9	29	19	13	13
10.0 – 19.9	29	34	42	42
≥ 20.0	3	8	5	11
Mean value	7.0	8.3	8.2	10.5
Median value	7.2	8.2	8.3	11.0
Maximum value	23	27	30	41

Nitrate-nitrogen results based on 38 wells consistently sampled that fall within the project area.

Tesch et al (2003a) began intensive testing in the Sunnyside area in 2002 because of citizen concerns over high nitrate levels. As of 2003, 69% of wells exceeded 10 mg/L and 35% exceeded 20 mg/L. The highest values are down gradient of a large AFO/CAFO. In the areas adjacent to the AFO/CAFO, there was also irrigated cropland, a dairy and an onion disposal site. Manure was also applied to land within the area. Sources of potential leaching of nitrates were identified as cattle manure, land applications of manure, wastewater lagoons, applied N-based fertilizers, rotations of legumes and septic systems (Tesch and Carlson 2003b). Ion fingerprinting and pharmaceutical sampling results indicated animal waste contamination and lagoon leakage (which has already been addressed by the producer). Nitrogen isotope sampling likewise showed that 80% of the twenty wells tested in the Sunnyside area indicated an animal/human waste source of nitrate, and the rest were a mixed/organic source.

Pesticides

ISDA began pesticide sampling in 1996. Of 52 wells sampled in 2002, 27 of the wells had positive detections for pesticides, and many had multiple pesticides detected. Atrazine desethyl, atrazine, dacthal, bromacil, simazine, diclofop methyl, hexazinone, metalochlor, metribuzin, and prometon were detected, in order of frequency. However, detection levels were generally far below levels of health concern. Only diclofop methyl exceeded the EPA reference dose, and this was the first year this pesticide has been detected in the project area (used on barley and wheat). Several of the pesticides detected are not presently in use but were in years past, or presently have a non-agricultural usage. ISDA oversees the Pesticide Management Plan (draft), designed to reduce the risk of ground water contamination from pesticide/chemical use for agriculture and other activities. The plan will address specific response levels to pesticide detection based on the pesticide's "reference point" (e.g., maximum contaminant level, health advisory level, reference dose). Refer to WIN-PST hazard rating (Tables P, Q and R in the Treatment Unit section) for risks associated with pesticide use.

Pathogens

Monitoring by IDWR has shown fecal coliform contamination in two wells in the project area. Both of these wells are used for irrigation and are relatively shallow (25-28 feet deep). Bacteria contamination in wells is often indicative of wellhead contamination or more localized water quality problems.

Protection of Public Drinking Water

The Weiser public water system's main source of water is surface water from the Snake and Weiser Rivers. However, ground water wells have been added to the system in recent years. Smaller public systems in the project area (e.g., transient systems) rely on ground water for their water supply, and nitrate exceedances have been noted in these wells on occasion (EPA 2004b). In addition to IDEQ's Drinking Water Program, the Source Water Assessment Plan for Idaho (IDEQ 1999) provides coordination of effort and collaboration among the many source water protection activities that are largely the responsibility of local jurisdictions. The source water assessment includes delineation of the area that may contribute to source water contamination, contamination source inventory, susceptibility analysis, and public distribution of findings. Source water extraction points for the project area are shown in Figure 1. The plan also encourages the use of programs such as well-head protection to ensure the safety of domestic well water. The program emphasizes the need for a combination of conservation practices to be most effective. These include land use controls, regulations and permits, structural measures, well-head protection, public education, land management, and emergency response preparedness plans (EPA 2001).

Ground Water Quality Summary and Implications:

If the sampling done by IDWR and ISDA is representative of the entire project area, then there may be many shallow private wells with nitrate levels above the MCL, posing a health risk to infants and the elderly infirm. This is why the basin is ranked first on the state's priority list for degraded ground water quality. Trend analysis indicates that nitrate levels are increasing in the area (Parliman 2002, Bahr and Carlson 2000, Fox et al. 2002). Nitrate is not the only ground water pollutant of concern. A few wells sampled tested positive for bacteria and a number of wells showed positive detections for multiple pesticides. High arsenic levels are a concern but are presumed to be due to natural sources.

There is a very strong relationship between land use activities and ground water quality (GWQC 1996). Water management practices as well as land uses, in combination with the hydrogeologic conditions, can increase the potential for ground water quality degradation, threatening ground water beneficial uses. The primary source of ground water impacts is apparently agricultural land use. Potential identified sources such as poor well construction and failed septic tanks are generally local scale issues — the extent of ground water contamination in the Weiser area is indicative of broad scale land use issues and the intrinsic vulnerability of the aquifer (Focazio et al. 2002, Parliman 2002, Donato 2000). Based on a nitrogen budget developed for the area using the method described by Rupert (1996, Table AA), agricultural sources (livestock and fertilizer application) account for over 90% of the nitrogen inputs to the system. Particular attention needs to be paid to irrigation water management and nutrient management. The AFO/CAFO issues are contributing to ground water impacts but will not be addressed in this project—separate EQIP funds will address AFO/CAFOs on an individual-project basis.

Table AA. Major Sources of Total Nitrogen Input and Loss in the Project Area

Total N Source	Percentage	Total N Loss	Percentage
Precipitation	1	Crop Uptake	52
Fertilizer	54	Beef & Dairy Manure	31
Septic Systems	< 1	Decomposition	17
Legumes	4		
Beef & Dairy Manure	40		
Total N Input	**6,977,130 lbs.**	**Total N Loss**	**5,733,869 lbs.**
Net Increase = 1,243,261 lbs.			

Based on methods described by Rupert (1996) with data from producers, Idaho State Department of Agriculture, South West District Health, and Ag Statistics Service website.

Water Quality - Surface

The Idaho Department of Environmental Quality (IDEQ) is the state agency primarily responsible for water quality in Idaho's rivers and lakes. As a requirement of the Clean Water Act, IDEQ must provide an accurate assessment of the state's waters. IDEQ works to implement federal and state water quality standards, including the regulation of pollutants that are discharged to the state's waters.

Water Quality Limited Water Bodies:

Section 303(d) of the Federal Clean Water Act requires states to list water bodies that are impacted by one or more pollutants. These water bodies cannot meet water quality standards for designated uses despite point source technologies. States must develop budgets for listed water bodies that determine the maximum loadings of pollutants of concern (incorporating seasonal variation and a margin of safety). Loads include both point and nonpoint sources contributing to the water body, and the maximum load must be consistent with water quality standards and designated uses. These budgets, or Total Maximum Daily Loads (TMDLs), must be approved by EPA and then become the basis for implementation plans to restore the water quality to a level that supports its designated uses. Designated uses for project area streams and rivers are presented in Table BB.

Table BB. Designated (or existing) Beneficial Uses for Southern Washington County Rivers and Tributary Segments (IDAPA 58.01.02).

River/Stream Segment	Designated Beneficial Uses[2]
Snake River, Boise River confluence to Scott Creek confluence ("Upstream Snake River") RM 409 to 335	Cold water aquatic life Primary contact recreation Domestic water supply Special Resource Water[3] (Scott Creek to Brownlee Dam)
Hog Creek – Headwaters to Snake River	Undesignated[1]
Warm Springs Creek - Headwaters to Snake River	Undesignated[1]
Jenkins Creek – Headwaters to Snake River	Cold water aquatic life Primary contact recreation
Scott Creek – Headwaters Snake River	Undesignated[1]
Weiser River- Galloway Dam to Snake River	Cold water aquatic life Primary contact recreation Domestic water supply
Mann Creek – Mann Creek Reservoir to Snake River	Cold water aquatic life Primary contact recreation Salmonid Spawning
Cove Creek – Headwaters to Weiser River	Undesignated[1]
Monroe Creek – Headwaters to Weiser River	Undesignated[1]

[1] Undesignated water bodies are presumed to support cold-water aquatic life and primary or secondary contact recreation unless IDEQ determines otherwise (IDAPA 58.01.02.140).
[2] All segments are designated for the statewide uses of agricultural and industrial water supply, wildlife habitat, and aesthetics.
[3] Stream segments or water bodies designated as Special Resource Waters need intense protection to preserve outstanding or unique characteristics or to maintain current beneficial uses, and are protected from additional point source contributions (IDAPA 58.01.02.002.96).

The most current approved listing of impacted Idaho water bodies is presented in the *1998 303(d) List* (additions to the list by EPA in 2000) (IDEQ 1998). The list contains stream segments with designated uses that are deemed impaired by one or more pollutants or stressors. The 303(d) list provides a mechanism for the state to prioritize cleanup of water quality problems. Streams on the list are required to have a TMDL established within certain dates, or basin assessments demonstrating that beneficial uses are fully supported and therefore not requiring TMDL development. Listed rivers and streams in the project area are presented in Table CC.

Table CC. Southern Washington County rivers and tributary segments deemed to be water quality limited (IDEQ 1998; IDEQ 2003a, b; IDEQ 2004).

River/Stream Segment	Pollutants of Concern
Snake River, Boise River confluence to Scott Creek confluence ("Upstream Snake River") RM 409 to 335	Bacteria, Nutrients, Sediment, Temperature, Dissolved Oxygen, pH, Mercury
Hog Creek – Headwaters to Snake River	Nutrients, Sediment, [Bacteria[2]]
Warm Springs Ck - Headwaters to Snake River	Nutrients, Sediment, [Bacteria[2]]
Jenkins Creek[1] – Headwaters to Snake River	Nutrients, Sediment, Bacteria
Scott Creek – Headwaters Snake River	Nutrients, Sediment, [Bacteria[2]]
Weiser River- Galloway Dam to Snake River	Nutrients (Phosphorus), Sediment, Temperature, Bacteria, Dissolved Oxygen[3]
Mann Ck[3] – Mann Ck Reservoir to Snake River	Sediment
Cove Creek[3] – Headwaters to Weiser River	Sediment, Nutrients

[1] Delisted in 1998, TMDL proposes new listing for next 303d List
[2] Not listed on 1998 303d List—TMDL proposes to add to next 303d List
[3] TMDL proposes to delist

The Lower Weiser River segment lies entirely within the project area. All other listed river or tributary segments lie partially within or adjacent to the project area. A TMDL addressing the Brownlee Reservoir (Weiser Flat) drainage was approved by EPA in 2003. All creeks in Weiser Flat originate in higher elevation and flow through irrigated cropland. There is little historical water quality data available for this area. The creeks are characterized by low bank stability and poor riparian vegetation condition (IDEQ 2003b). Two monitoring stations were established to provide data for loading allocations. The upper stations were generally above row crop areas, but did include impacts from livestock grazing and roads (not "natural" background only)(Campell 2001). According to the sub-basin assessment, cold water aquatic use is not fully supported in listed creeks (Hog, Scott, Warm Springs) and primary contact recreation is not fully supported in Hog, Scott, Warm Springs, or Jenkins Creeks.

The draft TMDL for the Weiser River was completed in June 2004. The segment of the lower Weiser River related to the project area is the portion from Galloway Dam to the confluence with the Snake River. This segment includes inflows from Cove, Monroe, and Mann Creeks. Irrigation water return flows play a large role in the lower Weiser. Agricultural drains to the lower Weiser River include the Sunnyside return ditch, Frazer Gulch, Smith Drain, Lower Payette Ditch and Unity Drain (IDEQ 2004). Co-mingling of ground and surface waters in the lower sub-basin influences the water quality of the lower Weiser River. Biological assessments indicate impairment of the river below Galloway Dam (pollution tolerant species present, intolerant species lacking) (IDEQ 2004). Although Monroe Creek is not currently listed, it has also been impacted by area land use (Campbell 2004).

There are no natural streams within the Sunnyside area. A large portion of the area drains directly to the Snake River -- that portion is addressed in the Snake River-Hells Canyon TMDL, completed in 2003 and approved by EPA in 2004.
Impacts to beneficial uses within the project area stem from hydrologic modifications due to irrigation, annual cropping tillage practices, unrestricted access by livestock or inadequate containment, inadequate nutrient management, roads, AFOs/CAFOs, failed or inadequate septic systems, stream channel and habitat modifications, reduced plant cover/density (range and pasture), erosion (primarily irrigation-induced), and storm water runoff (USDA-NRCS 2000,

IDEQ 2003a, IDEQ 2003b, IASCD 2003). Several point sources (waste water treatment plant and AFO/CAFOs) are located within the project area and loadings are regulated by NPDES permits.

An agricultural implementation plan has been drafted (IASCD and ISCC 2003) that establishes priority areas and appropriate conservation practices to reduce agricultural nonpoint source pollutant contributions within the Weiser Flat area. The plan includes establishment of priority treatment units for surface irrigated cropland (Tiers 1-3), irrigated pasture, sprinkler irrigated cropland and animal feeding operations (Figure 4). Urban/suburban sources such as storm water runoff and septic systems are also being addressed in the overall TMDL implementation plan for Weiser Flat. The IASCD/SCC will develop an implementation plan for the Weiser River sub-basin when the TMDL has been completed and approved.

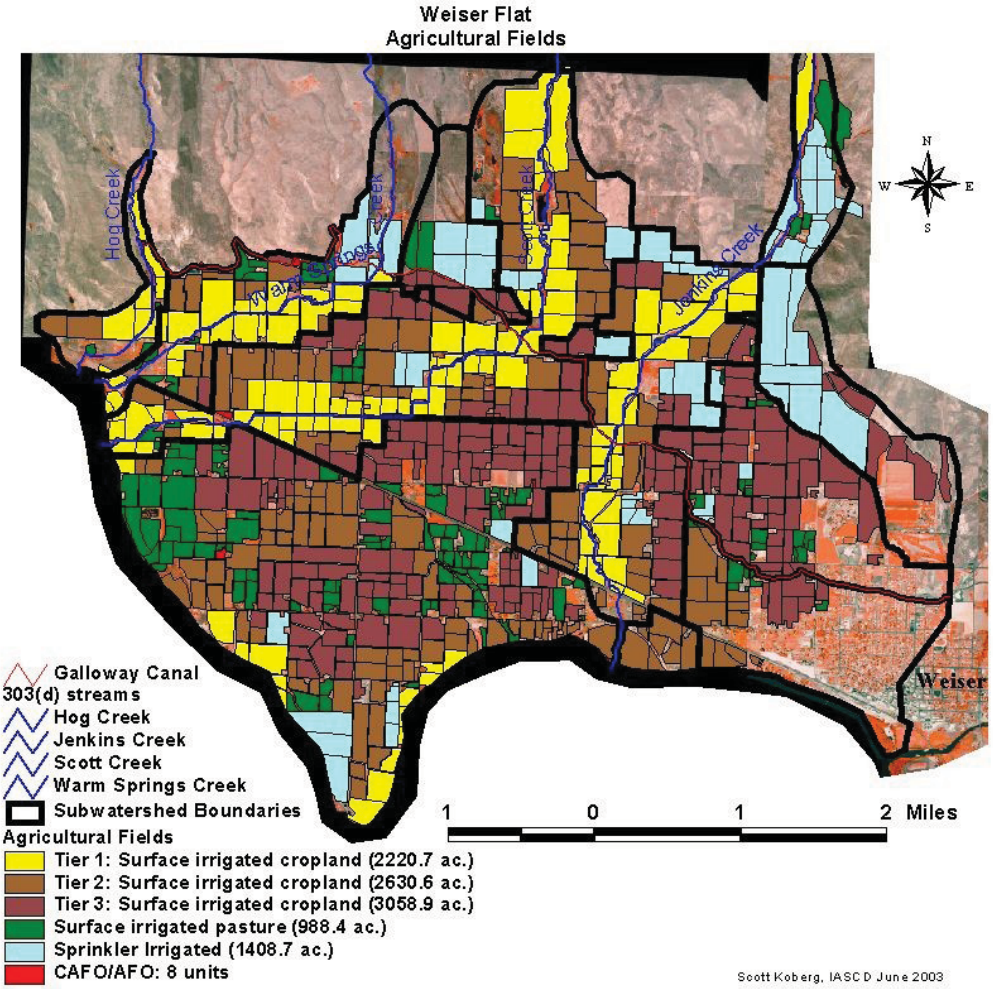


Figure 4. Priority Treatment Units Proposed in the Weiser Flat TMDL Implementation Plan (IASCD and ISCC 2003)

Specific Pollutants of Concern:

The majority of pollutant loads to project area streams and rivers occurs as a result of irrigation activity and snowmelt in spring. A summary of water column data and needed reductions is shown in Table DD, and a detailed discussion of individual pollutants follows.

Phosphorus

The driving force for much of the pollutant reduction needed within the Weiser River and Weiser Flat drainages is the Snake River-Hells Canyon (SRHC) TMDL, which was jointly developed by Idaho and Oregon to address the water quality problems and severe impacts to the Snake River and to Brownlee Reservoir, including frequent excessive algae blooms in the reservoir and tail waters (IDEQ 2003a,b). Excessive loading of phosphorus occurs primarily within the upper Snake River section (River Mile 409-335), which is where the Weiser River confluence with the Snake is located. According to the SRHC TMDL, the phosphorus loading is tied to dissolved oxygen (DO) depletion in the river caused by algae respiration and leads to fish kills. Because of this problem, phosphorus was defined as the nutrient of concern for all rivers and creeks within the project area, even though assessments have shown that phosphorus may not be impacting beneficial uses within those rivers and creeks. The phosphorus target established in the SRHC TMDL is 0.07 mg/L from May through September. This criterion was selected based on methodology utilizing chlorophyll "a" as a surrogate and determining levels of algae that would maintain aesthetics, and then correlating that to phosphorus levels (IDEQ 2003a). This criterion has been adopted by the Weiser Flat and Weiser River TMDLs.

According to monitoring by ISDA, average annual total phosphorus concentrations (mg/L) over the sampling period were 0.54 in Jenkins Creek, 0.34 in Scott Creek, 0.27 in Warm Springs Creek, and 0.19 in Hog Creek, all of which exceed the 0.07 mg/L target. While the Galloway Canal had an average concentration of 0.15 mg/L total phosphorus, it accounted for the highest load in the Weiser Flat sub-basin due to its high flow (Campbell 2001). The Weiser Flat TMDL (IDEQ 2003b) established loads and reductions as follows:

- Hog Creek - 2.5 lbs/day, requires 6.9 lbs/day reduction or 73%
- Scott Creek – 5.0 lbs/day, requires 21.1 lbs/day reduction or 81%
- Warm Springs Creek - 5.2 lbs/day, requires 15.5 lbs/day reduction or 75%
- Jenkins Creek - 3.9 lbs/day, requires 30.7 lbs/day reduction or 89%

Agricultural lands were allocated loads of 1.2, 4.8, 5.1, and 3.6 kg/day within the Hog, Scott, Warm Springs, and Jenkins Creek sub-watersheds, respectively. Approximately eleven years would be required to achieve results through implementation (IDEQ 2003b).

The phosphorus target load set by the SRHC TMDL for Weiser River is 144 kg/day, which would require an approximate 60% reduction in current phosphorus levels (IDEQ 2003a). This target applies to the critical period, May through September. All available data evaluated for the draft Weiser River TMDL showed critical period concentrations of total phosphorus ranged from 0.075 to 0.270 in the lower river. Although data were very limited, it did not appear that DO depletion was problematic. Total phosphorus reductions are estimated to be 30-70% depending on month (July through September requires most reduction) (IDEQ 2004).
Cove Creek had an average total phosphorus concentration of 0.29 mg/L, the majority in the form of orthophosphate. This was true for many area creeks. Lower Mann Creek exceeded the total phosphorus target concentration 100% of the time (Campbell 2002). Estimated load reductions would be approximately 65-80% for Cove and Mann Creeks (Campbell 2002, 2003). However, nutrient TMDLs have not been developed for Cove or Mann Creek. Although not listed on the 303(d) list, Monroe Creek had total phosphorus concentrations ranging from 0.17 (lower site) to 0.1 (upper site), requiring an estimated load reduction to Weiser River of about 60% to meet the SRHC TMDL target (Campbell 2004).

Table DD. Summary of available water quality data for streams & rivers within the project area[1].

Stream Segment	Annual average TP Mg/L	Critical Period[2] TP Mg/L	Estimated Reduction Needed for TMDL Target[3] %	Sediment Mg/L	Sediment Load Kg/day	Estimated Reduction Needed for TMDL Target[6] %	Nitrate Mg/L	Bacteria[5] % exceeding Water Quality Standard
Lower Weiser River (various sites)	0.08-0.13	0.13-.16	28 - 69	10.1-31.1[4]	---	8 - 11	----	18
Monroe (lower and upper)	0.10 - 0.17	0.11 - 0.17	----	11. 4 - 14.4	102 - 638	0	----	14 - 70
Cove	0.31	0.32	----	9.3	31	0	0.04	56
Mann (lower and upper)	0.22 - 0.053	0.22 - 0.055	----	2.9 – 17.8	270 – 1,088	0	0.02 – 0.57	0 - 45
Hogg (lower and upper	0.15 - 0.2	----	73	22 - 31.5	355 - 440	----	0.24 0 .33	36 - 45
Scott (lower and upper)	0.21 – 0.32	----	81	26 – 102.5	513 – 3,926	58	0.97 - 3.67	13 - 50
Jenkins (lower and upper)	0.14 – 0.42	----	89	6 - 152	41.5 – 3,690	72	0.39 – 3.44	13 - 41
Warm Springs (lower and upper)	0.18 – 0.25	----	75	3.7 - 82	19.3 – 2,913	49	0.26 – 1.19	31 - 42
Galloway Canal	0.14	----	----	27.5	7,455	----	0.19	23

[1] Sources: IDEQ 2003b, Campbell 2001, 2002, 2003, 2004, IDEQ 2004, USGS water quality database.
[2] Defined in the SRHC TMDL as May through September.
[3] Based on SRHC TMDL target set at 0.07mg/L during critical period.
[4] Results from TSS and Suspended Solids methods combined
[5] E coli forming units/100 ml, percent of samples exceeding the primary contact criteria.
[6] Based on TMDL load allocation and existing load data for critical period.

Sediment

Peak flow typically occurs March through June on the lower Weiser River. Due to extensive diking and channelization, access to the flood plain is greatly reduced. Sediment carried in the spring freshet no longer has the opportunity to be deposited on the flood plain prior to inflow to the Snake River. Erosion and sediment from land use practices is a problem in some areas. Suspended sediment in the water column can adversely impact aquatic life. Some native fish are adapted to high sediment loads occurring during spring runoff. However, longer durations of exposure can harm even adult fish, reduce available food, and smother eggs and fry in substrate. High levels of substrate embeddedness (greater than 30%) can inhibit salomonid spawning.

The mean total suspended sediment documented in the TMDLs was well above 50 mg/L on Jenkins, Scott and Warm Springs Creeks (Campbell 2001). Sediment loads established by the TMDL (IDEQ 2003b) were:

- Scott Creek – 3,973 lbs/day, requires 5,485 lbs/day reduction or 58%
- Warm Springs Creek – 3,973 lbs/day, requires 3,806 lbs/day reduction or 49%
- Jenkins Creek – 2,423 lbs/day, requires 6,327 lbs/day reduction or 72%.

Agricultural lands were allocated loads of 2,445, 3,911, 2,333 lbs/day within the Scott, Warm Springs, and Jenkins Creek sub-watersheds, respectively. Hog Creek did not have elevated sediment loads, nor did most of the upper portions of the creeks listed above.

It appears that major inputs of sediment to the Weiser River are from upstream of Galloway Dam, and neither the river nor lower segment inflows exceed the target concentration (Campbell 2002, 2003, 2004, IDEQ 2004). The SRHC TMDL load allocation to the Weiser indicated that an 8-11% reduction would be needed from March to May (IDEQ 2003a), but evaluation of available data indicates it is already meeting this load target. However, cobble embeddedness is still a problem within the Weiser River, and currently shows an average 41.7% embeddedness (30% embeddedness is where negative habitat impact begins to occur) thus requiring a 28% reduction in sediment fines (IDEQ 2004). It is unclear whether movement of bedload is impacting embeddedness in the lower river or whether the lack of storm water monitoring in the area has limited understanding of suspended sediment loads that contribute to embeddedness problems.

Bacteria

Bacteria and other pathogens are considered problems in surface waters when levels of either are high enough to create human health problems in rivers or streams used for recreational activity. All monitoring locations within the project area have exceeded the bacteria standard for primary and secondary recreation (Campbell 2001, 2002, 2003, 2004, IDEQ 2004).

A bacteria TMDL has not been developed on Weiser Flat, but is scheduled for 2006. Bacteria consistently exceeded geometric mean criteria over 2 years sampled (2001-2002) on the Weiser River as well, and a bacteria TMDL has been developed for the sub-basin.

Temperature

No violations of cold water aquatic life temperature standards were observed for any of the creeks in Weiser Flat (IDEQ 2003b). The sub-basin assessment for the Weiser River indicates water temperature is a basin-wide problem. Temperature loading to the lower Weiser occurs from ambient air, solar radiation, and upper watershed inflow (IDEQ 2004). Stream

channelization, lack of riparian cover and altered flow regimes are contributing factors to the temperature problem. Prolonged warming occurs in the basin from late spring into fall, with maximum temperatures in July and August. The temperature target established by the TMDL is 22°C (7-day average of maximum) if and when the site potential is less than 22°C. When the site potential is greater than 22°C, the target is limited to a 0.14°C increase from anthropogenic sources.

Nitrate-Nitrogen

Nitrate is not a nutrient of concern identified for surface water by the TMDLs. However, elevated nitrate levels were observed at some of the monitoring sites. All creeks within Weiser Flat (Campbell 2001) had levels exceeding the recommended standard concentration (0.3 mg/L, Cline 1973). Weiser Flat is an area with high ground water nitrate levels. Ground water /surface water interconnections are very likely throughout the project area due to geology and high water tables. Ground water flow appears to follow the topography, and flow direction is towards the Snake and Weiser Rivers (Bahr and Carlson 2000), so the potential for ground water to contribute nitrate and other pollutants to area water bodies is high (especially where agricultural drains intercept ground water). Slightly elevated nitrate levels were also observed in Mann Creek (average 0.57 mg/L).

For further information on Idaho water quality standards, policies and procedures please see http://www2.state.id.us/adm/adminrules/rules/idapa58/0102.pdf.).

Aquatic Macro-invertebrate Communities:

The composition of the aquatic macro invertebrate community of a waterway is an indicator of water quality and the condition of the stream. Bio-monitoring approaches that utilize macro-invertebrates cover a broad range of spatial and temporal scales. The community level complexity attempts to summarize the magnitude, and significance of an ecosystem stress on the waterway being examined (Merritt and Cummins 1978). The most commonly used method to describe macro-invertebrate communities is taxa-richness, which is the number of insect families in a community. Generally the number of taxa present decreases as water quality declines.

Another method of measuring community complexity is EPT richness. EPT refers to the richness of *Ephemeroptera* (mayfly), *Plecoptera* (stonefly), and *Trichoptera* (caddis fly). It assumes that most species in these orders are pollution sensitive and because these species are easily identified, provides a quick, reliable assessment of water quality. The distribution of these aquatic invertebrates is ubiquitous and they are normally abundant, easy to collect and of sufficient size to identify with the naked eye.

Of the three orders of *Ephemeroptera* (mayfly), *Plecoptera* (stonefly), and *Trichoptera* (caddis fly), Plecoptera is often considered to be the most pollution sensitive and was not found in any of the data collected by the IDEQ. IDEQ sampled the lower Weiser River for macroinvertebrates in 2001. The number of distinct taxa represented by EPT species was reduced, indicating water quality impacts (IDEQ 2004).

One of the major challenges for any aquatic invertebrate is to obtain sufficient quantities of oxygen for its metabolic needs. The aquatic environment contains much less oxygen than the terrestrial environment and often that oxygen content is highly variable, due to water quality

differences. Aquatic invertebrates have become highly adaptive in their ability to diffuse oxygen from water through the development of a tracheal respiratory system (Merritt and Cummins 1978). Water quality that is impacted by agricultural nutrient runoff often contains elevated levels of phosphorus. Elevated phosphorus can contribute to eutrophication of water which often results in depleted oxygen levels. Reduced dissolved oxygen restricts which organisms will be able to survive in this degraded environment.

The IDEQ and the ISDA sampled several creeks (Hog, Jenkins, Warm Springs and Scott) in the lower Weiser River watershed in 1995, 1996 and 1998. Macro-invertebrate communities that were identified during those surveys support the fact that waterways in the lower Weiser River within the project area have been impacted by human induced activities.

Aquatic macro-invertebrate communities found were dominated by the flowing taxa:

Jenkins Creek - Ephemeroptera (mayfly), Chironomidae, Trichoptera (caddis fly) and Annelid worm,
Lower Scott Creek - Ephemeroptera (mayfly), Chironomidae, Annelid worm,
Upper Hog Creek - Gastropoda, Annelid worm and Chironomidae,
Lower Hog Creek - Gastropoda and Chironomidae,
Lower Warm Springs Creek- Ephemeroptera (mayfly) and Chironomidae and Annelid Worm.

Surface Water Quality Summary and Implications:

Surface water quality of most streams and rivers within the project area has been impacted by a variety of pollutants. There is no data to identify “natural” background loads carried by area streams and rivers. While wildlife is often included in natural loading calculations, wildlife populations in the area have been altered by human management such that populations may be greater and more concentrated than historically occurred (IDEQ 2003b). No monitoring sites within the project area are representative of “natural” conditions. Background loads are taken from the SRHC TMDL for use as targets.

The reduction of May - September phosphorus levels will be a major effort due to the level of reductions needed. The majority of phosphorus loads in many area streams is in the form of orthophosphate, and not attached to sediment or organic matter. Conservation practices to address sediment and erosion will have less impact on phosphorus levels. IDWR Statewide Monitoring Program data for phosphorus (primarily orthophosphate) in sampled wells showed that almost all had values well above the 0.07 mg/L target for surface water. Of the ISDA wells sampled between 2000 and 2002, over half showed values greater than 0.07 mg/L. Studies in support of the lower Boise River TMDL indicated that substantial ground water inflows to area drains, tributaries, and the river occurred, and that these inflows were likely a significant source of orthophosphate in surface water. Similar conditions exist within the project area. Ground water reductions in phosphorus levels may be a key component in obtaining surface water reductions. Nutrient management, proper grazing, and irrigation water management will play a major role in both ground and surface water pollutant reduction.

Suspended sediment is problematic in the Weiser Flat creeks, and some stream segments within the Weiser sub-basin. Irrigation-induced erosion is a problem in some areas, as is streambank erosion (IDEQ 2003b). These are being addressed through the agricultural implementation plan.

Average loadings developed for the Brownlee Reservoir and Weiser River TMDLs provide no basis to guide specific management improvements needed. For agricultural land uses, implementation plans are developed by the Idaho Association of Soil Conservation Districts (IASCD) and the Idaho Soil Conservation Commission (ISCC) for this purpose. The Idaho Department of Agriculture (ISDA) along with the Weiser Soil Conservation District will develop a water quality monitoring plan to allow trend analysis of water quality and gauge progress towards meeting the TMDL load reductions and needed ground water improvements. Conservation practices and improved management have already been initiated (e.g., constructed wetlands on agricultural drains, drip and surge irrigation systems). The area northwest of Weiser and between Weiser and Crystal are priority areas for planning and implementation.

Wetlands

Wetlands are areas that provide a transition between the upland terrestrial ecosystem and the aquatic ecosystem. All wetlands have soils and a substrate that are periodically saturated or covered with water during some portion of the growing season. Wetlands can be of various types (freshwater marsh, scrub shrub, herbaceous emergent) and are classified by vegetative cover type and by the duration (i.e., temporarily flooded, seasonally flooded, permanently flooded) of the hydrologic period.

Most of the project area consists of level to moderately sloping land surrounded by rolling foothills. The Weiser River flows from east to west through the area east of the city. Connectivity to the natural flood plain is restricted along the river and, as a result, any natural wetlands have been reduced by the effects of human and agricultural activities.

Buttermilk Slough is a natural wetland in the southern portion of the project area. It is an old oxbow of the Snake River that was cut off from the river by the construction of U.S. Highway 95 and the railroad. Buttermilk Slough wetland functions include nutrient cycling, sediment retention, wildlife habitat and ground water recharge. Wetland composition consists of open water and emergent vegetation.

Numerous small artificial wetlands created using recovered irrigation tail water are scattered within the project area. There is an opportunity to create more of these artificial wetlands to act as sediment retention basins and nutrient filters for water re-entering the Snake and Weiser Rivers. The local irrigation district has utilized this strategy to filter water before it returns to the Snake River.

Wetland Types:

Historical wetland types, classified using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin 1979) found in the project area were dominated by:

- palustrine emergent freshwater wetland (PEM), approximately 300+/- acres
- palustrine forested wetlands (PFO), comprised of approximately 230+/- acres of open water seasonally and temporarily flooded areas
- palustrine freshwater shrub (PPS), approximately 190+/- acres
- riverine perennial, unconsolidated shore (R3USA), temporarily flooded with approximately 100 +/- acres

Numerous freshwater ponds classified as palustrine unconsolidated bottom permanently flooded (PUBH), comprising 90+/- acres are found scattered throughout the project area as well.

Wildlife

The intense agricultural activity of the project area has had an adverse impact on the historical wildlife community. Quality of wildlife habitat consists of various levels of breeding, rearing and foraging areas available along the lower Weiser River and in Weiser Cove. In the Weiser Flat area, Jenkins, Scotts, Warm Springs and Hog Creeks provide limited wildlife habitat. Buttermilk Slough in the Sunnyside area provides remnant wetland wildlife habitat similar to that seen if connectivity to the Snake River were not reduced by U.S. Highway 95 and the railroad.

Total wildlife functional diversity (TFD) in the lower Weiser River watershed from the historic to current conditions has changed significantly. Total functional diversity is a measure of how diverse wildlife habitat and species richness are based on the number of species that have overlapping ecological functions. Ecological functions include activities such as cavity building, burrowing, creating aquatic structures, building aquatic structures, creating ground structures, nutrient recycling, seed dispersal, plant dispersal, vertebrate control, insect control and pollination (NWPPC 2002). The cumulative effects of widespread agricultural activities in the Weiser area have removed much of the wildlife that performed these ecological functions.

Wildlife species include wintering elk and resident populations of mule deer. Local information suggests that production of forages such as alfalfa, along with small grain and sugar beets, has increased their presence during the winter. Riparian corridors, although scattered, provide habitats for pheasant, quail, cottontail rabbits, red-winged blackbirds and a variety of neo-tropical birds. Irrigation delivery ditches act as narrow green corridors that provide limited nesting and rearing habitat for waterfowl. The close proximity of the Snake River corridor suggests there would be numerous waterfowl including mallards, blue winged and brown teal along with over-wintering Canada geese. According to the Fish and Wildlife Service (FWS), resident breeding populations of Canada geese are common there. Great blue heron, green heron and curlew are frequently seen along the Snake and Weiser Rivers.

Forecasted Conditions

Forecasted conditions are predictions about what conditions would be in the future, without project action, assuming that all existing programs remain constant.

On-site Damages:

Critical factors for on-site damages include irrigation induced erosion, declining soil quality conditions and associated soil nutrients, pathogens and pesticide buildup.

Without accelerated land treatment (PL-566 funding) to address these needs, erosion on the surface irrigated cropland will continue in the untreated areas; the quality of the soils will continue to decline, and nutrients, pathogens and pesticides will continue to buildup in the soil profile.

Off-site Damages:

Sediment, nutrients and pathogens, as well as pesticides, are the primary problems related to off-site damages affecting the watershed's water quality. An estimated 71,920 tons of sediment, 71,777 pounds of phosphorus and associated pathogens and pesticides will be delivered to the local water bodies every year if no action is taken. In the no action alternative, future nitrogen will continue to be leached to ground water at the present rate of 803,180 pounds/year. Well monitoring indicates that nitrate concentrations in ground water are increasing every year.

Relatively high implementation costs are involved with installing sprinkler, drip and surge irrigation systems with intensive engineering required to design them. Also, monitoring soil moisture with granular matrix sensors (Watermark soil moisture sensors) for on-farm irrigation water management is needed due to the intense management of row crops in the watershed. Environmental impacts from sediment and nutrients to the local streams, ground water degradation from over-application or improper timing of nutrients and irrigation water, and nutrient and pathogen problems from animal wastes has established a great need for accelerated cost sharing and technical assistance to address these problems.

Without accelerated land treatment (PL-566 funding) to address these needs, erosion on the surface irrigated cropland will continue in the untreated areas; the sediment, nutrient and bacteria delivery to the Weiser and Snake Rivers and tributaries will continue; and the quality of the ground water will continue to decline. All cropland, pastureland, and AFO/CAFOs are considered critical as they have the potential to impact surface and ground water quality due to irrigation induced erosion and inadequate irrigation water management, nutrient management, pest management, prescribed grazing, waste storage and waste utilization.

A major portion of the project area's population relies on private domestic wells for their drinking water source. Based on trend analysis of the available water quality data, all wells located in the shallow aquifer within the Weiser Flat community of the project area will exceed the drinking water standard for nitrates within the next ten years, and the median nitrate level will approach 25 mg/L . Some owners with impacted wells have already sought alternative solutions, including purchases of filters (only partially effective) and bottled water for human consumption. In Idaho, private water supplies are the sole responsibility of the system owner to maintain and to ensure safe potable water. It may be necessary for the domestic well owner to develop a long-term alternative source of domestic water in the future (such as connecting to a community water system or drilling a well into the deep, relatively non-impacted aquifer) to ensure safe drinking water, at considerable expense. Although arsenic detections are attributed to natural background, the arsenic problem is being addressed by the State and they are in the process of developing strategies to deal with this issue.

FORMULATION AND COMPARISON OF ALTERNATIVES

Formulation Process

Project formulation followed the inventory, analysis and forecasting of the water and land resource conditions occurring in the four identified treatment units (TU) totaling 18,645 acres of cropland (includes 1,490 acres presently under contract), 1,125 acres of pastureland and 22 animal feeding operations (AFO/CAFOs). These treatment levels are approximately 75% of the identified areas. An interdisciplinary team of specialists and planners used the Conservation Options Procedure (COP) to develop technically feasible conservation options for each of the four Treatment Units.

- Treatment Unit #1 0-4% surface irrigated cropland
- Treatment Unit #2 0-10% sprinkler irrigated cropland
- Treatment Unit #3 0-10% surface and sprinkler irrigated pasture
- Treatment Unit #4(1) AFO/CAFOs

(1) The AFO/CAFO issues are contributing to surface and ground water impacts but will not be addressed in this project. Separate EQIP funds will address AFO/CAFOs on an individual-project basis.

Combinations of practices (conservation options) were developed that were expected to achieve the project's goal and objectives. Common base indicators for each TU were also developed as they related to both surface and ground water. These base indicators were used to determine the most cost efficient conservation option for each TU. The indicators for each TU are:

- Treatment Unit #1: Sediment, pesticides and phosphorus (surface water), and nitrates and pesticides (ground water)
- Treatment Unit #2: Nitrates (ground water)
- Treatment Unit #3: Phosphorus, pathogens and organics (surface water); and nitrates (ground water)

Through the Conservation Options Procedure process, the following alternatives were formulated and evaluated:

- No Action Alternative --- Future without Project Condition
- Alternative 1 --- Resource Protection (RP) Plan

Only those alternatives that were considered reasonable were evaluated. Alternatives that were not considered reasonable, and therefore were not evaluated further, were those that did not meet the Sponsor's objectives or that were socially unacceptable. These included eliminating crop production altogether and eliminating irrigation which would have the effect of also eliminating crop production in this climatic region. Eliminating crop production would have severe negative effects on economic stability in the area and would eliminate the agricultural land use and value.

Description of Alternative Plans

No Action Alternative (Future without PL-566 Project Condition):

This alternative is the "Future without Project Condition" where there is no PL-566 action, but where on-going programs continue at their present levels. This alternative predicts the conservation treatment that would be accomplished using current ongoing programs and private funds without accelerated PL-566 financial and/or technical assistance. Current ongoing programs that affect the degree of watershed protection on privately owned land are:

- Environmental Quality Incentives Program – USDA (EQIP)
- Idaho Water Quality Program for Agriculture (WQPA) (1)
- EPA 319 Non Point Source Program (NPSP)
- Resource Conservation and Rangeland Development Program – State of Idaho (RCRDP)

(1) WQPA is not currently available in the project area, but is scheduled for future years

The ongoing federal EQIP and 319 NPSP programs for southern Washington County were not originally funded to treat the entire watershed. Treatment utilizing these programs is focused mainly on introducing new irrigation technologies to convert existing surface irrigation systems for treatment of surface and ground water quality problems. Practices applied include Irrigation System conversion, Irrigation Water Management, Nutrient Management, Polyacrylamide Application, Pest Management, Residue Management, Sediment Basins, and Straw Mulch Application. Units of these practices applied are relatively low with the ongoing programs due to funding limitations. Without completing the treatment, erosion on cropland and pastureland in the watershed will continue in the untreated areas; the sediment, nutrient and bacteria delivery to the Weiser and Snake Rivers and tributaries will continue; and the quality of the ground water will continue to decline.

Alternative 1 - Resource Protection (RP) Plan:

This alternative is the Resource Protection (RP) plan that includes treatment of TUs 1-3.

TU 1 17,970 acres of surface irrigated cropland @ 75% is 13,480 acres
TU 2 4,900 acres of sprinkler irrigated cropland @ 75% is 3,675 acres
TU 3 1,500 acres of irrigated pasture @ 75% is 1,125 acres

The total of 17,970 acres of TU 1 does not include 1,490 acres of EQIP and 319 NPS acres that are currently under contract but not yet completed. Alternative 1 is based on a participation rate of 75%. The AFO/CAFO issues are contributing to surface and ground water impacts but will not be addressed in this project. Separate EQIP funds will address AFO/CAFOs on an individual-project basis. Practices included in the forecasting for each Treatment Unit are shown in Tables EE, FF, and GG.

The RP plan will reduce leached nitrate from 803,180 lbs/yr to 327,270 lbs/yr for a reduction of 475,910 lbs (59%). Irrigation water applied to cropland will be reduced to reverse the trend of leached nitrate nitrogen, bacteria and pesticides in ground water. Sediment delivery to adjacent drains and water bodies from cropland and pastureland will be reduced from 76,010 tons to 25,830 tons for a reduction of 50,180 tons (66%). Sediment delivered to the Snake River from cropland and pastureland will be reduced from 71,920 tons to 24,340 tons for a reduction of 47,580 tons (66%). Phosphorus delivered to the Snake River from cropland and pastureland

will be reduced from 71,777 lbs to 27,434 lbs for a reduction of 44,343 lbs (62%). Bacteria and pathogens delivered to the Snake River and tributaries will be reduced accordingly.

The cost of this alternative is $17,938,100, of which $7,518,300 is from PL-566 funds, $3,531,300 from other Financial Assistance (FA) funds and $6,888,500 from private funds. Average annual costs are $2,558,000 which includes an estimated operation, maintenance and replacement (OM&R) cost of $1,237,000. Average annual benefits are estimated at $873,000. The benefit to cost ratio is 0.34 to 1.00. Average annual benefits are low due to intangible environmental benefits or those benefits related to potential risks to public health (unable to develop economic value).

Land Treatment Measures, Irrigated Cropland (TU 1):

It should be noted that irrigation systems require numerous component practices, such as water conveyance pipelines, pumps, etc. These will be different for each installation and are not listed here for the sake of brevity. The Weiser River SCD prefers to offer cost-share on a per acre basis for irrigation systems.

Table EE. Conservation Practices for Surface Irrigated Cropland (Treatment Unit 1)

Conservation Practice	Number & Units
Conservation Crop Rotation	13,480 Ac
Irrigation Water Management (IWM) - Meters & Moisture Sensors	13,480 Ac
Irrigation System, Sprinkler	3,370 Ac
Irrigation System, Gated Pipe w/Surge	5,390 Ac
Irrigation System, Tail water Recovery	2,030 Ac
Irrigation System, Micro-irrigation	2,690 Ac
Nutrient Management	13,480 Ac
PAM	5,055 Ac
Pest Management	13,480 Ac
Residue Management - Seasonal or Mulch Till	13,480 Ac
Sediment Basins	
Small	50 No
Medium	50 No
Large	50 No
Straw Mulch	5,055 Ac

Land Treatment Measures, Sprinkler Irrigated Cropland (TU 2):

Table FF. Conservation Practices for Sprinkler Irrigated Cropland (Treatment Unit 2)

Conservation Practice	Number & Units
Conservation Crop Rotation	3,675 Ac
Irrigation Water Management (IWM) - Meters & Moisture Sensors	3,675 Ac
Irrigation System Improvement - Re-nozzle Sprinkler	3,675 Ac
Nutrient Management	3,675 Ac
Pest Management	3,675 Ac
Residue Management - Seasonal or Mulch Till	3,675 Ac

Land Treatment Measures, Irrigated Pastureland (TU 3):

Table GG. Conservation Practices for Irrigated Pastureland (Treatment Unit 3)

Conservation Practice	Number & Units
Sprinkler, Irrigated	(120 Ac)
Irrigation System Improvement - Re-nozzle Sprinkler	120 Ac
Irrigation Water Management (IWM)	120 Ac
Nutrient Management	120 Ac
Pest Management	120 Ac
Prescribed Grazing	120 Ac
Surface Irrigated	
Irrigation Water Management (IWM)	1,005 Ac
Nutrient Management	1,005 Ac
Pest Management	1,005 Ac
Prescribed Grazing	1,005 Ac
Sediment Basins	
Small	5 No
Medium	5 No
Large	5 No

Land Treatment Measures, AFO/CAFOs (TU 4):

The AFO/CAFO issues are contributing to surface and ground water impacts but will not be addressed in this project. Separate EQIP funds will address AFO/CAFOs on an individual-project basis.

Effects of Alternative Plans

The difference in effect between implementation of the No Action Alternative versus the Resource Protection Plan is a matter of scale and comprehensiveness. The No Action Alternative predicts the conservation treatment that would be accomplished using current ongoing programs and private funds without accelerated PL-566 financial and/or technical assistance. The ongoing federal EQIP and 319 NPSP programs for southern Washington County were not originally funded to treat the entire watershed. Units of practices applied are relatively low with the ongoing programs due to funding limitations. Without completing treatment on increased acreage and throughout the entire watershed area, erosion on cropland and pastureland will continue in the untreated areas; the sediment, nutrient and bacteria delivery to the Weiser and Snake Rivers and tributaries will continue; and the quality of the ground water will continue to decline. For the ongoing program efforts to be effective, additional funds and activities are needed. The Resource Protection Plan alternative evaluates the additional effectiveness and resource treatment that will be achieved by increasing the participation rate to the forecasted 75 percent for the watershed.

The following tables display the effects of each alternative on the resource concerns evaluated for this plan. A number of concerns were suggested during the scoping process and formulation of this plan (Table H, page 23). Not all of the suggested concerns were included in the analysis or comparison. Those concerns listed in Table H that are not specifically evaluated include:

- Animal Waste (Nutrients and Bacteria) – AFO/CAFO concerns for ground and surface water quality.
- Economics - High costs; depressed farm economy
- Land Use - Cropland loss; county concerned
- Odors and flies from animal waste - Dairies, beef and dairy heifer feedlots
- Prime Farmland – Cropland Loss, county concerned

The Animal Waste and Odors and Flies concerns would be addressed equally in the No Action Alternative and Resource Protection Plan Alternative through implementation of EQIP on an individual-project basis.

Economics are a secondary beneficiary of Project actions. Implementation of the Resource Protection Plan would increase economic stability through improved resource condition, decreased water quality degradation and associated decrease in risk to health and human safety, increased recreation and wildlife opportunities, and protection of the soil and water resource base for agricultural production. The No Action Alternative provides a small percentage of these benefits (less than 10 percent).

The Land Use and Prime Farmland cropland loss concerns are beyond the scope of ongoing programs and the recommended PL-566 Plan.

Comparison of Alternative Plans:

Tables HH, II, JJ and KK display and compare sediment and nutrient data for each alternative by treatment unit. Table LL is a comparison of the no action alternative to the RP Alternative 1.

Table HH. Comparison of Alternative Plans for Total Sediment Yield Delivered to Small Watershed Outlet (nearest surface source – ditch, drain, first-order tributary)

Treatment Unit (TU)	No Action	Alternative 1 (RP)
TU #1	71,920	23,270
TU #2	1,750	1,420
TU #3 Sprinkler Irr.	30	30
TU #3 Surface Irr.	2,310	1,110
Totals	**76,010**	**25,830**

The units are tons/year of sediment from sheet and rill and irrigation-induced erosion, using the WinEPIC (Windows version 2, Erosion-Productivity Impact Calculator) model. WinEPIC is designed for small watershed applications and utilizes an enrichment ratio and sediment delivery ratio based on delivery to the small watershed outlet (i.e., directly adjacent to a water body such as a ditch, drain or first-order tributary).

Table II. Comparison of Alternative Plans for Sediment Delivery to the Weiser and Snake Rivers

Treatment Unit (TU)	No Action	Alternative 1 (RP)
TU #1	68,325	22,105
TU #2	1,490	1,210
TU #3 Sprinkler Irr.	25	25
TU #3 Surface Irr.	2,080	1,000
Totals	**71,920**	**24,340**

Units are tons/year of sediment delivered to the Weiser and Snake Rivers, based on WinEPIC (Windows version 2, Erosion-Productivity Impact Calculator) and sediment delivery ratios (SDRs) estimated by Treatment Unit.

Table JJ. Comparison of Alternative Plans for Nitrogen Leached below Root Zone, by Treatment Unit

Treatment Unit (TU)	No Action	Alternative 1 (RP)
TU #1	785,730	321,780
TU #2	1,180	290
TU #3	16,270	5,200
Totals	**803,180**	**327,270**

Based on WinEPIC (Windows version 2, Erosion-Productivity Impact Calculator) model, used to evaluate nitrate-nitrogen leaching below the crop root zone. Nitrogen is represented in lbs/year.

Table KK. Comparison of Alternative Plans for Phosphorus Lost in Surface Runoff and Transported to the Weiser and Snake Rivers

Treatment Unit (TU)	No Action	Alternative 1 (RP)
TU #1	68,542	24,784
TU #2	2,321	2,018
TU #3	914	632
Totals	**71,777**	**27,434**

Results are based on WinEPIC (Windows version 2, Erosion-Productivity Impact Calculator) estimates of dissolved phosphorus vs. sediment-attached phosphorus lost in runoff for each treatment unit, and then adjusted based on the SDR for the treatment unit in order to estimate delivery to the Weiser and Snake Rivers. Percent of sediment-attached phosphorus ranged from 20% – 95% of total phosphorus depending on treatment unit and alternative. Phosphorus is represented in lbs/year.

Table LL. - Summary and Comparison of Alternative Plans

Effects	No Action	Alternative 1 (RP)
Project Investment	$1,278,300	$17,938,100

Comparison of Economic Benefits

Effects	No Action	Alternative 1 (RP)
Adverse (Average Annual)	$214,900	$2,558,000
Beneficial (Average Annual)	$73,300	873,000
Net Benefit (Average Annual)	-$141,600	-$1,685,000

Environmental Quality Account

Off-site Sediment	No Action	Alternative 1 (RP)
Sediment delivered to sub-watershed outlets	72,430 tons/year	25,830 tons/year
Reduction in sediment	3,580 tons/year	50,180 tons/year
Reduction in sediment (%)	0.05%	66%
Sediment delivery to the Weiser and Snake Rivers	68,530 tons/year	24,340 tons/year
Reduction in sediment delivery (tons/year)	3,390 tons/year	47,580 tons/year
Reduction in sediment delivery (%)	0.05%	66%
Water Quality, Surface, Weiser and Snake River and Tributaries		
Phosphorus delivery to the Weiser and Snake Rivers	68,617 lbs./year	27,434 lbs./year
Reduction in phosphorus delivery (lbs/year)	3,160	44,343 lbs/year
Reduction in phosphorus delivery (%)	0.04	62%
Temperature	No effect	Minimal effect
Pesticides	Majority of pesticides show loss in runoff – soluble fraction	Reduced pesticides delivered to surface waters, On-site retention
Reduction of Bacteria and Pathogens	0	Reduced bacteria and pathogens delivered to surface waters, restored support of designated beneficial uses
Dissolved Oxygen (DO)	0	Increased DO from decreased phosphorus load & algal growth in the Weiser & Snake River and tributaries
IDEQ integrated report, Weiser River and Weiser Flat TMDL allocations	0	Achieve goals established in TMDL and agricultural implementation plans for Weiser River and Weiser Flat
Water Quality (Ground) Private & Transient Domestic Water Supply		
Leached nitrate N	769,260 lbs/yr	327,270 lbs/year
Reduction in leached nitrate N	33,920 lbs.	475,910 lbs.
Reduction in leached nitrate N (%)	0.04%	59%
Pesticides Leached to Aquifer	Minimal effect	Reduced pesticides to aquifer
Bacteria Reaching Aquifer	Minimal effect	Reduced bacteria
Weiser Ground water Management Plan	Minimal effect	Help to achieve agricultural goals set out in plan

T&E Species	No Action	Alternative 1 (RP)
Bald eagle (LT) (*Haliaeetus leucocephalus*)	Minimal effect	Water quality improvements increase fishery & prey base
Canada Lynx (*Lynx canadensis*): Status under review	No effect, assumed to not inhabit project area	No effect, assumed to not inhabit project area
Bull trout (*Salvelinus confluentus*): (LT)	No effect, assumed to not inhabit project area	No effect, assumed to not inhabit project area

Fisheries, Weiser, Snake River & Tributaries	No Action	Alternative 1 (RP)
Weiser and Snake River: improved habitat	Minimal effect	Lower sediment and phosphorous loading, reduced algal blooms, higher dissolved oxygen, decreased cobble embeddedness
Wildlife	**No Action**	**Alternative 1 (RP)**
Aquatic, Snake River	Minimal effect	Improved water quality
Terrestrial, Project Area	Minimal effect	Improved water quality

Other Social Effects Account

Effects	No Action	Alternative 1 (RP)
Improved visual and aesthetic values, Weiser, Snake River and Tributaries	Minimal effect	Improved Snake River boating & fishing, wildlife viewing, reduced odors
Re-establishment of opportunity to harvest trout	Minimal effect	Lower sediment & phosphorous loading, reduce algal bloom & restore designated beneficial uses
Public Health Hazard, Drinking Water Contamination	Minimal effect	Meet drinking water standards for Nitrates in private wells over time
Public Health Hazard, Snake River Recreation	Minimal effect	Meet contact recreation standards (E. coli) in Weiser, Snake River and tributaries
Upland and Wetland Bird Populations	Minimal effect	Increase hunting opportunities from expanded wetland habitat

Regional Economic Development Account

Effects	No Action	Alternative 1 (RP)
Beneficial Effect, Average Annual		
Region	$57,100	$680,400
Rest of Nation	$16,200	$192,600
Adverse Effect, Average Annual		
Region	$157,100	$1,744,200
Rest of Nation		0
Other FA	$57,500	$275,700
PL-566	$0	$538,100

Risk and Uncertainty

The producers' willingness to participate contractually has been verified in recent years by the Weiser River Soil Conservation District. Participation and interest in ongoing programs such as 319 NPSP, WQPA, RCRDP and EQIP demonstrate the District's and local producers' (cooperators') commitment to ensuring the participation needed.

Except for onions, industry recommendations for nitrogen application on crops grown in the project area are within an acceptable range when compared to University of Idaho fertilizer guide recommendations. However, phosphorus recommendations by industry typically exceed the current fertilizer guides by a significant amount. There have been several efforts within the project area over the last two years to provide education and demonstration of nutrient management techniques to area producers. A current Section 319 project is demonstrating successful crop production utilizing fertilizer guide recommendations for phosphorus. Part of the problem with over-application of phosphorus has been due to variable presentation of soil test data (different units, non-standard soil analyses), and these issues are being addressed with laboratory certification efforts.

The recognition that nitrogen is being over-applied on onions, in part due to inefficient irrigation (loss from the root zone prior to crop uptake), has been demonstrated by several Extension projects in and around the project area. Onion producers are now aware that drip or surge irrigation coupled with proper irrigation water management and adherence to fertilizer guide recommendations is providing not only good production of onions, but decreased risk of disease and a better quality onion (jumbos). Contracts for onions do not stipulate the category of onion grown, or the specific irrigation and nutrient management required, so area growers are open to the idea of producing higher quality onions with less inputs. These projects have provided the ground work for a reasonable expectation of 75% participation, along with the continued support and efforts by the SCD.

The complexity of biological, ecological, and physical processes which comprise natural and managed systems makes modeling a potentially valuable tool for anticipating responses to management actions. However, there is some degree of uncertainty associated with all modeling outputs. Therefore, model estimates for pollutant reduction in the No Action and Selected Alternative cannot be considered absolute values. Because the WinEPIC model is process-based, the comparative differences between model output for different scenarios provides a good indication of the direction of change and extent of pollutant reduction associated with management practices. The spatial and temporal distribution of water quality impairment, and the spatial distribution and intensity of conservation practices and their effect on future water quality is very difficult to predict. Therefore, it is not possible to predict the likelihood of meeting TMDL goals, for example, based on varying degrees of producer participation. Modeling results show that the irrigation conversions and conservation practices recommended, over the long-term, will reduce the amount of nitrate lost below the root zone. It will take time for the shallow aquifer to re-equilibrate to reduced nutrient inputs, so an immediate reduction in soil water nitrate levels is not expected. In fact, levels may continue to rise for a number of years. Reductions in soil water nitrate levels in area wells are expected to occur with time. There is very little research available that examines the impacts of conservation practices on nitrate leaching on a watershed basis. Data provided through continued monitoring in the project area is extremely valuable to understanding aquifer response to reduced nutrient loading afforded by the implementation of conservation practices.

Rationale for Plan Selection

The following rationale was used in selecting the Resource Protection (RP) Plan (Alternative 1) as the recommended plan for implementation.

- The RP Plan provides for treatment of critical areas for the total watershed
- The RP Plan meets the objectives of the sponsors
- The RP Plan addresses the resource problems of the Weiser and Snake River TMDLs

Key Factors

This alternative meets the objectives of the sponsors. This alternative provides the best combination of biologic and physical benefits. Both positive and negative effects were considered and balanced with the stated need.

Technical Factors considered in making this decision include:

- Increased efficiency of irrigation water application due to conversion to more efficient systems compared to No Action.
- Improved public safety due to decreased nitrates, bacteria and pesticides in drinking water compared to No Action.
- Improved public safety due to decreased bacteria in surface waters used for recreation compared to No Action.

Environmental Factors considered include:

- Positive impacts to ground water quality due to decreased nutrient, bacteria, and pesticide loading compared to No Action
- Positive impacts to riparian and wetland habitats due to decreased sedimentation and water quality impacts compared to No Action.
- Positive impacts to surface water quality due to decreased nutrient, bacteria, sediment and pesticide loading compared to No Action.
- Positive impacts to soil quality and productivity compared to No Action.
- Positive impacts to fishery habitat due to decreased sedimentation, decreased phosphorus loading and algal blooms and increased dissolved oxygen compared to No Action.

Costs and Benefits for the Resource Protection Plan

The estimated average annual cost and benefits are $2,558,000 and $873,000 for a net benefit of negative $1,685,000. Quantified benefits include changes in production cost, reduction of leaching and runoff of nutrients and reduced cost of providing safe drinking water supply. Other benefits were identified, but monetary quantification was not possible. Benefits include public safety due to decreases in nitrates, bacteria and pesticides in drinking water, positive benefits to ground and surface water associated with reductions in sediment, nutrients and pesticides and benefits to wetlands and fishery habitats from improved water quality.

The Resource Protection Plan (Alternative 1) also provides the best combination of social benefits with long term protection of the natural resource base.

CONSULTATION AND PUBLIC PARTICIPATION

The Weiser River Soil Conservation District (WRSCD) has made a special effort to inform land users of the project and to involve them in the planning process. The District played a major role in the planning and development of the Southern Washington County Water Quality Project.

During the initial planning phase, a steering committee was established which consisted of land users, District supervisors and local agricultural professionals. The steering committee was an excellent method to ensure communication between the WRSCD and the local producers, and provide direction in specific areas. The committee was instrumental in providing realistic economic data, socially acceptable practices and cost-share rates.

The District embarked on an aggressive program by utilizing an EPA 319 NPSP grant. Contracts were developed and news articles, meetings, and tours utilized to promote the program. Several informational meetings for project land users were held. Landowners were given the opportunity to ask questions of NRCS personnel and District supervisors. Row-crop farmers provided detailed information on their daily operations. Several different operators allowed irrigation evaluations on their farms and the Washington County Extension Service, coordinating with the WRSCD, set up demonstrations using irrigation sensors on surge, drip and surface irrigation systems to demonstrate the relationships between irrigation water management and nutrient management on various crops in the project area.

Approximately 30% of the operators in the project area participated in the survey. Overall, producers seem interested in the project. The following agencies and organizations were involved in the development of the Southern Washington County Water Quality Project Plan:

Idaho Department of Agriculture
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Idaho Historical Preservation Society
Idaho Soil Conservation Commission
USDA - Farm Services Agency
USDA - Natural Resources Conservation Service
Washington County Commissioners
Washington County Extension Service
Weiser Area Groundwater Advisory Committee
Weiser Irrigation District

Coordination with the State Historic Preservation Officer regarding cultural resources and the U.S. Fish and Wildlife Service and Idaho Department of Fish and Game regarding threatened and endangered species was successfully completed for the purposes of this water quality plan.

RECOMMENDED PLAN

Recommended Plan

The Resource Protection Plan (Alternative 1) is the recommended plan that will meet the sponsors project goal and objectives. It has been selected as the plan for implementation. This plan is a system of land treatment measures designed to protect the resource base; reduce off-site sediment, nutrients and bacteria entering the Weiser and Snake Rivers and tributaries; reduce nitrate contamination of ground water; and improve the quality of both surface and ground water within the project area.

The cost of this alternative is $17,938,100, of which $7,518,300 is from PL-566 funds, $3,531,300 from other FA funds and $6,888,500 from private funds. Average annual costs are $2,558,000 which includes estimated operation, maintenance and replacement (OM&R) costs of $1,237,000. Average annual benefits are estimated at $873,000 with a benefit to cost ratio of 0.34 to 1.0.

The sponsors have chosen a combination of the following programs as the vehicles for implementing this project: the Idaho Agricultural Water Quality Program (Agricultural Water Quality Cost Share Program for Idaho, WQPA), USDA Small Watershed Program (PL-566), the Environmental Quality Incentives Program (EQIP), the 319 NPSP and the Resource Conservation and Rangeland Development Program (RCRDP) which provides loans and grants. Measures to be installed will be identified in the participants' individual conservation plans (long-term contracts) and approved following the applicable program's criteria and procedures.

Geographic Prioritization and Combination of Programs

If prioritization is needed in the future, the Weiser Flat area would probably be the first priority. The present plan calls for no geographic prioritization; all three subwatersheds (communities) will be treated equally. Complete implementation of the selected plan is dependent upon securing financial assistance through the PL-566 program and the continuing availability of funding through WQPA, EQIP and EPA's 319 NPSP. EQIP and EPA 319 NPSP funding are presently available for the project area.

Plan Elements

Comparison of Average Annual Benefits and Costs:

Tables 1, 2A, 4, 5A and 6 display the total and average annual costs and benefits of the Resource Protection Plan. Table 1 displays total cost distribution between PL-566 and other funds. Table 2A shows total costs for improvement work by treatment unit for each funding source. Project administration includes all administrative costs associated with installation of the selected alternative. These costs include the review and approval of conservation plans (contracts), administration of the water quality contracts and supervision of conservation practices application. Table 4 displays average costs for installation, technical assistance, project administration and operation, maintenance and replacement.

These are estimates based on the projected practice application. Final costs will be those actually incurred at the time of installation. Installation costs will be shared by the individual landowners and the particular government program(s) as outlined in each individual contract. No relocation or displacement costs of any kind are anticipated. Table 5A displays estimated average annual benefits with and without project implementation. Table 6 displays the benefit cost ratio for each treatment unit.

Installation and Financing:

Implementation of planned practices will be through individual water quality contracts. These contracts will follow PL– 566 standards and be administered by the Natural Resource Conservation Service (NRCS). Contracts for the PL– 566 program can be developed for a period of not less than three years (36 months) nor more than 10 years (120 months). A contract is to extend for at least two years (24 months) after the application of all required conservation treatment to ensure adequate establishment and operation of the installed treatment. This means that all required treatment must be scheduled and installation completed no later than the eighth year of a 10-year contract.

NRCS will assist the sponsors in developing individual contracts, use applicable practice standards and specifications contained within the field office technical guide, and schedule and supervise conservation practice installation. NRCS will also certify the installation of planned land treatment practices, provide needed follow-up assistance and complete annual status reviews.

Landowners will be responsible for installing all scheduled conservation practices contained in their contracts. They will provide any needed permits and easements necessary and make arrangements for their monetary obligations to fulfill the contract.

Operation, Maintenance and Replacement:

Landowners will be responsible for the operation, maintenance and replacement (OM&R) of installed practices and applied conservation practices throughout the life of their water quality contract. The contract between the landowner and the NRCS will explain the OM&R requirements for each. Technical assistance for OM&R will be provided by NRCS. The Weiser River SCD (WRSCD) will encourage each participant to continue the OM&R of installed practices after the project is completed.

TABLE 1 - ESTIMATED INSTALLATION COST

TABLE 1 ESTIMATED COST DISTRIBUTION					
Southern Washington County Watershed, Idaho					
Dollars (1)					
			Estimated Costs (dollars) (1)		
Land Treatment - Accelerated Installation Costs Items (3)	Unit	Number	PL-566	Other (2)	Producer
Treatment Unit 1					
Conservation Crop Rotation	acre	13,480	-	-	-
IWM Meters & Moisture Sensors	acre	13,480	242,600	94,400	337,000
PAM - Seasonal Application	acre	5,055	-	189,600	-
Straw Mulch	acre	5,055	-	284,300	-
Nutrient Management	acre	13,480	-	55,800	-
Pest Management	acre	13,480	-	-	40,400
Sprinkler Irrigation System	acre	3,370	1,364,900	530,800	1,895,600
Surge Irrigation System	acre	5,390	1,455,300	566,000	2,021,300
Micro-Irrigation System	acre	2,690	1,452,600	564,900	2,017,500
Pump Back Tailwater Recovery	acre	2,030	219,200	85,300	304,500
Residue Management - Mulch Till	acre	13,480	-	20,200	-
Sediment Basins – Small	each	50	16,200	6,300	22,500
Sediment Basins – Medium	each	50	32,400	12,600	45,000
Sediment Basins – Large	each	50	48,600	18,900	67,500
Installation			4,831,800	2,429,100	6,751,300
Technical Assistance			2,017,700	784,700	-
Project Administration			522,800	203,300	-
Treatment Unit 1 – Subtotal			7,372,300	3,417,100	6,751,300
Treatment Unit 2					
Conservation Crop Rotation	acre	3,675	-	-	-
IWM Meters & Moisture Sensors	acre	3,675	66,200	25,700	91,900
Sprinkler System Re-nozzle	each	3,675	11,300	4,400	15,600
Nutrient Management	acre	3,675	-	15,200	-
Pest Management	acre	3,675	-	-	11,000
Residue Management - Mulch Till	acre	3,675	-	5 ,500	-
Installation			77,500	50,800	118,500
Technical Assistance			35,500	13,900	-
Project Administration			9,200	3,600	-
Treatment Unit 2 – Subtotal			122,200	68,300	118,500

TABLE 1 ESTIMATED COST DISTRIBUTION (Continued)					
Southern Washington County Watershed, Idaho					
Dollars (1)					
			Estimated Costs (dollars) (1)		
Land Treatment - Accelerated Installation Costs Items (3)	Unit	Number	PL-566	Other (2)	Producer
Treatment Unit 3					
Sprinkler System					
Sprinkler System Re-nozzle	each	120	400	100	500
Irrigation Water Management	acre	120	-	3,400	-
Prescribed Grazing	acre	120	-	-	100
Nutrient Management	acre	120	-	500	-
Pest Management	acre	120	-	-	400
Sprinkler System Subtotal			400	4,000	1,000
Surface System					
Irrigation Water Management	acre	1,005	-	28,600	-
Prescribed Grazing	acre	1,005	-	-	1,100
Nutrient Management	acre	1,005	-	4,200	-
Pest Management	acre	1,005	-	-	3,000
Sediment Basins - Small	each	5	1,600	600	2,300
Sediment Basins - Medium	each	5	3,200	1,300	4,500
Sediment Basins - Large	Each	5	4,900	1,900	6,800
Surface System Subtotal			9,700	36,600	17,700
Installation			10,100	40,600	18,700
Technical Assistance			10,000	3,900	-
Project Administration			3,700	1,400	-
Treatment Unit 3 - Subtotal			23,800	45,900	18,700
PROJECT COSTS			7,518,300	3,531,300	6,888,500
TOTAL PROJECT COST					17,938,100

(1) Price Base 2005 Jun-05

(2) Other FA funds include: EQIP, WQPA, 319 NPSP and RCRDP costs.

(3) Management practices paid through other funds.

TABLE 4 - ESTIMATED AVERAGE ANNUAL COST (Dollars) (1)
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT, IDAHO

Evaluation Unit	Average Annual Installation Costs	Average Annual Operation, Maintenance & Replacement	Average Annual Technical Assistance	Average Annual Project Administration	Totals
Treatment Unit 1	1,031,900	1,148,700	206,400	53,500	2,440,500
Treatment Unit 2	18,200	51,600	3,600	900	74,300
Treatment Unit 3	5,100	36,700	1,000	400	43,200
TOTAL PROJECT ANNUAL COSTS	**1,055,200**	**1,237,000**	**211,000**	**54,800**	**2,558,000**

(1) Price Base 2005, amortized over 25 years at a discount rate of 5.375 percent. June 2005

TABLE 5A - ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION (Dollars) (1)						
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT, IDAHO						
Off-Site (Nonagriculture)						
	Estimated Average Annual Damage and Reduction					
	Without Project		With Project		Reduction	
	Nitrogen Leaching	Phosphorous Runoff	Nitrogen Leaching	Phosphorous Runoff	Nitrogen	Phosphorous
Treatment Unit 1	290,700	23,800	119,100	8,600	171,600	15,200
Treatment Unit 2	2,300	1,000	600	1,000	1,700	0
Treatment Unit 3	6,000	300	1,900	300	4,100	0
Totals	299,000	25,100	121,600	9,900	177,400	15,200
Total Off-site						192,600
On-Site	(Agriculture-related)					
	Estimated Average Annual Farm Production Return					
	Without Project		With Project			Added Return
		Return to Production Cost		Return to Production Costs		
Treatment Unit 1		2,859,400		3,436,100		576,700
Treatment Unit 2		414,400		475100		60,700
Totals		3,273,800		3,911,200		637,400
Total On-Site						637,400
	Estimated Average Annual Domestic Water Costs					
	Without Project		With Project		Reduction	
		910,000		867,000		43,000
Total Benefits						873,000

(1) Price Base 2005 June 2005

TABLE 6 - COMPARISON OF AVERAGE ANNUAL BENEFITS AND COSTS (Dollars) (1)						
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT, IDAHO						
Evaluation Unit						
	Off-site Benefits (2)	**On-site Benefits (2)**	**Domestic Water Cost Reduction (2)**	**Total Benefits**	**Costs (3)**	**Benefit to Cost Ratio (4)**
Treatment Unit 1	186,800	576,700		763,500	2,440,500	0.31:1.00
Treatment Unit 2	1,700	60,700		62,400	74,300	0.84:1.00
Treatment Unit 3	4,100	0		4,100	43,200	0.09:1.00
			43,000	43,000		
Project Totals	192,600	637,400	43,000	873,000	2,558,000	0.34:1.00

(1) Price Base 2005 June 2005
(2) From Table 5A
(3) From Table 4
(4) Refer to “Rationale for Plan Selection” section

Mitigation and Permit Features:

The selected alternative will be installed so that wildlife, wetlands and significant cultural resources will not be adversely affected or require mitigation. All installation activities will occur on private land. If local, state and/or federal permits or licenses are required, the individual landowner will be responsible for securing them and payment of any related costs incurred.

Estimated Installation Costs:

The tables in paragraph 1 of the watershed agreement (page viii & ix) display the needs and costs for planned treatment. It includes the units needed, cost-share rates, PL-566 cost-share and other (local) costs. These are estimates based on the projected practice installation. Final costs will be those actually incurred at the time of installation. Installation costs will be shared by individual landowners and the PL– 566 program as outlined in each individual contract. No relocation or displacement costs are anticipated. The selected alternative will not adversely affect fish or wildlife so no special mitigation costs or provisions are planned.

System Demonstration, Regional Benefits and the Agriculture/Urban Interface

The WRSCD believes that the project will have direct regional surface and ground water quality benefits for both rural and urban populations. It also believes that the plan represents an excellent value to taxpayers because of benefits to be realized and the use of funds from a variety of programs, private funds and loans. In addition, the WRSCD hopes to demonstrate several systems that are new to the area. Drip irrigation and Granular matrix sensors (Watermark soil moisture sensors) and meters for on-farm irrigation water management technologies are needed due to the intense management of row crops in the watershed. These systems will employ site specific combinations of conservation practices, and will demonstrate new approaches to conservation to a wider agricultural community, potentially beyond the boundaries of the project area.

Water Quality Monitoring:

Progress toward the project's water quality goals will be measured through long-term water quality trend monitoring programs already in place. IDWR monitors water quality in area wells through the Idaho Statewide Ground Water Quality Monitoring Program. More intensive ground water monitoring is performed by ISDA (Southern Washington County Monitoring Project). Surface water monitoring is managed by IDEQ to document progress towards achieving TMDL load reductions.

EFFECTS OF RECOMMENDED PLAN

General Effects

A broad range of environmental, economic and social factors were considered during the environmental assessment and scoping process. Potential impacts were evaluated and an analysis made as to their degree of significance in decision making. Table MM displays the effects of the "Recommended Plan on Resources of Principal National Recognition."

Air Quality

Air quality will improve through various cropland management practices, such as residue management, seasonal or mulch till, that increase cover and soil organic matter and reduces wind erosion. New or upgraded waste management facilities will reduce odor concerns due to improved handling of waste, and through proper land application of animal wastes to cropland.

Cultural Resources

Known cultural resource sites exist in the project area and include historic and prehistoric sites. A potential for encountering unknown cultural resource sites during planning and construction activities exists in the watershed. The exact location of each practice will not be known until the planning and implementation phase of each land treatment contract. Effects if any, will be assessed during the planning phase of each land treatment contract.

Practices such as buried pipelines and sediment basins have the greatest potential for ground disturbing activities which may impact cultural resources. To ensure that the effects of conservation activities on historic properties are thoroughly considered and that cultural resources protection is accomplished efficiently, procedures contained in the NRCS National Programmatic Agreement, GM-420, Part 401 and the Idaho NRCS State Level Agreement will be followed for all planning and installation of conservation practices.

Economics

Land users will be held financially accountable for much of the water quality improvements on their land, but the Weiser River SCD believes that implementation of these improvements will not impose an undue hardship. Over time, these improvements are expected to benefit each participating land user financially.

Erosion and Sedimentation

The Recommended Plan, plus the remainder of the activities associated with the ongoing work, will reduce erosion by 50,180 tons (66%) annually and off-site sediment delivery to the Weiser and Snake Rivers and tributaries by 47,580 tons annually (66%). The majority of the erosion and sediment delivery is from irrigation-induced erosion on surface irrigated cropland.

Fisheries

Most of the practices that are planned will have a positive impact on water quality and, therefore, on fisheries in the Weiser and Snake Rivers, both in the project area and

downstream. Sediment delivered to the Weiser and Snake Rivers from the watershed will be reduced by approximately 47,580 tons/year (66%). Phosphorous delivery to the Snake River will be reduced 62%. Quantification of the positive impacts of this project on the Weiser and Snake Rivers fishery resources can only be done indirectly because the Southern Washington County area is just one of many watersheds impacting the Snake River. Nevertheless, these actions can serve as a model for future work in the region. The cumulative impacts of all watersheds on this segment of the Snake River have been described in the Snake River-Hells Canyon TMDL.

Human Safety and Health

Excessive amounts of nitrate-nitrogen in drinking water can cause “Blue Baby Syndrome” in infants. Planned treatment will reduce the potential nitrate-nitrogen leaching from irrigated cropland and pastureland by 59%, resulting in a positive effect on the health and safety of local residents. This treatment will have an impact on reducing the amount of coliform bacteria available for leaching into the ground water and/or to be carried away with surface runoff. Reduced bacteria in surface water will restore primary and secondary contact recreation beneficial uses.

Land Use

The Southern Washington County project is not expected to affect the ratio of cropland and pastureland to other land uses. However, it is expected that a number of farms will convert the existing surface irrigated cropland to drip, surge, tail water recovery or sprinkler irrigation systems.

Nutrients

The WinEPIC (Windows version 2, Erosion-Productivity Impact Calculator) model was used to evaluate and quantify the effects of nitrate-nitrogen leaching below the crop root zone and sediment-attached and soluble phosphorus lost in surface runoff from each of the treatment units at a watershed scale. The planned treatment in the recommended plan will reduce nitrate nitrogen deep leaching to the aquifer by 475,910 lbs/year (59%). Phosphorus loading to the Snake River will be reduced by approximately 44,343 pounds/year (62%).

Recreation/Aesthetics

Improved water quality in the Weiser and Snake Rivers and tributaries will allow for more enjoyable recreation as some of the unsightly water weeds and algae that currently plague the river are eliminated. Opportunities for swimming, boating and sightseeing will improve.

Threatened and Endangered Species

The bald eagle is listed as threatened in the project area. Consultation with FWS will need to occur before implementation of project actions. Improved water quality in the Weiser and Snake Rivers and tributaries will have a positive effect on bald eagle wintering areas. The Snake River riparian area provides wintering areas for the eagle. The following factors were considered in determining the potential impact of the project on the bald eagle: roosting sites, prey base and human disturbance. None of the listed habitat requirements for the wintering bald eagle will be adversely impacted. Based on the practices proposed to be installed, the EA indicates that no

roosting sites will be impacted and no additional human disturbances adjacent to the Snake River should occur because of the activities. Also, the bald eagle's prey base of fish should be enhanced because of increased fisheries as a consequence of the reduced sediment and associated nutrients and pesticides being delivered to the Weiser and Snake Rivers and tributaries after land treatment practices are installed.

No other listed threatened or endangered species are assumed to inhabit the project area.

Water Quality

Surface Water:

Planned treatment will have a positive impact on surface water quality both within the project area and surrounding areas. This will be accomplished by reducing the amount of sediment, phosphorus, bacteria and pesticides entering irrigation drains and area streams. Implementation of the Recommended Plan will provide the treatment necessary to accomplish the reductions addressed in the TMDLs and agricultural implementation plans.

Ground Water:

Ground water quality within the project area will be improved over time through implementation of planned treatment. It is anticipated that treatment will reduce nitrate-nitrogen leaching by over 475,910 lbs/year (59%), and reduce impacts from bacteria, pathogens and pesticides. This reduction will contribute to meeting the drinking water standards for ground water.

Water Quantity

Ground water quantity in the shallow aquifer within the project area may be reduced over time through implementation of planned treatment. It is anticipated that planned treatment will reduce the amount of irrigation water applied to cropland and pastureland.

Wetlands

All construction practices will be individually evaluated for their effect on wetlands. It is anticipated that the proposed project will have no net loss of wetlands in the project area. New wetlands (PUBHx) will be created by the project as sediment basins are constructed to treat irrigation return flows discharging to the Weiser and Snake Rivers and tributaries. These wetlands will offset impacts to artificial wetlands lost due to conversion to sprinkler and drip irrigation.

Wetlands will improve with reduced sediment and nutrient delivery to the streams. Some small artificial wetlands (PUBHx), approximately 5 acres, may be lost due to conversion to sprinkler and drip irrigation. Isolated wetland conversions, if any, will be addressed during the on-farm planning (contracting) under the guidelines of NRCS's wetland policy.

Wildlife

Wildlife habitat in the watershed is limited to large cropland areas surrounded by linear strips of permanent vegetation associated with irrigation ditches, fence rows, odd areas and small

pasturelands. Available habitat for species life requisites is limited due to few acres and poor quality. The quality of the habitat is limited due to frequent disturbance activities (i.e., mowing, burning and chemical weed control on permanent vegetative areas), poor grazing management, and lack of crop residue over winter.

The conversion of surface irrigation practices to drip and sprinkler will reduce the amount of on-farm field ditches in the project area. In some cases, ditches are the only available habitat, linear islands of habitat in a sea of cropped fields, typically narrow delivery ditches approximately four feet wide. These areas provide limited habitat value due to mowing, burning or spraying with herbicides. The timing of these ditch maintenance activities typically is in the spring which disrupts nesting and, in the fall, which removes needed winter wildlife cover. The loss of these ditches is not considered critical to resident wildlife populations because of the low habitat quality provided and additional habitat enhancement provided by other project practices. Proper management of pasture and hayland will improve wildlife values, such as nesting and cover.

Table MM. Effects of the Recommended Plan on Resources of Principal National Recognition

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Air Quality	Clean Air Act (1970) as amended (42 U.S.C.7401 et seq.).	Positive effect due to reduced suspended dust from wind erosion.
Areas of particular concern within the coastal zone	Coastal Zone Management Act (1972) as amended (16 U.S.C.1451 et sq.).	Not present in planning area.
Endangered and Threatened Critical Habitat	Endangered Species Act (1973) as amended (16 U.S.C.1531 et seq.).	Effect on bald eagle will be "May Affect, Not Likely to Adversely Affect".
Fish and wildlife habitat	Fish and Wildlife Coordination Act (16 U.S.C.Sec.661 et seq.).	Positive effect on cold water fisheries in the Snake and Weiser Rivers and smaller tributaries. No effect to wildlife habitat.
Flood plains	Executive Order 11988 Flood plain Management, 7 CFR 650.25.	Positive effect due to decreased sedimentation in riparian zone.
Historic and Cultural Resources	National Historic Preservation Act of 1966 as amended (16 U.S.C. Sec 470 et seq.).	Known sites exist in the project area. No effect. Existing sites and unknown sites will be protected. The NRCS National and State Agreement will be followed.
Prime and Unique Farmland	CEQ Memorandum, August 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act and the Farmland Protection Policy Act of 1981.	Positive effect on retaining 30,770 acres of prime farmland in production.
Water Quality, Ground	Safe Drinking Water Act (1974) (42 U.S.C. 136 et seq.) - protection of underground sources of drinking water	Positive effect due to reduced nitrate and pesticide contamination of aquifer.
Water Quality, Surface	Clean Water Act (1977) as amended (33 U.S.C. 1251 et seq.) – Section 319, reduction of nonpoint source pollution	Positive effect due to reduction of sediment, nutrients, bacteria and pesticides entering surface waters.
Water Quality, Surface	Clean Water Act (1977) as amended (33 U.S.C. 1251 et seq.) – Section 303, Development and implementation of Total Maximum Daily Loads (TMDLs)	Positive effect, consistent with implementation plans to meet TMDLs developed for the Weiser River, Brownlee Reservoir, and the Snake River-Hells Canyon.
Wetlands, Protection of	Executive Order 11990, Clean Water Act of 1977 (33 U.S.C.1251, et seq.) Food Security Act of 1985.	Positive effect from enhancing water quality.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C.1271.	Not present in planning area.

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The following NRCS Personnel were involved with the development of the Watershed Plan / EA. It was reviewed and accepted by a variety of resource professionals.

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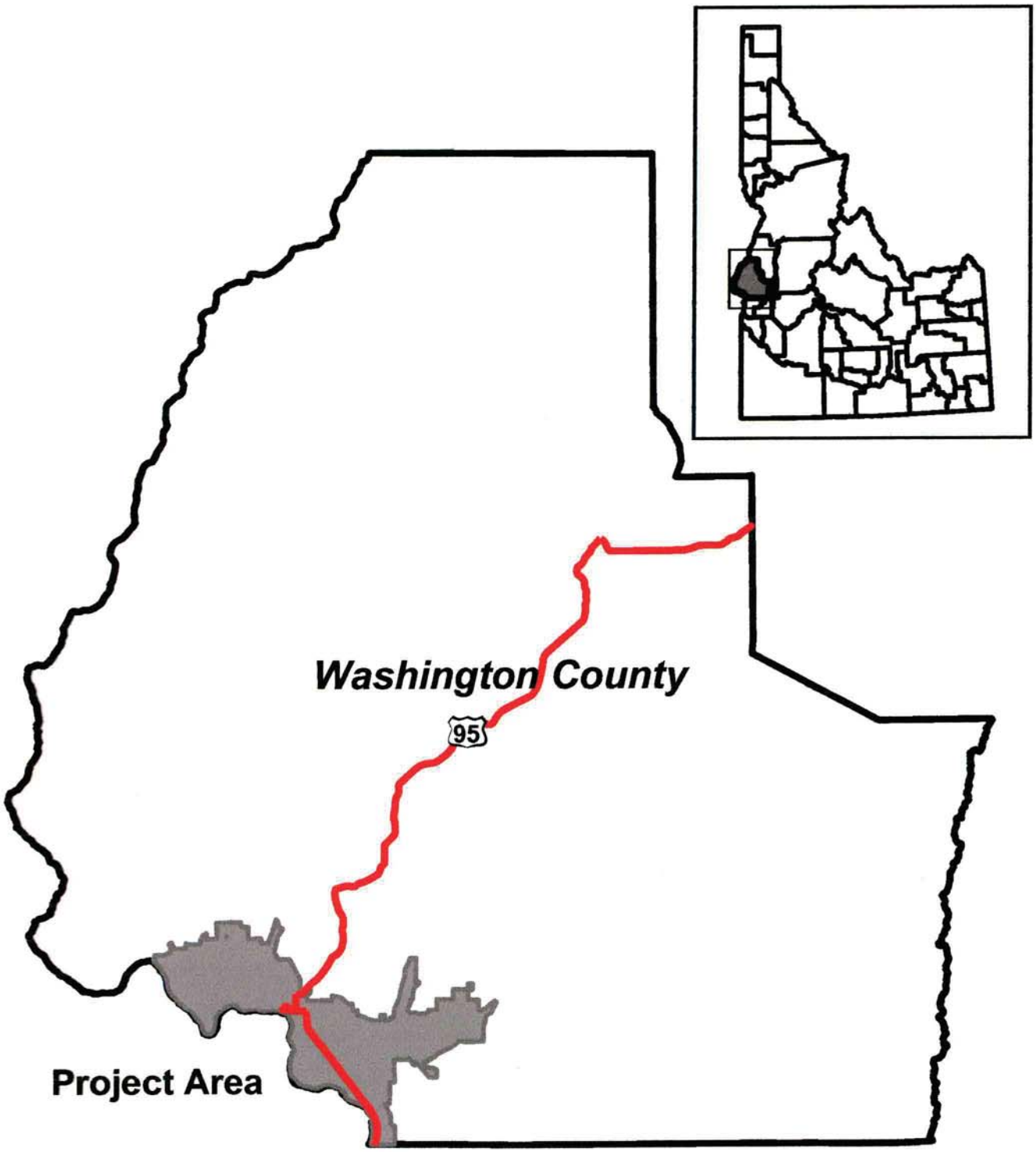
APPENDIX A. WATERSHED MAPS

Southern Washington County Water Quality Project

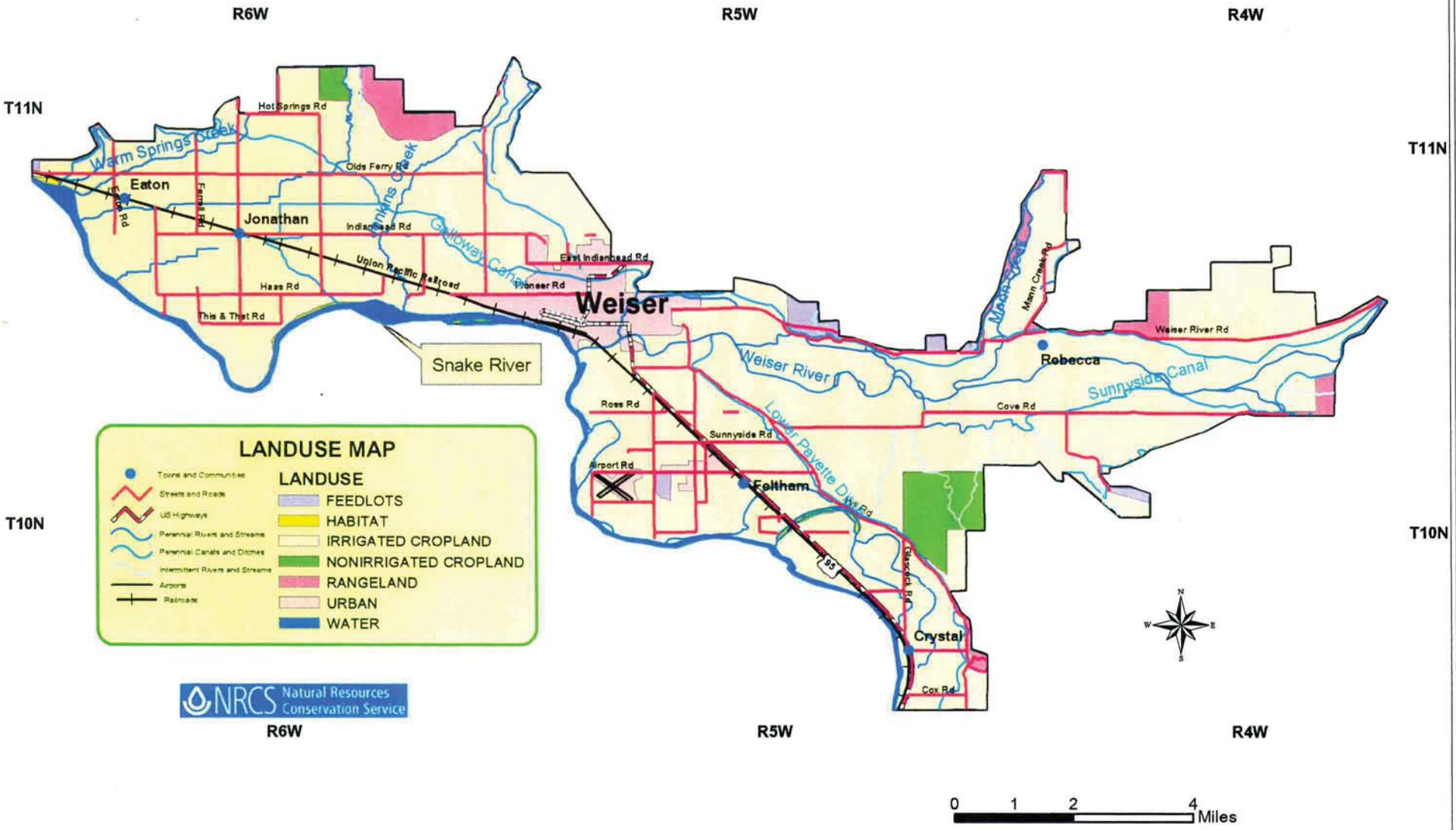


MAP NO. 1

USDA NRCS Natural Resources Conservation Service

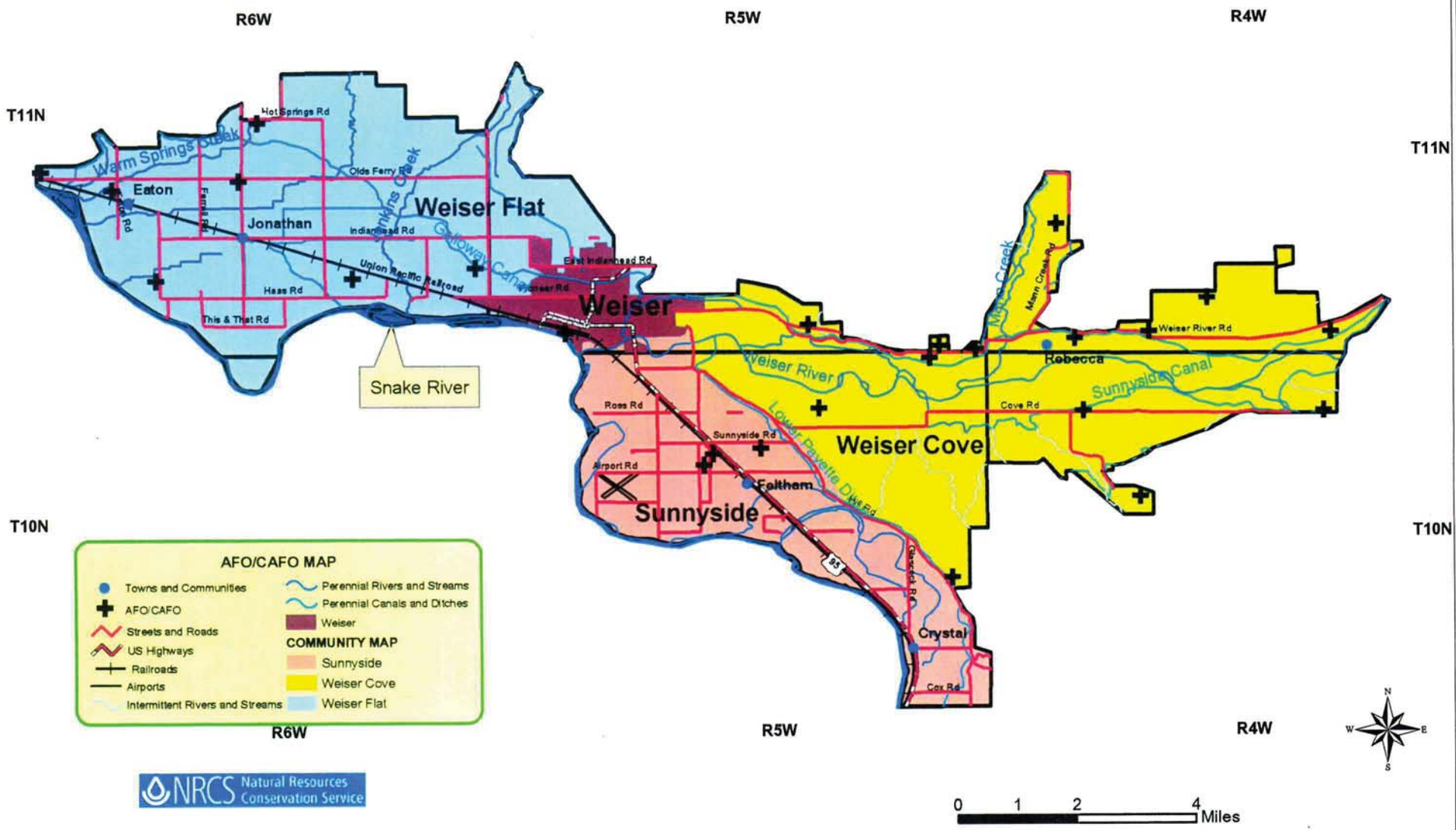
MAP NO. 2

SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT



SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT

MAP NO. 3



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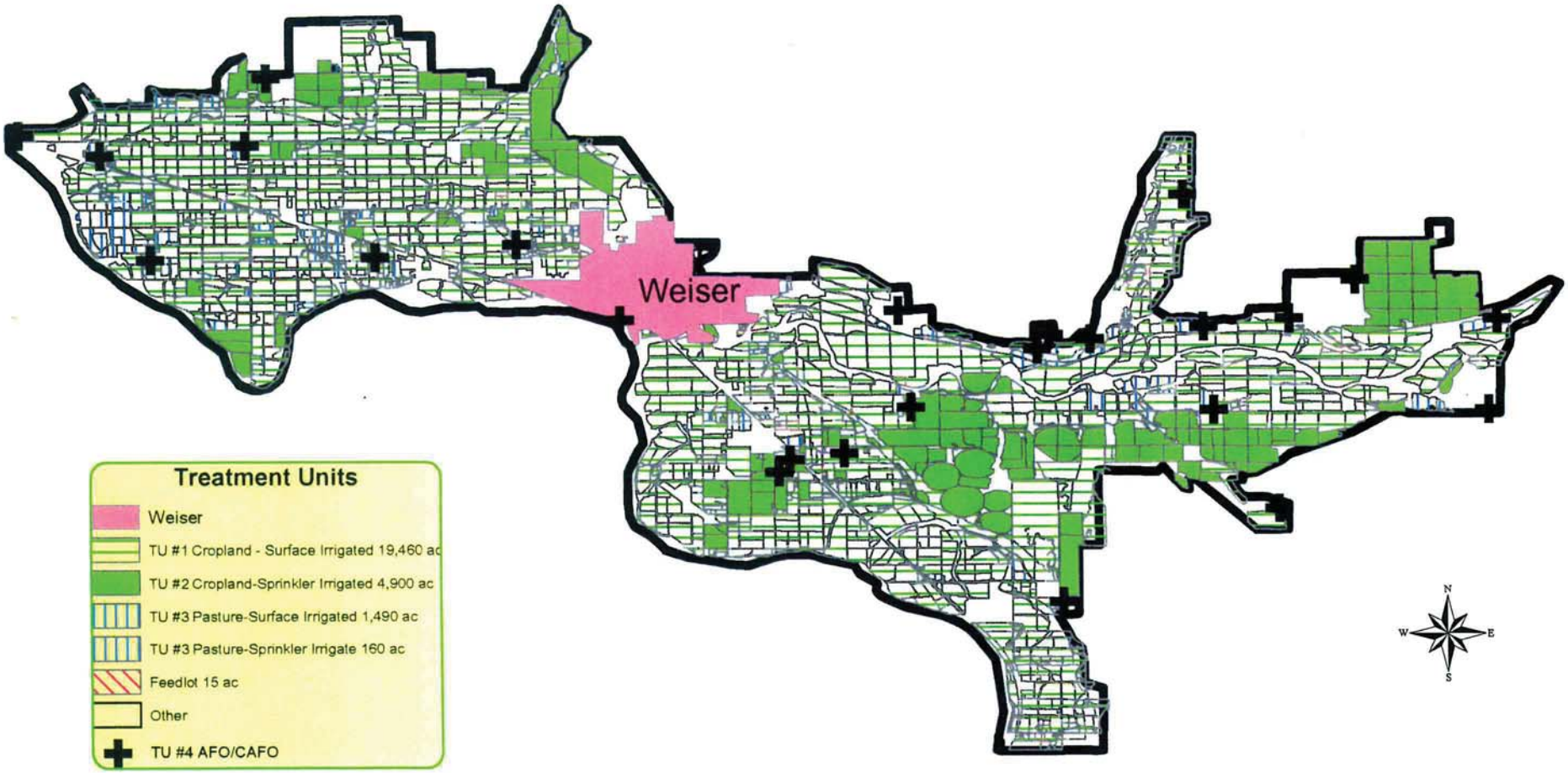
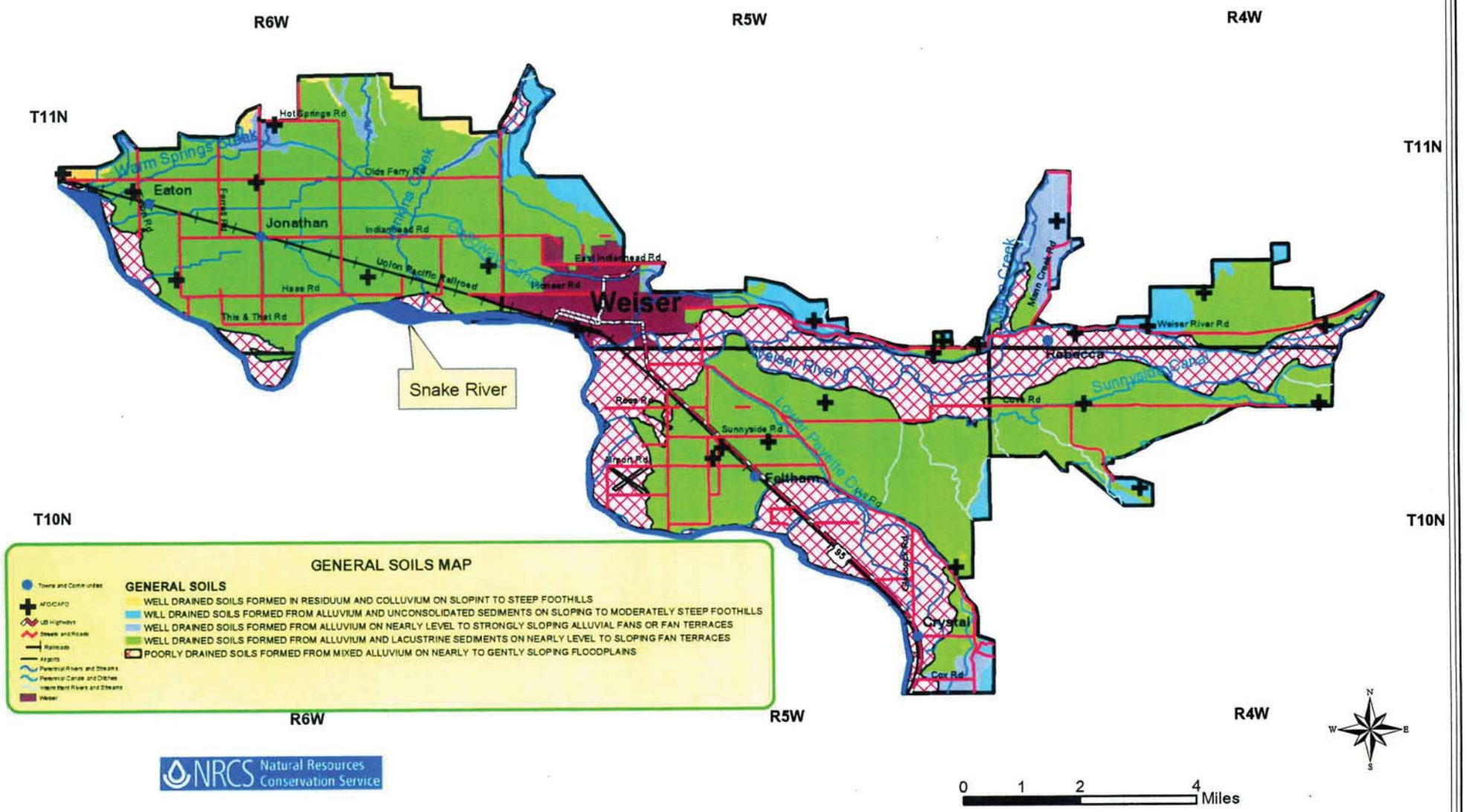
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT



USDA NRCS

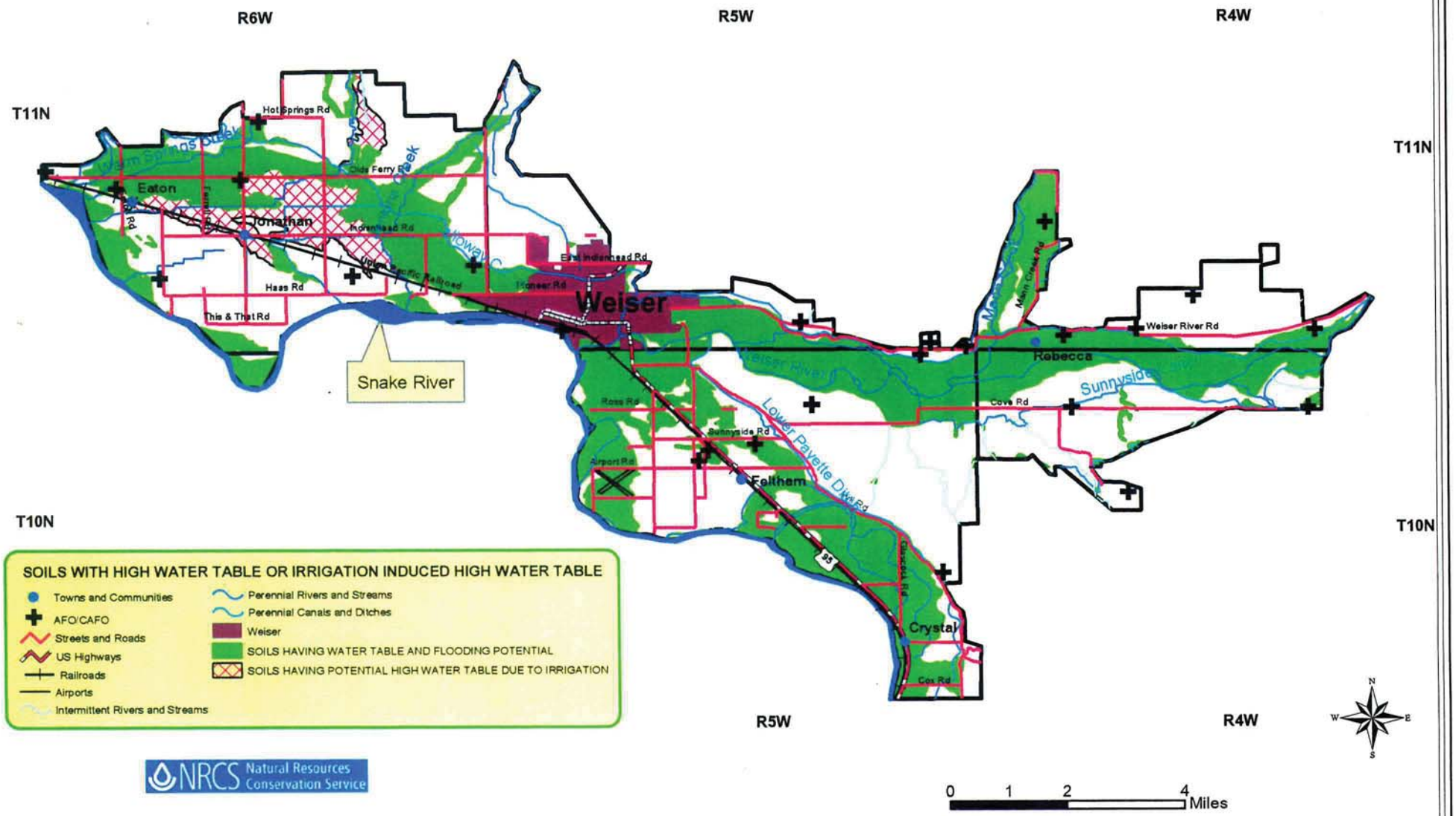
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT

MAP NO. 5



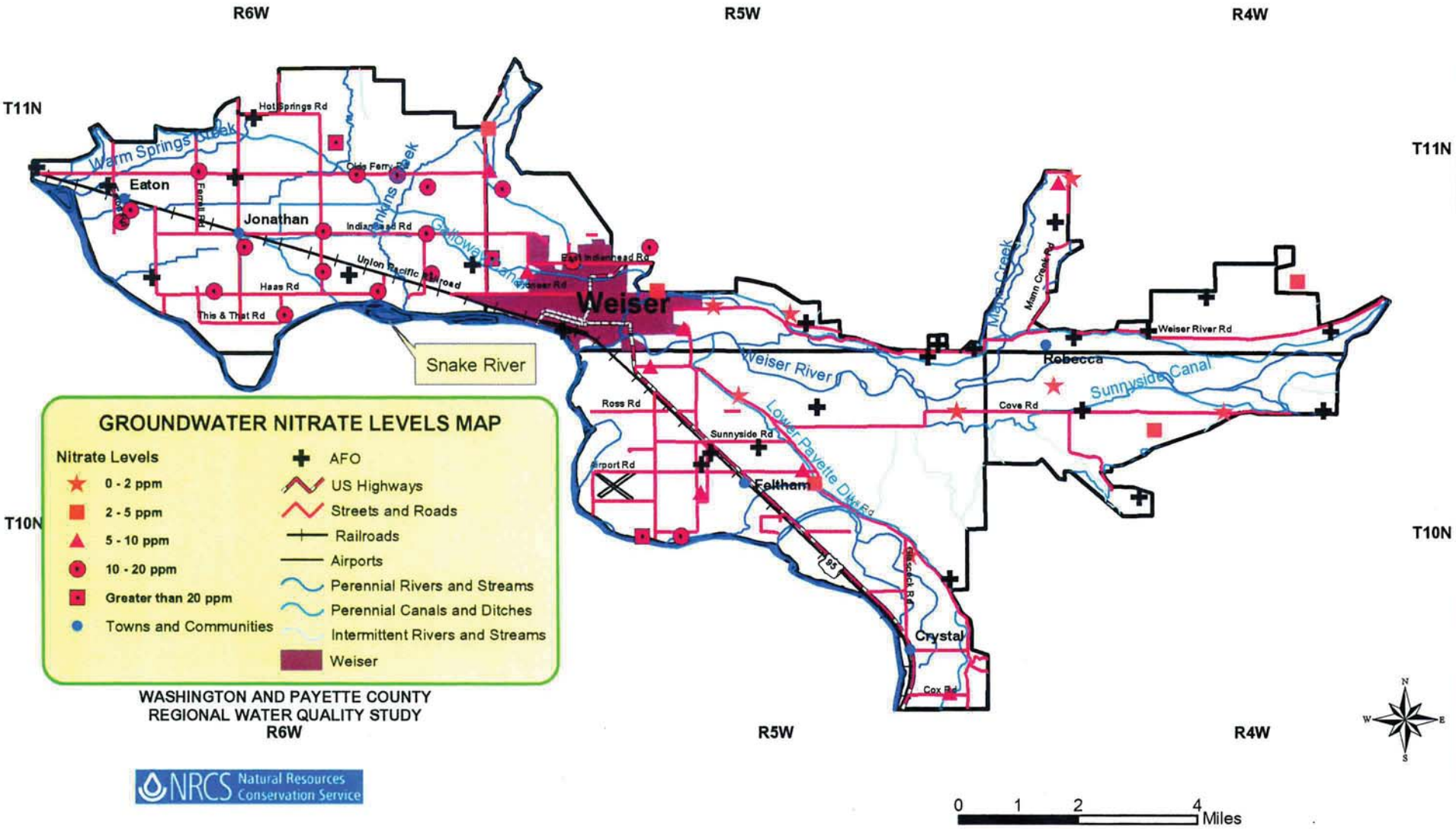
SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT

MAP NO. 6



SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT

MAP NO. 7

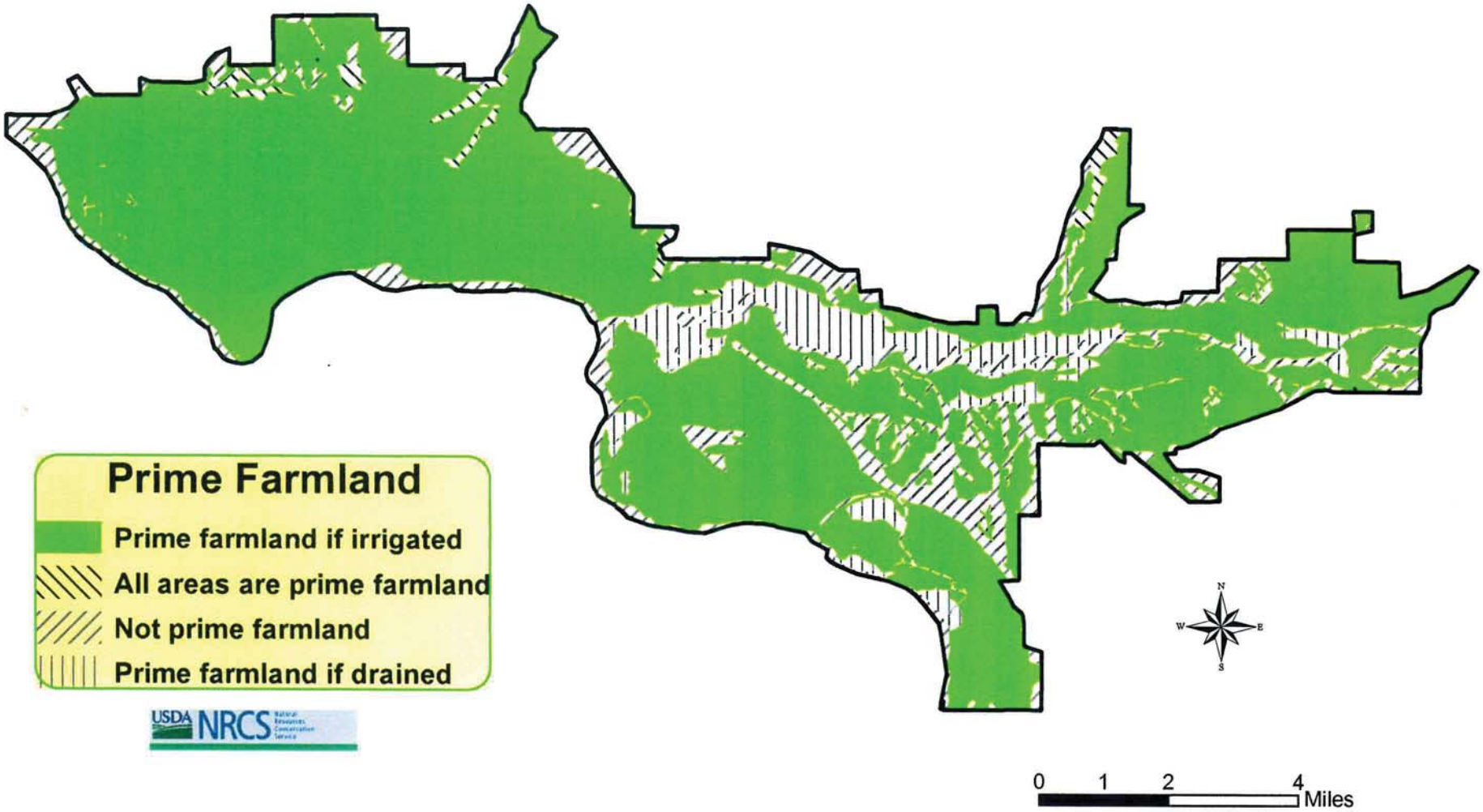


WASHINGTON AND PAYETTE COUNTY
REGIONAL WATER QUALITY STUDY

NRCS Natural Resources Conservation Service

MAP NO. 8

SOUTHERN WASHINGTON COUNTY WATER QUALITY PROJECT



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APPENDIX B. REVIEW COMMENTS

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APPENDIX C. INVESTIGATION AND ANALYSIS

All information sources, models, methodology and references used are described and listed in individual sections of "Resource Inventory and Forecasting" and "References" except as noted below:

Economics

The basis for the economic analysis in the Southern Washington County Watershed was by treatment units. Three treatment units were evaluated for the future without project and future with project. (See the Formulation and Comparison of Alternatives section for additional information). The treatment units were:

1. Surface Irrigated Cropland
2. Sprinkler Irrigated Cropland
3. Irrigated Pastureland

Practices included for evaluation by treatment unit were developed by an interdisciplinary team based on a resource inventory or the project area. Resource concerns in the project area include sediment, nutrients and bacteria to the Weiser and Snake Rivers and their tributaries. Groundwater contamination by leached nutrients and pesticides is also a major issue in the watershed. Planned practices were selected that will have positive impact on reducing surface and groundwater problems.

Practice costs were based on those used to implement the Environmental Quality Incentive Program (EQIP). An evaluation period of 25 years was selected to ensure full implementation of practices and project benefits. The evaluation of costs included determination of practice life and expected operation and maintenance. Replacement costs were added for practices with an expected life of less than 25 years. The price base for the evaluation was 2005. The Discount Rates for Water Resource Projects was used for the evaluation. The discount rate for 2005 was 5.375.

Farm production net return benefits were based on interviews with farmers in the watershed who have already implemented practices identified as needed to address resource concerns. Yields, tillage operations, inputs and harvest operations were identified for the benchmark (No Action) and With-Project condition. University of Idaho crop budgets were adjusted to reflect crop production in the watershed.

Domestic water costs were based on the number of wells in the watershed exceeding the maximum contaminant level (MCL) for nitrates (10 mg/L). The percentage of wells currently exceeding MCL is based on water quality data from the Idaho State Department of Agriculture (ISDA). A linear regression was fit to this data to estimate the potential impact to area wells into the future. It will take time for the shallow aquifer to re-equilibrate to reduced nutrient inputs, so an immediate reduction in nitrate levels in area wells is not expected. As a conservative approach, it was assumed that the percentage of wells exceeding the MCL will continue to increase in the immediate future, with or without the project. However, without the project, 100% of wells are estimated to exceed the MCL by 2030; if the project is implemented, then only 80%

of wells will exceed the MCL by 2030. Reductions in soil water nitrate levels in area wells are expected to occur with time. Dollar benefits for the difference in percentage of impacted wells were based on household population of 2.6 persons and a daily use of 97 gallons/day/person. It was further assumed that only 20 percent of the daily water use was for human consumption. The actual value of water consumed was based on the cost of purchasing water in 5 gallon bottles.

Nutrient leaching and runoff benefits were determined by estimating the loss to ground and surface water without project and with project. Nitrogen leached and phosphorous lost in surface runoff was evaluated. Benefits associated with retaining applied nutrients on site were determined by first estimating the loss of nutrients to ground and surface water in the benchmark condition. Estimates of nitrate leached from the root zone and phosphorus (soil-attached and orthophosphate) lost in runoff were estimated using the WinEPIC model. These losses were compared with the savings achieved by retaining nutrients on site using a variety of conservation practices (with project). The value placed on lost nitrogen and phosphorus was based on the cost to purchase those nutrients in the project area.

WinEPIC Modeling Results

Introduction

The complexity of biological, ecological, and physical processes which comprise natural and managed systems makes modeling a potentially valuable tool for anticipating responses to management actions. WinEPIC (Erosion/Productivity Impact Calculator, Windows version 2, Blackland Research Center, Texas A&M University) is a comprehensive, physically-based model developed to determine the relationship between soil erosion and soil productivity throughout the United States. It continuously simulates the processes associated with erosion, runoff, and percolation using a daily time-step, readily available inputs, and accepted methodologies. Climate inputs typical for the area are generated based on local climate data statistics. The model consists of numerous components that pertain to major aspects of the erosion/productivity relationship and water quality impacts, including hydrology, weather, erosion and sedimentation, nutrient cycling, plant growth, soil temperature, tillage and other management operations, pesticide and nutrient movement, and field-scale costs and returns. WinEPIC is designed to aid agricultural managers and decision makers in assessing the impacts of management on crop production, risks, and soil and water resources.

Methods

Land use in the project area is predominately agriculture, with both surface and sprinkler-irrigated cropland and pasture. Predominant soil texture is silt loam. The shallow alluvial aquifer is highly vulnerable, and groundwater is impaired. Water quality monitoring in the area has shown extensive and increasing trends in nitrate levels of area wells. There are also surface waters in the project area that have degraded water quality, impacting beneficial uses.

The model was used to estimate the impacts of agricultural conservation practices on groundwater and surface water quality. Short term runs were used to initialize the model for each treatment unit, based on actual crop, irrigation, fertilizer, soil test, and tillage records from area producers. Treatment units were delineated based on type of agricultural land use and irrigation system. Model calibrations were made based on information from the model developer to better simulate nitrate movement under the furrow irrigation scenarios.

Long-term (35 years) runs were used to compare baseline conditions in each treatment unit in the project area with similar operations using conservation practices such as nutrient management, irrigation water management, reduced tillage and irrigation system conversions for those portions in the plan identified as the treatment goal (typically 75% of unit acreage).

Summary and Implications

There is some degree of uncertainty associated with all modeling outputs. Therefore, model estimates for various parameters cannot be considered absolute values. However, because the WinEPIC model is process-based, the comparative differences between model output for different scenarios provides the manager or decision maker with a good indication of the direction of change associated with management practices.

Three typical treatment units in the project area (surface-irrigated onions-sugar beets-winter wheat, irrigated pasture, and sprinkler irrigated hay were compared to similar rotations using irrigation system conversions (for existing surface systems) and conservation practices over a thirty five year period. The conservation practices incorporated into the model were improved irrigation efficiency and scheduling, and improved nutrient management techniques such as factoring in soil nitrates in well water and timing of fertilizer application. In this restricted-release version of the WinEPIC model that we were using, there are currently no output files available to track soil nitrogen and phosphorus levels over time and depth. However, results indicate that the onions-sugar beets-winter wheat rotation (intensive agriculture) is losing a considerable amount of nitrate to the shallow aquifer, and that implementing the recommended conservation practices and irrigation system conversions will reduce inputs significantly over the long term. Of interest was the difference in timing of deep percolation loss and nitrate leaching between the cropped and grazed systems. The overall impacts of conservation practices on water quality for each treatment unit are described below:

Treatment Unit 1: On a per-acre basis, nitrate loss from the onions-sugar beet-winter wheat rotation was reduced 48% using surge/sprinkler irrigation system conversions and conservation practices compared to the baseline, and nitrate loss was reduced more than 95% using the drip/sprinkler systems. Phosphorus loss in runoff (dissolved and sediment-attached) was reduced 78% under the surge/sprinkler scenario, and 88% under the drip/sprinkler scenario, compared to the baseline runs. Assuming that 75% of the treatment unit acreage receives the recommended irrigation conversions and conservation practices (50% of operations to use surge/sprinkler, and 50% to use drip/sprinkler), this will result in a reduction of over 207,000 kg of nitrate-nitrogen reaching the shallow aquifer within this treatment unit. An estimated reduction of 20,250 kg of phosphorus will be prevented from reaching area streams and return drains from the treatment unit with the recommended conversions and conservation practices, as compared to the baseline.

Treatment Unit 2: On a per-acre basis, nitrate leached from the alfalfa-winter wheat rotation was reduced to almost zero with conservation practices, compared to the baseline. Phosphorus loss in runoff (dissolved and sediment-attached) was reduced 18% with conservation practices, compared to the baseline runs. Assuming that 75% of the treatment unit acreage receives the recommended irrigation system improvements and conservation, this will result in a reduction of about 1100 kg of nitrate-nitrogen reaching the shallow aquifer within this treatment unit. An estimated reduction of 450 kg of phosphorus will be prevented from reaching area streams and return drains from the treatment unit with the recommended improvements and conservation practices, as compared to the baseline.

Treatment Unit 3: On a per-acre basis, nitrate loss to deep percolation from the surface-irrigated pasture was reduced 35% using conservation practices compared to the baseline, and phosphorus loss in runoff (dissolved and sediment-attached) was reduced about 40%. Assuming that 75% of the treatment unit acreage receives the recommended conservation practices, this will result in a reduction of over 120 kg of nitrate-nitrogen reaching the shallow aquifer within this treatment unit for sprinkler irrigated pasture, and a reduction of 11,000 kg for surface irrigated pasture. An estimated reduction of 240 kg of phosphorus will be prevented from reaching area streams and return drains from the treatment unit with the recommended conservation practices, as compared to the baseline.

The amount of irrigation water applied can be reduced through use of more efficient systems and better timing of application by monitoring soil moisture. Also, nutrient management systems which incorporate soil testing, factor in soil nitrate in irrigation water, and split applications to better match the needs of the crop can reduce the overall inputs of fertilizer nitrogen required. Modeling results show that the irrigation conversions and conservation practices, over the long-term, will reduce the amount of nitrate lost below the root zone. It will take time for the shallow aquifer to re-equilibrate to reduced nutrient inputs, so an immediate reduction in soil water nitrate levels is not expected. In fact, levels may continue to rise for a number of years. Reductions in soil water nitrate levels in area wells are expected to occur with time. There is very little research available that examines the impacts of conservation practices on nitrate leaching on a watershed basis. Some studies have shown results within several years (Cambardella et al. 1999, Spalding et al. 2001), and others have shown no improvement over the study period (Currens 2002, Kraft et al. 2004). Data provided through continued monitoring in the project area is extremely valuable to understanding aquifer response to reduced nutrient loading afforded by the implementation of conservation practices.

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