ROCK CREEK BIBLIOGRAPHY

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ROCK CREEK BIBLIOGRAPHY

WATER QUALITY RELATED PUBLICATIONS

ROCK CREEK RURAL CLEAN WATER PROGRAM, IDAHO

REFERENCES THROUGH 1991

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INTRODUCTION

As the Rock Creek Rural Clean Water Program (RCWP) progressed and the amount of literature concerning various aspects of it has expanded, a need was seen to assemble a bibliography. An annotated bibliography is presented so that the literature will be made available to anyone interested in Rock Creek. The bibliography has emphasis on water quality and water resource related publications.

The goals of most Rock Creek studies and the Rural Clean Water Program have been to improve water quality or at least to measure water quality. Hence, most publications concerning Rock Creek deal at least to some extent with some aspect of water quality or water resources. The objective has been to include everything on Rock Creek, so I have tried to err on the side of including too much (even marginal) information rather than omit important references.

Previous updates of the bibliography have appeared as portions of the Rock Creek Rural Clean Water Program Annual Reports (Clark 1989a, 1989b) and the Final Ten Year Report (Yankey, et al. 1991). The first bibliography (Clark 1989a) contained references and abstracts to 405 publications as part of the 1988 Rock Creek RCWP Annual Report. Clark (1989b) provided a supplemental list of references and abstracts (#406-#525), which were not included in the previous list as part of the 1989 Annual Report. A list of 618 references (citations only, no abstracts) were included in the final Ten Year Report (Yankey, et al. 1991). The present list of 626 citations and abstracts is current through early 1991.

I have attempted to summarize each publication with a brief abstract. In some cases where a short abstract was presented, I have simply copied it. In many cases where no abstract was available, I have abstracted the article with emphasis on water quality aspects. In the case of some longer publications it will be necessary to consult them as it was not possible to cover all aspects of significance in the abstract. It is hoped that the abstract will at least let the user know if the paper is relevant or not to their needs.

A variety of government reports, newsletter articles, magazine and newspaper articles that form the so-called "gray literature" are included because they form the majority of the available information on Rock Creek. Because of their very nature they may be difficult for most to know that they exist and to obtain needed copies. It is hoped that the bibliography will serve a useful purpose by listing these.

The literature on Rock Creek is diverse and of the following general types: information on the LQ Drain study (technology learned on this project was transferred to Rock Creek RCWP); Rock Creek RCWP related documents;

historical water quality publications; water resources and stream discharge data; information on best management practices, especially in relation to the Twin Falls irrigation tract; groundwater information; and miscellaneous publications (including local history, archaeology, climate, geology, soils, fish, wildlife, recreation, etc.).

The main sources for Rock Creek literature include both primary, secondary, and review articles. These have appeared in a variety of formats: agency reports, unpublished reports, newsletters, newspapers, magazines, journals, books, theses, and as abstracts and/or papers presented at various meetings and symposia. References were found in the Rock Creek files of various agencies, libraries, personal interviews, and computer literature searches.

Since there are 46 "Rock Creeks" in Idaho (Branch of Geographic Names 1981), care must be taken when searching the literature for references pertaining to Rock Creek and the Rock Creek Rural Clean Water Program (Twin Falls and Cassia counties, Idaho).

The Rock Creek Rural Clean Water Program is undergoing a post-project evaluation during 1991 (Maret 1991). This evaluation of ten years of water quality and land treatment data makes publication of this bibliography necessary and timely.

ACKNOWLEDGEMENTS

Several people assisted with the assembly of this bibliography, including Ron Blake, Dr. David Carter, Bill Church, Dale Gray, Russ Gum, RaNae Hardy, Cindy Hodges, Evan Hornig, Jane Houston, Shannon Jones, Teresa Kline, John Kendrick, Walton Low, Richard Magleby, Terry Maret, Don Martin, Jean Spooner, Jo Stanford, Gayle Stover, and Rich Yankey.

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Clark, W.H. 1989b. Rock Creek bibliography water quality related publications, Rock Creek Rural Clean Water Program, Idaho, additional references through 1989, pp. 54-1 to 54-23, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce., Twin Falls, ID.

Maret, T. 1991. Rock Creek post-project evaluation receives funding. Idaho Clean Water. Spring 1991:16.

Yankey, R., S. Potter, T. Maret, J. McLaughlin, D. Carter, C. Brockway, R. Jesser, and B. Olmstead. 1991. Rock Creek Rural Clean Water Program final report 1981-1991. U.S. Dept. Agric., ID Div. Environ. Qual., and Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 328 pp.

BIBLIOGRAPHY UPDATE: 2 JUNE 1991

ROCK CREEK BIBLIOGRAPHY

1 Agricultural Research Service. 1988. Publications list, Volume I. U.S. Dept. Agr., Snake River Cons. Res. Cent., Kimberly, ID. 36 pp.

This list includes a complete list of publications of the Agricultural Research Service-USDA (formerly Snake River Conservation Research Center) at Kimberly, ID. The list contains all papers published from 1963 through 1980 (papers #1 through #460). Much of the research was conducted on the Twin Falls Tract and relates to Rock Creek. Much early research on BMPs presently being used is included.

2 Agricultural Research Service. 1988. Publications list, Volume II. U.S. Dept. Agr., Snake River Cons. Res. Cent., Kimberly, ID. 18 pp.

This updated list of publications by the Agricultural Research Service-USDA (formerly Snake River Conservation Research Center) contains papers published from 1981 through the present date (1988). It lists papers #461 through #651 and includes 12 additional ASAE papers, abstracts, and similar reports indicating upcoming publications. Much of the research was conducted on the Twin Falls Tract and relates to Rock Creek.

3 Agricultural Research Service. 1989. Publications list, Volume II. U.S. Dept. Agr., Snake River Cons. Res. Cent., Kimberly, ID. 20 pp.

This updated list of publications by the Agricultural Research Service-USDA (formerly Snake River Conservation Research Center) contains papers published from 1981 through the present date (1989). It lists papers #461 through #668 and includes 24 additional ASAE papers, abstracts, and similar reports indicating upcoming publications (publications that arae "in press". Much of the research was conducted on the Twin Falls Tract and relates to Rock Creek.

4 Agricultural Stabilization and Conservation Service. 1989. Agency progress report, Agricultural Stabilization and Conservation Service, pp. 49-53, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

The ASCS portion of the 1989 Rock Creek Rural Clean Water annual report consisted of financial sheets showing the funds allocated and used during the project.

5 Agricultural Stabilization and Conservation Service. 1989. Financial management, pp. 95-98, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This is the financial portion of the 1988 annual report of

the Rock Creek Rural Clean Water Program. The report shows $2,204,7234 allocated for BMP cost-sharing, $1,944,817 total amount approved, $1,282,1078 performance amount earned by participants, $350,149 balance available for modification, and total number of contracts approved as 185.

6 America's Clean Water Foundation. 1991. The Clean Water Act's twentieth anniversary. Idaho Clean Water. Spring 1991: 7.

A photograph from the Idaho Water Quality Bureau files was used with this article. The sign (Warning these waters are polluted with raw sewage avoid contact) was taken from along lower Rock Creek before the Rural Clean Water Program started.

7 Anon. 1959. Oxygen checked in Rock Creek water. Dec. 9. Times-News, Twin Falls, ID. 1 pp.

This short article and photograph showed Harlan Formo and Keith Harvey checking dissolved oxygen in Rock Creek. Bacterial counts of 2.5 million were reported. Formo said this represented a definite health hazard to anyone coming into contact with Rock Creek water.

8 Anon. 1959. Rock Creek pollution labeled "Most Critical" area problem. Aug. 11. Times-News, Twin Falls, ID. 1 pp.

This article listed the pollution of Rock Creek as some of the most critical stream pollution problems in southcentral Idaho and is of grave concern to the State Department of Health. The City of Twin Falls in June, 1958, had defeated a revenue bond which would have provided funds for a seqwage treatment plant, improvements to the water system, new sewer laterials and trunk and interceptor sewers providing lines to the treatment plant. The State Department of Health is sending the City of Twin Falls a letter requiring pollution control in the city if future expansion of either residential or industrial type is to continue.

9 Anon. 1959. Rock Creek sewage content checked. Dec. 9. Times-News, Twin Falls, ID. 1 pp.

This article was accompanied by a photograph of Robert Olson and Harlan Formo (Idaho State Department of Public Health) taking samples of aquatic life in Rock Creek. Formo noted that there are 2.5 million gallons of raw sewage (domestic and industrial) dumped into Rock Creek each day. "Handling contaminated trash fish after catching them also presents a certain health hazard", Formo said. No mention was made of game fish being found in Rock Creek but note that if the creek were cleaned up good trout habitat would exist. The health departmet often receives complaints of odors from the stream by residents near the creek.

10 Anon. 1969. New laws urged to curb stream pollution. Dec. 12. Times-News, Twin Falls, ID. 1 pp.

Some legislative measures apparently will have to be taken if the pollution problem in Rock Creek and other southern Idaho streams is to be corrected. This view was expressed by members of the Twin Falls County planning committee. Industrial dumping into Rock Creek is still a problem. The Sawtooth National Forest is planning on adding 6 miles of road in Rock Creek Canyon and they expect recreational use in the area to triple in the next few years. The Soil Conservation Service reported that a Rock Creek Watershed Project is now ready for a feasibility study. Bob Bell (ID Dept. Fish & Game) reported on fish production and planting, but said unless pollution can be corrected, the program is continuously faced with loss of fish.

11 Anon. 1979. Monitoring progress. Clean Water News, December. Soil Cons. Comm., Boise, ID. Pp. 1.

USGS has completed the first round of sampling in Cedar Draw, Rock Creek and Marsh Creek.

12 Anon. 1979. Rock Creek. Clean Water News, December. Soil Cons. Comm., Boise, ID. Pp. 2.

The Snake River and Twin Falls Conservation Districts (SCDs) have prepared a Rural Clean Water Project application. Significant problem areas have been inventoried. The SCDs have sponsored three tours. Landowners have been identified. Six supervisors serve on the project board with Marv Taylor as Chairman. These six people will make initial contacts with landowners.

13 Anon. 1980. ESS plan of work for comprehensive monitoring and evaluation of RCWP projects. Mimeo. Econ. Stat. Svce., Washington, D.C. 15 pp.

Regulations of the Rural Clean Water Program (RCWP) call for comprehensive monitoring and evaluation (CM&E) of a limited number of projects. The monitoring and evaluation is to include both physical (water quality) and socio-economic impact. ESS has specific responsibility for the socio-economic component. SCS has general responsibility for the overall CM&E. The objectives, scope, approach, outline of work, budget, and schedule are presented. The specific objectives are 1) identify and measure the positive and negative impacts on the landowners in the project area; 2) estimate the off-site benefits; and 3) evaluate the extent to which improved water quality can be achieved in the most cost effective way. Specific impacts/issues to be monitored and evaluated under each of the major land treatments.

14 Anon. 1980. Plans form to cut Rock Creek runoff pollution. March 7. Times-News, Twin Falls, ID. 1 pp.

Local and U.S. officials are making plans aimed at reducing runoff pollution into Rock Creek. Cost share agreements are described. About $2.4 million in grants has been awarded to the Rock Creek project. The program is volunteer. Some potential BMPs are described.

15 Anon. 1980. Rock Creek Clean water cost-sharing funds told. Sept. 18. Buhl Herald, Buhl, ID. 1 pp.

Farmers in the Rock Creek drainage of Twin Falls County are now eligible to receive cost share funds under the experimental Rural Clean Water Program. Rock Creek was one of 13 RCWP projects selected nationwide. The objectives are to save soil and improve the water quality of Rock Creek.

16 Anon. 1980. Rock Creek project viewed. July 20. Times-News, Twin Falls, ID. 1 pp.

Dr. David Carter is pictured explaining a buried pipe runoff system on a tour of the Rock Creek watershed (Rural Clean Water Program). Also discussed were filter strips, sediment ponds, minibasins and other BMPs utilized in the project to improve the water quality of Rock Creek.

17 Anon. 1980. Rock Creek water project, one of 13 areas on target. March 27, Buhl Herald, Buhl, ID. 1 pp.

Secretary of Agriculture Bob Bergland has announced 13 project areas selected under the $50 million Rural Clean Water Program. Included is the Rock Creek project. The project will provide cost share funds to implement best managaement practices on farmland and improve the water quality of Rock Creek.

18 Anon. 1980. Rural Clean Water Project monitoring proposal Rock Creek. Mimeo. 21 pp.

This proposal contains the application of information gained through the project, the problem, background, monitoring objectives, monitoring strategy, modeling, data management and analysis, costs, socio-economic strategy, institutional aspects, educational aspects, total comprehensive monitoring costs, references, and an appendix of Science Education Administration/Agricultural research publications that relate to the project.

19 Anon. 1980. USDA announces first project areas for 1980 Rural Clean Water Program. U. S. Dept. Agr. News, U.S.D.A., Washington, D.C. 2 pp.

Rock Creek was the third listed RCWP project out of the initial 134 project areas selected under the $50 million Rural Clean Water Program. A total of 281 farms are listed as eligible for assistance. Estimated total federal RCWP cost is listed as $2,400,000.

20 Anon. 1980. Work in cleaning up return irrigation flows recognized. Dec. 7. Times-News, Twin Falls, ID. 1 pp.

Dr. David L. Carter received national recognition for his work with the local trial project to clean irrigation return flows. He was named a Fellow of the American Society of Agronomy and of the Soil Science Society of America. Carter was cited for his work on the LQ Drain project which led to funding of the Rock Creek Rural Clean Water Program. The Rock Creek project could become a model project on which a national program will be designed. Carter has been asked by the SCS to advise on this program and its monitoring.

21 Anon. 1981. Church announces Idaho project as one of the first in new Rural Clean Water Program. Feb. 29, News Release From: Frank Church, U. S. Senator, Idaho. 1 pp.

Senator Frank Church announced that the Department of Agriculture has selected an Idaho project as one of the first in the new Rural Clean Water Program. The Rock Creek project is located near Twin Falls. The purpose of the program is to improve water quality by instituting new management practices on waste control.

22 Anon. 1981. Plan of work, Rock Creek Rural Clean Water Project. Soil Cons. Svce., Twin Falls, ID. 79 pp.

This document gave the plan of work for the Rock Creek Rural Clean Water Program. Included were three main topics: I. Project initiation (Local Coordinaing Committee briefing, organization and responsibilities, local announcement plans, and initial public participation plans); II. Project strategy (severity of water quality problem, estimate of water quality improvement, project control strategy and evaluation and scheduling); and III. project activity (Information and education plan, technical assistance plan [annual work plans], monitoring and evaluation plan [monitoring sites], and administrative plan. Various attatchments were included: executive summary, project maps, list of BMPs, and a memorandum of Agreement between ASCS and the Snake River and Twin Falls SCDs.

23 Anon. 1983. Rock Crek Rural Clean Water Program fact sheet. Soil Cons. Svce, Twin Falls. 3 pp.

A fact sheet was prepared which included the following sections: what is the Rural Clean Water Program (RCWP)?; what is the purpose of the Rock Creek RCWP project?; where is the project located?; what are the best management practices (BMPs) being installed?; what is the purpose of the monitoring element of the project?; what progress has been made so far?; and what role has the Soil Conservation Districts played in the project? In addition a map was included which show the approximately 45,000 acre study

area and the 10 subbasins.

24 Anon. 1987. Cost share helps improve Rock Creek. Times-News, Twin Falls, ID. 1 pp.

This article on cost share payments to farmers as part of the Rural Clean Water Program. The article is based on a talk by Dr. David J. Walker at the Western Agricultural Economics Association meeting in July at Kansas State University. Background into the Rock Creek Rural Clean Water Program was given. In the economic evaluation Walker determined that the government last year paid 84% of the costs of the Rock Creek project. Off-site benefits could not be calculated since firm data on project benefits were not available to compare the distribution of benefits with the distribution of costs. One fear is that after cost share payments terminate in 1991 BMPs may no longer be applied to the land and the water quality in Rock Creek might deteriorate, but probably not to pre-project levels.

25 Anon. 1988. Roy Jesser. Idaho Farmer-Stockman. Pp. 3.

This short news item mentions the Governor's Award received by Roy Jesser, Rural Clean Water Program project chairman, at the recent Rock Creek dedication. Roy has been a member of the Snake River Soil and Water Conservation District Board of Supervisors for the past 20 years, worked on the LQ Drain project and now the Rock Creek Rural Clean Water Program.

26 Anon. 1989. Talk-of-the-town. East Co. Chron., Kimberly, ID. Feb. 3. Pg. 1.

In this "Talk-of-the-town" section of the paper, mayor of Kimberly, Jesse Posey, is shown with a 5 pound German brown trout caught "somewhere between south of Kimberly and Poleline Road Bridge". Along with the fish story the mayor said that "Roy Jesser was instrumental in getting the Rock Creek Clean Water Committee organized in 1981. It has been successful. The water has really been cleaned up since waste water is no longer polluting the water". [A creel census card returned to DEQ and dated January 29, 1989, by J. Posey, lists a 5 pound (23") brown trout caught on Rock Creek (location not given). Also caught and released were 4 additioinal brown trout and 1 rainbow trout. All the fish were caught in one hour of fishing.]

27 Anon. 1990. Idaho environmental status. April 22, 1990. The ID Statesman, Boise. pp. 1A, 8A.

In this list of environmental problem areas, environmental successes and environmental priorities the "Rock Creek recovery effort" is listed as an environmental success by the State Division of Environmental Quality.

28 Anon. 1990. Rock Creek 78% cleaner! ID Assn. Soil Cons. Dist. Bull. 15(1):3.

Good news from the Rock Creek Rural Clean Water Project in Twin Falls County! Water quality is better than ever according to the lastest annual progress report. A summary of the project and its accomplishments is presented.

29 Anon. 1990. Rock Creek fishing project shows cooperation, success. March 29, Times-News, Twin Falls, Idaho. 1 pp.

Between 40 and 60 percent success has been registered in the put-and-take fishing project of steelhead in Rock Creek. Idaho Department of Fish and Game can now stock the stream since the water quality has improved.

30 Anon. n.d. Monitoring results: Rock Creek sediment loads on the decline. Univ. ID Extension Focus, Twin Falls, ID. Pp. 2.

Sediment carried by Rock Creek into the Snake River may be decreasing--at least that is the indication given by a recently completed monitoring report on water quality in Rock Creek. An introduction to the Rock Creek Rural Clean Water Program is given. During 1981 48,000 pounds of phosphorus was lost down Rock Creek representing a replacement cost to farmers of over $26,000. More than 20,000 tons of sediment entered the Snake River from Rock Creek.

31 Arenz, A. 1986. Skiing Rock Creek. Times-News, Twin Falls, ID. July. 1 pp.

A large photograph showing another use of Rock Creek - skiing on a piece of plywood tied to a bridge. This is another form of recreation that probably was not done on Rock Creek in the past when it was highly polluted.

32 Arenz, A. 1988. Survey Station. Times-News, Twin Falls, ID. November 4. 1 pp.

This article consists mostly of a large photograph showing Rich Morrison (DEQ) and Ernie Hendricks (SCS) establishing a fishing survey box at water qality monitoring station S-2 (Poleline Road crossing). Eight such boxes will be placed along Rock Creek near popular fishing areas to gather data from anglers. The information will be used to help determine the degree of success of the Rural Clean Water Program.

33 Arenz, A. 1990. Stocking steelhead. March 6, 1990, Times-News, Twin Falls, ID. 1 pp.

A large photograph appeared in this issues showing Chip Corsi of Idaho Department of Fish and Game stocking stelhead into Rock Creek during the night. The planting of 100 wild steelhead was the firs reintroduction of the fish to the stream. The stocking was done in the lower part of Rock Creek.

34 Arrington, L.J. 1986. Irrigation in the Snake River Valley, an historical overview. Idaho Yesterdays 30: 3-11.

Today two-thirds of Idaho's farmlands are located along the fertile Snake River with 35 main reservoirs on the river and its tributaries furnishing irrigation water. Ira Perrine incorporated the Twin Falls Land and Water Company in 1900. Milner Dam was completed in 1905, and water diverted to 60,000 acres of Magic Valley farmland. Soon the project included 240,000 acres of farmland watered by gravity flow from the Snake River.

35 Aucutt, T. 1988. Electrofishing: Mixing water and electricity. Idaho Clean Water, Spring: 9.

Electrofishing is the use of electricity to capture fish. Electrofishing is used annually to study the fish populations in Rock Creek.

36 Austin, J. ed. 1988. Stricker Ranch improved. Mt. Light, Boise, ID. 27 (2): 11.

A brief news note announcing the planning of a solution to the erosion problems along Rock Creek as well as other improvements to the Stricker Ranch.

37 Baldwin, M., and F.O. Youngs. 1925. Soil survey of the Twin Falls area, Idaho. U. S. Dept. Agric., Bur. Soils. pp. 1367-1394 + I-III.

This publication includes a description of the area, climate, agriculture and irrigtion. Temperature and precipitation data are given for Twin Falls. All early attempts to dry farm the area failed. In 1905 irrigation water began to be used on the tract. The soils are discussed in detail. The predominamt (about 84% of the total area) soil is the Portneuf silt loam. All of this soil type in the area is under cultivation. The farmers found from experience that the growing of leguminous crops was essential to maintaining soil fertility. "Barnyard manure is practically the only fertilizer used. It is often wasted, and straw and stubble are often burned." The nature of Rock Creek and its two small tributaries, Cottonwood and McMullen Creeks are described. The lower portion of Rock Creek is described as narrow and steep.

38 Bassick, M.D. 1985. Ground-water levels, 1980, Snake River Plain, Idaho and eastern Oregon. U. S. Geol. Surv. Open-File Rpt. 85-330. 77 pp.

Well inventory and ground-water level data for 1,562 sites were collected on and near the Snake River Plain in the spring and summer of 1980. The data supplement a report that describes the configuration of the water table, depth to water, water-level fluctuations, and water movement in the Snake River Plain regional aquifer system. A map gives

the water table configuration as of spring, 1980. For the Rock Creek area the water table is at about 4,000 feet for the upper reach, 3,800 feet in the area near Twin Falls, and 3,600 to 3,400 feet near the mouth of Rock Creek at the Snake River. The report follows with tables of specific water level data for the Snake River Plain.

39 Bassick, M.D. 1986. Compilation of references on geology and hydrology of the Snake River drainage basin above Weiser, Idaho. Open-File Rpt. 86-245. U. S. Geol. Surv., Boise, ID. 133 pp.

A total of 1107 references concerning the geology (references 1-679) and hydrology (references 680-1107) of the Snake River drainage basin above Weiser, Idaho are compiled as part of the U. S. Geological Survey's Regional Aquifer-System Analysis, study of the Snake River Plain. Publications listed were published prior to 1983. Reference numbers correlate with a key-word index to help the user select and locate desired references. The key words are from publication titles. Eighteen of the publications contain "Twin Falls County" in the title. Several of these reports contain water quality or hydrology data for the Rock Creek area.

40 Bauer, S.B. 1979. Upper Rock Creek (Twin Falls & Cassia Counties) 1976-1977, water quality status report. WQ-38. ID Dept. H&W, Div. Environ., Boise. 42 pp.

Water quality survey conducted on upper Rock Creek (above Rock Creek townsite) from July 1976 through August 1977. Most parameters were within Idaho water quality standards at the Sawtooth Forest boundary with the exception of elevated phosphorus concentrations. At the lower station near Rock Creek, bacterial densities exceeded the standards approximately one-half the time. Although phosphorus values recorded at each station exceed accepted criteria, these phosphorus concentrations are probably a natural characteristic of the watershed. Increased bacterial densities between the two stations are likely due to livestock grazing which occurs in this segment.

41 Bauer, S.B. 1980. Trend analysis stations, biological monitoring 1980. ID Dept. H&W, Div. Environ, Boise, ID. 3 pp.

The water quality trend stations for the Division of Environment are compared for periphyton data for 1980. Rock Creek near Twin Falls (Station S-1, #2060146) has two samples reported: Total chlorophyll, 168 and 86 mg/m2; ash-free dry weight, 38,095 and 24,542; and an autotrophic index of 227 and 286. These data are for July and August respectively. The chlorophyll ratings are 45th and 23rd out of a total of 62 for the state (mean 149 mg/m2); the ash-free dry weight is 51st and 33rd in the state (mean 27,850 mg/m2); and the autotrophic index ratings are 35th and 41st out of 62 in the state (mean 258).

42 Bauer, S.B. 1981. Attached algae biomass (periphyton) at water quality trend stations, 1978 and 1979. ID Dept. H&W, Div. Environ, Boise, ID. 11 pp.

Algal biomass is given for water quality trend stations in Idaho for 1978 and 1979. Rock Creek (Mouth, station #2060146) has the following values: Total chlorophyll 3.71 and 2.65 mg/m2; ash-free dry weight 1,505 and 3,300 mg/m2; and an autotrophic index of 405 and 1,245 for the years 1978 and 1979 respectively. The total chlorophyll values place Rock Creek in the low productivity range. However the ash-free dry weight values place Rock Creek into the area of moderate to high productivity.

43 Bauer, S.B. 1983. Summary of agricultural water quality problems in Idaho. ID Dept. H&W, Div. Environ, Boise, ID. 16 pp.

This report was preparaed in support of the Planning for Implementation Project, Phase II, funded by Section 208 of the Clean Water Act. A comprehensive monitoring program was initiated in 1981 on Rock Creek in Twin Falls County as part of the Rural Clean Water Program. In the baseline year, 1981, 13,900 tons of sediment were discharged into Rock Creek from five subbasins which include 19,895 acres. Also 25,090 pounds of total phosphorus were carried into Rock Creek. Preliminary results indicate that an 80% reduction in sediment loading has been achieved in subbasin 7 (high priority) after two field seasons of BMP installation. Reductions of total phosphorus and fecal coliform bacteria have also occurred but at a lower percentage. Information was also presented for the LQ Drain study .

44 Bauer, S.B. 1986. Pilot study of quality assurance sample procedures 1986. Water Qual. Bur. Rpt., ID Dept. H&W, Div. Environ., Boise. 41 pp.

Quality assurance procedures were tested using Division of Environment water quality studies of agricultural runoff in the Twin Falls (Rock Creek) and Lewiston areas, 1984-1985. Precision for suspended sediment, total Kjeldahl nitrogen, total inorganic nitrogen and total phosphorus was good (4.4-20.7% average relative range), but fair for dissolved ortho-phosphate (16.6-26.9%) and poor for fecal coliform bacteria (52.1%). Accuracy was good for most parameters (90.3-112.8%), fair for ammonia (120%) and hydrolyzable phosphorus (80%), and poor for fluoride (20.7%). Replicate sampling for estimation of precision and field spiking for estimation of accuracy is recommended for all future water quality investigations.

45 Bauer, S.B., M.A. Smith, and R.L. Braun. 1978. Idaho water quality status report 1978. Volume I, report, 173 pp. and Volume II, tables and figures, 222 pp. ID Dept. H&W, Div. Environ., Boise. 65 pp.

This two volume report listed Idaho's water quality status up to 1978. The covers for both volumes show the confluence of Rock Creek at the Snake River on August 2, 1977. The heavy suspended sediment load from Rock Creek changes the color of the Snake River at this point. The sediment is attributed to irrigation return flows in the watershed. Rock Creek water quality parameters (temperature, dissolved oxygen, pH, bacteria, trophic, aesthetics, solids, dissolved gas & radioactivity, and organic) are discussed in relation to yearly and seasonal trends, comparison to recommended criteria and water quality standards and effects on protected uses. Flow (in cfs) is graphed for Rock Creek near Twin Falls for 1976-78.

46 Bauer, S.B., W.H. Clark, and J.A. Dodds. 1986. Quality assurance sample procedures for water quality. Jour. ID Acad. Sci. 22: 1.

This is the abstract of a paper presented at the 28th annual meeting of the Idaho Academy of Science, April 19, 1986, Nampa, ID. Quality assurance procedures were tested using Division of Environment water quality studies of agricultural runoff in the Twin Falls (Rock Creek) and Lewiston areas, 1984-1985. Precision for suspended sediment, total Kjeldahl nitrogen, total inorganic nitrogen and total phosphorus was good (4.4-20.7% average relative range), but fair for dissolved ortho-phosphate (16.6-26.9%) and poor for fecal coliform bacteria (52.1%). Accuracy was good for most parameters (90.3-112.8%), fair for ammonia (120%) and hydrolyzable phosphorus (80%), and poor for flouride (20.7%). Replicate sampling for estimation of precision and field spiking for estimation of accuracy should be included in all water quality investigations.

47 Bauer, S.B., W.H. Clark, and J.A. Dodds. 1986. Quality assurance sample procedures for water quality surveys. Jour. ID Acad. Sci. 22: 47-55.

Quality assurance procedures were tested using Division of Environment water quality studies of agricultural runoff in the Twin Falls (Rock Creek) and Lewiston areas, 1984-1985. Precision for suspended sediment, total Kjeldahl nitrogen, total inorganic nitrogen and total phosphorus was good (4.4-20.7% average relative range), but fair for dissolved ortho-phosphate (16.6-26.9%) and poor for fecal coliform bacteria (52.1%). Accuracy was good for most parameters (90.3-112.8%), fair for ammonia (120%) and hydrolyzable phosphorus (80%), and poor for fluoride (20.7%). Replicate sampling for estimation of precision and field spiking for estimation of accuracy is recommended for all future water quality investigations.

48 Bell, R.J. 1969. Fishery potentials on Rock Creek from a reservoir such as proposed below the Fifth Fork of Rock Creek. Mimeo Rpt., ID Dept. Fish & Game, Jerome. 13 pp.

This report addressed the following items: considerations to be made in evaluating an impoundment on Rock Creek; possible negative effects of an impoundment; positive effects of an impoundment; present fish populations in Rock Creek in vicinity of Fifth Fork dam site; estimated present fishing pressure and rough estimates of future pressure; possible eradication of drainage prior to impoundment; stocking proposed impoundment; flows of Rock Creek; conservation pool size at Fifth Fork site and minimum flow below dam; and potential fishery on Lower Rock Creek when stream pollution is eliminated. A historical photograph is included taken in August 1953 showing six large rainbow trout caught in Rock Creek about 0.5 miles below the hospital.

49 Bennett, T. 1984. Best management practices keep the sediment out of Rock Creek. Soil Water Cons. News. 5(2): 6-7.

The best way to get conservation on the land is through local people who care the most about the land. This has been accomplished through the Rock Creek RCWP. The goals are to improve water quality and reduce nonpoint source pollution. To evaluate the effectiveness of the project the Idaho State Division of Environment was selected to carry out intensive water quality monitoring. The monitoring data obtained so far show a 60-80% reduction of sediment entering Rock Creek from the highest ranked subbasin over the past three years. The technical knowledge gained through the project is reaching beyond the local level. Idaho now has a State agricultural water quality cost-share program patterned after RCWP.

50 Bennett, T. 1984. RCWP is working in Idaho's Rock Creek project. Irrigation Age. Feb.: 20.

This article describes the first three successful years of the project of planning and implementation.

51 Berg, R.D., and D.L. Carter. 1980. Furrow erosion and sediment losses on irrigated cropland. IN: Journal of Soil and Water Conservation, November-December. pp. 267-270.

Sediment losses from furrow erosion on irrigated cropland ranged from 0.5 to 141 metric tons per hectare (0.2 to 63.0 tons/acre) on 49 Idaho fields during one irrigation season. Erosion increased sharply on row-cropped fields when slopes exceeded 1.0 percent. The article discusses a variety of methods to reduce furrow erosion, including irrigation water controls and sediment recapture using filter strips and sediment basins. Total phosphorus losses were reduced in proportion to the reduction in sediment losses.

52 Bigelow, B.B., S.A. Goodell, and G.D. Newton. 1986. Water withdrawn for irrigation in 1980 on the Snake River Plain, Idaho and eastern Oregon. U. S. Geol. Surv. Hydro. Invest.

Atlas HA-690. 2 maps.

These two maps show water withdrawn for irrigation in 1980 for the western and eastern Snake River Plain (the boundary is located along Salmon Falls Creek north to King Hill, a few miles west of Twin Falls). Map 1 shows that little agroundwater is pumped for irrigation in the lower reaches of Rock Creek and that 8.1 acre-feel per square mile is pumped in the upper section of the area for irrigation. The map also shows the position of irrigation water wells located along Rock Creek. Map 2 shows no surface water pumping plants at the mouth of Rock Creek. There are eight such plants on upper Rock Creek pumping a total of 4,700 acre-feed per irrigation season (or 27% of the total flow from May 1 through September 30).

53 Blake, R. 1989. Idaho history preserved by conservation. LICA News 2(9): 13.

The water quality of Rock Creek has improved dramatically during recent years because of the voluntary participation of farmers in the Rural Clean Water Program. Streambank erosion, however is still a problem. One of the problem areas is on the Stricker estate, home of the historic Rock Creek Trading Post build in 1865. During 1988 the Soil Conservation Service helped the Idaho Chapter of LICA (Land Improvement Contractors of America) design and install streambank stabilization practices at the site. The Lica field day (a weekend in June 1988) was the first held in Idaho. LICA associate members and special interest groups (over 70 volunteers) donated materials, equipment, food, and labor for the two day project. An emergency spillway was cut, streambanks were sloped and covered with erosion control blankets and rock riprap for protection.

54 Blalock, L.L. 1989. Legislative history of the Rural Clean Water Program (P.L. 95-217, 91 Stat. 1579, 33 U.S.C. 1288). Part II. RCWP enabling legislation. NWQEP Notes 40: 2-3.

The first part of this article concerning legislative action was published in July 1989 by Linda Blalock (NWQEP Notes 39: 1-2). The present article discusses the enabling legislation for RCWP. The objectives of RCWP were to: a) achieve improved water quality in the approved project area in the most cost-effective manner in keeping with the provisioin of adequate supplies of food, fiber, and a quality environment; b) assist agricultural land owners and operators to reduce agriculturald nonpoint source water pollutants and to improve water quality in rural areas to meet water quality standards/goals; and c) develop and taest programs, policies, and procedures for the control of agricultural nonpoint source pollution. The first 13 projects with funds appropriated for FY1980 included Rock Creek, Idaho.

55 Bondurant, J.A. 1971. Quality of surface irrigation

runoff water. Trans. ASAE 14(6): 1001-1003.

This paper was presented at the Annual Meeting of the American Society of Agricultural Engineers at Washington State University, Pullman, June 1971, as Paper No. 71-247. Water quality of irrigation runoff water in several areas including the Twin Falls, Idaho area was compared with that of receiving waters, in this case the Snake River from 1966 to 1968. Chemical constituent concentrations increase in runoff waters during surface irrigation because of incorporation of undissolved fertilizer particles in the irrigation stream or by erosion of soil particles having attached fertilizer ions. Diffusion due to ion concentration differences in the soil water at the soil surface and the irrigation water is negligible. The use of grassed filter strip or a silt settling pond or both would reduce the loss of sediment and improve water quality.

56 Bondurant, J.A., C.E. Brockway, and M.J. Brown. 1978. Predicting Irrigation Return Flow Rates. Trans. of ASAE, 21: 6. pp. 1142-43.

Return flows from irrigated areas in southern Idaho have been analyzed and a relationship developed that characterizes flows by relating the cumulative percent of total seasonal flow to maximum flow rate. This aids in designing efficient sediment ponds based on expected sediment concentration and particle size.

57 Boone, L. 1988. Idaho place names. Univ. ID Press, Moscow. 413 pp.

On page 319 there is a listing for Rock Creek (Twin Falls County). "T9S R16E sec 25. Rises at 6000' in the Sawtooth National Forest and flows 45 mi N and W to empty into Snake River 3.5 mi NW of Twin Falls. A short distance above Twin Falls it has cut a canyon through lava and in a 3-mi stretch falls several hundred feet to 2992'. Rock Creek State Station was established on this stream in 1865 by James Bascom. It became a stopping place for emigrants on the Oregon Trail, beacause this was the first water after leaving Snake River, about 20 mi away. Rock Creek village grew up around Herman Stricker's homesite, and in 1929 a rock crusher was moved in or built to produce gravel for roadbuilding. Post office, 1871-1925. Named by early trappers and emigrants for the rocks found along the stream."

58 Branch of Geographic Names. 1981. Idaho geographic names, Book 2. U. S. Geol. Surv., Topograph. Div., Reston, VA. 507 pp.

This two volume set gives an alphabetical listing of geographic names (place names) for Idaho. Rock Creek is listed in Book 2. A total of 46 Rock Creeks are known for the state. Information is given for feature class, county, coordinates for the stream as well as the source of the

stream, and a map reference.

59 Brichford, S. 1989. Newsflash: RCWP personnel changes. NWQEP Notes. March 15.

This Editor's note informs that Bill Clark (Idaho Department of Health and Welfare, Division of Environmental Quality) has accepted the Nonpoint Source Monitoring Coordinator position. He is being replaced as water quality monitoring coordinator on the Rock Creek Rural Clean Water Program by Terry Maret.

60 Briggs, J.C., and J.F. Ficke. 1977. Quality of rivers of the United States, 1975 Water Year--based on the National Stream Quality Accounting Network (NASQUAN). U. S. Geol. Surv., Open-File Rpt., Reston, VA. 78-200. 436 pp.

This report gives water quality data for the U. S. Geological Survey's NASQUAN stations across the United States. A description of the program and map of stations as well as summary statistics is included. Data is included for the following station: Snake River at King Hill, Idaho (#13154500). This is the main water quality monitoring station on the Snake River below the confluence of Rock Creek. While it is located some distance below Rock Creek the station may be useful in assessing long term trends in water quality. It would be interesting to see if the changes made in Rock Creek water quality since 1981 are visible in the data reported for this station since that time. Data are presented for temperature, specific conductance, streamflow, pH, bacteria, nutrients, sediment, major ions, metals, and periphyton.

61 Brockway, C.E. 1980. Addendum to final report irrigation return flow project - 1979, conclusions and recommendations. ID Water Resour. Res. Inst., Univ. ID, Moscow. Mimeo. 3 pp.

This is an addendum to the Irrigation Return Flow Final Report for 1979 (Kline 1980) which concerns the LQ Drain project. The addendum is in the conclusions and recommendations section and includes a section of watershed evaluation and a summary of expenditures for the USDA Science and Education Administration, Agricultural Research. The addendum contains additional information on BMPs for water quality improvement. Additional information on BMPs is provided and education of irrigators is recommended. Total project costs (USDA Science and Education Administration Agricultural Research) was $13,633. Technology learned during the LQ Drain project was used on the Rock Creek RCWP.

62 Brockway, C.E., D.L. Carter, and C.W. Robison. 1981. Irrigation return flow study, final report, 1980. Univ. ID, Ag. Eng. Dept., Mimeo. Rpt. 55 pp.

Sediment delivered to the Snake River was 2300 tons in 1980

The results of placing straw in furrows to control erosion and increase infiltration was evaluated and was found to reduce erosion and increase infiltration and lateral water movement when properly controlled and applied.

101 Carter. D.L., MJ. Brown, C.W. Robbins, and J.A. Bondurant. 1974. Phosphorus Associated with Sediments in Irrigation and Drainage Waters for Two Large Tracts in Southern Idaho. J. Environ. Quality, vol. 3, no. 3. July-Sept. pp.287-291.

Phosphorus was measured in irrigation and surface drainage waters for the Twin Falls and Northside irrigation tracts, and inorganic, water-soluble phosphate and total P inputs and outputs were computed. Present irrigation practices conserve P by removing more P from the Snake River in irrigation water than is returned in drainage water. Particle size segregation takes place in some drainage streams and the finer sediments returning to the river contain higher total and extractable P concentrations than the soils from which they were eroded.

102 Castelin, P. 1989. 1987-88 drought impacted ground-water levels in southern Idaho. Currents, January: 2.

The 1987-88 drought has had the expected effect on ground-water levels--declines approaching or exceeding those experienced in the previous drought periods. Several factors, all somewhat related, contributed to the declines: lack of winter snows and spring rains reduced recharge to the shallower aquifers; reservoirs did not fill and the normal seepage losses were not experienced; and irrigators had to pump groundwater earlier in the spring and later in the fall. A well located in Twin Falls County, appears to be quite responsive to wet and dry periods. It has relatively constant withdrawals from year to year and actually shows an increase in water levels over the long term. This trend may not be typical of wells in other parts of the country.

103 Center for Environmental Systems. 1988. State of Idaho identification of 304 (I) waterbodies: candidate lists. US Environ. Protec. Agency, Washington D.C. 250 pp.

This report was prepared to help the State of Idaho meet the requirements of Section 304(1) of the 1987 Clean Water Act Amendments. Waterbodies are identified which are candidates for listing by Idaho in its 1988 305 (b) report. Nonpoint sources are listed as problems for Rock Creek. Toxics and nontoxics are given agricultural sources. These include pesticides and metals. Metals are also listed as of natural origin. Point sources are listed as a sugar beet processor.

104 Chambers, G. 1980. Rock Creek project is breaking new ground. ID Farmer-Stockman. Aug. 7. 1 pp.

One of the problems hindering efforts to improve water

quality along Rock Creek in Twin Falls County is the need to adapt a system engineered and constructed 75 years ago to modern demands and technology. The Rural Clean Water Program was developed to do this. This is a volunteer project so incentives must be present. Cost share to the farmers is the incentive to apply the best management practices to the land.

105 Clark, B. 1988. Reporting suggestions submitted by Bill Clark, Rock Creek RCWP, Idaho. NWQEP Notes, Nat. Water Qual. Eval. Proj., NC State Univ., Raleigh. 33: 4.

In response to a previous article on RCWP reports, the following additional recommendations were submitted: General recommendations - always include an abstract: acknowledgements and literature cited sections; and the report should always have the author(s) listed on the front. Water quality monitoring recommendations - all water quality monitoring methods should be described in detail with new or innovated methods illustrated; quality assurance should be discussed; and a section discussing the relationships between BMPs and water quality monitoring data should be included even if not completely known or understood at the time the report is prepared.

106 Clark, B. 1988. Rock Creek, Idaho RCWP gains international exposure. NWQEP Notes, Nat. Water Qual. Eval. Proj., NC State Univ., Raleigh. 33: 3.

A brief notice of two Rock Creek RCWP presentations made by Clark is given: "Rock Creek Rural Clean Water Program, Idaho, U.S.A.: An example of agricultural nonpoint source pollution abatement" at the Sixth International Water Resources Association World Congress on Water Resources held in Ottawa, Canada, in May 1988 and the poster session "Rock Creek Rural Clean Water Program" held at the National Symposium on Water Quality Assessment in Annapolis, MD, during June 1988.

107 Clark, B. 1989. Prehistoric rock art found in Rock Creek Canyon. ID Herp News. 2(2): 5.

This is a reprint of the article which appeared in Idaho Clean Water, Fall 1987, on request from the Editor of Idaho Herp News. An Indian pictograph was found along Rock Creek. The toad was painted on rimrock with a red pigment. The toad depicted may indicate some special significance or value early peoples (Shoshonian) may have had for Rock Creek and certainly shows early use of the stream resource.

108 Clark, E.H., II, J.A. Haverkamp, and W. Chapman. 1985. Eroding soils, the off-farm impacts. The Conservation Foundation, Washington, D.C. 252 pp.

This book compiles what is known about the effects of erosion on water quality and provides a total estimated cost per year ($6 billion, 1980 dollars). The major

sections of the book include: muddied waters; the basic processes; impacts of sediment; impacts of erosion-associated contaminants; economic costs; some estimates; techniques for control; and options for government. Rock Creek is mentioned in Chapter 4 (impacts of erosion-associated contaminants) under the "Pesticides" subsection where a fish kill of 17,500 individuals was reported.

109 Clark, W.H. 1975. Rock Creek, Twin Falls County, 1970-1974, Water Quality Status Report. Water Qual. Ser. 18. ID Dept. H&W, Div. Environ., Boise. 69 pp.

Rock Creek is still highly polluted. Changes in pH, high temperature, high concentrations of BOD5 and nutrients along with high coliform densities are major factors influencing the poor condition of the creek.

110 Clark, W.H. 1985. Rock Creek Rural Clean Water Program comprehensive monitoring and evaluation, annual report. ID Dept. H&W, Div. Environ., Boise. 152 pp.

Suspended sediment has shown a significant decrease in five of the six subbasins since 1981. Three of the subbasins show significant reductions in TKN, two for total phosphorus and only one each for orthophosphate and coliform bacteria. Pesticides are present in low concentrations in the water column, sediment, and fish tissue. DDT has shown a significant reduction since 1981. Quality assurance sampling showed excellent accuracy for suspended sediment, TKN, nitrate, TP and minerals. Good precision was found for TKN, SS and TP and poor precision was found for dissolved orthophosphate and fecal coliform bacteria. Benthic macroinvertebrates show greatest diversity at upstream Rock Creek stations. Fish populations in Rock Creek have increased since 1981.

111 Clark, W.H. 1985. Rock Creek Rural Clean Water Program: an overview. Proc. WA State Entomol. Soc., 47:756-758.

This is an abstract of an invited paper presented at the Tri-State Entomological Meetings, Moscow, ID, September 29, 1985. An overview of the Rock Creek RCWP was presented. The project area and project were introduced. Goals, benefits, and results were presented. Comparison was made with the LQ Drain study. Emphasis was placed on macroinvertebrate sampling and results to date.

112 Clark, W.H. 1985. Rock Creek Rural Clean Water Program: an overview. Retort 22(2):4.

An overview of the Rock Creek Rural Clean Water Program is given. The study, study area, and cooperative nature of the project are discussed. Goals of BMP implementation are listed. Water quality monitoring role and results are briefly listed. Potential results are compared with an earlier study on the LQ Drain.

113 Clark, W.H. 1985. Rock Creek Rural Clean Water Program: An overview. Idaho Clean Water. Fall: 13-14.

An overview of the Rock Creek RCWP is presented. The study, study area, and cooperative nature of the project are discussed. Goals of BMP implementation are listed. Water quality monitoring role and results are briefly listed. Potential results are compared with an earlier study on the LQ Drain.

114 Clark, W.H. 1986. No selenium found in Rock Creek. Idaho Clean Water. Winter 1986/87: 5.

Because the occurrence of selenium in surface waters draining agricultural lands has received much national attention recently, we examined samples in Rock Creek and its irrigation return flows. Of 72 samples examined no selenium was detected.

115 Clark, W.H. 1986. Rock Creek RCWP changes direction: new emphasis on conservation tillage. Idaho Clean Water. Fall: 14.

New emphasis was placed on conservation tillage (reduced and no till) during 1986 and for the remainder of the project. Conservation tillage works by reducing erosion with the individual field. With the reduced erosion on the field there is less sediment reaching Rock Creek. There is also a long term benefit to the farmer by retaining the productivity of the land.

116 Clark, W.H. 1986. Rock Creek Rural Clean Water Program comprehensive water qulaity monitoring report 1981-1986. ID Dept. H&W, Div Environ., Boise. 147 pp.

This water quality report represents Appendix B of the 1986 RCWP report.

117 Clark, W.H. 1986. Rock Creek Rural Clean Water Program. Jour. ID Acad. Sci. 22: 1.

This is the abstract of a paper presented at the 28th annual meeting of the Idaho Academy of Science, April 19, Nampa, ID. An introduction to the Rock Creek RCWP is given. Water quality monitoring program is discussed and some results presented. Native trout populations have increased significantly at half of the sample stations.

118 Clark, W.H. 1986. Rock Creek Rural Clean Water Program. Idaho Clean Water. Winter: 5.

The Rock Creek Rural Clean Water Program is briefly described. The deadline for applications for cost-share funds by farmers is given as September 30, 1986. Water quality monitoring will continue through 1990 to assess BMP effectiveness.

119 Clark, W.H. 1987. Highlights from 1986 Rock Creek RCWP water quality monitoring report. Snake River Soil Water Cons. Dist., Twin Falls, ID. pg. 4.

Water quality monitoring has shown some improvements in Rock Creek since 1981. Fish (wild trout) populations have improved. Traces of pesticides are found in fish tissue but are below levels of human health concern. Suspended sediment loadings have decreased from an estimated 30,000 tons (May-August 1982) to 13,400 tons in 1986. Streambank erosion is still a problem, with an estimated 20,000 tons of suspended sediment contributed to Rock Creek during 1986. Suspended sediment has been reduced significantly in the subbasins since 1981.

120 Clark, W.H. 1987. Highlights of the 1986 Rock Creek report. Idaho Clean Water. Summer: 10-11.

Water quality monitoring has shown some improvements in Rock Creek since 1981. Fish (wild trout) populations have improved. Traces of pesticides are found in fish tissue but are below levels of human health concern. Suspended sediment loadings have decreased from an estimated 30,000 tons (May-August 1982) to 13,400 tons in 1986. Streambank erosion is still a problem, with an estimated 20,000 tons of suspended sediment contributed to Rock Creek during 1986. Suspended sediment has been reduced significantly in the subbasins since 1981.

121 Clark, W.H. 1987. Perrine Coulee, Twin Falls County, Idaho, 1986. Water Quality Status Report 73. ID Dept. H&W, Div. Environ., Boise. 29 pp.

The Perrine Coulee System is a group of agricultural drains entering the Snake River just upstream of its confluence with Rock Creek. Water quality monitoring methods follow that of the Rock Creek RCWP. The May-October suspended sediment loadings were calculated at 7,322 tons for one of the drains (higher than any reported for the Rock Creek subbasin stations). Perrine Coulee has a higher flow than the Rock Creek subbasins.

122 Clark, W.H. 1987. Prehistoric art found in Rock Creek project area. Idaho Clean Water. Fall: 11.

An Indian pictograph was found along Rock Creek. The toad was painted on rimrock with a red pigment. The toad depicted may indicate some special significance or value early peoples (Shoshonian) may have had for Rock Creek and certainly shows early use of the stream resource.

123 Clark, W.H. 1987. Rock Creek 1987, the uncertainties of monitoring water quality. Idaho Clean Water. Summer: 11.

It is difficult to obtain a "normal year's" water quality data with all of the incidents that have happened on Rock

Creek during 1987: 1987 is a drought year; the Highline Canal failed yielding nearly a 100 year flood of short duration on Rock Creek; a fish kill resulted from an algicide entering the stream; a heavy rain (over 1 inch in about 20 minutes) hit part of the watershed in June; and a second hydroelectric generating facility is currently being planned for lower Rock Creek.

124 Clark, W.H. 1987. Rock Creek Rural Clean Water Program water quality results. Jour. ID Acad. Sci. 23: 22.

This is an abstract of a paper that presented a summary of the first six year's water quality data for the Rock Creek RCWP to the 29th Annual Meeting of the Idaho Academy of Science in Moscow, ID. Results in reduced suspended sediment, reduced organic nitrogen and phosphorus as well as improved fishery was discussed. Possible masking of results by eroding streambanks was illustrated.

125 Clark, W.H. 1987. Rock Creek Rural Clean Water Program water quality results, 1981-1986. Water Qual. Sec. Newsletter, Amer. Fish. Soc. 10(2): 15.

This was a literature notice in the presentations section of the continuing bibliography of water quality research of the Water Quality Section Newsletter of the American Fisheries Society. The paper was presented at the Idaho Academy of Science 29th Annual Meeting, Moscow, ID, April 4, 1987.

126 Clark, W.H. 1987. Rock Creek Rural Clean Water Program Comprehensive Water Quality Monitoring Report 1981-1986. Water Qual. Sec. Newsletter, Amer. Fish. Soc. 10(2): 14.

This was a literature notice in the journal article section of the continuing bibliography of water quality research of the Water Quality Section Newsletter of the American Fisheries Society.

127 Clark, W.H. 1987. Rock Creek Rural Clean Water Program - six years of water quality data. Water Qual. Sec. Newsletter, Amer. Fish. Soc. 10(2): 15.

This was a literature notice in the presentations section of the contunuing bibliography of water quality research of the Water Quality Section Newsletter of the American Fisheries Society. The paper was presented at the Idaho Chapter American Fisheries Society, annual meeting, March 14, 1987.

128 Clark, W.H. 1988. Fish populations in Rock Creek, a stream impacted by agricultural nonpoint source pollution, have improved. Abstract. Amer. Fish. Soc., ID Chap., Boise. Pp. 4.

This paper was presented at the Idaho Chapter, American Fisheries Society, Annual Meeting, in Boise, ID, March 5,

1988. A brief background of the Rock Creek RCWP was presented. The portion of the 1987 Rock Creek video concerning the fishery was shown. Fish populations in Rock Creek have increased since the beginning of the project. Wild trout populations have increased significantly at most Rock Creek sample stations since 1981. Catchable trout populations have increased at five of six sample stations and trout size (biomass) has increased at four of those five stations. A significant increase in economic value is associated with this positive increase in fish numbers and size. The fisherty in Rock Creek is improving with the decrease in sediment and other pollutants to the stream. The talk was illustrated with slides.

129 Clark, W.H. 1988. Groundwater aspects of the Rock Creek Rural Clean Water Program. Abstract of paper presented at symposium: "Idaho Groundwater quality: Managing our valuable resource", Twin Falls, ID. 1 pp.

This invited paper was presented December 1, 1988, in Twin Falls, ID, at the Idaho Association of Commerce and Industry/Idaho Division of Environmental Quality (Water Quality Bureau) symposium: "Idaho groundwater quality: Managing our valuable resource". The talk was illustrated with slides of the Rock Creek RCWP and groundwater monitoring sites. Rock Creek groundwater monitoring is composed of two parts: drain tunnels and domestic wells. Groundwater is being sampled in the tunnel drains (hand dug in the basalt rims to drain farm lands after the start of irrigation and subsequent raising of the water table in some areas) and in domestic wells (no pesticide data yet). Avadex BW, dacthal, dieldrin, dursban, methoxychlor, parathion, pentachlorophenol, and 2,4-D have been found in trace concentrations in the tunnel drains to date.

130 Clark, W.H. 1988. Groundwater study proposed. Rock Creek Review, Project Newsletter. July: 4.

A groundwater study is proposed for the Rock Creek watershed. Drain tunnels and domestic wells would be sampled for nitrate, coliform bacteria, herbicides and water discharge.

131 Clark, W.H. 1988. Idaho fishery improves. Sport Fish. Inst. Bull. #399, pp. 2-3.

During the 1960s the fishery of Rock Creek was so impaired by point and nonpoint sources of pollution that in 1971 it had the dubious notoriety of making the Wildlife Habitat Obituary in the Idaho Wildlife Review. Historically, the stream served as a spawning and natal area for fall chinook salmon until the early 1900s when the first hydroelectric facilities blocked migratory passage on the Snake River. Since 1981 the Rock Creek Rural Clean Water Program has been making progress in reducing the sediment and other pollutant load to Rock Creek. An improved fishery (wild rainbow and brown trout) has resulted. An improved

economic picture exists. A creel census is planned to help evaluate the improvement in the fishery.

132 Clark, W.H. 1988. New aspects of water quality monitoring for Rock Creek. Idaho Clean Water. Winter: 10.

Two new projects are proposed for the Rock Creek study: 1) Groundwater monitoring to assess background conditions in the Rock Creek area and to compare before and after levels in subbasins with conservation tillage and those with only conventional tillage; and 2) Harrington Fork fire - during September 1987 the watershed of Harrington Fork (11,000 acres) burned. Study sites have been established on Harrington Fork and in Rock Creek above and below the confluence with Harrington Fork to look at sediment production from the burned area. Water flow, nutrients, sediment, macroinvertebrates and fish populations will be monitored to try to determine the changes the fire may make on Rock Creek.

133 Clark, W.H. 1988. Prehistoric rock art found in Rock Creek canyon. Rock Creek Review, Project Newsletter. July: 4.

An Indian pictograph was found along Rock Creek. The toad was painted on rimrock with a red pigment. The toad depicted may indicate some special significance or value early peoples (Shoshonian) may have had for Rock Creek and certainly shows early use of the stream resource.

134 Clark, W.H. 1988. Project spotlight - Rock Creek RCWP, Idaho: an example of furrow irrigated agricultural nonpoint source pollution abatement. NWQEP Notes 34. Agric. Exten. Svce., NC State Univ., Raleigh. Pp. 1-3.

The Rock Creek Rural Clean Water Program is described in this newsletter which is published for all RCWPs and others interested in nonpoint source pollution. A location map is included. Water quality monitoring objectives, methods and results are discussed. Sediment, nutrients, bacteria, pesticides, macroinvertebrates and fish monitoring results are described. The 1988 Land Improvement Contractors of America (LICA) field weekend spent on a Rock Creek streambank stabilization project is described and illustrated.

135 Clark, W.H. 1988. Rock Creek Rural Clean Water Program (RCWP 3) Idaho. Brochure. ID Dept. Health Welfare, Div. Environ. Qual., Boise. 6 pp.

This brochure was produced for the Rural Clean Water Program Workshop on September 13-14, 1988 in St. Paul, Minnesota. The project logo and a location map illustrated the brochure. The project and project area are introduced. BMP implementation are discussed. The new emphasis on conservation tillage is described. The results show the suspended sediment reductions, streambank erosion problems,

and improvements in the fishery. The cooperating agencies are listed: ASCS; Agricultural Research Service; Economic Research Service; Idaho Department of Fish and Game, Idaho Department of Health & Welfare, Division of Environmental Quality, SCS, Snake River and Twin Falls SCDs; Twin Falls County ASCS Committee; Twin Falls County Commissioners; U. S. EPA; University of Idaho, Agricultural Economics Department and Cooperative Extension Service.

136 Clark, W.H. 1988. Rock Creek Rural Clean Water Program comprehensive water quality monitoring annual report 1987. ID Dept. H&W, Div. Environ., Boise. 226 pp.

The 1987 water quality report was Appendix B of the Rock Creek RCWP annual report. New topics discussed in this report include economic values estimated for the fishery; quality assurance information; a discussion of water quality-BMP-Crop relationships; and two new aspects of the water quality monitoring (a proposed groundwater study and a study to quantify sediment and other pollutants entering Rock Creek from the Harrington Fork watershed which burned in late 1987).

137 Clark, W.H. 1988. Rock Creek Rural Clean Water Program, Idaho U.S.A.: An example of agricultural nonpoint source pollution abatement. Abstract 289A6. Sixth IWRA World Congress on Water Resources, Ottawa, Canada. Abstracts, Volume II. 3 pp.

This is the abstract of an invited paper presented at the Sixth IWRA World Congress on Water Resources, Ottawa, Canada, May 31, 1988. Rock Creek, in Twin Falls County, Idaho, has long been recognized as one of the most polluted streams in the State. The RCWP began in 1981 as one of 13 originally selected in the U.S. and one of 5 selected for comprehensive monitoring and evaluation. Description of the study area, objectives and methods were given. The project has been successful in meeting its contracting quota, in developing sediment reduction coefficients, in reducing suspended sediment and other pollutants significantly from agricultural drains, to a lesser extent to Rock Creek, and has resulted in an improved wild trout fishery, and has led to improved water quality monitoring techniques used by the Water Quality Bureau.

138 Clark, W.H. 1988. Rock Creek Rural Clean Water Program, Idaho. pp C-1. IN: Tetra Tech, Inc. National symposium on water quality assessment, Annapolis, Maryland, June 1-3, 1988, meeting summary. U.S. Environ. Protec. Agen., Washington, D.C.

This report lists the invited poster presented at the National Symposium on Water Quality Assessment, June 1-3, 1988 in Annapolis, Maryland. The poster stressed Rock Creek project background, BMPs, suspended sediment results, and fish population and fisheries economic data.

139 Clark, W.H. 1988. Rock Creek Rural Clean Water Program, Idaho U.S.A.: an example of agricultural nonpoint source pollution abatement, pp. 290-298. IN: Water for world development, Proceedings VIth IWRA World Congress on Water Resources, Ottawa, Canada. Volume III, agriculture, irrigation and drainage. IWRA, Urbana, IL. 621 pp.

This invited paper was presented at the Sixth International Water Resources Association World Congress on Water Resources on 31 May 1988, in Ottawa, Canada. The paper gave a brief history of Rock Creek and the Rural Clean Water Program. The study area, methods and results were discussed and illustrated with slides. The project is in its eighth year. Best management practices used to reduce the nonpoint source pollution from farmland were illustrated and described. The evidence of streambank erosion masking some of the results was discussed. Significant reductions in suspended sediment have been recorded at five of six subbasins studied since the beginning of the project. Trout size (biomass) increased at four Rock Creek stations and give a substantial economic increase to the Twin Falls County area.

140 Clark, W.H. 1988. Rock Creek Rural Clean Water Programme, Idaho, USA: An example of agricultural nonpoint source pollution abatement. Congress Programme. Sixth Int. Water Resour. Assoc. World Cong. Water Resour., Ottawa, Canada. Pp. 24.

This invited paper was listed in the Congress Programme of the Sixth International Water Resources Association World Congress on Water Resources held in Ottawa, Canada on 31 May 1988. The program was distributed to scientists worldwide involved in various aspects of water resources. The paper is discussed in Clark (1988) Abstract and paper presented in the Proceedings of the Congress.

141 Clark, W.H. 1988. Rock Creek fishery improves. Idaho Clean Water, Spring: 8-10.

Fish populations and fish habitat have been sampled since 1981 when the Rural Clean Water Program began. In 1971 Rock Creek was listed in the Wildlife Habitat Obituary in the Idaho Wildlife Review. Fish populations (wild trout) have increased since 1981 at five of six sample sites and trout size increased at four of those sites. From 1985 to 1987 trout numbers increased at four of the sample sites and combined with size increases at most of the sites gave economic values ranging from $75.81 (S-1) to over $400 (S-5). The base economic value determined by the U. S. Forest Service for fishing Rock Creek was $42.56 per fishing trip. A creel census to determine fishing pressure and success along Rock Creek is being planned.

142 Clark, W.H. 1988. Rock Creek program produces bibliography. Idaho Clean Water, Winter 1988/1989: 3.

As Idaho's rock Creek Rural Clean Water Program grew and the amount of literature concerning various aspects of it expanded, a need for a bibliography became evident. An annotated bibliography has now been prepared so that the literature will be available to anyone interested. The bibliography emphasizes water quality related publications. A total of over 400 publications are included and more will be added. Each publication is summarized with a brief abstract. The literature is diverse and of the following general types: information on the "LQ" Drain study; Rock Creek RCWP documents; historical water quality and quantity publicatioins; water resources data; information on BMPs; etc. Contact W. H. Clark, Idaho Department of Health and Welfare, Division of Environmental Quality, 450 West State Street, Boise, Idaho 83720.

143 Clark, W.H. 1988. Rock Creek project serves as outdoor classroom. ID Clean Water, Fall: 16.

This article describes some of the educatial or "technology transfer" type activities conducted on Rock Creek during 1988 by the water quality monitoring staff. In August the State Division of Environmental Quality water quality monitoring staff met on Rock Creek for a water quality monitoring training session and a quality assurance workshop. In September EPA's Region X office conducted an audit of field monitoring and quality assurance procedures of the Rock Creek RCWP. No deficiencies were noted and EPA learned some techniques that the project has initiated. In addition some rapid bioassessment techniques for macroinvertebrate monitoring. Fish were collected (electrofishing) for pesticide analysis and a new fish health method was also demonstrated. A national rapid bioassessment workshop is planned for Rock Creek in 1989.

144 Clark, W.H. 1988. Volunteers improve Rock Creek. Idaho Clean Water. Summer: 8-9.

Preventing erosion while preserving history reads the subtitle. This report along with eight photographs and a diagram illustrate the streambank stabilization work completed. The weekend of June 25-26, 1988, saw the activity of about 165 volunteers. The Land Improvement Contractors of America (LICA), Idaho Chapter, did much of the earth moving and heavy equipment work. Equipment was donated by local businesses as were food and supplies for the weekend. The objectives were to stabilize a portion of Rock Creek's eroding streambanks and thus protect one of the historic buildings associated with the Stricker Cabin site as well as conduct a demonstration project on Rock Creek steambank stabilization.

145 Clark, W.H. 1988. Wild trout populations improve in Rock Creek. Program and Abstracts, ID Acad. Sci., Boise, ID. pp. 13.

Catchable trout populations have increased at five of six

sample stations and trout size (biomass) has increased at four of those five stations. A significant increase in economic value (from a lot of $42.45 to $75.81 to a high of from $42.45 to $401.54) results. The fishery in Rock Creek is improving with the decrease of sediment and other pollutants to the stream.

146 Clark, W.H. 1989. Clark makes Rock Creek water quality presentations. Retort 25(4): 24-25.

This newsletter article describes two recent national/ international Rock Creek RCWP water quality presentations made by Clark: 1) an invited paper "Rock Creek Rural Clean Water Program, Idaho U.S.A.: An example of agricultural nonpoint source pollution abatement" at the Sixth Internatioinal Water Resources Association World Congress on Water Resources held in Ottawa, Canada, 31 May 1988; and 2) an invited poster session "Rock Creek Rural Clean Wataer Program" at the National Symposium on Water Quality Assessment, in Annapolis, MD, 1-3 June 1988.

147 Clark, W.H. 1989. Comprehensive Water Quality Monitoring progress report, pp. 80-88, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This water quality monitoring report is a part of the annual report for the Rock Creek RCWP. The summary emphasizes suspended sediment reductions, quality assurance information, information on fish populations (trout numbers up as compared with pre-RCWP sampling), first results in from the creel census on Rock Creek, the first data from the groundwater study (sampled from both tunnel drains and domestic wells), sediment production by the Harrington Fork Fire area, and substrate dissolved oxygen in Rock EPA field audit were presented (with no deficiencies noted by EPA). An attempt was made to show the relationships between BMP implementation and water quality results. During 1988 DEQ continued technology transfer efforts with over 20 articles being published on the Rock Creek project including a bibliography of over 400 Rock Creek articles.

148 Clark, W.H. 1989. Idaho Clean Water (Winter 1988/1989). Water Qual. Sec. Newsletter, Amer. Fish. Soc. 12(2): 11-12.

This newsletter article gives an abstract of two articles from Idaho Clean Water (Winter 1988/1989). One article concerns the Rock Creek Water Quality Bibliography: "As Idaho's rock Creek Rural Clean Water Program grew and the amount of literature concerning various aspects of it expanded, a need for a bibliography became evident. An annotated bibliography has now been prepared so that the literature will be available to anyone interested. The bibliography emphasizes water quality related publications. A total of over 400 publications are included and more will be added. Contact W. H. Clark, DHW, 450 West State Street, Boise, Idaho 83720."

149 Clark, W.H. 1989. Innovative water quality monitoring techniques for the Rock Creek Rural Clean Water Program, Twin Falls County, Idaho. Jour. ID Acad. Sci. 25: 9.

This is and abstract of a paper presented at the 31st annual meeting of the Idaho Academy of Science held in Idaho Falls. Water quality monitoring on the Rock Creek Rural Clean Water Program began in 1981 by the ID Division of Environment. Background information on the project, and a summary of results to date are presented. Since that time many innovative water quality monitoring techniques have been used, including: economic analysis of fish populations; rapid bioassessment of macroinvertebrates; fish health protocols; streambank erosion measurements and stabilization; cobble embeddedness; use of artificial trout egg pockets for intergravel dissolved oxygen measurements and for egg survival studies; and sampling of tunnel drains for analysis of groundwater. These methods and others are illustrated with slides and discussed.

150 Clark, W.H. 1989. Innovative water quality monitoring techniques for the Rock Creek Rural Clean Water Program, Twin Falls County, Idaho, pg. 33, IN: Program & Abstracts, 31st Ann. Symp. ID Acad. Sci. Idaho Falls, ID.

This is the abstract of a paper presented at the IAS meetings in Idaho Falls, April 15, 1989. The Idaho Division of Environmental Quality began water quality monitoring on the Rock Creek Rural Clean Water Program in 1981. Background information on the project are presented and a summary of results to date are presented. Since that time many innovative water quality monitoring techniques have been used and are being developed, including: economic analysis fish population; rapid bioassessment of macroinvertebrates; fish health protocols; streambank erosion measurements and stabilization; cobble embeddedness; use of artificial trout egg pockets for intergravel dissolved oxygen measurements and for egg survival studies; and sampling of tunnel drains for analysis of groundwater. These methods and others are illustrated with slides and discussed.

151 Clark, W.H. 1989. Pesticides in Rock Creek. Poster Session, Univ. ID College of Agriculture, Centennial Symposium, Pesticide Issues: Today and Tomorrow, Boise, ID.

This invited poster was presented January 25-26, 1989, in Boise, ID, at the University of Idaho, College of Agriculture, Centennial Symposium on "Pesticide Issues: Today and Tomorrow". Rock Creek pesticide monitoring is composed of two parts: surface water and groundwater. The surface water portion has concentrated on fish (both game and nongame) tissue analysis. The fish are collected by electrofishing. Rainbow and brown trout have contained mainly DDT, dieldrin, heptachlor and B-BHC. Rainbow trout also commonly have dacthal and lindane in the tissue.

Groundwater is being sampled in the tunnel drains and in domestic wells (no pesticide data yet). Avadex BW, dacthal, dieldrin, dursban, methoxychlor, parathion, pentachlorophenol, and 2,4-D have been found in trace concentrations in the tunnel drains to date.

152 Clark, W.H. 1989. Rock Creek Fishery Improves. Retort 25(4): 22-24.

The fishery in Rock Creek has improved since the beginning of the Rural Clean Water Program in 1981. Catchable trout populations have increased at five of six sample stations and trout size (biomass) has increased at four of those five stations. A significant increase in economic value (from a lot of $42.45 to $75.81 to a high of from $42.45 to $401.54) results. The fishery in Rock Creek is improving with the decrease of sediment and other pollutants to the stream.

153 Clark, W.H. 1989. Rock Creek Rural Clean Water Program Comprehensive Water Quality Monitoring annual report, 1988. ID Dept. Health Welfare, Div. Environ. Qual., Boise. 316 pp.

This water quality monitoring report is a part of the annual report for the Rock Creek RCWP. This report emphasizes suspended sediment reductions, quality assurance information, information on fish populations (trout numbers up as compared with pre-RCWP sampling), first results in from the creel census to help determine fishing pressure and fishing success on Rock Creek, the first data from the groundwater study (sampled from both tunnel drains and domestic wells), sediment production by the Harrington Fork Fire area, and substrate dissolved oxygen in Rock Creek. The results of an Environmental Protection Agency field audit were presented (with no deficiencies noted by EPA). During 1988 DEQ continued technology transfer efforts with over 20 articles being published on the Rock Creek project including a bibliography of over 400 Rock Creek articles.

154 Clark, W.H. 1989. Rock Creek Rural Clean Water Program Comprehensive Water Quality Monitoring annual report - 1988, executive summary, pp. 4-7, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This water quality monitoring summary is a part of the annual report for the Rock Creek RCWP. The summary emphasizes suspended sediment reductions, quality assurance information, information on fish populations (trout numbers up as compared with pre-RCWP sampling), first results in from the creel census to help determine fishing pressure and fishing success on Rock Creek, the first data from the groundwater study (sampled from both tunnel drains and domestic wells), sediment production by the Harrington Fork Fire area, and substrate dissolved oxygen in Rock Creek.

The results of an Environmental Protection Agency field audit were presented (with no deficiencies noted by EPA). During 1988 DEQ continued technology transfer efforts with over 20 articles being published on the Rock Creek project including a bibliography of over 400 Rock Creek articles.

155 Clark, W.H. 1989. Rock Creek Rural Clean Water Program, pp. 51, IN: Abstracts, International Symposium on the Design of Water Quality Information Systems, Colorado State Univ., Fort Collins. 60 pp.

This was the abstract of a paper presented on 9 June 1989 by William H. Clark at the International Symposium on the Design of Water Quality Information Systems, held at Colorado State University, Fort Collins, CO, 7-9 June. The entire paper is scheduled to be published in a proceedings of the symposium later this year. The paper briefly outlined the location, geology, soils, climate, and irrigation history of the project; the methods used (BMPs and water quality monitoring methods); and the results obtained. Also some of the new and innovative water quality monitoring methods used such as substrate dissolved oxygen sampling, trout egg baskets and artificial redds, cobble embeddedness, use of tunnel drains for groundwater monitoring, fish population and economics information, and quality assurance program were discussed and illustrated.

156 Clark, W.H. 1989. Rock Creek Rural Clean Water Program, Idaho: An example of furrow irrigated agricultural non-point source pollution abatement. Environ. Health Digest 15(1): 10-13. (ID Environ. Health Assoc., Boise)

The Rock Creek area, history of pollution problems and the Rock Creek Rural Clean Water Program are described. A location map is included. Water quality monitoring objectives, methods and results are discussed. Sediment, nutrients, bacteria, pesticides, macroinvertebrates and fish monitoring results are described. The 1988 Land Improvement Contractors of America (LICA) field weekend spent on a Rock Creek streambank stabilization project is described and illustrated. In brief, the Rock Creek RCWP has been very successful. Monitoring will continue to track surface as well as groundwater quality as BMP implementation continues. A bibliography of water quality related publications is in preparation (340 publications listed so far) to document the work done on Rock Creek.

157 Clark, W.H. 1989. Rock Creek Rural Clean Water Program: Macroinvertebrate sampling results. ID Entomol. Group Newsletter. 19(1): 10.

The Rock Creek Rural Clean Water Program has just completed its eighth year of water quality monitoring including quarterly Hess samples for macroinvertebrates. Specific identifications are continuing and turning up some interesting invertebrates: over 40 species of Trichoptera have been recorded for Rock Creek. Diversity in other

insect groups is greater than anticipated. For example, two species of Petrophila (Lepidoptera: Pyralidae) and four species of Optioservus (Coleoptera: Elmidae) have been found. When specific determinations are completed, the data will be entered into the U. S. Environmental Protection Agencie's BIOS data base. At that time a variety of diversity and other population characteristics will be calculated for Rock Creek.

158 Clark, W.H. 1989. Rock Creek bibliography water quality related publications, Rock Creek Rural Clean Water Program, Idaho, additional references through 1989, pp. 54-1 to 54-23, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

This bibliography of poublications relating to water quality in Rock Creek lists references #406-525. These publications are added to the 405 publications cited in Clark (1989). The literature on Rock Creek is diverse and contains information on the LQ Drain study which provided much of the BMP technology used on Rock Creek; Rock Creek RCWP related documents; historical water quality publications; water resources and stream dischage data; information on best management practices (especially in relation to the Twin Falls irrigation tract); groundwater information; and miscellaneous publications (including local history, climate, geology, soils, fish, wildlife, recreation, etc). The main sources for the literature have been agency reports; unpublished reports, newsletters; newspapers; magazines; journals; books; and theses.

159 Clark, W.H. 1989. Rock Creek bibliography, water quality related publications, Rock Creek Rural Clean Water Program, Idaho, references through 1988, pp. 99-190, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce., Twin Falls, ID. 190 pp.

This annotated bibliography consists of information on 405 publications relating to water quality or more general water resources of Rock Creek or the Rock Creek watershed. The literature on Rock Creek is diverse and contains information on the LQ Drain study which provided much of the BMP technology used on Rock Creek; Rock Creek RCWP related documents; historical water quality publications; water resources and stream dischage data; information on best management practices (especially in relation to the Twin Falls irrigation tract); groundwater information; and miscellaneous publications (including local history, archaeology, climate, geology, soils, fish, wildlife, recreation, etc). The main sources for the literature have been agency reports; unpublished reports, newsletters; newspapers; magazines; journals; books; and theses.

160 Clark, W.H. 1989. Study plan--Rock Creek RCWP groundwater study, pp. 16-20, IN: Soil Conservation

Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

A groundwater study is proposed as part of the Rock Creek Rural Clean Water Program. Some preliminary groundwater sampling was done in 1988 and is reported in Clark (1989 - Water Quality Monitoring Report). Groundwater will be monitored from both drain tunnels and domestic wells in the Rock Creek area through the end of the project. The drain tunnels were dug into the basalt rimrock of Rock Creek Canyon some distances laterally under areas of high water tables. The fractured basalt in the area allows the excess water to drain into these tunnels and then into Rock Creek. Domestic wells will be sampled in subbasin 5 (area of no planned conservation tillage) and the adjacent subbasin 7 (area with the most conservation tillage planned) to see if differences can be detected. Nitrate, coliform bacteria and pesticides will be analyzed.

161 Clark, W.H. 1990. Coordinated nonpoint source water quality monitoring program for Idaho. ID Dept. H&W, Div. Environ. Qual., Boise. 139 pp.

This document is a result of the 1988 Antidegradation Agreement for Idaho. The agreement suggested that three types of water quality monitoring be done in Idaho: Trend, beneficial use, and best management practice. In the section discussing watershed trend surface water quality sampling sites for Idaho, Rock Creek near Twin Falls (station #13093000) is listed. The station will be monitored six times per year, every other year by the U.S. Geological Survey under cooperative agreement with the Division of Environmental Quality. Nutrients, common ions, trace ions, water discharge, alkalinigy, water temperature, dissolved oxygen, pH, specific conductance, barometric pressure fecal coliform and fecal streptococci bacteria will be monitored. The data will be entered into WATSTORE and STORET. The sample location is indicated on a map.

162 Clark, W.H. 1991. Mayfly verifications needed. The Mayfly Newsletter 1(2): 2.

W.H. Clark, Idaho Division of Environmental Quality, is looking for a qualified ephemeropterist to verifiy identifications of mayfly specimens made on material collected from Rock Creek during the Rural Clean Water Program. The mayflies present in Rock Creek will help us understand the water quality of the stream.

163 Clark, W.H. 1991. Water quality problem identification in Rock Creek, Idaho: Evolution of a monitoring project. Abstract of paper presented at Nonpoint Source Watershed Workshop, January 29, New Orleans, LA. 12 pp.

An introduction to the Rock Creek RCWP is included. A brief overview of the monitoring system and how it changed

over the life of the project were given. Monitoring results show reductions in loadings at the mouth of Rock Creek, 5,541 tons down from the original 29,816 tons, ad decrease of 82%. Intensive evaluation of trout spawning habitat in 1989-1990 has documented impairment of this designated use, due to excessive sedimentation of the substrate and low oxygen levels in the spawning gravel. Despite the reductions in sediment loadings and measured improvements in the water quality, this sensitive and important use remains impaired. Other pollution sources, including streambank erosion, fish hatcheries and stream alterations, are suspection reasons for the impairment of this beneficial use.

164 Clark, W.H., R.L Yankey, and P. Malone. 1988. Rock Creek Rural Clean Water Program. Poster Session, Rural Clean Water Program Workshop, St. Paul, MN.

This invited poster was presented at the Rural Clean Water Program Workshop on September 13-14, 1988 in St. Paul, Minnesota. This poster described the background of the Rock Creek RCWP. Various best management practices were displayed. Results including suspended sediment reduction and fishery improvements were discussed. The 1987 Rock Creek video was shown many times. The Rock Creek RCWP brochure was made available to those attending the workshop.

165 Clark, W.H., and A.M. Hampton. 1991. Longitudinal zonation of triclads in Rock Creek (Idaho), Abstract of paper presented at 64th Annual Meeting, Northwest Science Association Meeting, March 20-22, 1991, Boise, ID.

The triclad Dugesia dorotocephala (Woodworth, 1897) is abundant at the lower and middle sample stations on Rock Creek. Further, it has been collected from these sites prior to extensive pollution abataement measures. At upstream sites Dugesia is supplanted by Polycelis (presumably Polycelis coronata cornata (Girard, 1981). These findings add to the knowledge of habitat raequirements and tolerances for these two triclads.

166 Clark, W.H., and L. Koenig. 1987. Hungary sends representative to review Rock Creek project. Idaho Clean Water. Fall: 11.

An agricultural engineer, Ferenc Horvath, from the Ministry of Agriculture and Food, Budapest, Hungary visited the Rock Creek area and discussed the project in relation to agricultural problems in Hungary.

167 Clark, W.H., and T. Maret. In Press. Rock Creek tunnel drains. Ground Water Mon. Rept. Ser., ID Dept. H&W, Div. Environ. Qual., Boise, ID.

The tunnel drains had dug into the basalt rims adjacent to Rock Creek were used as a groundwater monitoring means

during the latter part of the Rock Creek Rural Clean Water Program. Data is presented for inorganic and organic (pesticide) chemistry and bacteria.

168 Cooperative Extension Service. 1982. Monitoring results: Rock Creek sediment loads on the decline. Extension Focus, Coop. Exten. Svce., Univ. ID., Twin Falls. pg. 2.

Sediment carried by Rock Creek into the Snake River may be decreasing according to a recently completed monitoring report on water quality in the stream. Between 1977 and 1980 Rock Creek dumped an average of 32,700 tons annually into the Snake River. In 1981 the loading dropped to 20,000 tons. The article describes the Rural Clean Water During 1981, 48,000 pounds of phosphorus was lost down Rock Creek representing a replacement cost of over $26,000 to local farmers. Program objectives and water quality monitoring program. In addition to sediment and phosphorus, monitoring is also concerned with bacteria levels, aquatic organisms and fish. Fish populations were low but included both brown and rainbow trout which averaged 6.5 and 9.8 inches respectively. The largest fish found using electro-shocking was a 13.2 inch rainbow trout.

169 Crosthwaite, E.G. 1957. Ground-water possibilities south of the Snake River between Twin Falls and Pocatello, Idaho. Contributions to hydrology. U. S. Geol. Surv. Water-Supl. Pap. 1460-C. Pp. 99-145, plus IV and 1 map.

This publication covers the area south of the Snake River between Twin Falls and Pocatello. The Rock Creek area is only briefly discussed. Rock Creek and Cottonwood Creek are described. The geology of the Rock Creek Hills is described.

170 Crosthwaite, E.G. 1969. Water resources in the Goose Creek-Rock Creek basins, Idaho, Nevada and Utah. Water Info. Bull 8. ID Dept. Reclam., Boise. 73 pp.

Agricultural development has been accomplished using ground and surface water for irrigation. Rocks of pre-Tertiary age (limestone, quartzite, shale, sandstone, granite, and metamorphosed sediments) crop out in the hills forming the headwater areas of the Goose Creek-Rock Creek basins. These yield large supplies of water to irrigation wells at the NE edge of the Rock Creek hills. The Idavada volcanics of Pliocene age (welded ash flows and tuffs of rhyolitic and latitic composition, with interbedded clay, silt, sand and gravel) blanket the Rock Creek hills and are an important aquifer beneath the lowland. Basalts underlie much of the lowlands. About 94,000 acre feet annually recharges the aquifers from precipitation and 345,000 from irrigation water. The water has a low sodium hazard.

171 Crosthwaite, E.G. 1969. Water resources of the Salmon Falls Creek Basin Idaho-Nevada. U. S. Geol. Surv. Water-Supl. Pap. 1879-D. 33 pp.

This report covers the geography (including agriculture), geologic units and their water-bearing characteristics, development of surface and ground water resources, occurrence of surface and ground water, results of test drilling, and water quality for the area south and southwest of Twin Falls. Some of the area covered lies within the Rock Creek watershed. Some information is presented on Cottonwood Creek and McMullen Creek as well as Rock Creek. Water quality data are presented for several wells in the basin.

172 Crowley, J.O. 1989. Idaho's water, an overview. Desert Notes, Comm. ID High Desert, Boise. 8(1): 1.

This newsletter article on an overview of the status of Idaho's water contained the following note: "Quality is going down the drain. We all have heard ad nauseum about logging on the Idaho batholith, overgenerous farm chemical application, industrial runoff, sewage plant failures, and horror stories about landfills. For a happy ending see the 'Rock Creek Project' in this issue." No article was found on the project in this newsletter, perhaps it will appear in a later issue. But it is noteworthy that the project is considered a success!

173 Cryer, E., and D. Wetstein. 1980. City of Twin Falls, Twin Falls, Idaho, wastewater treatment plant modifications, solids management study. James M. Montgomery, Consulting Engineers, Inc., Boise, ID. 59 pp.

An evaluation of the Twin Falls wastewater treatment plant revealed that one of the critical elements affecting plant operation was the lack of effective and reliable solids handling. This report addresses that situation. Rock Creek is discussed some. A map of Twin Falls County showing the general soils in the area covers most of the Rock Creek RCWP watershed area. The map shows most of the RCWP area is in the Portneur-Minidoka-Minveno silt loam group. An additional comment is made that aside from the sludge storage area near Rock Creek and the plant site itself, no additional land would be permanently committed on a long term basis.

174 Decker, S.O., R.E. Hammond, L.C. Kjelstrom, et al. 1970. Miscellaneous streamflow measurements in Idaho, 1894-1967. U.S. Geol. Surv., Boise, ID. 310 pp.

Miscellaneous streamflows were compiled and several listed for the Rock Creek Basin: McMullen Creek, April 18, 1913, 21.2 cfs; Rock Creek near Kimberly, April 14, 1938, 59.9 cfs; Rock Creek near Twin Falls, April 14, 1938, 111 cfs; and Rock Creek at mouth, September 23, 1958, 304 cfs, March 25, 1959, 152 cfs, and August 6, 1959, 282 cfs.

175 Dressing, S.A. 1987. Draft nonpoint source monitoring and evaluation guide. U.S. Environ. Protect. Agency,

Washington, D.C. 287 pp.

This draft document will soon be updated. It is an attempt to provide those concerned with nonpoint source pollution a monitoring and evaluation guide that can be used in the field. The Rock Creek Rural Clean Water Program is mentioned in several places in this guide. The Rock Creek RCWP (pp. 71-73) is listed as a project with its major focus on the control of sediment from irrigation return flow. The water quality monitoring strategy is described from past Rock Creek RCWP annual reports.

176 Dressing, S.A., R.P. Maas, and J. Spooner. 1984. National Water Quality Evaluation Project 1984 annual water quality report. National Water Quality Evaluation Project, Raleigh, North Carolina. 115 pp.

This report describes the DWQEP-DMS and its application, a section on methods for the selection of critical areas for control of water quality, and a section on the methods for evaluating NPS programs and projects for development of remedial efforts. The concepts developed for selecting critical areas will be used in subsequent analyses and in the final analysis of the degree of success of NPS programs.

177 Dunn, A.K., and M.R. Finch. 1989. Chairman's report 1989 Basin Area Meetings State of Idaho Antidegradation Agreement. ID Dept. H&W, Div. Environ. Qual., Boise. 404 pp.

This report gives the results of the eight Basin Area Meetings held across Idaho during July 1989. The meetings were a result of the Idaho Antidegradation Agreement and were held to obtain public input on Stream Segments of Concern. Rock Creek (segments #400, 401), Rock Creek, Fifth Fork (segment #402), and Rock Creek tributaries Cottonwood & McMullen Creeks were nomninated to "restore water quality". Slaughterhouse Gulch (tributary to Rock Creek SW of Twin Falls) received two identical nominations. It is a "source of seep waters and was drained by the canal company about 1926. The effect of fish farming and backing up of water to cause new seep water levels to cause environmental distress draining the level down to original levels before fish ponds were allowed could improve probalems and drop seep levels again"(Appendix C, pg. 65).

178 Edwards, T.K. 1984. Effects of irrigation-return flows on water quality in Marsh Creek, Rock Creek, and Cedar Draw in south-central Idaho. pp. 185, IN: U. S. Geol. Surv. Geological survey research, fiscal year 1981, Geologic and hydrologic principles, processes, and techniques. Geol. Surv. Prof. Pap. 1375. 424 pp.

A 2-year study to monitor nonpoint sources of pollution in Rock Creek and two other streams in rural Idaho is described. Suspended sediment concentrations ranged from

less than 0.01-600 mg/L. Sediment loads related to availability of materials for transport rather than to stream discharge. Peak loads generally occurred in May and June, after cultivation and during initial irrigation of cropland. Peak nitrate concentrations occurred in September and December except for one site on Rock Creek where the maximum concentration was measured in August. In contrast, dissolved oxygen and fecal coliform concentrations were less predictable in occurrence, showing wide variations throughout the areas studied.

179 Edwards, T.K., M.L. Jones, and H.R. Seitz. 1982. Water-quality monitoring in the Marsh Creek, Rock Creek, and Cedar Draw areas, Bannock and Twin Falls Counties, southern Idaho. U.S. Geol. Surv., Boise, ID. Open-File Rpt. 51 pp.

USGS studied three rural streams in southern Idaho to assess agricultural nonpoint source pollution during 1980-1981 (see Frenzel & Jones 1985). Rock Creek consisted of 45,000 ac - 40,360 were surface-irrigated cropland, 1,430 sprinkler irrigated cropland, and 3,210 are irrigated pasture. Flow on Rock Creek is regulated by agriculture. During the 1980 water year 38,400 tons of sediment was discharged from Rock Creek. Nitrate concentrations ranged from 0-3.2 mg/L, dissolved oxygen ranged from 7.3-14.1 mg/L with saturation levels of 82% and greater. Diel variations were atypical with high concentrations of DO occurring in the early morning and low concentrations in the early evening. Fecal coliform bacteria ranged from 2-4, 100/100 mL w/44% of the samples exceeding water quality standards.

180 Edwards, T.K., and H.W. Young. 1984. Ground-water conditions in the Cottonwood-West Oakley fan area, south-central Idaho. U.S. Geol. Surv. Water-Resour. Invest. Rept. 84-4140, Boise, ID. 32 pp.

The report discusses the ground water resources in the Cottonwod-West Oakley Fan area which occupies nearly 210 sq mi in Cassia County. The West Oakley Fan and the Cottonwood Critical Ground Water Areas are described. The Cottonwood area is adjacent to the Rock Creek Hills. Tertiary silicic volcanics (rhyolite) which consist chiefly of welded ash flows of the Idavada Volcanics, are exposed all throughout the Rock Creek Hills and underlie the West Oakley Fan. These volcanics yield between 550-1,800 gal/min of water to irrigation wells. Limited data on water quality is presented and shows dissolved solids concentrations of 159-275 mg/L. The dissolved solids are dominated by calcium, bicarbonate and, at some wells, silica. The sampled water is chemically suitable for both irrigation and domestic use.

181 Epperson, T. 1977. Advance preliminary draft final report on first year's work Bureau of Reclamation Upper Snake River Project, Salmon Falls Division, Twin Falls and Cassia Counties, Idaho. ID State Univ. Mus. Nat. Hist.,

Pocatello. 64 pp.

This report presents the results of the first season of archaeological mitigation on the Bureau of Reclamation's Upper Snake River Project, Salmon Falls Division. Sites along Rock Creek and McMullen Creek. Several Rock Creek aboriginal sites were examined. Shells and shell fragments of the fresh water mussel (Margarifera falcata) were found at one of the sites. This mussel is found in parts of Rock Creek today. Rock Creek was the water source for several of the aboriginal sites.

182 Evermann, B.W. 1896. A report upon salmon investigations in Idaho in 1894. Bull. U.S. Fish Comm. 15: 253-275.

This early report of the salmon fishery in Idaho had the following information relating to Rock Creek on page 257: "I visited Auger Falls September 9 and spent several hours examining that part of the river. Although it was at a time when we might expect to find fish there, we did not see a single salmon attempting the rapids or in the quieter water below. Immediately below these rapids a small stream known as Rock Creek flows into Snake River from the south or left bank, and it is claimed that salmon entered this stream formerly.
Mr. I. B. Perrine, of Blue Lakes, situated about 4 miles above Auger Falls, says he has killed salmon in this creek and that they used to run into it in considerable numbers."

183 Everts, C. 1982. Rock Creek Rural Clean Water Project report on information and education activities. Univ. ID, Coop. Exten. Svce., Twin Falls. 7 pp.

This report is Appendix IV-E of the 1982 RCWP annual report. A summary of information and education activities included the following: 1) water utilization practices and their impact on soil loss, water quality and irrigation effectiveness: 2) fourteen fields were evaluated for water application practices: 3) an irrigation field day, attracting 250 farm operators and others was held (including 17 separate demonstrations).

184 Everts, C., and C. Brockway. 1982. Reducing soil losses with filter strips. Univ. ID, Coll. Agric., Current Info. Ser. 587. 4 pp.

Higher fertilizer costs and nonproductive field ends are the prices growers pay directly for soil erosion caused by furrow irrigation. Soil erosion damage, however, does not stop at the field boundary. Topsoil carried off in tailwater also affects downstream water users. Sediment in irrigation runoff increases costs for canal and ditch maintenance; causes excessive wear on turbines; pumps and sprinkler nozzles; increases labor; and adds nutrients and sediment to downstream waters. Filter strips reduce soil loss from 40-60%. Idaho is relying on the voluntary

cooperation of its farmers and ranchers to reduce the volume of agricultural pollutants, mostly sediment and nutrients, that enter the state's waters. The research for this publication was conducted on the Twin Falls irrigation tract.

185 Everts, C., and C. Brockway. 1983. Reducing soil losses by sediment retention. Mimeo. Agric. Resear. Svce., Kimberly, ID. 2 pp.

Soil erosion is a serious problem in many surface-irrigated areas. Silt loam soils, which are predominant in the Magic Valley area of Idaho are the most erosive soils in the state. How to recognize soil loss is discussed and sediment fans, deeply eroded furrows, convex ends, and exposed subsoils which appear as white areas are given as clues. The sediment retention methods: mini-basins; buried drain runoff systems; drain slots ("I" or "T" slots) and large sediment basins are described. Information is presented on sizing and construction of a sediment basin. Some information is provided for cost sharing through ASCS. Good water use practices are needed in conjunction with sediment retention practices to do a good job of cutting sediment losses from fields. Typical erosion rates are presented for 6 crops on various slopes on silt loam soils.

186 Everts, C.J., and D.L. Carter. 1981. Furrow erosion and topsoil losses. Univ. ID, Coll. Agric., Current Info. Ser. 586. 4 pp.

Annual soil losses on furrow-irrigated fields can average from almost nothing on a nearly level alfalfa field to 30 tons (25 cubic yards) an acre on sugarbeet fields with more than a 2% slope. The following areas are discussed: introduction; Idaho Agricultural Pollution Abatement Plan; soil movement within a furrow; magnitude of soil losses; controlling erosion losses and best management practices. Various aspects of soil erosion are illustrated as well as a T-slot and sediment basin. Preplant irrigations are of special concern in reducing sediment losses. As much as one-third of the total season's soil loss occurs during a preplant irrigation. Eliminating this irrigation when soil moisture conditions permit would substantially reduce soil losses. This technology was applied to the Rock Creek Rural Clean Water Program.

187 Falter, C.M., and D.T. Wade. 1979. Colonization of benthic invertebrates on artificial substrates in the Snake, Spokane, Clark Fork and Bear River Drainages, 1977. N. Amer. Plan. Group, Inc., Moscow, ID. 17 pp.

Hester-Dendy multiple plate samplers were placed in rivers for eight weeks of macroinvertebrate colonization. Rock Creek (at the mouth, RCWP station S-1, 2060146) was dominated by collector organisms. A mean total of organisms collected at the Rock Creek Site was 286.8 (n=3). The Shannon diversity was 1.77, the Brillouin diversity was

1.72, redundancy 0.53 and evenness 0.52. Biomass (dry) was 0.2105 g. A total of 12 taxa were found (9/22/77).

188 Federal Energy Regulatory Commission. 1987. The Twin Falls (FERC No. 2899), Auger Falls (FERC No. 4797), and Star Falls (FERC No. 5797) hydroelectric projects on the mainstem of the Snake River, Idaho, Draft Environmental Impact Statement. FERC/DEIS-0048, Federal Energy Regulatory Commission, Office of Hydropower Licensing, Washington, D. C. 337 pp.

Rock Creek forms the downstream border of the area of study for four hydroelectric projects. It is the largest tributary in the study reach (mean flow of 213 cfs). Rock Creek is mentioned in several areas of the report concerning water quality, location, wildlife, etc. The Rock Creek Hydro I is listed as a source of turbidity and sediment to the Snake River. Rock Creek Hydro II would be a source of turbidity and sediment during construction and a "minor to negligible" source after disturbed land surfaces had been stabilized.

189 Fisher, V. 1938. The Idaho encyclopedia. Caxton Printers, Ltd., Caldwell, ID. 452 pp.

Rock Creek is listed in two places in this reference: Page 65 - "Source is in Minidoka Forest on northern and western slopes of a low mountain range. It flows north and west across Twin Falls County for 45 miles. Altitute at source os 6,000; at mouth, 2,992. A short distance above Twin Falls it has cut a canyon through lava, and in a 3-mile stretch here the creek falls several hundred feet." Page 110 - gives the location of Rock Creek. The Stricker Stage Station, has its beginning as a permanent settlement in 1863. In 1879 a group of cattlemen located ranches in the area and dominated the region for many years. When the railroad passed Rock Creek by, the settlement lost its trade, and the post office was moved to Hansen in 1908. The old store was still standing in 1937, but the site is now a farming community.

190 Fox, L. 1990. Lessons from Rural Clean Water Programs. Water Talk, April:2.

A team of EPA water quality specialists reviewed and documented the results from Rural Clean Water Program projecsts in Rock Creek, Idaho and Tillamook Bay, Oregon. Trout have returned to Rock Creek. Sediment loads to the creek have been reduced by 78% and phosphorus contributions by 57%. Fisherty biologists are currently evaluation whether the entire length of the creek can fully support salmonid spawning as an attainable use.

191 Frenzel, S.A., and M.L. Jones. 1985. Water-quality data for Marsh Creek, Rock Creek, and Cedar Draw, southern Idaho, 1979-81. U.S. Geol. Surv., Boise, ID. Open-File Rpt. 85-159. 43 pp.

This is a listing of the water quality data used in the interpretive report published previously (Edward et al. 1982). The data was used to study the effects of irrigation return flow on water quality in Marsh Creek, Rock Creek and Cedar Draw, in southern Idaho. Data was gathered from 1979 through 1981 on a variety of Rock Creek sample stations (including some RCWP stations); irrigation drains and drain tunnels. Data is provided for flow, SC, pH, temperature, turbidity, DO, fecal coliform bacteria, suspended sediment, Ca, Mg, Na, SAR, K, HCO3, SO4, Cl Si, F, NO3, NO2, NH4, organic nigrogen, P, OrthoP, As, B, Cr, Cu, Fe, Pb, Mn, Hg, and Zn.

192 Freund, B. 1985. Rock Creek project clearing up water. Times-News, Twin Falls, ID. Sunday March 3. pp. C-1-C-2.

The Rock Creek Rural Clean Water Program is described and the project area is illustrated. The map shows the critical areas and Rock Creek water quality monitoring stations. The Snake River Soil and Water Conservation District's work on the LQ Drain project is mentioned. Photographs show erosion on irrigated cropland and equipment used in conservation tillage. One hundred forty-six farmers have agreed to place BMPs on 62.2% of the critical area to date. There is a pay-off to people who use Rock Creek for fishing, since the fishery has improved. There is also a pay-off to farmers who keep more topsoil and fertilizer on their land. Thus there is more fertilizer available to the crops and not drained into Rock Creek.

193 Freund, B. 1987. Try alternative crops for profits, says Otter. Jan. 30. Times-News, Twin Falls, ID. 1 pp.

This article gave part of a speech by Lt. Gov. C.L. "Butch" Otter. The presentation was given at a conservation tillage conference held in Twin Falls by the Rock Creek Rural Clean Water Program. The Magic Valley Conservation Tillage Conference discussed both agricultural practices used in soil saving methods of farming and their economic effects. Many BMPs either used or planned for the Rock Creek watershed were discussed. Talks primarily covered irrigated crops.

194 Friends of Stricker. n. d. The Stricker Store and Home. Friends of Stricker, Inc., Filer, Idaho. 2 pp.

This informational flyer provides an map of the Stricker Ranch area, a skeleton history of the area, and highlights of some of the more interesting features.

195 Fritz, M. 1990. Learn how to stretch water. April 8, 1990, Idaho Statesman, Boise, ID. 1 pp.

The article mentions some of the low water years we have had in southern Idaho recently. Cablegation, center-pivot

sprinkler systems and improvements, and other means of conserving irritation water are described. Ssome of these impdrovements are used as best management practices used on the Rock Creek Rural Clean Water Program.

196 Garabedian, S.P. 1986. Application of a parameter-estimation technique to modeling the regional aquifer underlying the eastern Snake River Plain, Idaho. U. S. Geol. Surv. Water-Supl. Pap. 2278. 30 pp.

A nonlinear, least-squares regression technique for the estimation of ground-water flow model parameters was applied to the regional aquifer underlying the eastern Snake River Plain, Idaho. The technique uses a computer program to simulate two-dimensional, steady-state ground-water flow. Diversions from the Snake River at Lake Milner for irrigation are given as: Rock Creek, 25,000 acre-ft; and Cottonwood, McMullen, Deep Creeks, 15,000 acre-ft. The model was most sensitive to changes in recharge, particularly near the spring discharge area from Milner Dam to King Hill.

197 Garifo, S, and R. Gum. 1984. Recreation impacts. Rock Creek Rural Clean Water Project Evaluation Report, ERS, U.S.D.A., Washington, D.C. 5 pp.

No abstract available.

198 Garifo, S.E. 1983. Distortions to travel cost derived demand curves: water quality and durable goods. PhD Diss., OR State Univ., Corvallis. 152 pp.

This dissertation was completed under the direction of Russell S. Gum who did the early economic analysis of the Rock Creek Rural Clean Water Program. Data from water quality standards of Idaho, Oregon, and Washington were used in the study. The results have been used on the Rock Creek project by Gum. Water quality improvements resulted in significant increased annual benefits to anglers and to the economics of the local areas.

199 Goodell, S.A. 1988. Water use on the Snake River Plain, Idaho and eastern Oregon. U. S. Geol. Surv. Prof. Pap. 1408-E. 51 pp.

Amounts of water withdrawn and consumptively used for irrigation and other uses on the Snake River Plain were estimated to help determine hydrologic effects of ground and surface water use. Irrigation is the largest offstream use of water on the plain. The physical setting of the Twin Falls Tract is described. Irrigation history and irrigation withdrawals and aquaculture are described for the Twin Falls Tract and the Rock Creek area. Hydropower sites are also describaed.

200 Graham, W.G., D.W. Clapp, and T.A. Putkey. 1977. Irrigation wastewater disposal well studies, Snake Plain

Aquifer. EPA-600/3-77-071. U. S. Environ. Protect. Agency, Ada, OK. 52 pp.

An investigation was conducted to evaluate the impact of irrigation disposal well practiaces on the water quality of the Snake Plain Aquifer. Rapid lateral movement of the wastewater discharge water through the recharge zone indicated that flow was through fractures and channels. Bacterial levels and turbidity within the recharge zone approached those of the discharged wastewater and were far in excess of drinking water standards. Deep percolation of injected wastewater resulted in bacterial contamination of both the deep perched water zone overlying the confining layer and the artesian groundwater system. Suspended solids were filtered out by the percolation process. These data were compared to that reported by Bondurant and Carter for the Twin Falls Tract which showed low ionic concentrations & surface water shows slight increases in NO3.

201 Graham, W.G., and L.J. Campbell. 1981. Groundwater resources of Idaho. ID Dept. Water Resour., Boise. 100 pp.

Idaho is the largest user of ground water in the northwestern United States and high in usage on the national list. Ninety percent of this total use (1.8 million acre feet) are used for irrigated agriculture. The Salmon Falls Creek-Rock Creek groundwater system is primarily within basalts of the Banbury Formation. The system is recharged from downward percolation of precipitation and snowmelt, runoff from surrounding uplands, leakage from streams crossing the basin, and infiltration of surface water diverted for irrigation. Static water levels in wells varied from 72 to 512 feet below land surface. Reported levels of dissolved fluoride in groundwater often exceeded the primary drinking water standard and concentrations of dissolved cadmium occasionally exceeded the primary standard of 0.01 mg/L.

202 Green, J.P. 1972. Archaeology of the Rock Creek Site 10-CA-33 Sawtooth National Forest, Cassia County, Idaho. M.A. thesis, ID State Univ., Pocatello. 222 pp.

The Rock Creek Site is located in the Cassia Mountains (South Hills), 25 miles SE Twin Falls on a stream terrace at the confluence of the Third and Main Forks of Rock Creek. This tributary is the last stream anadromous fish could descend before reaching their terminus at Shoshone Falls. Rock Creek was the obvious source of water for the site. The site was found to be an open camp and workshop and was used for more than 8,000 years. Anadromous fish (salmon) were an important food resource for the site.

203 Grover, N.C. 1916. Surface water supply of the United States, 1912. Part XII. North Pacific drainage basins. U. S. Geol. Surv., Water-Supl. Pap. 332. 748 pp.

Daily discharge data are provided for Rock Creek near Rock Creek and McMullen Creek near Rock Creek for the water year ending September 30, 1912. The minimum discharge for Rock Creek was 7.5 cfs on August 24-26. The maximum discharge for Rock Creek was 429 cfs on May 21. The mean discharge was 64.8 cfs and the total runoff was 47,100 acre-feet. McMullen Creek had a minimum flow of 1 cfs in June and a maximum of 84 cfs in May. The total runoff was 6,200 acre feet for the year. It was notaed that several small ranch ditches divert above and below the sample station.

204 Grover, N.C. 1919. Surface water supply of the United States, 1916. Part XII. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 443. 186 pp. plus LI.

Rock Creek near Rock Creek and McMullen Creek near Rock Creek are listed as gaging station sites for 1909-1913 and 1910-1912, respectively.

205 Grover, N.C. 1926. Surface water supply of the United States, 1922. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 553. 295 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1922. The minimum discharge was 23 cfs on September 4 and the maximum was 1,140 cfs on May 9. The mean discharge was 170 cfs and the total runoff in acre feet was 123,000. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. Flow past gage derived largely from waste and seepage water from the South Side Twin Falls tract. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

206 Grover, N.C. 1928. Surface water supply of the United States, 1923. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 573. 259 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1923. The minimum discharge was 99 cfs on March 14 and the maximum was 462 cfs on June 27-28. The mean discharge was 203 cfs and the total runoff in acre feet was 147,000. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. Flow past gage derived largely from waste and seepage water from the South Side Twin Falls tract. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

207 Grover, N.C. 1929. Surface water supply of the United States, 1924. Part XII. North Pacific drainage basins. B.

Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 593. 264 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1924. The minimum discharge was 97 cfs on August 2-5 and the maximum was 538 cfs on November 12. The mean discharge was 202 cfs and the total runoff in acre feet was 147,000. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. Flow past gage derived largely from waste and seepage water from the South Side Twin Falls tract. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

208 Grover, N.C. 1929. Surface water supply of the United States, 1925. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 613. 271 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1925. The minimum discharge was 112 cfs on November 28 and the maximum was 665 cfs on January 30. The mean discharge was 232 cfs and the total runoff in acre feet was 168,000. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. Flow past gage derived largely from waste and seepage water from the South Side Twin Falls tract. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

209 Grover, N.C. 1931. Surface water supply of the United States, 1926. Part XII. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 633. 263 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1926. The discharge ranged from 93 cfs (April 1) to 440 cfs (February 16).

210 Grover, N.C. 1932. Surface water supply of the United States, 1930. Part 12. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 708. 191 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1930. The discharge ranged from 88 cfs (March 27) to 735 cfs (May 9). The mean flow was given at 254 cfs with a total run-off of 184,000 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles

above, causes appreciable changes in stage at times.

211 Grover, N.C. 1933. Surface water supply of the United States, 1931. Part 12. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 723. 205 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1931. The discharge ranged from 95 cfs (April 16) to 514 cfs (March 14). The mean flow was given at 199 cfs with a total run-off of 144,000 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles above, causes appreciable changes in stage at times.

212 Grover, N.C. 1934. Surface water supply of the United States, 1932. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 738. 197 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1932. The minimum discharge was 95 cfs on April 10-11 and the maximum was 542 cfs on February 27. The mean discharge was 232 cfs and the total runoff in acre feet was 173,000. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

213 Grover, N.C. 1935. Surface water supply of the United States, 1933. Part 12. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 753. 197 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1933. The discharge ranged from 106 cfs (April 20) to 693 cfs (February 21). The mean flow was given at 253 cfs with a total run-off of 183,000 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles above, causes appreciable changes in stage at times.

214 Grover, N.C. 1936. Surface water supply of the United States, 1935. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 793. 197 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1935. The minimum discharge was 94 cfs during April and the maximum

was 396 cfs on June 1. The mean discharge was 167 cfs and the total runoff in acre feet was 120,800. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

215 Grover, N.C. 1936. Surface water supply of the United States, 1934. Part 12. North Pacific drainage basins, B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 768. 202 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1934. The discharge ranged from 132 cfs (May 20) to 308 cfs (October 21). The mean flow was given at 191 cfs with a total run-off of 138,000 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles above, causes appreciable changes in stage at times.

216 Grover, N.C. 1936. Surface water supply of the United States, 1935. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 793. 197 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1935. The discharge ranged from 94 cfs (April 1-3, 11-12) to 396 cfs (June 1). The mean flow was given at 167 cfs with a total run-off of 120,800 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles above, causes appreciable changes in stage at times. The total number of second-foot-days was given as 60,926. Data are also given for the 1934 calendar year.

217 Grover, N.C. 1937. Surface water supply of the United States, 1936. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 813. 242 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1936. The discharge ranged from 97 cfs (April 1, 6) to 693 cfs (February 21). The mean flow was given at 212 cfs with a total run-off of 120,800 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Canal, which crosses Rock Creek 10 miles above, causes appreciable changes in stage at times. The total number of second-foot-days was given as 77,469. Data are also given for the 1935 calendar year.

218 Grover, N.C. 1938. Surface water supply of the United States, 1937. Part 13. Snake River Basin. U. S. Geol.

Surv., Water-Supl. Pap. 833. 221 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1937. The discharge ranged from 104 cfs (April 8) to 488 cfs (April 29-30). The mean flow was given at 219 cfs with a total run-off of 120,800 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles (revised from previous years data) above, causes abrupt fluctuations in stage at times. The total number of second-foot-days was given as 79,854. Data are also given for the 1936 calendar year.

219 Grover, N.C. 1938. Surface water supply of the United States, 1937. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 833. 221 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1937. The minimum discharge was 104 cfs April 8 and the maximum was 488 cfs on April 29-30. The mean discharge was 167 cfs and the total runoff in acre feet was 158,400. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

220 Grover, N.C. 1939. Surface water supply of the United States, 1938. Part XII. North Pacific drainage basins. B. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 863. 238 pp.

Discharge measurements are given for Rock Creek near Twin Falls for the water year ending September 30, 1938. The discharge was 114 cfs February 20 and the maximum was 301 cfs on July 5. The mean discharge was 197 cfs and the total runoff in acre feet was 142,900. Notes include information that after spring floods the normal flow is entirely diverted for irrigation several miles upstream. At times waste water from South Side Twin Falls Canal which crosses Rock Creek about 10 miles above causes appreciable changes in stage.

221 Grover, N.C. 1939. Surface water supply of the United States, 1938. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 863. 238 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1938. The discharge ranged from 114 cfs (February 20) to 301 cfs (July 5). The mean flow was given at 197 cfs with a total run-off of 120,800 acre-feet. A note was made that normal summer flow was entirely diverted

for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles above, causes abrupt fluctuations in stage at times. The total number of second-foot-days was given as 72,033. Data are also given for the 1937 calendar year.

222 Grubbs, G. 1989. Rapid bioassessment workshops. Surface Water Assessment Program, Status Rpt., May 31. U. S. Environ. Protect. Agen., Washington, D.C. 9 pp.

This monthly status report from EPA's Office of Water contains a notice from the Headquaters Office concerning rapid bioassessment workshops that will be held across the nation in six locations. Twin Falls, Idaho (12-14 September 1989) has been selected as one of the national study sites because of the Rock Creek Rural Clean Water Program. Evan Hornig in the Seattle EPA (Region X) office, Jim Plafkin in the EPA Washington, D.C. office are the contact persons. Michael T. Barbour of EA Engineering, Science, & Technology, Inc. is the workshop leader. The Rock Creek project was selected as a workshop site because of the biological, chemical, and physical work that had been done on the stream as well as the period of record for the research. Recent rapid bioassessment work on Rock Creek will be used for comparison with workshop findings.

223 Guillierie, R. 1981. Cost-share program helps stop erosion. Acerage. Jan. Pp. 8-9.

This article was one of the first major descriptions of the Rock Creek Rural Clean Water Program for the public. The article has a large photograph of Rock Creek discharging a heavy suspended sediment load into the Snake River. The project of supplying cost share funds to farmers for applying best management practices to the land is described. The anticipated results will be soil saved for the present and future generations and improved water quality in rock Creek. Interviews with landowners and agency officials are included.

224 Guillierie, R. 1981. Creel survey starts. ID Assoc. Soil Cons. Dist. Fall Bull. 1 pp.

This news note explained the Rock Creek Rural Clean Water Program creel survey planned to help quantify fishing use on Rock Creek. This information is important to use in conjunction with the fish population surveys that are planned to be held on an annual basis (conditions permitting). Several fisherman interviewed said that they would buy a special permit to fish Rock Creek if the money went to improve the fishery.

225 Guillierie, R. 1981. Rock Creek RCWP. ID Assoc. Soil Cons. Dist. Summer Bull. 2 pp.

This article provides the announcement that funding has been received for the Rock Creek Rural Clean Water Program

to begin in Twin Falls County. The objectives are to save soil on farmland and to solve Rock Creek's water pollution problems. The background information provided by the LQ Drain project is discussed. The importance of a good information and education program is stated. Demonstrations of conservation tillage are planned.

226 Guillierie, R. 1981. Rock Creek response shows farmers are interested. Oct. 1. ID Farmer-Stockman. Pp. 13-14.

This report describes the background of the Rock Creek Rural Clean Water Program. Various best management practices are described. The importance of the volunteer program and excellent cooperation by the landowners is stressed. Fishermen are enjoying the improved recreational quality of the stream. Information learned in the project will be used as a model for improving water quality on furrow-irrigated tracts in the West.

227 Guillierie, R., ed. 1981. Rock Creek Clean Water Newsletter. Univ. ID Exten., Twin Falls. August. 6 pp.

This newsletter was issued for the Rock Creek RCWP. This issue was the only one issued under this name. It was replaced by the "Rock Creek Review, Project Newsletter". This issue contained an article on the water quality monitoring efforts of the project. The main portion of the newsletter contained photographs and descriptions of BMPs used in the Rock Creek watershed including: mini-basins, gated pipe, large sediment basins, "I"-slots, vegetative filter strips and a buried pipe runoff system. Notice of a planned creel survey was also placed in the newsletter.

228 Guillierie, R., ed. 1981. Rock Creek Clean Water Newsletter. Univ. ID Exten., Twin Falls. April. 4 pp.

This was the first newsletter issued entirely on the Rock Creek Rural Clean Water Program. Topics discussed include: Funds approved for 14 farm plans; Rock Creek water outlook; the small, adaptable pond (mini-basins); cutting fertilizer losses; and from Rock Creek (an editorial by Dean Kidd).

229 Gullidge, E.J., ed. 1972. Columbia-North Pacific Region comprehensive framework study of water and related lands, main report. Pacific NW River Basins Comm., Vancouver, WA. 373 pp.

This report, prepared by state and federal agecies, in cooperation with the Pacific Northwest River Basins Commission, presents the results of comprehensive investigations of water and related land resoucres of the Columbia-North Pacific Region. The West Side Subarea (Subregion 4) includes tributaary drainages areas to the Snake River between Milner Dam and King Hill. Rock Creek is shown on the map of the area but specific references to it are not included. The importance of irrigation and irrigated farmland is stressed. Discussions of new farm

land and the water required to irrigate it are made.

230 Gum, R., R. Magleby, and J. Kasel. 1984. Interim economic evaluation of the Rock Creek, Idaho RCWP project. Econ. Resear. Svce., Washington, D.C. 35 pp.

This report is Attachment II of the 1984 Rock Creek Rural Clean Water Program annual report. Economic analysis of the implementation of the project strongly suggests that a redirection is necessary in the practices being implemented in order to insure an economically justifiable project. The initial emphasis on structural irrigation practices served the purpose of getting farmers interested in participating, but the current need is to shift to irrigation water management and conservation tillage practices which will: 1) reduce instead of increase farmer costs; 2) reduce on-field erosion, thus resulting in greater yield benefits; 3) reduce sediment coming off fields more cost effectively; and 4) have a high probability of continued farmer use after the project is completed.

231 Gum, R., and S. Garifo. 1981. Recreation impacts. U.S. D.A., Econ. Resear. Svce., Washington, D. C. 48 pp.

This report concerns one of the most obvious impacts of improved water quality in Rock Creek - its potential for significant increases in recreational trout fishing. In order to quantify the economic value of such an increase in fishing activity two sets of data were collected: the relationship between water quality and fishing activity and the relationship between fishing activity and economic value. The procedure was to estimate the aquatic habitat index for the base year, 1981, and for 1984 and then to project these results to 1991 and 2031 on the assumption of the completion of the Rock Creek project. Fishing conditions were described as bad, poor, medium (average), and good. The number of angler trips was calculated at 500 per year for bad/poor conditions; 7575 trips for medium conditions; and 8005 for good conditions.

232 Gum, R.L. 1982. Socioeconomic evaluation of Rock Creek RCWP, annual report. Econ. Res. Svce., Washington, D.C. 34 pp.

This is Appendix III-5 of the 1982 RCWP annual report and it contains an Appendix A. The economic impacts on participants will be measured in terms of: 1) changes in net farm income; and 2) the present value of reduced erosion. The changes in net farm income will be calculated from budget information. The benefits of erosion reduction will be calculated from the difference in projected yields between current practices and installed BMPs as estimated by the Erosion Productivity Impact Calculator Model or a similar yield simulation model.

233 Gum, R.L. 1983. Socioeconomic evaluation of Rock Creek

RCWP annual report. Econ. Resear. Svce., Washington, D.C. 7 pp.

This section of the 1983 Rock Creek RCWP annual report is Appendix V. The major economic benefits of the RCWP will involve improving the recreation value of Rock Creek and maintaining crop yield levels in the project area. Potential exists if Rock Creek's water quality can be improved to increase recreation value by 10 to 100 times depending upon the level of improvement. Potential exists for a benefit of very roughly 10-100 $/acre if topsoil depths can be maintained at current levels. Current work is underway to refine the yield to soil depth erosion predictions and to finalize recreation value estimates, as well as estimate other benefits.

234 Gum, R.L. 1984. Economic analysis of Rock Creek Rural Clean Water Project. Rock Creek Rural Clean Water Project Evaluation Report, ERS, U.S.D.A., Washington, D.C. 26 pp.

No abstract available.

235 Gum, R.L. 1985. Assessment of wildlife values. Report to U.S.D.A. Wildlife Values Assessment Committee, January 1985, Washington, D.C. 99 pp.

No abstract available.

236 Gum, R.L., and R.S. Magleby. 1982. Socioeconomic monitoring and evaluation, progress report for FY 81, Rock Creek RCWP Project - Idaho. Econ. Resear. Svce., Washington, D. C. 82 pp.

This report represents the third portion of the 1981 annual report for the Rock Creek Rural Clean Water Program. The report is the first made by the Economic Research Service for the project. The procedures for the socioeconomic evaluation of the project are as follows: 1. Evaluate impacts of the project and BMPs on participating farmers and landowners; 2. Evaluate community and off-site impacts of the project and resulting changes in water quality; 3. conduct cost effectiveness and benefit/cost analysis of individual BMPs and the total project; and 4. Report results. Most of the results are preliminary. The methods for study are explained. Information on agriculture and BMPs are given. Also included is Dan LaPlant's discussion of the wildlife habitat investigation that he conducted on the Rock Creek watershed.

237 Habiger, J.N. 1982. Executive report - annual report 1982, comprehensive monitoring and evaluation of Rock Creek RCWP. Soil Cons. Svce., Boise, ID. 5 pp.

This is a summary of the monitoring activities for the 1982 annual RCWP report. It covers the following: Program objectives; water quality (modeling, BMP effectiveness); socioeconomic evaluation; general; and budget.

238 Hamilton, J., P. Patterson, and D.J. Walker. 1983. Economic evaluation of the Rock Creek Idaho RCWP project annual report fiscal year 1983. Univ. ID, Dept. Agric. Econ., Moscow. 60 pp.

This report is Appendix VI of the 1983 Rock Creek RCWP annual report. The major accomplishments made during FY-83 include the conducting of the mini-sessions to acquire data on the operation and maintenance costs needed to finish the costs of certain BMPs and completion of the crop budget data and irrigation system costs, including operating, maintenance and labor. In addition the LP matrix was specified, along with the development and successful testing of a matrix generator. The major problem areas include the lack of a finalized land classification with the sediment coefficients for each crop by land class and irrigation system; and the lack of modified BMP efficiencies when used in combination with other BMPs.

239 Harenberg, W.A., H.G. Sisco, I. O'Dell, and S.C. Cordes. 1987. Water resources data, Idaho, water year 1985. U.S. Geol. Surv., Boise, ID. 633 pp.

This report gives the daily discharge (in cfs) for Rock Creek below Poleline Road near Twin Falls, ID (U.S.G.S. #13093000) for October 1984 through September 1985. Monthly totals, means, maxinums, minimums, and volume in acre-feet are given. Extremes for the current year were: maximum daily discharge of 648 cfs on April 5, and a minimum daily discharge of 63 cfs on January 30, 31, and February 9. Remarks indicate that the records are good and that the flow is partially regulated by many diversions upstream for irrigation and irrigation-return flows. The Rock Creek Rural Clean Water Program funds the operation of this gauge which is Rock Creek sample station S-2 (STORET #2060148). Eight dates are given with instantaneous flow, specific conductance and water temperature information for the Poleline Road station also.

240 Harenberg, W.A., M.L. Jones, I. O'Dell, and S.C. Cordes. 1990. Water resources data, Idaho, water year 1989. ID-89-1. U.S. Geol. Surv., Boise, ID. 681 pp.

This report gives the daily discharge (in cfs) for Rock Creek below Poleline Road near Twin Falls, ID (U.S.G.S. #13093000) for October 1988 through September 1989. Monthly totals, means, maxinums, minimums, and volume in acre-feet are given. Extremes for the current year were: maximum daily discharge of 422 cfs on September 20, and a minimum daily discharge of 91 cfs on Feb 6. Remarks indicate that the records are good and that the flow is partially regulated by many diversions upstream for irrigation and irrigation- return flows. The Rock Creek Rural Clean Water Program funds the operation of this gauge which is Rock Creek sample station S-2 (STORET #2060148). Four dischrge measurements are given for Rock Creek 12 mi. south of

Hansen as well as some basic water chemical and physical data.

241 Harenberg, W.A., M.L. Jones, I. O'Dell, and S.C. Cordes. 1988. Water resources data, Idaho, water year 1987. Water-Data Rpt. ID-87-1. U. S. Geol. Surv., Boise, ID. 655 pp.

This report gives the daily discharge (in cfs) for Rock Creek below Poleline Road near Twin Falls, ID (U.S.G.S. #13093000) for October 1986 through Septembaer 1987.. Monthly totals, means, maximums, minimums, and volume in acre-feet are given. Extremes for the current year were: maximum daily discharge of 512 cfs on October 8, 1986, and a minimum daily discharge of 80 cfs on January 1987. Remarks indicate that the records are good and that the flow is partially regulated by many diversions upstream for irrigation and irrigation-return flows. The Rock Creek Rural Clean Water Program funds the operation of this gauge which is Rock Creek sample station S-2 (STORET #2060148). Eight dates are given with instantaneous flow, specific conductance and water temperature information for the Poleline Road station also.

242 Harenberg, W.A., M.L. Jones, I. O'Dell, and S.C. Cordes. 1988. Water resources data, Idaho, water year 1986. U.S.G.S. Water-Data Rpt. ID-86-1. U. S. Geol. Surv., Boise, ID. 682 pp.

This report gives the daily discharge (in cfs) for Rock Creek below Poleline Road near Twin Falls, ID (U.S.G.S. #13093000) for October 1985 through September 1986. Monthly totals, means, maximums, minimums, and volume in acre-feet are given. Extremes for the current year were: maximum daily discharge of 599 cfs on January 17, and a minimum daily discharge of 63 cfs on January 30, 31, & February 9. Remarks indicate that the records are good and that the flow is partially regulated by many diversions upstream for irrigation and irrigation-return flows. The Rock Creek Rural Clean Water Program funds the operation of this gauge which is Rock Creek sample station S-2 (STORET #2060148). Eight dates are given with instantaneous flow, specific conductance and water temperature information for the Poleline Road station also.

243 Harenberg, W.A., M.L. Jones, I. O'Dell, and S.C. Cordes. 1989. Water resources data, Idaho, water year 1988. Water-Data Rpt. ID-88-1. U. S. Geol. Surv., Boise, ID. 669 pp.

This report gives the daily discharge (in cfs) for Rock Creek below Poleline Road near Twin Falls, ID (U.S.G.S. #13093000) for October 1987 through September 1988. Monthly totals, means, maximums, minimums, and volume in acre-feet are given. Extremes for the current year were: maximum daily discharge of 321 cfs on May 31, and a minimum daily discharge of 93 cfs on March 18. Remarks indicate that the

records are good and that the flow is partially regulated by many diversions upstream for irrigation and irrigation-return flows. The Rock Creek Rural Clean Water Program funds the operation of this gauge which is Rock Creek sample station S-2 (STORET #2060148). Two dischrge measurements are given for Rock Creek 12 mi. south of Hansen: 8.91 cfs (10-13-87) & 7.11 cfs (9-27-88). (Page iv erreously lists the report date as March 24, 1988).

244 Harenberg, W.A., R.L. Moffatt, and R.W. Harper. 1985. Cost effectiveness of the stream-gaging network in Idaho. U. S. Geol. Surv. Water-Resour. Invest. Rpt. 84-4132. 109 pp.

Operation of Idaho's current (1982) network of stream gages requires an annual budget of $781,000, which results in an overall standard error of 22.7%. At the minimum budget ($760,000), the average standard error is 23%. At a maximum budget of $1,500,000, the average standard error is 13.4%. Upgrading equipment and developing strategies to minimize lost records would improve reliability and accuracy of streamflow data. The number of stations in use is 185 (19 could be discontinued). The streamflow network is described. Station #13093095, Rock Creek at mouth near Twin Falls, Idaho, is described. Its drainage area is given as 300 square miles. Its period of record is 1975-present. The mean annual flow of Rock Creek is listed as 200 cubic feet per second. Statistics concerning variances in the data are presented.

245 Harper, R.W., H.G. Sisco, I. O'Dell, and S.C. Cordes. 1983. Water resources data, Idaho, water year 1982. Volume I. Great Basin and Snake River Basin above King Hill. U.S. Geol. Surv., Boise, ID. 332 pp.

Discharge from Rock Creek near mouth, water year October 1981-September 1982. This station was discontinued during water year 1983 and moved to below Poleline Road near Twin Falls because of hydroelectric development of the lower reach of Rock Creek.

246 Harper, R.W., H.G. Sisco, I. O'Dell, and S.C. Cordes. 1984. Water resources data, Idaho, water year 1983. U.S. Geol. Surv., Boise, ID. 515 pp.

Stream discharge for Rock Creek below Poleline Road near Twin Falls, ID, for water year October 1982-September 1983. Gauge was established in March 1983.

247 Harper, R.W., H.G. Sisco, I. O'Dell, and S.C. Cordes. 1985. Water resources data, Idaho, water year 1984. U.S.G.S. Water-Data Rept. ID-84-1. U. S. Geol. Surv., Boise, ID. 540 pp.

Discharge data for Rock Creek near Poleline Road near Twin Falls, ID. water year October 1983-September 1984.

248 Hayden, C.W., and C.W. Robbins. 1975. Mechanical Snake

River undisturbed soil core sampler. Soil Sci. 120(2): 153-155.

A power-driven undisturbed soil core sampler was designed to obtain undisturbed soil cores from a much greater depth than the original hand-operated sampler. The unit will obtain undisturbed cores to bedrock (a depth of about 5 meters or 15 to 16 feet). The sampler worked well through the very hard, compacted layer usually encountered between 25 and 100 cm in the soils in the Twin Falls area.

249 Hedrick, W. 1969. Map of Rock Creek stream bank erosion areas. Soil Cons. Svce., Twin Falls, ID. 2 sheets.

These two large scale (4" = 1 mile) maps cover in detail Rock Creek from the U. S. National Forest boundry (just upstream from Rock Creek RCWP sample station 6) to the mouth at the Snake River. Streambank erosion areas are indicated in red on the appropriate site of the stream. The erosion is indicated as being either "limited", "moderate", or "severe". Additional information is also provided, such as: spoil banks; canals; gravel pits; diversions (concrete or wood, rock, and wire); intermittent streams; roads; bridges; wetlands; trash dumps; wells; buildings; and land use (range, pasture, or cropland). In addition, some point source and nonpoint source locations, pipe lines into the canyon and old car bodies are indicated. Few copies exist, one in the Rock Creek Library at DEQ & one at SCS in Twin Falls are known.

250 Heitman, G. 1982. The segment priority list. ID Dept. H&W, Div. Environ., Boise. 75 pp.

The purpose of a segment priority list is to indicate the lakes and streams in the state which should receive the most attention in the state's water pollution control program. The two main factors considered in development of the segment priority list are the existing water quality and the number of people affected by that segment. Data from 1973-1981 were used to evaluate Rock Creek segment (USB-720, source to Rock Creek). The population base used was 10,600 and it had a Water Quality Index (WQI) of 18.7. Rock Creek segment (USB-730, Rock Creek to mouth) was examined for the time period of 1975-1981 had a population base of 21,100 and a WQI of 71.8. Rock Creek (USB-730) was listed a 2nd priority (total 92.08 points) out of a list of 21 priority segments in the Twin Falls region.

251 Hendricks, E.L. 1963. Compilation of records of surface waters of the United States, October 1950 to September 1960. Part 13. Snake River Basin. U. S. Geol. Surv. Water-Supl. Pap. 1737. 282 pp.

A summary of records is given for Rock Creek at Rock Creek for 1951 through 1960. Information is provided on the monthly and yearly mean discharge in cfs, monthly and yearly discharge in acre-feet, and yearly discharge, in

cfs. Small ranch diversions above the sample station are noted.

252 Henshaw, F.F., G.C. Baldwin, G.C. Stevens and E.S. Fuller. 1915. Surface water supply of the United States, 1911. Part XII. North Pacific drainage basins. U. S. Geol. Surv., Water-Supl. Pap. 312. 706 pp.

Daily discharge data are provided for Rock Creek near Rock Creek for the water year ending September 30, 1911. Summary statistics are not provided. The minimum discharge was 6 cfs on September 1-3. The maximum discharge was 111 cfs on May 6.

253 Hessing, K.D. 1976. Potential sites for small reservoirs. Tech. Stud. Rpt. 2, ID Dept. Water Resour., Boise. 172 pp.

The headwaters of Rock Creek are in the Sawtooth Mountains south of the city of Twin Falls. Two of its major tributaries are Cottonwood and McMullen Creeks. The average annual flow of Rock Creek at its mouth is 150,000 acre-feet. Nearly all of the irrigable land within the basin is presently irrigated with water from the High Line and Low Line canals. This allows the runoff of Rock Creek to be put to other uses. One of the possible uses that is presently being considered is aquaculture. Maps are included which show the Rock Creek drainage area and potential dam sites along Rock Creek, Cottonwood and McMullen Creeks.

254 Hogg, R.A. 1977. Potential power development studies foir Twin Falls Canal Co. & Northside Canal Co. Unpublished Rpt., Boise, ID. 26 pp.

This report covers an introduction (authorization, previous studies, data and limitations), background information, general concepts of development, plans, cost estimates, and appendiacies (information on the Low Line Canal Site and the Milner-Snake River Site) for potential hydro-electric generating sites. Of special concern to Rock Creek are two sites: Low Line Drop (on the Low Line Canal, just east of Rock Creek); and Rock Creek (near the mouth of Rock Creek). Water flow information is given for these two sites as is an estimate of cost for power generated. [This report is unpublished and was written by Robert A. Hogg, 904 North 22nd Street, Boise, ID 83702].

255 Holstine, L.L., and S.M. Lowman. 1985. Setting agricultural pollution control priorities. Jour. Soil Water Cons. 40: 65-67.

This article explains Idaho's method of setting agricultural pollution control priorities by using problem assessment, a priority list, and state cost-sharing. The information is based on experiences gained from agricultural nonpoint source pollution projects such as the

Rock Creek Rural Clean Water Program.

256 Horn, D.R. 1987. Annual flow statistics and drought characteristics for gaged and ungaged streams in Idaho. Resear. Tech. Comp. Rpt. 14-08-0001-G1222-03, ID Water Resour. Resear. Inst., Univ. ID, Moscow. 170 pp.

This study addresses the problem of drought risk assessment for streams within the State of Idaho. It is essential thqt a rational planning basis be established to quantitatively estimate the expected duration and severity of low stream flow periods, especially for extended, multiyear droughts. For ungaged streams or for locations with a limited period of gaged data, the problem of assessing drought probabilities has remained almost totally unresolved. Rock Creek near Rock Creek (Station No. 13.0920.00) was used during this study. The total record length was 65 years (1920-1984) and the longest consecutive historical period was 30 years (1945-1974). Over various methods of study median drought lengths ranged from 2.0 to 6.5 years. Detailed statistics are presented for these data.

257 Hornig, E. 1989. R10, Idaho, pg. 6. IN: Surface water quality assessment program, status report. U. S. Environ. Protec. Agen., Washington, D. C. 8 pp.

Water quality staff from the Idaho Department of Health and Welfare have been involved since 1981 in an intensive long-term monitoring study of Rock Creek, Idaho. This model study, associated with the Rural Clean Water Program is assessing NPS impacts from irrigated croplands, and documenting improvements associated with implementation of BMPs. Among the attributes evaluated are stream sediments, substrate dissolved oxygen, nutrients, bacteria, and aquatic life status. The Rock Creek Project also serves as a classroom site, including training citizens for fish population studies, quality assurance training and information exchange for state and dregional monitoring staff, and EPA rapid bioassessment training scheduled for 1989. For information or reports, contact Bill Clark at (208) 334-5860.

258 Horton, B., and S. Allen. 1989. Hydropower, fish & wildlife Three is a crowd? ID Wildlife 9(1): 8-13.

This popular article describes the history of hydropower projects in Idaho. It shows operating and proposed hydropower projects in the state, including the large number in the region near Twin Falls. A section "Milner Dam: A hydro project for all factions" gives the history of the dam which supplies irrigation water to the Twin Falls Tract (including the Rock Creek RCWP project area): In 1896, Ira Perrine thought of building a dam on the Snake River above Twin Falls that would divert water into a mammoth canal system by gravity. In 1905 the dam was completed and named after Stanley Milner. The 84-year old

dam has been declared unsafe and will be rebuilt to include a hydropower plant. The power plant will save farmers money and there will be added water released into the Snake River for downstream fish and wildlife.

259 Hovey, L. 1981. Here's one that makes everybody a winner. Times-News, Twin Falls, ID. Oct. 31. pg. C-9.

This news article appeared in the Outdoors section of the newspaper. It gives the background of the Rock Creek project and past pollution problems. Emphasis is placed on the fish population survey (large photograph) and the fishery in Rock Creek.

260 Hovey, L. 1981. Here's one that makes everybody a winner. Oct. 31. Times-News, Twin Falls, ID. Pp. C-9.

The Rock Creek Rural Clean Water Program is described and is designed to a) help protect valuable topsoil for agriculture and b) improve water quality in the lower Rock Creek. A photograph of the fish population study (electrofishing) is shown. Fishing in Rock Creek is described.

261 Hovey, L. 1989. How about some steelhead in Rock Creek? Times-News, Twin Falls. December 28. pp. D5-D6.

This article suggests the Idaho Fish and Game Department should stock some of the surplus steelhead from this year's run in Rock Creek. The article highlights the ongoing multi-agency and private sector battle to return Rock Creek to a point of offering a recreation diversion that is seldom seen in Southern Idaho. It is also pointed out that Rock Creek is the last tributary of any significance which has ever accommodated an anadromous fishery. The author believes private holdings should be secured to open more of Rock Creek to the public for recreation purposes.

262 Hovey, L. 1990. Anglers already pulling steelhead from renewed Rock Creek. March 8, 1990, Times-News, Twin Falls, ID. 1 pp.

For the first time since Swan Falls Dam closed its gates about 1911 (and blocked wild salmonid fish migrations upstream), wild steelhead will be available to Magic Valley fishermen early in March. The Idaho Department of Fish and Game has planted about 100 "B" strain steelhead trout in Rock Creek. Fishermen are already catching fish in the area of Rock Creek Park.

263 Hovey, L. 1990. Wild steelhead will be planted in Rock Creek. March 1, 1990, Idaho Statesman, Boise, ID. 1 pp.

For the first time since Swan Falls Dam closed its gates about 1911 (and blocked wild salmonid fish migrations upstream), wild steelhead will be available to Magic Valley fishermen early in March. The Idaho Deparatment of Fish

and Game will plant about 100 "B" strain steelhead trout in Rock Creek.

264 Hubbard, L.L. 1987. Low streamflow conditions in the western states during 1987. U.S. Geol. Surv., Portland, OR. Water Resour. Invest. Rpt. 87-4267. 29 pp.

Drought conditions prevailed throughout the states of California, Nevada, Idaho, Oregon, and Washington during the summer of 1987. Conditions are conducive for a potentially serious drought in 1988 as many storage reservoirs are well below average levels. Most of Rock Creek lies in an area of moderate drought; however, the headwaters area is considered to be in extreme drought.

265 Humenick, F.J., M.D. Smolen, and S.A. Dressing. 1987. Pollution from nonpoint sources, where we are and where we should go. Environ. Sci. Tech. 21: 737-742.

An overview of the nonpoint source pollution picture is given. The assessments, recent legislation, early experience, recent experience, urban runoff, lessons learned, and future needs and opportunities are discussed. The Rural Clean Water Program is discussed under the "recent experience" section. Rock Creek is one of three projects listed with documented water quality improvements.

266 Humpherys, A. 1979. Automatic furrow irrigation systems. Irrig. Age. 13(5): 58-60.

An automated irrigation system was developed on the Twin Falls irrigation tract. One advantage of an automated system is that furrow streams can be cut aback automatically to reduce runoff and thus reduce soil erosion.

267 Hydrology and Hydraulics Committee. 1976. River Mile Index, Part II, Snake River above Weiser. Hydrology and Hydraulics Committee, Pacific Northwest River Basins Commission. 49 pp.

This index is one of a series of reports on the Columbia River and its major tributaries and other major streams. River miles are recorded to the nearest tenth mile begining at mile 351.2, the U. S. Highway bridge at Weiser, Idaho. Measurements were taken from the newest Geological Survey maps available at the time of revision. Rock Creek is shown as a tributary to the Snake River at River Mile 606.4.

268 Idaho Department of Fish and Game. 1971. Wildlife habitat obituary. Idaho Wildlife Review. May-June, 1 pp.

Lower Rock Creek is discussed briefly and illustrated in five photographs. The destruction of fish and wildlife habitat by municipal, industrial, and agricultural wastes and refuse in general is described.

269 Idaho Department of Health & Welfare. 1976 Pre-survey study plan for nonpoint source survey on Lower Rock Creek. ID Dept. H&W, Div. Environ., Boise. unpaged, many figures, maps and tables.

This report was to locate sections of Lower Rock Creek which were being adversely affected by irrigation return flows and nonpoint sources for a study of the problem. A pre-survey in August, 1976, will provide data for a more detailed study plan. The intensive survey was to be conducted during the summer of 1977 to locate and assess the irrigation return flows and nonpoint sources on Lower Rock Creek. Water quality data from 1976 are included. Maps of study sites and major features along Rock Creek are also included. A monitoring plan is outlined.

270 Idaho Department of Health and Welfare and Idaho Department of Fish and Game. 1989. Upper Snake River Basin status report. A summary for the Basin Area Meeting implementing the Antidegradation Agreement. ID Dept. H&W, Div. Environ. Qual., Boise. 9 pp.

This summary report was taken from the Idaho water quality status report and nonpoint source assessment for 1988 (Idaho Department of Health and Welfare 1989) and distributed statewide for the Basin Area Meetings. Rock Creek is listed as a major tributary to the Snake River (Twin Falls Reservoir to Bliss Reservoir). Nonpoint source impacts in Rock Creek result from irrigated cropland, feedlots, pastureland, and rangaeland. Additional impacts occur from storm sewer runoff, animal holding areas, streambankl modification, and flow regulation. Agricultural water supply and secondary contact recreation are potentially at risk. Primary pollutants in this watershed are nutrients, sediment, bacteria, ammonia, and organic enrichment from agricultural activities. Sediment, oil and grease from urban runoff also occur.

271 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1989. State/EPA agreement for fiscal year 1990. ID Dept. Health Welfare, Div. Environ. Qual., Boise, ID. 249 pp.

The Rock Creek Rural Clean Water Program is discussed on pages 178-179. Tasks and outputs are to "conduct rapid bioassessment monitoring workshop at Rock Creek (Twin Falls Coungy); "implement the study and reporting requirements of the Rock Creek RCWP, a. Conduct chemical and biological monitoring according to the annual plan of work. b. Coordinate monitoring activities with participating agencies and the Technical Advisory Committee. c. Write annual water quality monitoring reports."

272 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1986. State/EPA agreement for fiscal year 1987. ID Dept. Health Welfare,

Div. Environ., Boise, ID. 185 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 80. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is "to evaluate the effectiveness of BMPs installed under RCWP". This is an ongoing project receiving the efforts of a full time person in Central Office.

273 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1979. State/EPA agreement - FY 80. ID Dept. Health Welfare, Div. Environ., Boise, ID. 192 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on pages 61-62. The task and output are "Develop and carry out intensified I&E program in selected high priority areas: Rock Creek - Twin Falls County" and "develop Rural Clean Water Program applications for: Rock Creek, Marsh Creek, Paradise Creek, and Cedar Draw".

274 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1980. State/EPA agreement - FY 81. ID Dept. Health Welfare, Div. Environ., Boise, ID. 192 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on pages 72 and 76. The LQ Drain study is listed on page 74. The task and output are "Carry out intensified I&E program in selected high priority areas: Rock Creek - Twin Falls County" and "develop and implement intensive monitoring plan for Rock Creek (Twin Falls County) if the stream is selected for RCWP intensive monitoring and evaluation".. The purpose is "to evaluate the effectiveness of BMPs applied under the RCWP program in reducing agricultural NPS pollution". This is an ongoing project receiving the efforts of a full time person in Central Office.

275 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1981. State/EPA agreement - FY 82. ID Dept. Health Welfare, Div. Environ., Boise, ID. 122 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 44. The task and output are "implement intensive monitoring plan for Rock Creek (Twin Falls County)". The purpose is "to evaluate the effectiveness of BMPs applied under the RCWP program in reducing agricultural NPS pollution". This is an ongoing project receiving the efforts of a full time person in Central Office.

276 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1982. State/EPA agreement FY 83. ID Dept. Health Welfare, Div. Environ.,

Boise, ID. 122 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 58. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is "to evaluate the effectiveness of BMPs applied under RCWP". This is an ongoing project receiving the efforts of a full time person in Central Office.

277 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1983. State/EPA agreement FY 84. ID Dept. Health Welfare, Div. Environ., Boise, ID. 151 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 68. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is "to evaluate the effectiveness of BMPs applied under RCWP". This is an ongoing project receiving the efforts of a full time person in Central Office.

278 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1984. State-EPA agreement fiscal year 85. ID Dept. Health Welfare, Div. Environ., Boise, ID. 167 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 66. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is "to evaluate the effectiveness of BMPs installed under RCWP". This is an ongoing project receiving the efforts of a 3/4 time person in Central Office and a part time person in the Twin Falls Field Office.

279 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1985. FY 86 State/EPA agreement. ID Dept. Health Welfare, Div. Environ., Boise, ID. 185 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 76. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is "to evaluate the effectiveness of BMPs installed under the RCWP". This is an ongoing project receiving the efforts of a full time person in Central Office and a part time person in the Twin Falls Field Office and the EPA Idaho Operations Office.

280 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1987. FY 1988 State/EPA agreement. ID Dept. Health Welfare, Div. Environ., Boise, ID. 195 pp.

The Rock Creek Rural Clean Water Program (RCWP) is

discussed on page 86. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is to evaluate the effectiveness of BMPs installed under the RCWP. This is an ongoing project receiving the efforts of a full time person in Central Office and a part time person in the Twin Falls Field Office and the EPA Idaho Operations Office.

281 Idaho Department of Health and Welfare and U.S. Environmental Protection Agency. 1988. State/EPA agreement for fiscal year 1989. ID Dept. Health Welfare, Div. Environ. Qual., Boise, ID. 215 pp.

The Rock Creek Rural Clean Water Program (RCWP) is discussed on page 149. The task and output are "implement intensive monitoring plan for Rock Creek" and "prepare annual report". The purpose is to evaluate the effectiveness of BMPs installed under the RCWP. This is an ongoing project receiving the efforts of a full time person in Central Office and a part time person in the Twin Falls Field Office and the EPA Idaho Operations Office.

282 Idaho Department of Health and Welfare. 1975. Idaho water quality status. ID Dept. H&W, Div. Environ., Boise. 134 pp.

This document reports the water quality status for the state of Idaho for water year 1974. Rock Creek (source to mouth, USB-720) has insufficaient data to determine status with water quality problems or violations. Rock Creek (lower - Rock Creek to mouth, USB-730) has problems with turbidity, nutrients, and aesthetics. It is water quality limited.

283 Idaho Department of Health and Welfare. 1976. Statewide water quality management planning report. ID Dept. H&W, Div. Environ., Boise. 215 pp.

The statewide water quality management planning report is in part a review of the present status of water quality management programs within the State - their activities, their strengths, and their weaknesses. The report also contains general and specific recommendations for modifying the existing management programs and for giving direction to the State's continuing planning process. Two recommendations specific to agricultural nonpoint sources were: agencies work towards the control of NPS pollution coordinate and strengthen their programs; & that "on-farm" management practices be used to control pollutant sources from irrigation return flows. Rock Creek (source to Rock Creek) had insufficient data to characterize water quality problems and lower Rock Creek (Rock Creek to mouth) had turbidity, nutrient, and aesthetic water quality problems.

284 Idaho Department of Health and Welfare. 1976. Water quality program procedures manual. ID Dept. H&W, Div. Environ., Boise. 72 pp. + appendicies.

This procedures manual was developed to insure that the output commitments contained in the annual water quality program strategy are met; to clarify the program responsibilities between the Water Quality Bureau and the Regional Environmental Services Bureau; to aid a new employee in familiarizing himself with Division operation, but more specifically with the Water Quality Bureau's operating procedures; and to provide procedures for handling certain activities and programs. Rock Creek is listed in the stream segment classificatiion list (Appendix B): USB-720, source to Rock Creek, water quality standards problems or violations - insufficient data; and Rock Creek to mouth, WQS problems/violations are turbidity, nutrients, and aesthetics. Both segments are given an "A" classification and considered water quality limiting.

285 Idaho Department of Health and Welfare. 1979. Application for Rural Clean Water Program funds, Rock Creek Twin Falls County, Idaho. Idaho Dept. Health Welfare, Div. Environ., Boise. 86 pp.

This document is the original application for Rural Clean Water Program (RCWP) funding from the State of Idaho, soil conservation districts, Soil Conservation Service and Agricultural Stabilization and Conservation Service and contains a color photograph of a very turbid Rock Creek at its confluence with the Snake River. The report briefly outlines the water quality problems on Rock Creek and the objectives of the RCWP for improvement of those problems. The application contains supporting letters, a memorandum of agreement between the Snake River SWCD and the Twin Falls SCD, information on cost-share levels, an application for federal assistance, and a proposed monitoring plan for the project.

286 Idaho Department of Health and Welfare. 1979. Idaho agricultural pollution abatement plan. ID Dept. H&W, Div. Environ. Qual., Boise. 79 pp + 509 pp Appendix.

This is the basic document which describes the State of Idaho's agricultural pollution plan. Rock Creek is listed as one of the five first priority stream segments with irrigated cropland as the problem source. The degree of impact from irrigated cropland is listed as severe sediment pollution.

287 Idaho Department of Health and Welfare. 1979. State of Idaho 208 water quality management plan. ID Dept. H&W, Div. Environ., Boise. 145 pp.

Agricultural pollution is listed as the number one priority problem to be addressed during the next five years. As a result of progress demonstrated in the initial statewide 208 planning effort, the IDHW-DOE in cooperation with the SCC has developed four "planning for implementation projects" which are presently being initiated. Rock Creek

(Twin Falls County) is considered one of four high priority critical erosion areas in the state. The schedule involves developing Rural Clean Water Program applications for Rock Creek.

288 Idaho Department of Health and Welfare. 1979. State of Idaho 208 water quality management plan. ID Dept. H&W, Div. Environ., Boise. 25 pp.

This report is a short summary of the full 1979 208 report. The report briefly mentions the LQ Drain project in Twin Falls County and the fact that it demonstrated to farm operators that best management practices could cause reductions in sediment and nutrients to streams receiving irrigation return flows. The report also mentions a special water quality study done on Upper Rock Creek (Cassia County).

289 Idaho Department of Health and Welfare. 1980. Idaho water quality status report 1980. ID Dept. H&W, Div. Environ., Boise. 65 pp.

The status of the waters of the State of Idaho as of 1980 are listed. Rock Creek (USB-730) is given an overall water quality condition of "very poor". It is impacted by irrigation practices. Problems listed are bacteria, trophic, aesthetics, sediment, and metals toxicity.

290 Idaho Department of Health and Welfare. 1981. Idaho water quality status report 1980 (abridged). ID Dept. H&W, Div. Environ., Boise. 40 pp.

This report is an update of Idaho Department of Health and Welfare, 1980, Idaho water quality status report. Rock Creek water quality remains very poor due to bacteria, nutrients, turbidity, and suspended sediment. An ongoing 208 project is examining irrigated agriculture, and a Rural Clean Water grant is expected to help fund implementation of BMPs in this drainage.

291 Idaho Department of Health and Welfare. 1981. Irrigation return flow project, Twin Falls County. Pp. 3, IN: Clean Water and the Idaho Farmer. April. Bureau of Water Qual., Div. Environ., ID Dept. H&W, Boise. 4 pp.

The Snake River Soil Conservation District submitted a report on the LQ Drain project which set forth the following conclusions: the district believes that many operators will maintain their BMPs because of increased awareness and concern about sediment losses; the number of practices maintained in the future will depend on the amount of technical and financial assistance available and the priority given sediment control by relevant agencies; the LQ Drain project demonstrates that the district has the ability to carry out a successful nonpoint source control program when adequate funds for administration, technical assistance and implementatioin are available.

292 Idaho Department of Health and Welfare. 1981. Rock Creek, Twin Falls County. Pp. 1, IN: Clean Water and the Idaho Farmer. April. Bureau of Water Qual., Div. Environ., ID Dept. H&W, Boise. 4 pp.

The Twin Falls Soil Conservation District received approval and commendation of the final report on the Rock Creek 208 project. The 208 funds in the area have been terminated, with the exception of those covering information activities. The Rural Clean Water Project is progressing very well in the watershed under the direction of the Agricultural Stabilization and Conservation Service (ASCS). About $188,000 in cost-share funds have been approved to carry out 14 farm plans. Eight plans are in progress and 64 farmers have applied for cost-share funds.

293 Idaho Department of Health and Welfare. 1981. State of Idaho 208 water quality management annual plan update. ID Dept. H&W, Div. Environ., Boise. 45 pp.

This plan update was designed as a summarized program overview presenting essential program direction and status. Concerning agricultural nonpoint source pollution it is the IDHW-DOE policy to design and implement a voluntary pollution control program on agricultural lands according to a stream segment/water quality problem priority rating system and utilizing appropriate best management practices. Reference is made to the Idaho Agricultural Pollution Abatement Plan for more details. A voluntary program of BMP application is being implemented by the IDHW-DOE and the Idaho Soil Conservation Commission and the 51 soil conservation districts across the state. One of the soil conservation districts has received an RCWP grant for more than 2.5 million dollars for BMP implementation on Rock Creek in Twin Falls County.

294 Idaho Department of Health and Welfare. 1983. Idaho agricultural pollution abatement plan. ID Dept. H&W, Div. Environ., Boise. 104 pp.

Rock Creek is listed as a first priority stream segment under the section "problem source - irrigated cropland". The Rock Creek Rural Clean Water Program is discussed as an example of agricultural pollution control evaluation project. The project is described along with its monitoring objectives, monitoring strategy, and socioeconomic strategy. A summary of 1981 and 1982 water quality monitoring results are given The Idaho Soil Conservation commission, the U.S. Environmental Protection Agency, and the 51 soil conservation districts in the state assisted in the preparation of this document.

295 Idaho Department of Health and Welfare. 1983. Rock Creek Rural Clean Water Program, Twin Falls County. Pp. 4, IN: Clean Water and the Idaho Farmer. April. Bureau of Water Qual., Div. Environ., ID Dept. H&W, Boise. 4 pp.

The Twin Falls ASCS County Committee, the Twin Falls and Snake River Soil Conservation Districts, and other entities are continuing BMP implementation efforts on the Rock Creek project. Contracts to date number 85 and cover more than 10,000 acres. It was apparent that the Idaho project was being very effective in showing that BMPs reduce sediment and that progress to date on the total project is probably the best in the nation. Results of the LQ Drain study are also given. Agencies involved in the project want to now see if water quality remains improved because of maintenance of BMPs.

296 Idaho Department of Health and Welfare. 1985. Groundwater quality management plan for Idaho. IDHW, Div. Environ., Boise.

The Salmon Falls Creek-Rock Creek aquigaer is given a rating priority of 5 for pollution potential. Ratings of major aquifers were from 1 to 11.

297 Idaho Department of Health and Welfare. 1985. Idaho water quality standards and wastewater treatment requirements. ID Dept. H&W, Div. Environ., Boise. 78 pp.

The water quality standards list the designated beneficial uses for stream segments. Rock Creek is listed on pages 40-41 and shown on the location map (Upper Snake Basin) on page 43. Two segments are recognized in the standards: USB 720 - "Rock Creek - source to Rock Creek (City) (Twin Falls County)" and USB 730 "Rock Creek - Rock Creek (city) to mouth". USB-720 is protected, by the standards, for domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, secondary contact recreation and as a special resource water. USB-730 is protected for agricultural water supply, cold water biota, salmonid spawning, primary contact recreation (future use), and secondary contact recreation. Rock Cr. from the High Line Canal to mouth is also protected for use by the Twin Falls Canal Co. (pg. 54).

298 Idaho Department of Health and Welfare. 1987. Idaho environmental quality profile. ID Dept. H&W, Div. Environ., Boise. 67 pp.

Rock Creek is referenced in this review of Idaho's environmental quality. In the nonpoint source pollution section the Rock Creek-Salmon Falls Creek area is listed as 5th priority in reference to pollution potential rating of major Idaho aquifers.

299 Idaho Department of Health and Welfare. 1989. Idaho Nonpoint Source Management Program. Idaho Dept. of H & W, Div. of Env. Qual. 195 pp.

The Rock Creek Rural Clean Water Program (RCWP) is addressed in the program report in terms of

post-implementation monitoring. Results to date suggest that BMPs implemented in the project area have improved water quality significantly. Sediment loadings are reduced and fish populations have increased. The monitoring program has provided the opportunity to evaluate the individual and collective effectiveness of BMPs.

300 Idaho Department of Health and Welfare. 1989. Idaho water quality status report and nonpoint source assessment 1988. ID Dept. H&W, Div. Environ. Qual., Boise. 389 pp.

A summary of the Rock Creek Rural Clean Water Program is given along with an update of the status of the project. Background information on location, problems, and BMPs are listed. The results to date suggest that BMPs implemented under the RCWP in the project area have improved water quality in Rock Creek. The results show that BMPs have significantly reduced sediment and other pollutants to the agricultural drains studied. The sub-basins with the greatest percentage of best management practices implemented also show the greatest reductions in suspended sediment and other agricultural pollutants. Fish populations in Rock Creek have increased since the beginning of the project. Quality assurance is an important part of both the field research and the laboratory analyses.

301 Idaho Department of Health. 1960. Report on pollution problems in Rock Creek Cassia and Twin Falls Counties, Idaho 1959. ID Dept. Health, Boise. Mimeo Rpt. 30 pp.

Other than the pollution load placed upon the stream by irrigation runoff and stockyard drainage, the individual contributors who discharge wastes to the stream are listed as follows: Amalgamated Sugar Company; Independent Meat Company; Magic Valley Processing Company; Jerome Cooperative Creamery; Custom Packing Company; and City of Twin Falls. General recommendations include fencing stockyards and feed lots along Rock Creek so that the animals do not have free access to the stream and an effort should be made to eliminate surface drainage from these areas into the creek. A program for eliminating the discharge of overflows from individual septic tanks into Rock Creek is needed. Irrigation runoff water is listed as a minor source of pollution to Rock Creek.

302 Idaho Division of Environment. 1979. Application for Rural Clean Water Program Funds. pp. 272-314. IN: Implementation of the Federal Water Pollution Control Act (Nonpoint pollution and the areawide waste treatment management program). Hearings before the subcommittee on oversight and review of the committee on public works and transportation U.S. House of Representatives, 96th Congress 1st Session. U.S. GPO, Washington, D.C. 1049 pp.

This was the original application for Rock Creek RCWP funds to the 96th Congress. The application contained an

executive summary; description of project area (including maps); severity of water quality problem (including pesticide data from 1975 - EPA); water quality impact summary; objectives; planned action (including a list of BMPs to be used); project schedules; estimated budget (including cost share rates); proposed water quality monitoring plan; estimated water quality benefits and effects; and project administration.

303 Idaho Power Company. 1962. Feasibility report Twin Falls Canal Company South Side Low-Line Canal drop power development. ID Power Co., Boise. 23 pp.

This project was built in 1984 on the Low Line Canal on the east side of Rock Creek. The Low Line Canal is the main source of irrigation water to the Rock Creek RCWP area. A second project (Lower Low Line) was built in 1988 about two miles east of the Low Line Canal siphon on the west side of Rock Creek. Both were constructed by Bonneville Pacific Corporation.

304 Israel, L. 1980. Rich Yankey inspects a sediment pond. Times-News, Twin Falls. March 23.

This photo is of Rich Yankey of the Soil Conservation Service inspecting a sediment pond on Ken Arrington's farm east of Twin Falls. The pond is part of an experimental irrigation system that reduces sediment runoff. A white strip of soil indicates that most of the topsoil in the area has been eroded away.

305 Jamieson, C.A., J. Spooner, R.P. Maas, and M.D. Smolen. 1986. The use and effectiveness of nonpoint source control in four western USA agricultural watersheds. Sixth annual International Symposium, Lake and Reservoir Management: Influences of nonpoint source pollutants and acid precipitation. Portland, OR. pp. 1-15.

Four agricultural land treatment/water quality projects located in arid areas were analyzed. Sediment was the primary pollutant in three and phosphorus in the fourth. Most BMPs were sediment control structures and changes in the type of irrigation system. The responses in water quality of land treatment appear to be more rapid in these arid areas than those in humid areas where similar agricultural nonpoint source projects have been analyzed. This rapid response is probably because of the lower meterologic variability of these arid areas. Specific information on Rock Creek RCWP concerning project background, land treatments and impacts on water quality. Rock Creek is compared to Snake Creek RCWP, South Yakima MIP, and Columbia Basin Block-86.

306 Jamieson, C.A., J. Spooner, R.P. Maas, and M.D. Smolen. 1986. The use and effectiveness of nonpoint source control in four western USA agricultural watersheds. Abstract. Sixth annual International Symposium, Lake and Reservoir

Management: Influences of nonpoint source pollutants and acid precipitation. Portland, OR. pp. 18.

This is the abstract of a paper presented at the Sixth annual International Symposium, Lake and Reservoir Management held in Portland, OR, November 6, 1986. Four agricultural land treatment/water quality projects located in arid areas were analyzed. Sediment was the primary pollutant in three and phosphorus in the fourth. Most BMPs were sediment control structures and changes in the type of irrigation system. The responses in water quality of land treatment appear to be more rapid in these arid areas than those in humid areas where similar agricultural nonpoint source projects have been analyzed. This rapid response is probably because of the lower meteorologic variability of these arid areas.

307 Jansen, B. 1987. Park advisory board urges Rock Creek expansion. Nov. 20. Times-News, Twin Falls, ID. Pp. B1-B2.

A 40 acre expansion of Rock Creek Park located along Rock Creek in Twin Falls is discussed. A photograph is included. The park may be able to expand because the Rock Creek II Hydroelectric Project, which is planned about three miles downstream is looking for a project in exchange for building a road, powerhouse and diversion structure on about 3.2 acres of land near the mouth of Rock Creek.

308 Jansen, B. 1987. The grass may [illegible] greener. April 19. Times-News, Twin Falls, ID. 1 pp.

A large photograph of Rock Creek at the edge of Rock Creek park in Twin Falls is shown. The article talks about plans to add a bridge for pedestrians and another for vehicles at the park. An expansion of the park to the north side of Rock Creek is discussed. This will provide more use for Rock Creek in the future.

309 Jenkins, P., and B. Jenkins. 1981. The walk west, a walk across America 2. Ballantine Books, William Morrow Co., Inc., NY. 431 pp.

In this popular account of two people walking across America, they mention ranch work in the Rock Creek area. Chapter 33 concerns a cattle drive up Cottonwood Canyon and mentions the West Fork of Rock Creek (Pg. 358). Chapters 34 (the double cross brand); 35 (ridin' fences); and 36 (our Oregon Trail) all mention life and ranching around the Twin Falls area of Magic Valley.

310 Jensen, S.L. 1966. The mayflies of Idaho (Ephemeroptera). M. S. Thesis, Univ. UT, Salt Lake City. 367 pp.

The mayflies are an important group of aquatic insects concerning water quality aspects of streams. Jensen's

thesis was the first and is the only comprehensive treatment for the State of Idaho. Several specific records are given for Rock Creek: pg. 172 - Epeorus longimanus (Heptageniidae) "TWIN FALLS Co.: Rock Creek Can., 11 mi. S. Rock Creek, 30-VI-53"; and pg. 191 - Rhithrogena futilis (Heptageniidae) "TWIN FALLS Co.: Rock Cr. Can., 11 mi. S. Rock Creek, 30-VI-53" [this was the only record given for Idaho]. Page 295 lists a record of Ephoron album (Polymitarcidae) for "TWIN FALLS Co., Twin Falls, 16-VIII-64" it is not specified if the record is for Rock Creek or the nearby Snake River.

311 Jesser, R. 1990. The farmer's perspective. Abstract of paper presented at the 45th Annual Meeting of the Soil and Water Conservation Society, July 29-August 1, 1990, Salt Lake City, Utah. pp. 2.

This paper was presented as the Land Use Perspective and a reactor to the overview given by D.L. Carter under a session on the Rock Creek Rural Clean Water Program moderated by Jan Jinings. In 1980, the farmers in the Rock Creek watershed realized they were losing some top soil by irrigation erosion, but had no idea how much. By installing best management practices, such as sediment ponds, it became eviden that we were losing way more topsoil than we had imagined. By developing long term contracts we were able to receive cost share assistance for installing best management practices. As farmers within the community observed their neighbors installing the BMPs, they also became interested in the project. Some farmers did not develop and sign contracts but installed the BMPs anyway.

312 Jinings, J. 1990. Rock Creek Rural Clean Wataer Project, Idaho. Title of paper presented as moderator at the 45th Annual Meeting of the Soil and Water Conservation Society, July 29-August 1, 1990, Salt Lake City, Utah. 1 pp.

Jan Jinings served as the moderator of the Rock Creek Rural Clean Wataer Project for this session which included presentations by D.L. Carter, R. Jesser, and R.L. Yankey on an overview of the project, reaction by SCS,1 and reaction by a land user, respectively.

313 Jones and Stokes Associates. 1988. Effectiveness of agricultural and silvicultural nonpoint source controls. U. S. Environ. Protect. Agency, Seattle, WA. 225 pp.

This document was produced with the assistance of a nonpoint source workgroup including William H. Clark. The objectives were to inventory monitoring programns associated with BMPs implemented by resource management agencies in agricultural and silvicultural sectors; summarize water quality and aquatic habitat parameters used; evaluate the applicability of minitoring techniques; and recommend appropriate elements of a monitoring program. The Rock Creek Rural Clean Water Program is listed as one

of seven in the Irrigated Farming section. A site description is given along with land use, beneficial use, BMPs, monitoring, discussion, and a contact for additional information as well as available published reports. A table of parameters measured on Rock Cr. is included. The project uses quality assurance procedures on a routine basis.

314 Kasal, J., R. Magleby, D. Walker, and R. Gum. 1987. Economic evaluation of the Rock Creek, Idaho Rural Clean Water project. U.S. Dept. Agr., Econ. Res. Svce., Ft. Collins, CO. 23 pp.

This report is Technical Appendix C of the 1986 Rock Creek annual report. The Rock Creek Project will improve recreational fishing and reduce ditch cleaning costs. The project is also providing cost, tax and long term yield benefits to farmers. Total economic benefits may exceed costs, but water quality benefits alone will not. Conservation tillage is the most cost effective practice, while irrigation structures are the least cost effective.

315 Kasal, J., R. Magleby. 1985. Economic evaluation progress report for FY85 Rock Creek, Idaho RCWP Project. U.S. Dept. Agr., Econ. Res. Svce., Ft. Collins, CO. 30 pp.

This is Appendix II to the 1985 Rock Creek RCWP annual report. The economic evaluation concentrated on updating the farm level spread sheet analysis to incorporate actual and planned BMP implementation for the 101 participants through FY84 and the 67 new participants in FY85. Irrigation water management and conservation tillage are the two most cost effective means of reducing sediment delivery to Rock Creek. Only 47% of the critical acres under contract in '85 have been treated with IWM and almost no CT implementation has occurred. Irrigation structures because of their high cost are the least cost effective means of sediment reduction. The mix of BMPs applied to the land to date will not achieve the goal of reducing sediment delivery by 70%. Major off-site benefits are recreational fishing enhancement & reduced ditch cleaning.

316 Kelly, S., and R. Gum. 1981. Income distribution and the Rural Clean Water Project. U.S.D.A., Econ. Resear. Svce, Washington, D. C. 10 pp.

The RCWP with its cost/share payments has more of an effect on income levels than it does on the distribution of income in the Twin Falls area. Given the size of the farms in the area, even if cost/share payments are not taxable, the farmers are the ones who pay for cleaning up the water. It may be in their best interest in the long run because the BMPs are primarily concerned with reducing soil loss and soil erosion resulting in cleaner water and good crop production for a longer period of time. Farmers are getting the benefits from reduced soil loss, but who is getting the benefits from cleaner water? Perhaps those who benefit from the cleaner water should help pay the cost.

The policy implications of allowing cost/share payments to be nontaxable are discussed. Farmers with large farms can make a profit from such a program.

317 Kemper, W.D., P. Jolley, and R.C. Rosenau. 1988. Soil management to prevent earthworms from riddling irrigation ditch banks. Irrig. Sci. 9: 79-87.

This research was conducted in several areas including the Rock Creek watershed of Idaho. The banks of old irrigation ditches were used intermittently were examined for earthworm activity and found to have infiltration rates which are 4 to 10 times those in adjacent cultivated fields. Vegetation on ditch banks provides food for worms as the roots die. Both compaction and use of subsoil (low organic content) for the banks of the ditches show promise for reducing earthworm burrowing and water loss from ditches. Less seepage loss will occur if drop structures are provided so the ditch sections are not steep and vegetation on the ditch banks can be eliminated with herbicides.

318 Kemper, W.D., T. . Trout, A. Segeren, and M. Bullock. 1987. Worms and water. Jour. Soil Water Cons. 42: 401-404.

This research was conducted in several areas including the Rock Creek watershed of Idaho. The banks of old irrigation ditches were used intermittently were examined for earthworm activity and found to have infiltration rates which are 4 to 10 times those in adjacent cultivated fields. Vegetation on ditch banks provides food for worms as the roots die. Both compaction and use of subsoil (low organic content) for the banks of the ditches show promise for reducing earthworm burrowing and water loss from ditches. Less seepage loss will occur if drop structures are provided so the ditch sections are not steep and vegetation on the ditch banks can be eliminated with herbicides.

319 Kemper, W.D., T.J. Trout, A.S. Humphreys, and M.S. Bullock. 1988. Mechanisms by which surge irrigation reduces furrow infiltration rates in a silty loam soil. Trans. ASAE 31: 821-829.

This research was conducted on Portneuf silt loam soils in the Rock Creek area. Surge irrigation, the intermittent supply of water to furrows or borders, generally reduces infiltration rates. However, the degree of infiltration reduction is variable and difficult to predict. Mechanisms by which surge irrigation reduces infiltration rates include (a) consolidation of the furrow perimeter due to increased soil water tension during flow interruptions, (b) filling of cracks which develop during flow interuptions with bed load during the following surge, (c) forced settlement of suspended sediment on the furrow perimeter when the water supply is interrupted, and; (d) greater sediment detachment and movement caused by more

rapid advance of the surged stream front.

320 Kind, M. 1990. Concern for soil cleaned up Rock Creek. July 23, 1990, Times-News, Twin Falls, ID. pp. A1, A5.

Local farmer Roy Jesser is quoted giving a summary of the Rock Creek Rural Clean Water Program. The farmers were realizing that their top soil was washing into drains and into Rock Creek. Considering the farmers' cost of the program, Jesser still marvels at the success of the cleanup. "The amazing thing to me was the amount of cooperation from everybody," he said.

321 Kline, F.J. 1980. Irrigation return flow project, 208 "LQ" Drain study area, Twin Falls County, Idaho, summary report. ID Dept. H&W, Div. Environ., Boise. 85 pp.

This summary report of the LQ Drain study covers activities of the year 1979. Twenty-two of the 25 landowners/operators have completed conservation and water quality management plans. A total of 14 BMPs have been used on the land. Water quality data is provided for the following parameters: suspended sediment; total phosphorus; dissolved ortho phosphate; water temperature; dissolved oxygen; pH; electrical conductivity; and nitrate nitrogen. Technology used on Rock Creek RCWP.

322 Krunich, J. 1990. Fly rods ideal as fish hatch in Rock Creek. March 15, Times-News, Twin Falls, Idaho. pp. D-4.

Because of water quality improvements in Rock Creek it is once again a nice trout fishery. Because Rock Creek is relatively small, shorter fly rods are ideal. Dry flies, small patterns in the 16-20 size have provided the best action. Nymphs in 12-16 size are always a good choice and have accounted for the highest percentage of brown trout taken from the waters. Streamers in smaller sizes also produce resusts. Even thought Rock Creek is a small stream, wear chest waters if you want to stay dry. Many areas of the stream that are open to year-round fishing flow through a small canyon. The stream might not be wide byt many of the pools have considerable depth. A photograph of a person fishing in Rock Creek is included.

323 Kuska, J. J., W.H. Snyder, and R. Wells, eds. 1974. Rock Creek recreational resource inventory and analysis. Community Development Center, Univ. ID, Moscow. 97 pp.

This was a study of the physical and cultural characteristics together with recreational needs of Twin Falls County. The studies pointed out the value of Rock Creek for providing the recreational needs of the people of both the city and county of Twin Falls. The studies also show Rock Creek as a diverse resource suitable for a variety of uses. Cultural (history, socio-economic, land use, ownership, maps); scenic evaluation; physical [geology, climate, soils, vegetation, wildlife, hydrology

(including water quality and stream flow)], maps; and recreation are treated in the report. The conclusion of the report is that Rock Creek could be an important link in a countywide recreational program. The report describes point source pollution problems and sediment loads from soil erosion.

324 LICA. 1988. Field day was constructive. Times-News, Twin Falls, ID., Wednesday, July 13. 1 PP.

This article was a letter of thanks for the various groups, businesses, and agencies who helped the Idaho Land Improvement Contractors Association with the streambank stabilization project at the Stricker Ranch historic site along Rock Creek.

325 LaPlant, D. 1981. Wildlife habitat investigation Rock Creek Rural Clean Water Program Twin Falls County, Idaho. U. S. Soil Cons. Svce., Boise, ID. 22 pp.

This report details the methods used to determine wildlife habitat condition along Rock Creek. The major habitats examined were cropland, the riparian region, and the aquatic system. The Habitat Suitability Index models for the rainbow trout were used to monitor changes in aquatic habitats. Rock Creek sites near the Forest Service boundary, at 3500 East Road, at Twelvemile Road, near Highway 93 crossing, and at Poleline Road were studied. Raw data for the aquatic habitat is included for these sites. In addition cropland data was included which described land use, irrigation systems, crop types, and cropland habitats. The data was collected for analysis by economists. The data was to be compared with that collected in the future to see if changes could be documented and related to the Rural Clean Water Program results.

326 LaPlant, D., D. Martin, L. Wear, and R. Gum. 1984. Wildlife habitat impacts. U.S.D.A., Econ. Resear. Svce., Washington, D.C. 21 pp.

The impact of the RCWP on cropland habitat was found to be insignificant for the period 1981 and 1983. Unless major changes occur in BMPs implemented, such as a dramatic increase in conservation tillage, no impact on cropland habitat either good or bad can be expected. The impact on the aquatic habitat between 1981 and 1984 was positive but not of major consequence. Values of the aquatic habitat indices increased for three stations from 0.76 to 0.27, respectively, and decreased for one station.

327 Laird, L.B. 1964. Chemical quality of the surface waters of the Snake River Basin. U. S. Geol. Surv. Prof. Pap. 415-D. 47 pp.

A description of the water quality patterns in the Snake River basin and a discussion of the geologic, climatic, and water use variations that produce these patterns is

discussed. Rock Creek is described as mostly composed of irrigation return water in the lower reaches. At Twin Falls the water is predominately of a calcium bicarbonate type. "From about 1 mile upstream from the city of Twin Falls to its mouth, Rock Creek is often polluted. Oxygen-depleting wastes from domestic and industrial sources foul the stream, which makes a noticeable contribution of wastes and sludge to the Snake River" (pg. 18).

328 Lancaster, F. 1987. 1988 field day planning begins. ID Chapter, Land Improvement Contractor's Assoc. Newsletter, Filer. November: 1 pp.

This newsletter article announced the planning for the Stricker Cabin streambank stabilization project planned for Rock Creek in 1988. It is anticipated that in addition to protecting the historic site, progress can be made on Rock Creek water quality. A plea for LICA members and other contractors to assist was made.

329 Levinski, C. 1984. Idaho water quality status report 1984. ID Dept. H&W, Div. Environ., Boise. 83 pp.

The status of the waters of the State of Idaho as of 1984 are listed. Rock Creek (USB-730) is given an overall water quality condition of "very poor". It is impacted by irrigation practices. Problems listed are bacteria, trophic, aesthetics, sediment, and metals toxicity. Rock Creek is listed as 5th priority out of 54 segments rated. It is given a water quality index value of 71.8 (81 was the highest and 7 the lowest).

330 Levinski, C.L. 1987. Review of EPA toxic & microbiological criteria 1987. Water Qual. Bur. Rpt., ID Dept. H&W, Div. Environ., Boise. 82 pp.

Recommendations are presented for making Idaho's water quality standards program more compatible with the new federal water quality standards requirements and for best utilizing information from this assessment in other water quality program areas. Comparisons were made with EPA Gold Book criteria. Existing Rock Creek water quality data showed arsenic, cadmium, copper, mercury, lead and pesticides identified as toxics present.

331 Lindholm, G.F., and S.A. Goodell. 1986. Irrigated acreage and other land uses on the Snake River Plain, Idaho and eastern Oregon. U. S. Geol. Surv. Hydro. Invest. Atlas HA-691. 1 map.

Surface water diversions for irrigation on the Snake River Plain began in the 1940's. Landsat data were used in the mapping of the irrigated acerage for 1980. Irrigated acerage is shown for 1899 (none in the Rock Creek area), 1929 (much along Rock Creek, especially along the west side), 1945 and 1966 (irrigation fully developed along Rock

Creek). The irrigation was essentially done with surface water in the Rock Creek area. Groundwater is used more for irrigation in other parts of the Snake River Plain. The detailed irrigation map for 1980 shows that groundwater is used some in the areas just northwest of Twin Falls and along the upper reaches of Rock Creek. Essentially all of the land along Rock Creek is in irrigated agriculture (the exception being the urban area around the city of Twin Falls).

332 Lipson, S. 1980. Creek's quality watched. July 1. Times-News. Twin Falls, ID. 1 pp.

Harold Seitz, a hydrologist for the U.S. Geological Survey said "don't drink the water, don't swim in it, either" in comments made concerning Rock Creek. Seitz noted that Rock Creek's quality has improved over the last 10 years because of improved waste disposal practices by the city of Twin Falls and others. High levels of bacteria have been found in Rock Creek. The USGS has been monitoring the water quality at the mouth of Rock Creek and the data obtained will be used as a benchmark against which to measure any future improvements in water quality.

333 Lipson, S. 1980. Erosion: Magic Valley farmers making renewed effort to halt steady loss of soil to mother nature. Times-News, Twin Falls, ID. 1 pp.

The article talks about furrow irrigated soil erosion in the Magic Valley in general. The LQ Drain project and Rock Creek Rural Clean Water Program are mentioned as examples of programs to help control erosion and improve water quality. An interview with Dr. David Carter revealed that much soil erosion has already taken place in the Magic Valley. Carter said it takes nature 50 years to make a quarter inch of soil (35 tons/acre) In some surveys 10 tons per acre are being eroded, hence losing in 4 years what it takes nature to build in 50 years. Rich Yankey is shown inspecting a sediment pond as part of the Rock Creek Creek Rural Clean Water Program. The photograph shows farmland in the background which has a white strip of soil indicating that most of the topsoil has been eroded away.

334 Lipson, S. 1980. Reduced silt flow to Snake River. March 2. Times-News, Twin Falls, ID. Pp. A-9.

This article and photograph describe the results of the LQ Drain project. The project history and results are discussed. Vegetative filter strips and sediment ponds were the major BMPs used. The project resulted in a sigificantly reduced amount of silt (sediment) to the Snake River.

335 Lipson, S. 1980. Rock Creek cleanup OK'd. Sept. 5. Times-News. Twin Falls, ID. 1 pp.

The $3 million Rock Creek Rural Clean Water Program project

has been given the federal green light. Federal money now will be made available for cost share to help farmers eliminate sediment runoff into Rock Creek.

336 Lipson, S. 1980. Rock Creek contracts signed. Nov. 5. Times-News, Twin Falls, ID. Pp. B-2.

Contracts bringing the first of $2.4 million in federal funds for the clean-up of Rock Creek were signed on 4 November. Interviews with some of the first farmers to sign contracts to receive cost share funds and apply best management practices to the land are included. The Rural Clean Water Program is to save farm land and improve the water quality of Rock Creek.

337 Lipson, S. 1980. Rock Creek funding may be weeks away. May 18. Times-News. Twin Falls, ID. 1 pp.

The $2.4 million federal grant earmarked for the cleanup of Rock Creek could be on the way to Idaho within three weeks. ASCS said the funding had been approved and could become available to farmers as early as July. Conservaiton practices should begin being installed in the fall. By next year, the water quality in Rock Creek should start showing measurable improvement. The key to the project is the voluntary participation of farmers. Federal cost share funds will help provide the incentives.

338 Lipson, S. 1981. Controlling Rock Creek pollution first test for clean-up measures. May 17. Times-News, Twin Falls, ID. 1 pp.

A large photograph of Earl O'Harrow with a glass of nearly clear water from his settling pond is shown. Efforts have so far been focused on the coulee that drains water from about 6,700 acres south of the Amalgamated Sugar Co. factory. This is subbasin 7. The federal government is making cost share funds available for landowners to apply best management practices to the land and help control water pollution in Rock Creek as well as save their valuable soil. Different BMPs are described.

339 Lipson, S. 1983. Conservation efforts helping solve Rock Creek pollution. Jan. 19. Times-News, Twin Falls, ID. 1 pp.

Rock Creek may become a prime fishing spot thanks to a federal grant awarded in 1980 and work since then to prevent sediment from entering the stream. The article describes some of the monitoring efforts on the project and the Rural Clean Water Program funding. The results of a recent creel census showed that fishermen were catching fish at a rate of 0.04 per hour which is very poor. A recent study of fish habitat showed that the stream provides a good environment for rainbow trout in the reaches from the South Hills to just south of Twin Falls. But from there to where it joins the Snake River, the creek

provides a relatively poor environment.

340 Little, B. 1991. How not to restore Rock Creek. March 23. Times-News, Twin Falls, ID. 1 pp.

This letter to the editor concerns the article that recently appeared in the Times-News (N.S. Nokkentved 1991) concerning the damage to the Rock Creek stream bank by a construction project. The article condemns the person for damaging the stream and suggests that he begin a good faith restoration program and become part of the solution and help improve the water quality in Rock Creek.

341 Little, C.E. 1988. A report on the Rural Clean Water Program. Unpublished draft, Kensington, MD. 72 pp.

This report covers the 20 projects in the Rural Clean Water Program. The author describes the setting in relation to the local geology and history of agriculture in the area. The RCWP is discussed. Rock Creek was one of the most polluted streams on both state and national lists. A native salmonid fishery did not exist during the 1960-70s. But through the efforts of the RCWP wild trout are again seen and caught in the stream. The project has been making an effort to switch to more conservation tillage for the watershed. The potential of groundwater pollution following that conversion is discussed. People in the area have noticed the improvements in the creek. The project is considered a success since stable wild trout populations are now present and able to spawn in the clear gravel margins of the creek.

342 Little, C.E. 1989. Geology and survival on the Snake River Plain. Jour. Soil Water Cons. 44: 127-129.

This article is fourth in a series of five articles on selected projects in the Rural Clean Water Program. The author interviewed Rich Yankey (SCS), Bill Clark (IDHW-DEQ) and Jim McLaughlin (ASCS) and visited the site during 1988 to prepare the article. The author describes the setting in relation to the local geology and history of agriculture in the area. The RCWP is discussed. Rock Creek was one of the most polluted streams on both state and national lists. A native salmonid fishery did not exist during the 1960-70s. But through the efforts of the RCWP wild trout are again seen and caught in the stream. The project has been making an effort to switch to more conservation tillage for the watershed. The potential of groundwater pollution following that conversion is discussed. People in the area have noticed the improvements in the creek.

343 Little, C.E. 1989. The Rural Clean Water Program: A report. U. S. Dept. Agric., Washington, D. C. 26 pp.

This is the final version of Little 1988. This report covers the 20 projects in the Rural Clean Water Program. The author describes the setting in relation to the local

geology and history of agriculture in the area. The RCWP is discussed. Rock Creek was one of the most polluted streams on both state and national lists. A native salmonid fishery did not exist during the 1960-70s. But through the efforts of the RCWP wild trout are again seen and caught in the stream. The project has been making an effort to switch to more conservation tillage for the watershed. The potential of groundwater pollution following that conversion is discussed. People in the area have noticed the improvements in the creek. The project is considered a success since stable wild trout populations are now present and able to spawn in the clear gravel margins of the creek.

344 Low, W.H. 1987. Solute distribution in ground and surface water in the Snake River Basin, Idaho and eastern Oregon. U. S. Geol. Surv., Atlas HA-696, 2 maps.

The groundwater chloride levels in the upper Rock Creek drainage are greater than 50 and less than 250 mg/L in the lower watershed. Dissolved solids are mostly greater than 400 mg/L except for near the mouth of Rock Creek where levels are given as 200-400 mg/L. Upper Rock Creek is listed as Quaternary and Tertiary young and old silicic volcanic rocks with most of the lower portion of the creek in Quaternary and Tertiary basalt. Concentrations (mg/L) are given for the surface water for DS, SO4, CL, HCO3, Na, Mg, and Ca.

345 Lowman, S. 1983. The Rock Creek success story. Idaho Clean Water. April: 4.

Rock Creek has changed dramatically in the last twenty years, going from a garbage disposal to a good backyard fishery. The article discusses the pollution history of Rock Creek and improvements made with point source discharges and the RCWP.

346 Lowman, S.M. 1984. A marketing plan for agricultural pollution abatement. ID Dept. H&W, Div. Environ., Boise. 10 pp.

The techniques of modern marketing can be applied to the field of resource management, in order to enhance efforts to protect the environment. Trying to market an agricultural pollution control program is not exactly like trying to market an item for retail sale, but it does have similarities. The principles of good marketing--involving product, distribution, promotion, and pricing--can be applied to a clearly delineated target group. If the appropriate marketing mix is developed for this group, the profit can be seen in cleaner water, better fishing, and a well-protected resource base for the long-term production of food and fiber. Background information for this report was gained while working with the State of Idaho's Agricultural Pollution Abatement Plan and the Rock Creek Rural Clean Water Program.

347 Maas, R.P., M.D. Smolen, S.A. Dressing, C.A. Jamieson, and J. Spooner. 1985. Practical guidelines for selecting critical areas for controlling nonpoint source pesticide contamination of aquatic systems. pp. 363-367. IN: U. S. Environmental Protection Agency, Perspectives on nonpoint source pollution, proceedings of a national conference. U. S. Environmental Protection Agency, Wash., D.C. 514 pp.

The criteria for selecting pesticide critical areas are grouped into four broad categories: 1) type of water resource impairment; 2) source magnitude criteria; 3) transport-related criteria; and 4) other criteria.

348 Magleby, R. 1988. Cost-effectiveness of BMP implementation. Poster Session, Rural Clean Water Program Workshop, St. Paul, MN. 10 pp.

This poster was presented at the Rural Clean Water Program Workshop on September 13-14, 1988 in St. Paul, Minnesota. The Rock Creek, Idaho, Highland Silver Lake, Illinois; Conestoga Headwaters, Pennsylvania; Oakwood-Poinsett Lakes, South Dakota; and St. Albans Bay, Vermont CM&E projects were discussed. The Rock Creek project size is 33,503 cropland acres. The problem is sediment in Rock Creek and the Snake River. Cost-effectiveness (based on LP model) is given in terms of cost/1% reduction in sediment. Three scenarios were described: RCWP as contracted on 17,299 acres ($146,000/1% sediment reduction); RCWP + 10,000 acres of conservation tillage ($46,000/1% reduction); and conservation tillage only on all cropland ($30,000/1% reduction). Conservation tillage is feasible and effective on irrigated land and incentives could be increased.

349 Magleby, R., J. Kasal, D. Walker, and R. Gum. 1989. Economics of controlling sediment from irrigation: An Idaho example. Resour. Tech. Div., Econ. Resear. Svce. U. S. Dept. Agric. Staff Rpt. AGES 89-33. 23 pp.

The Rock Creek, ID, project of the experimental Rural Clean Water Program may improve recreational fishing and hunting, reduce costs of removing sediment from irrigation ditches, and slightly lower the cost of hydroelectric plant maintenance. The project is also providing cost, tax, and long-term yield benefits to farmers. Total economic benefits, including onfarm benefits, may exceed costs, but water quality benefits along may not unless substantial additional implementation of conservation tillage occurs among program participants. Conservation tillage is the most costeffective practice, while improved irrigation structures are the least cost effective. If funding for future projects is based on water quality only, it suggests a need for consideration of dual objectives, and perhaps dual funding sources for some projects in the future.

350 Magleby, R.S., S. Piper, and C.E. Young. 1989. Economic insights on nonpoint pollution control from the Rural Clean Water Program, pp. 63-69, IN: National Association of

Conservation Districts, Making nonpoint pollution programs work. Proc. Nat. Conf., April 23-26, 1989, St. Louis, MO. Nat. Assoc. Cons. Dist., League City, TX.

The experimental Rural Clean Water Program (RCWP), involving 21 diverse projects across the United States, provides some valuable insights for enhancing the economic benefits and efficiency of future programs for agricultural nonpoint pollution control. Mixed RCWP results emphasize the need for comprehensive preproject assessment of likely benefits and of the cost and effectiveness of control options to aid future project selection & planning. Future projects that preserve or improve water quality in lakes, bays, or estuaries with high existing or potential recreational use have strong prospects for economic benetifs that exceed costs. RCWP results also indicate that using available funds for targeted implementation of nonstructural management practices rather than structural measures can often increase water quality benefits.

351 Magleby, R.S., and C.E. Young. 1985. Controlling agricultural runoff: Government's perspective. pp. 234-236. IN: U.S. Environmental Protection Agency, Perspectives on nonpoint source pollution, proceedings of a national conference. U.S. Environmental Protection Agency, Washington, D.C. 514 pp.

The argument for greater consideration by government and others of economic benefits and costs in making decisions on NPS pollution control. Sediment reduction in Rock Creek is mentioned and the estimated $411,000 in benefits to recreational fishing and $185,000 in reduced ditch cleaning costs are reported. Total estimated water quality benefits over 50 years are $596,000. An estimated $200,000 in upland game habitat improvements will be seen with conservation tillage for a total off-site benefit of $802,000.

352 Malde, H.E. 1968. The catstrophic Late Pleistocene Bonneville Flood in the Snake River Plain, Idaho. U. S. Geol. Surv. Prof. Pap. 596. 52 pp.

A catastrophic flood caused by overflow and rapid lowering of Pleistocene Lake Bonneville at Red Rock Pass near Preston, Idaho resulted in the Snake River canyon from the area near Pocatello west to Swan Falls having its current appearance and features. The flood may have taken place as recent as 18,000 years to as long as 30,000 years ago. The Snake River canyon below Twin Falls is generally 500-600 feet deep and cuts throu various sections of basalt and detrital deposits. The flood is estimated to have had a discharge (flow) of from between 12.2-16.3 million cubic feet per second (about 0.3 cubic mile per hour) for approximately 6 weeks. The canyon shape is a result of variable erodibility of rocks and enlargement of the canyon at tributary junctions. The mouth of Rock Creek is not notably enlarged and had no obvious effect on the flood.

353 Maret, T. 1989. Agency progress reports, comprehensive water qulity monitoring, pp. 38-46, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

This report is the Division of Environmental Quality portion of the 1989 annual progress report for the Rock Creek Rural Clean Water Program. Results of the 1989 water quality monitoring efforts are presented. Suspended sediment has shown a decrease in loadings in 8 of 10 drain stations. Sediment reductions in Rock Creek are at 78% since 1981. Substrate analysis still shows that all Rock Creek stations are impacted by fine sediment. Stream bank erosion continues to be a major source of sediment impacting Rock Creek. A new technique to directly measure trout spawning is being tested in Rock Creek. Habitat Evaluation Procedures conducted in 1981, 1984 and 1988 show a gradual improvement at lower Rock Creek sites. Trace levels of pesticides have been found in the surface and ground water.

354 Maret, T. 1989. Evaluating beneficial use support in the Rock Creek Rural Clean Water Program, 1981-1989, Twin Falls County, Idaho. Abstract of paper presented at the Idaho Chapter American Fisheries Society annual meeting, March 3, 1989, Boise, ID. 1 pp.

Water quality monitoring for the Rock Creek Rural Clean Water Program (RCWP) in Twin Falls County, Idaho is one of 21 national projects to be funded to evaluate best management practices on irrigated cropland and trends in water quality. Suspended sediment has been reduced by 78% compared to preproject loadings. Instream monitoring of beneficial uses in Rock Creek has been targeted at cold-water biota, habitat quality, and comparison to water quality criteria. Fine sediment appears to be reducing intergravel dissolved oxygen below 6.0 mg/L at some stations. Rainbow trout embryo survival in artificial egg pockets has been limited to stations above the agricultural impact areas. Macroinvertebrates collected during August between 1981 and 1988 have not shown improvingd trends in taxa numbers or densities but are adequate for fish food.

355 Maret, T. 1989. Rock Creek monitoring update. Idaho Clean Water. Summer/Fall: 4-5.

The groundwater sampling program is described and updated. Tunnel drains are used to sample groundwater along Rock Creek in the Twin Falls area. Nitrate values have ranged from 3.0-5.0 mg/L with a high of 5.4 mg/L being recorded. Pesticide scans have found a variety of agricultural chemicals in the water in trace amounts: 2,4-D, Dacthal, Dursban, chlordane, pentachlorophenol, Avadex BW and Dieldrin. Elevated bacterial levels have been found in a tunnel which drains beneath the city of Twin Falls. Preliminary results from the evaluation of spring rainbow

trout spawning through the use of egg baskets shows that the fish can spawn at four stations along the creek. Eggs planted at the lower stations did not produce trout fry. A lack of suitable spawning habitat in this area due to sediment deposition.

356 Maret, T. 1989. Water quality monitoring update. Rock Creek Review, Newsletter. April. pg. 3.

Terry Maret is the new coordinator of the Rock Creek monitoring program. He has experience with the Long Pine Rural Clean Water Program in Nebraska. Terry plans to place emphasis on streambank erosion projects; the ground water study; and biological aspects of Rock Creek.

357 Maret, T. 1990. Evaluating agricultural impacts on brown trout spawning success in Rock Creek, Twin Falls, County, Idaho. Title of contributed paper for 1990 Western Division, Amer. Fish. Soc., Meeting, July 7-11, 1990. The Tributary. 15(3):2.

Title only given for paper to be presented at the Western Division annual meeting of the American Fisheries Society, to be held in Sun Valley, Idaho in July.

358 Maret, T. 1990. Evaluating agricultural impacts on brown trout spawning success in Rock Creek, Twin Falls County, Idaho. Abstract of paper presented at the Western Division American Fisheries Society, July 7-11, 1990, Sun Valley, ID.

Salmonid spawning is a protected beneficial use of water quality in many western states. Several nonpoint source activities cause accelerated sedimentation, which adversely affects salmonid spawning. A methodology for monitoring sedimentd impacts on salmonid spawning success has been developed. The technique permits measurement of embryo survival, fine sediment accumulation and intergravel dissolved oxygen in artificial egg pockets placed in streams. Effects of sediment on egg survival and alevin escapement are dependent on watershed development and fine sediment size. Streams in geologies which produce silt & clay textured fines appeared to suppress intergravel oxygen concentration & growth and survival of developing embryos. Salmonid spawning in Rock Creek is impaired by excessive sedimentation.

359 Maret, T. 1990. Monitoring and evaluation in the Rock Creek Rural Clean Water Program 1981-89 lessons learned. Abstract of paper presented at Idaho Water Quality Conference, February 26-28, 1990, Boise, ID. pg. 37.

Water quality monitoring for the Rock Creek Rural Clean Water Program (RCWP) in Twin Falls County, Idaho is one of 21 national projects to be funded to evaluate best management practices on irrigated cropland and trends in water quality. Suspended sediment has been reduced by 78%

compared to preproject loadings. Instream monitoring of beneficial uses in Rock Creek has been targeted at cold-water biota, habitat quality, and comparison to water quality criteria. Land treatment and resulting water quality improvements appear to be dependend on cropping patterns. Using an erosion index to account for this variability can help explain observed trends in water quality.

360 Maret, T. 1990. Monitoring evaluates cold-water fishery in Rock Creek. ID Clean Water. Spring/Summer:1-3.

Recent monitoring and evaluation of data has provided insight to the effectiveness of cropland best management practices in restoring cold-water habitat in Rock Creek. Data is presented concerning the salmonid spawning experiments conducted in Rock Creek. Early in the project cropland was the prime contributor of suspended sediment to Rock Creek, now it is unstable stream banks. The recent introduction of adult steelhead is a tribute to the efforts that landowners have given to clean up Rock Creek.

361 Maret, T. 1990. Rock Creek Rural Clean Water Program comprehensive water quality monitoring annual report 1989. ID Dept. Health & Welfare, Div. Environ. Qual., Boise. 179 pp.

Results of the 1989 water quality monitoring efforts are presented. Suspended sediment has shown a decrease in loadings in 8 of 10 drain stations. Sediment reductions in Rock Creek are at 78% since 1981. Substrate analysis still shows that all Rock Creek stations are impacted by fine sediment. Stream bank erosion continues to be a major source of sediment impacting Rock Creek. A new techniue to directly measure trout spawning is being tested in Rock Creek. Habitat Evaluation Procedures conducted in 1981, 1984 and 1988 show a gradual improvement at lower Rock Creek sites. Water quality Index values for Rock Creek stations below the ag drains show a gradual improvement in water quality. Trace levels of pesticides have been found in the surface and ground water. Quality assurance continues to be an important aspect of the research.

362 Maret, T. 1990. Rock Creek Rural Clean Water Program. Abstract of poster presented at the Soil and Water Conservation Society, Annual Meeting, July 31, 1990, Salt Lake City, UT.

Water quality monitoring for the Rock Creek Rural Clean Water Program (RCWP) in Twin Falls County, Idaho is one of 21 national projects to be funded to evaluate best management practices on irrigated cropland and trends in water quality. Suspended sediment has been reduced by 78% compared to preproject loadings. Instream monitoring of beneficial uses in Rock Creek has been targeted at cold-water biota, habitat quality, and comparison to water quality criteria. Land treatment and resulting water

quality improvements appear to be dependant on cropping patterns. Using and erosion index to account for this variability can help explain observed trends in water quality.

363 Maret, T. 1991. Evaluating agricultural impacts on brown trout spawning success in Rock Creek, Twin Falls, Idaho. Abstract of paper presented at the First Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 15, 1991, Boise, ID.

Salmonid spawning was evaluated to determine if land treatment practices have also restored this important designated use. New monitoring protocols developed by DEQ were applied to evaluate the status of brown trout (Salmo trutta) spawning. Results indicate that mean intragravel dissolved oxygen concentrations and saturations were significantly less at stations impacted by sediment than a control station. Mean percent fine sediment was also higher at all impacted sites. Survival of embryos at the control station had a mean of 48% while the mean for the impacted sites was 17%. Reduced growth in those surviving was also noted at the impactaed sites. The findings of this study strongly suggest salmonid spawning in lower Rock Creek is impaired by excessive sedimentation.

364 Maret, T. 1991. Rock Creek post-project evaluation receives funding. Idaho Clean Water. Spring 1991: 16.

A one year post-evaluation of Rock Creek water quality and land treatment data was recently approved by the U.S. Deparatment of Agriculture and will begin in March 1991. The funding will be provided by USDA's Agricultural Stabilization and Conservation Service. The $153,000 project will support an interagency effort to focus on relationships between land treatment practices and changes in water resource quality. A final report of the results is scheduled to be reseased by the end of 1991.

365 Maret, T.R. 1990. Bridging the gap between land treatment and surface water quality in the Rock Creek project, annual Rural Clean Water Program workshop, Brookings, South Dakota.

This is an abstract of a paper given in September 1990 at the Rural Clean Water Workshop held in Brookings, South Dakota. The monitoring results from the Rock Creek RCWP over the last nine years have shown reductions in sediment and nutrient pollutants entering Rock Creek. The water quality monitoring program is briefly described. Changes in cropping patterns have been identified as an important variable to consider when evaluating land treatment and resulting changes in water quality. An erosion index representing crop type, acres planted and slope is being used to identify the effects of cropping patterns on water quality. External impacts including stream bank erosion, fish hatchery discharges, canal chaining and increased

flows for hydropower generation complicate interpretation of water quality trends.

366 Maret, T.R., T.A. Burton, G.W. Harvey, and W.H. Clark. In Press. Evaluation agricultural impacts on brown trout spawning success in Rock Creek, Twin Falls County, Idaho. N. Amer. Jour. Fish. Manage.

Salmonid spawning is a protected beneficial use of water quality in many western states. Several nonpoint source activities cause accelerated sedimentation, which adversely effects salmonid spawning. A methodology for monitoring sediment impacts on salmonid spawning success has been developed. The technique permits measurement of embryo survival, fine sediment accumulation and intergravel dissolved oxygen in artificial egg pockets placed in streams. Effects of sediment on egg survival and alevin escapement are dependent on watershed development and fine sediment size. Streams in geologies which produce silt & clay textured fines appeared to supress intergravel oxygen concentration & growth and survival of developing embryos. Salmonid spawning in Rock Creek is impaired by excessive sedimentation.

367 Marshall, R.B. 1914. Profile surveys in Snake River Basin, Idaho. U. S. Geol. Surv., Water-Supl. Pap. 347. 12 pp. plus 37 maps.

This publication consists mainly of profile maps showing elevations for the Snake River. One map shows the confluence of Rock Creek with the Snake River at about 2992 feet elevation.

368 Martin, D. 1984. Project profile Rock Creek Rural Clean Water Program. pp. 11-22, IN: National Water Quality Evaluation Project, Proceedings of the Rural Clean Water Program C,M&E Workshop. Nat. Water Qual. Eval. Proj., Raleigh, NC.

These proceedings present the presentations given by the five RCWP CM&E projects (ID, IL, PA, SD, and VT) on April 2-5, 1984 at Raleigh, NC. Background history and other information are presented concerning the study area and the project. The monitoring component of the Rock Creek RCWP is quite comprehensive. IDHW-DOE is the principal agency monitoring drainage water quality and the beneficial uses of Rock Creek by measuring trends in water chemistry, benthic macroinvertebrates, and fish populations.

369 Martin, D.M. 1981. Intensive monitoring work plan Rock Creek Rural Clean Water Program. Mimeo. ID Dept. H&W, Div Environ., Boise. 14 pp.

The work plan for water quality monitoring for the Rock Creek Rural Clean Water Program Comprehensive Monitoring and Evaluation are presented. Five Rock Creek stations will be sampled; all major irrigation drains (16 stations

on 9 drains) will be monitored; and 17 seep tunnels will be monitored during major rainstorm events in 1981. The chemical, physical and bacteriological monitoring parameters and schedules are listed. Biological monitoring (benthos) and fisheries (creel census and fish population assessment by electrofishing) will be done. A sampling schedule is given as well as an example of an angler interview form.

370 Martin, D.M. 1982. 1982 annual report Rock Creek RCWP intensive monitoring. ID Dpt. H&W, Div. Environ., Boise 2 pp.

This brief summary of the 1982 RCWP monitoring activities is Appendix III-2 of the annual report. It presents suspended sediment loadings for Rock Creek subbasins for the 1981 and 1982 irrigation seasons. During 1981 a total of 10,801 tons of suspended sediment entered Rock Creek via the subbasins and 7,515 tons entered the stream during 1982.

371 Martin, D.M. 1983. Rock Creek Rural Clean Water Program-comprehensive monitoring and evaluation, annual report. ID Dept. H&W, Div. Environ., Boise. 85 pp.

The RCWP subbasins had a reduction of 55% in suspended sediment delivered to Rock Creek in 1983 when compared to 1980 (pre-RCWP). An estimated 7,587 tons of suspended sediment was contributed to Rock Creek from unstable streambanks during the 1983 spring runoff. Downstream nutrient enrichment does occur annually in Rock Creek for both nitrogen and phosphorus. Total phosporus follows the pattern of suspended sediment. Ortho-phosphate concentrations were erratic. There has been a 25% reduction of total Kjeldahl nitrogen since 1980. The lower Rock Creek sites had reductions of fecal coliform bacteria of 75%. Pesticides were found in fish tissue but below that of U.S. Food and Drug Administration criteria.

372 Martin, D.M. 1983. Rock Creek Rural Clean Water Program-Idaho. Amer. Soc. Agr. Eng., 1983 Winter Mtgs., Chicago, IL. No. 83-2549. 74 pp.

The RCWP subbasins had a reduction of 55% in suspended sediment delivered to Rock Creek in 1983 when compared to 1980 (pre-RCWP). An estimated 7,587 tons of suspended sediment was contributed to Rock Creek from unstable streambanks during the 1983 spring runoff. Downstream nutrient enrichment does occur annually in Rock Creek for both nitrogen and phosphorus. Total phosporus follows the pattern of suspended sediment. Ortho-phosphate concentrations were erratic. There has been a 25% reduction of total Kjeldahl nitrogen since 1980. The lower Rock Creek sites had reductions of fecal coliform bacteria of 75%. Pesticides were found in fish tissue but below that of U.S. Food and Drug Administration criteria.

373 Martin, D.M. 1984. Rock Creek Rural Clean Water Program comprehensive monitoring and evaluation, annual report. ID Dept. H&W, Div. Environ., Boise. 151 pp.

Water quality trends were examined by the use of standard probability distributions, trends in annual log mean concentrations, differences in adjusted downstream values and flow-weighted mass export loadings. By 1983 BMP implementation had reached an average level of 36%. Significant reductions in suspended sediment concentrations were found at five of the six subbasin stations which discharge into Rock Creek. Suspended sediment concentrations averaged 55% less than 1981 levels. Phosphorus reductions were not as evident. Significant reductions in Kjeldahl nitrogen concentrations were found at all Rock Creek sites and three of six subbasin stations. Bacterial origins are from livestock. Some reduction in bacteria was seen.

374 Martin, D.M., P. Robillard, and W.H. Clark. 1988. Monitoring beneficial use conditions to determine the effectiveness of best management practices (BMP) implementation. Abstract, Rural Clean Water Program Workshop, Sept. 13. St. Paul, MN.

This presentation was made by Don Martin and Paul Robillard on 13 September 1988 at the Rural Clean Water Program Workshop in St. Paul, Minnesota. Monitoring the condition of instream beneficial uses to determine the effectiveness of BMP implementation is often termed off-site evaluation. The Rock Creek Rural Clean Water Program ws used as an example during the presentation. The importance of integration of other measures of beneficial use was stressed. In addition to water quality data and evaluation of the habitat component (physical, chemical and biological) is critical.

375 Martin, D.M., and S. Bauer. 1982. Water quality monitoring assessment of the rural clean water program: First year baseline report, Rock Creek water year 1981. ID Dept. H&W, Div. Environ., Boise. 68 pp.

This report represents the first year baseline report for the water quality monitoring assessment of the Rock Creek RCWP. It is included as Appendix III-1 of the annual report. The report covers an introduction to the project, materials and methods (covering survey design, chemical and biological monitoring), and results and discussion of the chemical and biological data. Some major findings discussed are: loading, implementation, baseline, and monitoring frequency for the subbasin monitoring; and loading in 1981, yearly trends in loading, sediment rating curves, and trend factors for Rock Creek itself. Nutrients, bacteria, pesticides in fish tissue, fisheries, and macroinvertebrates are also discussed. Information on storm related sediment loadings in Rock Creek are also presented.

376 McConnell, J.B. 1967. Chemical-quality investigations of surface water in Idaho, 1965-66. Open-File Rpt., U. S. Geol. Surv., Boise, ID. 25 pp.

This report deals generally with U.S.G.S. water quality investigations in Idaho. The Snake River reach between Milner and Twin Falls and between Twin Falls and Buhl are of interest to Rock Creek related research. The largest increase in dissolved solids concentration per mile of river occurred between Milner and Twin Falls (presumably from the large volumes of irrigation return flow, high in dissolved solids and sodium). The sodium concentrations were sufficient to cause to sharp increase in SAR. In the reach between Twin Falls and Buhl (the reach which receives water from Rock Creek), dissolved solids concentrations increased further, but SAR decreased. These changes in river water quality probably reflect interaction between additional return flows from irrigation and water discharging from the Snake Plain aquifer through springs.

377 Meyer, K.T. 1989. Three cities get bikepath grants. Idaho Currents. December: 1.

The cities of Caldwell, Weiser, Twin Falls received grants from the Idaho Department of Water Resources' Energy Division for bikepaths. The city of Twin Falls received a $32,000 grant which will help construct an 8-foot wide paved bike path in Rock Creek Canyon.

378 Mitchell, K. 1988. County wary of new fish farms. June 29. Times-News, Twin Falls, ID. Pp. B1-B2.

Twin Falls County officials are wary about the potential pollution risks of fish farms above Rock Creek. Proposals for three new fish farms on Deadman's Gulch may endanger the water quality of the creek. The county noted that Rock Creek was a popular floating and fishing location.

379 Moffat, D. 1983. Hydroelectric canal collapses. Aug. 17. Times-News, Twin Falls, ID. 1 pp.

Two large photographs of the concrete canal associated with the hydroelectric project on lower Rock Creek are shown. When the canal was tested a 280 foot section collapsed. A cause was not established but after the canal was rebuilt reinforcing metal angle iron was placed all along the top to hold the sides together. No pollution problems were mentioned in the article but a large load of sediment must have entered Rock Creek from the canal failure.

380 Moffatt, R.L., and M.L. Jones. 1984. Availability and chemistry of ground water on the Bruneau Plateau and adjacent eastern plain in Twin Falls County, south-central Idaho. U. S. Geol. Surv. Water-Resour. Invest. Rpt. 84-4065. 43 pp. + 2 pl.

This groundwater report concentrates on the Bruneau Plateau between the Bruneau River and Salmon Falls Creek (a portion of the Salmon Falls Tract includes the upper irrigated watershed for Rock Creek). Data are also included as far east as the Cassia County line (The Twin Falls South-Side Tract) and thus covers much of the Rock Creek watershed. Plate 1 shows the generalized geology of the area. Lower Rock Creek lies within Quaternary and Tertiary basalts. Plate 2 shows the potentiometric surface of the regional aquifer. This indicates that the water table just above the High Line Canal is at about 4100'; about 3900' at the Low Line Canal; 38-3600' in the Twin Falls area; and about 3300' near the mouth of Rock Creek. The majority of the Rock Creek watershed is irrigated by surface water. The aquifer to the west of Twin Falls is perched.

381 Molnau, M., and F.M. Winters. 1988. Mean annual precipitation map for Idaho. Resear. Tech. Compl. Rpt., ID Water Resour. Resear. Inst., Moscow. 39 pp.

This document provides the data for the mean annual precipitation map for Idaho to be published in 1989. The SNOTEL snow monitoring station on Magic Mountain (headwaters to Rock Creek) was used in making the map. The map will show precipitation for the Rock Creek area as well as the rest of Idaho.

382 Moon, J.H. 1988. Stricker friends say thanks. Times-News, Twin Falls, ID., Wednesday, July 13. 1 pp.

This article was a letter of thanks for the various groups, businesses, and agencies who helped the Idaho Land Improvement Contractors Association with the streambank stabilization project at the Stricker Ranch historic site along Rock Creek.

383 Moore, V. 1986. Fisheries management plan, 1986-1990. ID Dept. Fish & Game, Boise. 274 pp.

Rock Creek is covered in the section on Salmon Falls Creek, Goose Creek, Raft River, and other drainages south of the Snake River (pp. 201-208). Rock Creek is considered in the section "All other streams in Salmon Falls Creek drainage". The area is lissted as a coldwater fishery of "yield" type. It is noted for wild rainbow and cutthroat (where present) and its season and regulations are "general". Management directions for Idaho Department of Fish and Game are to emphasize protection of native cutthroat where present; not to stock rainbow trout where cutthroat are present; and to maintain a catch rate of 1.0 trout/hour.

384 Moreland, J.A. 1976. Digital-model analysis of the effects of water-use alternatives on spring discharges, Gooding and Jerome Counties, Idaho. Water Info. Bull 42. ID Dept. Water Resour., Boise. 46 pp.

Although this paper deals with springs dischaarging from

the Snake Plain aquifer between Milner and King Hill, part of the study area includes the lower portion of Rock Creek. The main recharge for the aquifer in this area is from irrigation return flows. Inflows from the south side of the Snake River are generally irrigation return water.

385 Mundorff, M.J., E.G. Crosthwaite, and C. Kilburn. 1964. Ground water for irrigation in the Snake River Basin in Idaho. U. S. Geol. Surv. Water-Supl. Pap. 1654. 224 pp.

The average annual runoff of Rock Creek was given at about 27,000 acre-feet during the period 1944-1953. About half of the runoff was diverted for irrigation, and depletion by irrigation is estimated to have been 7,000 acre feet.

386 Murrey, A.E. 1989. Idaho's agricultural pollution abatement plan, pp. vc1-vc7, IN: Nonpoint source pollution control workshop, technical issues, Irvine, CA.

This paper was presented at the Nonpoint Source Pollution Control Workshop, Technical Issues, held July 25-28, 1989 in Irvine, CA. The workshop was sponsored by the Western States Water Council. The paper describes Idaho's agricultural pollution abatement program and plan. The Rock Creek Rural Clean Water Program was used as an example project in the talk and accompanying slides.

387 Nace, R.L., I.S. McQueen, and A.V. Hul. 1958. Records of springs in the Snake River Valley, Jerome and Gooding Counties, Idaho 1899-1947. U.S. Geol. Surv. Water-Supp. Pap. 1463. 62 pp.

Many springs and seeps discharge water into the Snake River between Milner and Bliss, Idaho. This report brings together all obtainable records for the period 1899-1947. Included are several references to Rock Creek including one of a spring on the south side of Rock Creek with an estimated discharge of 1 cubic foot per second.

388 Nace, R.L., I.S. McQueen, and A.V. Hul. 1958. Records of springs in the Snake River Valley Jerome and Gooding Counties, Idaho, 1899-1947. U. S. Geol. Surv., Water-Supl. Pap. 1463. 62 pp.

Page 32 lists springs entering the Snake River between the mouth of Rock Creek and Crystal Springs.

389 National Oceanic and Atmospheric Administration. various dates. Climatological data, Idaho; and climatological data, annual summary, Idaho. Nat. Ocean. Atmosp. Admin., Asheville, NC.

These two summary reports (monthly and annual) are available from the National Climatic Data Center, Federal Building, Asheville, NC 28801-2696. They are in their 92nd year (1989). They provide information for the two climatological stations in the Twin Falls area (CSI and

WSO). Data includes precipitation, temperature, and evaporation.

390 National Water Quality Evaluation Project. 1985. Rural Clean Water Program, status report on the CM&E projects, supplemental report: analysis methods. National Water Quality Evaluation Project, Raleigh, North Carolina 71 pp.

This report is the National Water Quality Evaluation Project's supplement to their 1985 annual report on the Rural Clean Water Program Comprehensive Monitorina and Evaluation projects. [A revised edition of the report (mailed on April 14, 1985) is the correct version to consult.] It covers data analysis methods. Rock Creek RCWP is compared with the projects from Illinois & Vermont. The main topics covered are: preliminary data inspection; analysis of covariance; regression of hydrologic or meteorologic parameters versus time; simultaneous slope and intercept tests for regression analysis; analysis of variance between two related sets of data using time as an independent variable; and minimum detectable change in water quality parameters. A 25-55% reduction in suspended sediment is required for statistical significance.

391 National Water Quality Evaluation Project. 1985. Rural Clean Water Program, status report on the CM&E projects. National Water Quality Evaluation Project, Raleigh, North Carolina 122 pp.

Rock Creek, Idaho--RCWP 3 is highlighted in this report along with the other four CM&E projects. Major findings include: significant improvements in sediment concentration in irrigation drains; improvements are more rapid in arid regions; BMP costs were high; sediment control as a BMP is consistent with farmer preference; and economic offsite benefits include recreating (mostly fishing) and reduced ditch cleaning.

392 National Water Quality Evaluation Project. 1986. Summary of the 1986 RCWP data analysis workshop, July 21-23, 1986. U.S. Environ Protec. Agen., Washington, D.C. 166 pp.

This report is a summary of the July 21-23 Rural Clean Water Program data analysis workshop held in Chicago, IL. Most of the report concerns water quality data analysis discussions and overview of the individual projects. A fact sheet on the Rock Creek RCWP of two pages is included. In addition a table of sediment reduction coefficients for Rock Creek RCWP BMPs was included (data from Dr. David Carter). W. H. Clark served as recorder for the sections on "Paired Watershed Surface Water Projects" and "Linking Water Quality Trends to Land Treatment".

393 National Water Quality Evaluation Project. 1988. NWQEP 1987 annual report: status of agricultural nonpoint source projects. National Water Quality Evaluation Project, Raleigh, North Carolina. 214 pp.

This report was made using the 1986 (5-year) reports of the individual RCWPs. A summary of Rock Creek - RCWP 3 is given in eight pages. The following areas are covered: Project's major contributions toward understanding the effectiveness of NPS control efforts; the project's characteristics and results; lessons learned; project documents, and NWQEP project contacts. Forty-four references are listed for the project.

394 National Water Quality Evaluation Project. 1988. Rural Clean Water Program 1988 workshop proceedings, September 12-15, 1988, St. Paul, Minnesota. National Water Quality Evaluation Project, Raleigh, North Carolina. 190 pp.

These proceedings record the 1988 Rural Clean Water Program workshop held September 12-15, 1988, in St. Paul, Minnesota. RCWP projects in Idaho, Illinois and Pennsylvania, are used to illustrate cost-effectiveness. The Rock Creek RCWP is considered in the working session "Cost-effectiveness of BMP implementation" by Richard S. Magleby. The Rock Creek project was examined by gross erosion and sediment delivery equations in a linear programming model provided estimates of reductions in sediment loadings to Rock Creek. In Idaho the contracted BMPs, including high cost irrigation improvements & sediment retention basins, are estimated to reduce sediment loadings to rock creek by 13-24% with an average cost of $146,000 per 1% reduction. Conservation tillage should reduce sediment by 45-56%, a $30,000 per 1% reduction.

395 National Water Quality Evaluation Project. 1989. NWQEP 1988 annual report: status of agricultural nonpoint source projects. National Water Quality Evaluation Project, Raleigh, North Carolina. 169 pp.

Pages 42-50 of this report concern the Rock Creek Rural Clean Water Program. Major sections include: major contributions toward understanding the effectiveness of NPS control efforts; water quality goals and objectives; characteristics and results; lessons learned; and project documents. The land use activities and water quality monitoring efforts are discussed in detail. Of interest are the major points included in the "lessons learned" section: projects can succeed on a voluntary basis but non- participants can adversely impact results; irrigation drains appear to respond to land treatment faster than streams; water quality monitoring successfully quantified sediment loads; the need for followup education was pointed out so that land owners would continue practices after the project ends; and economic improvement was limited.

396 National Water Quality Evaluation Project. 1990. NWQEP Rural Clean Water Program COntacsts, September, 1990. NWQEP Notes. 46, 1 pp.

Contacts for the Dural Clean Water Program are listed for

all the national projects. Contacts for the Rock Creek, Idaho project are: Water Quality Monitoring, Terry Maret and Bill Clark; Land Treatment, Rich Yankey, Dave Detuillio, Jim McLaughlin, and Jean Greear; and Information and Education, Gayle Stover.

397 Nelson, C.R., and R.W. Baumann. 1987. The winter stonefly genus Capnura (Plecoptera: Capniidae) in North America: Systematics, phylogeny, and zoogeography. Trans. Amer. Entomol. Soc. 113: 1-28.

In this study of the winter stonefly genus Capnura, a species new to science was described from Rock Creek. Capnura intermontana Nelson and Baumann was collected from Rock Creek between Hansen and Rock Creek on 25 February 1984 by Baumann and Nelson. The species is known from Idaho, Oregon, and Utah.

398 Neubeiser, M.J. 1985. Rock Creek Rural Clean Water Project: the experiment continues. pp. 391-396 IN: U. S. Environmental Protection Agency, Perspectives on nonpoint source pollution, proceedings of a national conference. U.S. Environmental Protection Agency, Washington, D.C. 514 pp.

An introduction to the Rock Creek Rural Clean Water Program is given along with sections on program evolution, description of project area and irrigation system, landowner participation, comprehensive monitoring and evaluation, strategy for monitoring implementation effects, monitoring results and conclusions, and program changes. After only four years the Rock Creek RCWP has significantly helped meet reductions in targeted chemical parameters.

399 Neubeiser, M.J. 1985. Rock Creek Rural Clean Water Project: The experiment continues. Abstract. Proc. Perspectives on Nonpoint Source Pollution, Kansas City, MO. 1 pp.

This is the abstract of the paper by Neubeiser (1985) given at the national conference "Perspectives on nonpoint source pollution" in Kansas City, MO, May 19-22, 1985. The Rock Creek project is a cooperative effort involving many state and federal agencies and has resulted in some unexpected accomplishments in cleaning up one of Idaho's most severely degraded streams. Some equally unexpected problems and a major shift in planning strategy, involving conservation tillage, have come to the fore. The Rock Creek Rural Clean Water Project (RCWP) "experiment" has raised as many questions as it has answered. A voluntary program can be successful, even during a fair to poor economic climate. Valuable information is accumulating concerning changes in the concepts of treatment of nonpoint source pollution from furrow irrigated croplands.

400 Neubeiser, M.J. 1986. "Tons of success" for Rock Creek RCWP. ID Farmer-Stockman. October. pp. 12.

Background information is given on the experimental Rock Creek Rural Clean Water Program. According to the 1985 water quality monitoring report the project has met its objective of reducing sediment entering Rock Creek by 70%. The strong effort to plan and implement conservation tillage is stressed.

401 Neubeiser, M.J. 1986. Five-year extension gives RCWP project second wind to fight sediment. Acre Age, June. 1 pp.

The experimental Rock Creek Rural Clean Water Program received a five-year extension to continue BMP implementation and water quality monitoring. Poor economic times have resulted in a slower implementation rate than originally anticipated.

402 Neubeiser, M.J. 1987. Better farms, cleaner water. Soil Water Cons. News. June. pg 3.

This article is a review of the Rock Creek RCWP with emphasis on the success of the project to date. BMPs are reducing solid erosion and improving water quality in Rock Creek. At the end of the planning phase of the project 185 individual plans had been developed for treating 21,000 acres. Of the 4,000 BMPs in the plans, about 1,900 have been implemented. The rest are scheduled for completion by 1995.

403 Neubeiser, M.J. 1987. Motivating landowners in difficult economic times. Ann. Mtg., Soil Cons. Soc. Amer., Billings, MT. August. 17 pp.

This paper was presented at the annual meeting of the Soil Conservation Society of America in Billings, Montana in August. When the contracting phase of the Rock Creek RCWP concluded in September 1986, all of the planning goals set forth in the plan of work had been achieved. Suspended sediment has been reduced in drainage ditches and in Rock Creek. Good progress is being made towards adding conservation tillage to the water quality plans. The voluntary cost-share program approach is sound. A non-voluntary program would require a much larger expenditure for staff to regulate and enforce program requirements, and would undoubtedly weaken the hard-earned bonds of communication and cooperation developed among the various agencies and landowners.

404 Newell, R.L., and G.W. Minshall. 1977. An annotated list of the aquatic insects of southeastern Idaho, part II: Trichoptera. Great Basin Natur. 37: 253-257.

Distribution records for the Trichoptera occurring in the southeastern one-third of Idaho are summarized based on published records and recent collections. Cheumatopsyche campyla Ross (Hydropsychidae) was reported from Twin Falls

Co.: Rock Creek.

405 Newell, R.L., and G.W. Minshall. 1979. Aquatic invertebrates of southeastern Idaho II. Trichoptera (caddisflies). Jour. ID Acad. Sci. 15: 33-51.

Rock Creek in Twin Falls, County was one of the collection sites for Trichoptera. Cheumatopsyche campyla Ross (Hydropsychidae) was collected on from Rock Creek.

406 Nokkentved, N.S. 1989. Agency plans to conduct Rock Creek fish census. Times News, Twin Falls. March 10. Pp. B1-B2.

This article explains that surveys of fish in Rock Creek show conservation efforts are paying off in an increasing resident trout population. The article makes a public appeal for volunteers for the Division of Environmental Quality's fish population survey scheduled for March 1989. The electrofishing method is explained in the article. Fish are counted, weighed and measured for comparison with previous years. Surveys since 1984 show that a fish population has become re-established in the stream. This growing population indicates that water quality is improving. The large adult fish found in recent surveys indicate that habitat and water quality have improved enough to sustain a year-round population. The fish need clean gravel beds for spawning. Rainbow, German brown, and brook trout are found in Rock Creek.

407 Nokkentved, N.S. 1989. Specialist lauds water quality success of Rock Creek Project. Times News, Twin Falls. May 21. Page B-3.

Will Whelan of the Idaho Conservation League (ICL) said that the Rock Creek Project is a good example of what can be done to improve water quality at the annual ICL meeting at Redfish Lake, Idaho. He said "it shows that progress is possible". The Rock Creek Project is a good example of application of best management practices on agricultural lands to reduce erosion and related pollution. The project shows that voluntary compliance can work to protect recreation, fishing, wildlife, and drinking water. Will used the example to explain the state's anti-degradation agreement and the resulting Basin Area Meetings to be held in July.

408 Nokkentved, N.S. 1990. After a decade of hard work, Rock Creek flows clean again. Times- News, Twin Falls, ID. January 25, 1990. 2 pp.

A summary of the Rock Creek pollution problems and the Rock Creek Rural Clean Water Program is presented. Reductions in suspended sediment are presented. The project is characterized as very successful.

409 Nokkentved, N.S. 1990. The Snake River. Terminal? 1990. Times-News, Twin Falls, ID. 3 pp.

Problems with nutrient loadings to the middle Snake RIver are discussed. Rock Creek is listed asd one of the major tributaries to the middle Snake River. The clean up of Rock Creek has helped reduce pollutants from this source.

410 Nokkentved, N.S. 1991. State orders halt to damage along Rock Creek segment. Times News, Twin Falls, ID. March 19, 1991. 2 pp.

A local businessman's activity along Rock Creek has undermined state and local efforts to clean up the once-dead stream. Many trees were removed from along Rock Creek north of Orchard Drive and dirt has been pushed into the water. The Idaho Department of Water Resources has issued a cease-and-desist order against the responsible person. Studies by the Division of Environmental Quality have shown that eroding streambanks are the biggest portion of Rock Creek's sediment problem. Actions such as the one reported here only contribute to the problem. A photograph of the damage is included.

411 Oertel, B. 1988. Erosion control blankets saving old trading post. Land and Water 32(6): 8-9.

Preventing erosion while preserving history were the dual goals of this work weekend. This report along with eight photographs and a diagram illustrate the streambank stabilization work completed. The weekend of June 25-26, 1988, saw the activity a variety of volunteers. The Land Improvement Contractors of America (LICA), Idaho Chapter, did much of the earth moving and heavy equipment work. Equipment was donated by local businesses as were food and supplies for the weekend. The objectives were to stabilize a portion of Rock Creek's eroding streambanks and thus protect one of the historic buildings associated with the Stricker Cabin site as well as conduct a demonstration project on Rock Creek steambank stabilization. Two photographs show some of the work being done.

412 Parker, G.L. 1941. Surface water supply of the United States, 1940. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 903. 246 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1940. The discharge ranged from 95 cfs (March 29-30) to 298 cfs (August 30 and September 19). The mean flow was given at 183 cfs with a total run-off of 132,500 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles above, causes abrupt fluctuations in stage at times. Irrigation waste water and return flow from project lands enter above gage. The total number of second-foot-days was 74,185. Data are given for the 1939 calendar year.

413 Parker, G.L. 1941. Surface water supply of the United States, 1940. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 903. 246 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1940. The discharge ranged from 95 cfs (March 29-30) to 298 cfs (during August and September). The mean flow was given at 183 cfs with a total run-off of 132,500 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second-foot-days was 66,807. Data are also given for 1939 calendar yr.

414 Parker, G.L. 1942. Surface water supply of the United States, 1941. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 933. 246 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1941. The discharge ranged from 92 cfs (March 27-28) to 348 cfs (June 8). The mean flow was given at 186 cfs with a total run-off of 134,400 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles above, causes abrupt fluctuations in stage at times. Irrigation waste water and return flow from project lands enter above gage. The total number of second-foot-days was 67,773. Data are given for the 1940 calendar year.

415 Parker, G.L. 1944. Surface water supply of the United States, 1942. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 963. 232 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1942. The discharge ranged from 113 cfs (April 3) to 398 cfs (January 28). The mean flow was given at 223 cfs with a total run-off of 161,200 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles above, causes abrupt fluctuations in stage at times. Irrigation waste water and return flow from project lands enter above gage. The total number of second-foot-days was 81,257. Data are given for the 1941 calendar year.

416 Parker, G.L. 1945. Surface water supply of the United States, 1943. Part 13. Snake River Basin. U. S. Geol.

Surv., Water-Supl. Pap. 983. 233 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1943. The discharge ranged from 136 cfs (during January and February) to 380 cfs (June 14). The mean flow was given at 228 cfs with a total run-off of 164,900 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second-foot-days was 83,151. Data are also given for 1942 calendar yr.

417 Parliman, D.J. 1988. Idaho ground-water quality, pp. 229-236, IN: U.S. Geological Survey, National water summary 1986, hydrologic events and ground-water quality. U. S. Geol. Surv. Water-Sup. Pap. 2325.

Idaho ranks as one of the top five states in the nation for volume of ground water used. The Twin Falls/Rock Creek area is shown to be in the basalt aquifer area and the upper Rock Creek watershed is in the sedimentary/volcanic aquifer area. The lower Rock Creek area around Twin Falls is listed as and area of ground-water quality concern. Currently nitrate/nitrate has a mean value of about 1 mg/L; dissolved solids at about 250 mg/L; a pH of between 7 and 8; hardness of about 200 mg/L (as CaCO3); and fluoride of 0.4 mg/L. Maximum values for these and other parameters are also given. The final page contains a photograph of an open-hole well construction type frequently used in Idaho. It is south of Kimberly on 3500 East Road near Rock Creek sample site S-5. Ground water quality information for the entire state is summarized in this publication.

418 Parliman, D.J., and H.W. Young. 1987. Selected Water-Quality Data for the Murtaugh Lake Area, South-Central Idaho, June 1987. U.S. Geological Survey Open-file report 87-466. 1 map plus 1 table.

The purpose of this study was to determine concentrations of nitrogen compounds in ground water in the Murtaugh Lake area. Murtaugh Lake is 2 miles south of the Snake River and about 18 miles west of Burley, Idaho, and feeds the Twin Falls Canal system. The scope of the study was limited to inventorying 45 wells. Onsite determinations were made of specific conductance, pH, water temperature, and concentrations of alkalinity, dissolved chloride, and dissolved nitrite plus nitrate (as nitrogen) and ammonia plus organic nitrogen (as nitrogen).

419 Patrico, J., D. Seim, and C. Johnson. 1990. "Dead" creek lives again. Farm Jour., March, 114(5):19-21.

This article briefly describes the past history of

pollution in Rock Creek and the Rural Clean Water Program. Ity concludes that taen years and $64 million later, the Rural Clean Water Program pays off. The Rock Creek project is briefly compared to several other Rural Clean Water projects. Mention is made of the 78% reduction in suspended sediment seen through the project. Several photographs of local farmers and their quotes are included.

420 Paulsen, C.G. 1940. Surface water supply of the United States, 1939. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 883. 315 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for Nov. 1938-July 1939. A min. of 5.2 (July 21) & a max. of 89 cfs (Apr 30-May 1) was given. Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1939. The discharge ranged from 135 cfs (March 29) to 358 cfs (April 15). The mean flow was given at 203 cfs with a total run-off of 147,200 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 miles above, causes abrupt fluctuations in stage at times. The total number of second-foot-days was 74,185. Data are given for the 1938 calendar year. Summary data is presented for 1923-1939.

421 Paulsen, C.G. 1949. Surface water supply of the United States, 1946. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1063. 262 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A min. of 8.3, max. of 278 cfs & runoff of 29,450 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1946. The discharge ranged from 124 cfs (Feb. 16-17, 23) to 349 cfs (Sept. 4). The mean flow was given at 215 cfs with a total run-off of 155,800 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second -foot-days was 78,556. Data are given for 1945 calendar yr.

422 Paulsen, C.G. 1950. Surface water supply of the United States, 1947. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1093. 260 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A min. of 6.4, max. of 126 cfs & runoff of 18,550 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending

September 30, 1947. The discharge ranged from 175 cfs (Jan. 11) to 436 cfs (June 9). The mean flow was given at 237 cfs with a total run-off of 14,570 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second -foot-days was 7,347. Data are given for 1946 calendar yr.

423 Paulsen, C.G. 1951. Surface water supply of the United States, 1948. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1123. 269 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 4.4 (September 14) and a maximum of 225 (May 18) cfs, a mean of 30.7 cfs, and runoff of 18,550 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1948. Total number of second-foot-days was 11,240. Data are given for 1947 calendar yr. Small ranch diversions above station are noted.

424 Paulsen, C.G. 1952. Surface water supply of the United States, 1949. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1153. 264 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 5.7 (August 27) and a maximum of 230 (April 25) cfs, a mean of 36.8 cfs, and runoff of 26,650 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1949. Total number of second-foot-days was 13,434. Data are given for 1948 calendar yr. Small ranch diversions above station are noted.

425 Paulsen, C.G. 1953. Surface water supply of the United States, 1950. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1183. 250 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 6.6 (September 1-6) and a maximum of 252 (May 16) cfs, a mean of 37.3 cfs, and runoff of 26,650 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1950. Total number of second-foot-days was 13,607. Data are given for 1949 calendar yr. Small ranch diversions above station are noted.

426 Paulsen, C.G. 1954. Surface water supply of the United States, 1951. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1217. 257 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 7.6 and a maximum of 257 cfs, a mean of 46.3 cfs, and runoff of 33,520 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1951. Data are also presented for calendar year 1950. Small ranch diversions above station are noted.

427 Piper, S., C.E. Young, and R. Magleby. 1989. Benefit and cost insights from the Rural Clean Water Program. Jour. Soil Water Conser. 44: 203-208.

This article is an overall economic review of the 21 Rural Clean Water Program (RCWP) projects in the United States. One-third to two-thirds of the 21 projects are likely to generate positive net benefits. The costs Much has been gained from the program and the information gained is valuable in targeting areas for future nonpoint source pollution control projects. The conclusion was that as an experimental program, RCWP has been successful. The Rock Creek RCWP had the following attributes listed: water quality problems (turbidigy, sediment); impaired uses (recreation, ditch maintenance); approx. % of pollutant from ag. land within RCWP project (100); ;% critical area under contract (69); water quality improvement to date (yes); realistic water quality goals (yes); & water quality improvement likely (yes). Benefits are listed as low.

428 Piper, S., R.S. Magleby, and C.E. Young. 1989. Economic benefit considerations in selecting water quality projects. Insights from the Rural Clean Water Program. AGES 89-18, U. S. Dept. Agric., Econ. Resear. Svce., Washington, D. C. 28 pp.

The Rural Clean Water Program was initiated in 1980 to demonstrate the effectiveness of improved agricultuiral land management practices in enhancing water quality. Projects that preserve or improve water quality in a heavily used lake or estuary appear to have the greatest potential for generating net benefits. This appears particularly true for projects with recreational or commercial fishing impairments. About a third of the projects have good prospects for generating net benefits under acurraent circumstances. Another third have the potential for generating benefits if they beacome part of a larger program that successfully preserves or expands downstream water uses. Major impaired uses for Rock Creek are recreation and irrigation systems. Water quality has improved under RCWP & is likely to continue to improve.

429 Plafkin, J.L. 1989. Rapid bioassessment workshop. An overview of applications, methods, and assessment approach. EA Eng., Sci. Tech., Inc., Sparks, MD. unpaged.

This workshop was held in Twin Falls, ID, 12-14 September 1989 and was co-hosted by the Rock Creek Rural Clean Water

Program and the Idaho Division of Environmental Quality. Approximately 60 people from across the nation attended. Rock Creek was the local example used for the benthic macroinvertebrate and fish protocols. The last chapter of the workbook. Case Study Site, included general information and maps for the Rock Creek study. Specific analysis was made of benthic samples taken on 21 Sept. 1988 at Stations S-6, S-5, and S-3. The data show that S-5 is slightly impaired and S-3 moderately impaired as compared to the reference station (S-6). Aquatic habitat quality was slightly less than 90% of the reference and considered "supporting". Fish data was taken from Clark (1989, Rock Creek RCWP water quality monitoring report).

430 Pratter, M. 1987. Farmers told to cut back on tilling. Times-News, Twin Falls, ID. pg. B-10.

This article describes the conservation tillage tour taken in July 1987 around the Rock Creek Rural Clean Water Program project area. The tour visited farms where conservation tillage was being used and the individual farmers were on hand to explain what they had done and how they felt the results would be at harvest time.

431 Pratter, M. 1987. Group cheers Rock Creek cleanup. Sept. 18. Times-News, Twin Falls, ID. Pp. B-1-B-2.

Dedication of the Rock Creek Rural Clean Water Program and the Rock Creek sign in Rock Creek Park on September 17, 1987 is described and illustrated. Roy Jesser received a special award from Gov. Andrus for his work on conservation projects, including the LQ Drain and Rock Creek RCWP. A photograpgh of the park, sign and some of the people present at the dedication is included.

432 Pratter, M. 1987. Rising fish count shows Rock Creek clean-up at work. March 20. Times-News, Twin Falls, ID. Pp. B1-B2.

This news article described the 1987 fish population survey on Rock Creek. Trout populations have increased since 1981. The fish are also used as indicators of pesticide usage in the watershed.

433 Ralston, D.R., R. Broadhead, and D.L. Grant. 1984. Hydrologic and legal assessment of ground water management alternatives for Idaho. Resear. Tech. Compl. Rpt, ID Water Resour. Resear. Inst., Univ. ID., Moscow. 159 pp.

This report is a hydrologic and legal assessment of conjunctive management of surface and ground water with emphasis on the water resources of the upper Snake River Basin in Idaho. Eleven basins tributary to the upper Snake River were selected for detailed study based upon existing data and the Rock Creek-Goose Creek area was one selected. The location and geology of the area is discussed. Ground water and surface water aspects are discussed also. The

ground water in the area occurs under confined, unconfined, and perched conditions. Surface and ground water is interconnected throughout the area. Ground water dischrge from the area is estimated to be 94,000 acre-feet/ year. The average surface water discharge from Rock Creek and Dry Creek combined is 13,000 acre-feet/year. Most of the south side tributaries have overdevelopment problems.

434 Ralston, D.R., and N.C. Young. 1971. Water resources of the Twin Falls tract, Twin Falls County, Idaho. Water Information Bull. 22, ID Dept. Water Admin., Boise. 57 pp.

The water resources of the 350 square mile Twin Falls Canal Company tract are evaluated by assimilation of available hydrologic and geologic data. Most of the flow of Rock Creek is derived from precipitation and irrigation water applied to the tract. Rock Creek output is 167,000 acre-feet per year. Subsurface inflow from the Rock Creek-Milner Low Lift area has been estimated at 58,000 acre-feet. Consumptive use of water by crops is given for the area. Water quality data (Na, K, Cl, Ca, HCO3, Mg2, SO4, and electrical conductivity) are given for the Rock Creek area. Information on water rights is presented.

435 Ringert, W.F. 1986. Irrigation districts purpose, history, funding, and problems. Idaho Yesterdays 30(1-2): 64-76.

The purpose, history, funding and various problems facing irrigation districts in Idaho are discussed in this review article. Information concerning the formation and history of the Twin Falls Canal Company is provided.

436 Robbins, C.W. 1977. Hydraulic conductivity and moisture retention characteristics of southern Idaho's silt loam soils. Resear. Bull 99. Ag. Expt. Sta., Univ ID, Moscow. 13 pp.

This bulletin brings together some physical and hydraulic data for the silt loam soils (including the Portneuf Silt Loam which includes much of the Rock Creek study area) of southern Idaho. The silt loam soils generally have irregular topography and depth due to the underlying basalt lava flow. The fractured basalt bedrock provides good drainage under natural conditions although the application of irrigation water to some areas has caused isolated wet spots that have to be artificially drained. Hydraulic conductivity, bulk density and moisture retention characteristics of surface soils were not affected by cropping histories. These properties varied greatly in the hard layers. The rates of water flow away from lagoons and manure and waste water holding ponds can be calculated from the data provided.

437 Robbins, C.W., and C.E. Brockway. 1978. Irrigation water salt concentration influences on sediment removal by ponds. Soil Sci. Soc. Amer. Jour. 42: 478-481.

Three sediment ponds that collected runoff water from rowcropped land irrigated with low total salt waters were studied to determine if salt concentration changed sediment pond efficiencies. One of the ponds was near Twin Falls, Idaho in Portneuf silt loam soil. Increasing salt concentration increases the sediment removal efficiency of sediment ponds. Sediment pond data should be compared with similar ponds in similar soils. If different soils are compared, different sediment removal efficiencies will be in effect and the results will be in error.

438 Robbins, C.W., and D.L. Carter. 1975. Conservation of sediment in irrigation runoff. IN: Journal of Soil and Water Conservation. May-June, Vol 30, No. 3. pp. 134-35.

A study of 202,000 acres served by the Twin Falls Canal Company in south central Idaho showed about 150 natural and man-made ponds that act as settling basins for irrigation runoff. Farmers may use sediment collected in these basins to improve the land's topography while reducing the downstream sediment load. A 1.1 acre test pond captured 1,254 tons of sediment from 167 acre-feet of water in 1972, and 1.379 tons of sediment from 185 acre-feet of water in 1973, raising the deepest point by 38 inches and eliminating a previously swampy area. It was estimated the pond removed 85 percent of the sediment in the runoff water. Effective sediment ponds can be built with a minumum of cost but are only an emergency solution to sediment source control.

439 Robbins, C.W., and D.L. Carter. 1980. Nitrate-nitrogen leached below the root zone during and following alfalfa. Jour. Environ. Qual. 9(3): 447-450.

The nitrate-nitrogen contribution to subsurface drainage water by irrigated alfalfa (Medicago sativa L.) in crop rotations was evaluated by measuring the soil water flux and nitrate concentration below the root zone of alfalfa and crops following alfalfa with and without additional nitrogen fertilization on Portneuf silt loam in the Rock Creek area. After plow out of alfalfa, nitrogen using plants (such as corn and barley) should be planted. Early irrigations carry nitrate past the area where the new crop can use it and into the groundwater. Care should be used in determining N fertilizer application rates and timing to crops planted on land plowed out of alfalfa and irrigation should be carefully managed to avoid leaching any more nitrate out of the new crop root zone than necessary.

440 Robison, C.W. 1984. Irrigation runoff sediment removal with vegetal filters. Thesis, Univ. ID, Moscow. 131 pp.

Erosion of topsoil by surface irrigation and the resulting water quality degradation in receiving streams are the major reasons for this work. The research deals with return flow sediment from furrow irrigated fields; however,

it may be applicable to other sedimentation problems having similar characteristics. Vegetal filter strips of small cereal grains with moderately dense stands reduced sediment losses by 80%. High density stands of small cereal grains did not significantly improve the removal efficiency. A computer model (FILTR) was developed to examine the operating characteristics of vegetal filters. The model underpredicted the removal efficiency possibly because of sediment deposition in the filter which changed the furrow hydraulics upstream of the filter.

441 Rosholt, J. 1986. Irrigation and politics. Idaho Yesterdays. 30: 20-25.

Politics and water are inseparable in Idaho. One thousand gallons of domestic water costs $1.08 in Twin Falls. Irrigation water costs 8.8 mills on the Twin Falls tract. The largest requests for land under the Carey Act were the Twin Falls Canal Company for 200,000 acres. There have been four significant confrontations in the formation and operation of the Twin Falls tract in the Magic Valley: 1) in 1898 the Snake River Canyon was proposed as a national park; 2)in 1901 a filing for power development at Shoshone Falls required condemnation of adjacent lands; 3) in 1908 a legal case involving appropriation of Snake River current and the rights of the public was tried; and 4) a second court case was held to determine who was responsible for the costs of water diversion.

442 Runsvold, J.M. 1980. Reducing sediment in Idaho's irrigation return flows. Paper pressented to Environmental Law class, Boise State Univ., Boise, ID. 29 pp.

This paper is a good review of the problem of sediment in irrigation return flows in Idaho. The LQ Drain study and Rock Creek Rural Clean Water Program are listed as a couple of attempts to regulate and monitor nonpoint source pollution entering Idaho's surface waters through irrigation return flows. These projects were not covered in detail.

443 Russell, I.C. 1902. Geology and water resources of the Snake River Plains of Idaho. U. S. Geol. Surv. Bull. 199. 192 pp.

This classic work contains some information about Rock Creek which is described as draining the Rock Creek Hills. The Rock Creek Hills are described as having a sheet of rhyolite forming their surface. The suggestion is made that favorable artesian conditions exist along Rock Creek. In the valley of Rock Creek about 3 miles south of Rock Creek post office a 275 foot 6" well was put down in 1899. Water rose at first to a height of about 20 feet. South of this well another well was drilled which had an estimated temperature of 75°F. Springs are numerous in the area and supply Rock Creek, which flows throughout the year to below Rock Creek post-office, where its water is all used for

irrigation. Other artesian wells are described from the area. Wells of 50 and 75 feet depth 4 miles west of the post office produced warm water.

444 Ryan, C. 1989. Effective nonpoint source public education and outreach: A review of selected programs in Region 10. U. S. Environ. Protect. Agency, Seattle, WA. 44 pp.

This report gives public education and outreach methods and results for selected nonpoint source projects in the Pacific Northwest. The Rock Creek Rural Clean Water Program was described as to the site and background of water quality problems. The public eduction and outreach activities included: a video on the compliance requirements of the Food Security Act; awards banquets to recognize outstanding cooperators; poster contests in schools; a LICA field day to help stabilize eroding streambanks; district sponsored tours of conservation tillage fields; classes on water quality taught to school children; a display used at local meetings, conventions, fairs, etc.; conservation tillage signs that are posted on visible farms; newspaper and radio coverage; a newsletter (325 people, 3-4 times per year); and fact sheets.

445 Salisbury, M. 1988. Fishy business. Times-News, Twin Falls, ID. March 21. 1 pp.

A large photograph of the March 20th fish population survey on Rock Creek station S-8 was shown with a brief caption.

446 Sampson, N. 1979. New approaches of Idaho's SRCD conserves water, prevents erosion. pp. 156-157, IN: Implementation of the Federal Water Pollution Control Act (Nonpoint pollution and the areawide waste treatment management program). Hearings before the subcommittee on oversight and review of the committee on public works and transportation U.S. House of Representatives, 96th Congress 1st Session. U.S. GPO, Washington, D.C. 1049 pp.

This article was part of an attachment to testimony of Neil Sampson, NACD, July 11, 1979. The article was reprinted from Tuesday Letter, published by NACD. The article was chosen to show some of the variety of projects being carried out around the nation as conservation districts work with farmers and ranchers, local, state and federal agencies to develop effective, economic solutions to nonpoint source agricultural pollution problems. The article describes the success of the LQ Drain study - a 70% reduction in sediment after the first operating year of the project. Some BMPs are also described: vegetative filter strips; "T"-slots; and large retention basins. Several photographs show some of the BMPs.

447 Sampson, N. 1979. Statement on Agricultural nonpoint pollution and the 208 program. pp. 254-263, IN: Implementation of the Federal Water Pollution Control Act (Nonpoint pollution and the areawide waste treatment

management program). Hearings before the subcommittee on oversight and review of the committee on public works and transportation U.S. House of Representatives, 96th Congress 1st Session. U.S. GPO, Washington, D.C. 1049 pp.

The LQ Drain Irrigatiion Project in Twin Falls County, Idaho is listed as one of two specific examples where meaningful relationships have been determined between the cause and effect relationships between agricultural practices, conservation measures (best management practices) and water quality on pilot-size areas and the information is being used to develop programs on larger areas.

448 Sampson, N., L. Berger, and T. Barlow. 1979. Statements by a panel consisting of Neil Sampson et al. pp. 254-263, IN: Implementation of the Federal Water Pollution Control Act (Nonpoint pollution and the areawide waste treatment management program). Hearings before the subcommittee on oversight and review of the committee on public works and transportation U.S. House of Representatives, 96th Congress 1st Session. U.S. GPO, Washington, D.C. 1049 pp.

This document lists statements by a panel consisting of: Neil Sampson, Vice President, Natioinal Association of Conservation Districts; Leo Berger, President, Colorado Association of Conservation Districts; and Thomas Barlow, Natural Reources Defense Council. Neil Sampson stated that "We have talked about the need to learn cause and effect relationships. In Idaho, on irrigated farms in the Snake River Plain, a little project conducted by the Snake River Conservation District removed 70% of the sediment delivery into the Snake River in a 1-year test. It cost them $2 a ton to keep it out of the river, which related to a cost of $4 per acre for the actual expenditures on the land. It was neither expensive, nor was it impossible." The reference was made to the LQ Drain study which supplied technology to the Rock Creek RCWP.

449 Saveson, S. 1986. Cool, cool water. Times-News, Twin Falls, ID. Aug. 5. 1 pp.

This large photograph points to one of many uses of Rock Creek - tubing. Hot temperatures brought more use (heat-beating pursuits) to Rock Creek this week.

450 Saveson, S. 1986. Thinking spring. Times-News, Twin Falls, ID. November. 1 pp.

This large photograph shows two people fishing Rock Creek, at Rock Creek Park in Twin Falls in the fall. Fall fishing is common now along Rock Creek.

451 Saveson, S. 1987. Park expansion underway. Times-News, Twin Falls, ID. 1 pp.

This brief article contained a large photograph of the

expansion of Rock Creek Park to the north side of Rock Creek. Two bridges will cross Rock Creek to reach the 9 acre expansion. Work is expected to be complete by December 1988.

452 Schorzman, D. 1988. Volunteers give Stricker Ranch area a facelift. Magic Valley Farm Lines, July: 18.

This article was a letter of thanks for the various groups, businesses, and agencies who helped the Idaho Land Improvement Contractors Association with the streambank stabilization project at the Stricker Ranch historic site along Rock Creek. In addition it contained a more detailed description of the streambank stabilization work that was done and included two photographs of the site.

453 Schulz, E.R. 1980. An investigation of the feasibility of several small-scale hydroelectric power sites on the Snake River and its tributaries near Twin Falls, Idaho. M. S. Thesis, Univ. ID, Moscow.

The overall feasibilities of several small hydroelectric power sites along the Snake River and tributaries (including Rock Creek) [illegible] Twin Falls-Hagerman area. Two alternatives are [illegible] Rock Creek Canyon Site: High Diversion Alt[illegible] Diversion Alternative. The High diversion alternative describes what is presently Rock Creek Hydro I (a diversion above the mouth and water transported along the creek) and is given a very low feasibility rating because "Rock Creek supports excellent trout populations which migrate in and out of the stream from the Snake River. The existing fishery is very popular. Without the maintenance of a substantial minimum flow in this reach, the fishery impact would be disastr-ous." This diversion is at the mouth of the creek & is again given a very low feasibility for similar reasons.

454 Seitz, H.R., A.M. La Sala, Jr., and J.A. Moreland. 1977. Effects of drain wells on the ground-water quality of the western Snake Plain Aquifer, Idaho. U. S. Geol. Surv. Open-File Rpt 76-673. 34 pp. + 1 map.

Rock Creek lies on the southern boundary of the Snake Plain Aquifer but the lower reach is considered to be in the Snake River Plain. Figure 7 shows Rock Creek in relation to the High Line Canal and Low Line Canal. Approximately 3,100 drain wells are used in the area to insject irrigation waste water, urban runoff, septic-tank effluent, and industrial waste water into the western Snake Plain Aquiver. This method of waste water discharge causes pollution of the groundwater.

455 Simpson, J.C., and R.L. Wallace. 1978. Fishes of Idaho. Univ. Press ID, Moscow. 237 pp.

This is the first book on Idaho fishes. It includes information on 67 species (in 13 families). Each species

is shown on a distribution map of major drainages in the state. The following fish are shown for Rock Creek: Rainbow trout (Salmo gairdneri); and redside shiner (Richardsonius balteatus).

456 Smith, J.H., C.L. Douglas, and J.A. Bondurant. 1972. Microbiological Quality of Subsurface Drainage Water from Irrigated Agricultural Land. J. Environ. Quality, Vol. 1, no. 3. pp. 308-311.

Irrigation and subsurface drainage waters sampled from an irrigation district in southern Idaho were evaluated for bacteriological quality. Water samples were obtained at 2-week intervals from tunnels amd drains carrying fairly large amounts of water representative of typical agricultural areas in the Twin Falls irrigation district. Water diverted from the regular flow and passed through the soil contained 5 or fewer coliforms per 100 mL as compared to counts of 140 to 3300 coliforms per 100 mL in surface waters. Percolation through the soil improved the water quality almost to domestic water standards.

457 Smith, J.H., and C.L. Douglas. 1973. Microbiological Quality of Surface Drainage Water From Three Small Irrigated Watersheds in Southern Idaho. J. Environ. Quality, Vol. 2, no. 1. pp. 110-112.

The irrigation waters applied to and the surface drainage waters leaving three small watersheds in southern Idaho were analyzed for coliforms and other microorganisms and for biochemical oxygen demand (BOD). Numbers of coliforms and fecal coliforms tended to be greater in the drainage than in the irrigation water, but the differences were generally within the confidence limits. Fecal streptococci numbers were higher in the drainage than in the irrigation water on two of the three watersheds; otherwise, the bacteriological quality of the irrigation water was not significantly changed by irrigation use. BOD in the drainage water samples averaged 4 mg/L oxygen demand compared with 2 mg/L in the irrigation water. All three watersheds were located near Twin Falls, Idaho and received water from the Twin Falls Canal or a secondary lateral.

458 Smith, M.A. 1979. Snake River nutrient analysis executive summary and general nutrient control plan. ID Dept. H&W, Div. Environ., Boise. 25 pp.

This report was prepared as part of the statewide 208 planning. The available data on the Snake River from the Idaho-Wyoming border to Weiser shows a general increase in nutrient concentrations from upstream to downstream. Rock Creek was listed as a tributary which impacts the Snake River in the Magic Valley. The major point sources of phosphorus were either discharging to the City of Twin Falls STP or provided land treatment. Therefore, the most important mechanism to reduce total phosphorus should be the application of best management practices to nonpoint

sources through the Agricultural Pollution Abatement Plan. A 1979 208 project was proposed to develop an implementation plan for Rock Creek and the stream could also become a special Rural Clean Water Program project.

459 Snake River Conservation Research Center. 1986. List of publications. U.S. Dept. Agr., Snake River Cons. Res. Cent., Kimberly, ID. 27 pp.

A total of 586 publications are listed for the research center from 1963 through 1986. The publications deal with a wide variety of irrigation and BMP problems as well as agricultural nonpoint source pollution. The majority of the research was conducted on the Twin Falls Tract, on or near the Rock Creek watershed.

460 Snake River Soil Conservation District. 1978. The irrigation return flow study. Snake River Soil Conservation District, Twin Falls, ID. Mimeo. Rpt. 16 pp.

The Snake River Soil Conservation District recommends that a voluntary sediment control program be implemented for a period of five years. Some areas may require additional time. Analysis of the project program should be conducted by an impartial local group. A regulatory program should be implemented as a last resort only. Administration should be by the local soil conservation district. Best management practices to control sediment should be given first priority by all federal, state, and local agencies for technical and financial assistance. Technology used on Rock Creek RCWP.

461 Snake River Soil Conservation District. 1980. The irrigation return flow study. Snake River Soil Conservation District, Twin Falls, ID. Mimeo. Rpt. 20 pp.

This is an annual report on the LQ Drain project. The LQ water quality project has demonstrated that the Snake River Soil Conservation District has the ability to administer and carry out a successful nonpoint pollution control program. Sediment reductions have been dramatic.

462 Snake River Soil and Water Conservation District. 1982. Snake River Soil and Water Conservation District newsletter, 1981 Annual Report. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter is the 1981 annual report for the Snake River Soil and Water Conservation District. The issue introduces the Rock Creek Rural Clean Water Program. Mention is made of various staff members working on the project. The spring of 1980 started off fast and furious for the Rock Creek RCWP. Water quality plans were developed with individual farmers so they could install best management practices prior to the irrigation season. Twenty-two plans were written and many BMPs installed. All of athe plans written in the spring were implemented and

had a noticeable effect on keeping sediment from reaching Rock Creek. At the end of the irrigation season, approximataely 12,000 tons of sediment had been trapped on the 22 farms and prevented frrom reaching Rock Creek. WQ monitoring is done to show the effectiveness of BMPs.

463 Snake River Soil and Water Conservation District. 1983. Snake River Soil and Water Conservation District newsletter, 1982 Annual Report. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter is the 1982 annual report for the Snake River Soil and Water Conservation District. The Rock Creek Rural Clean Water Project Board is described. During 1982 andother 47 wataer quality plans were developed and approved for a total of 80. Over 300 separate practices were implemented. Intensive monitoring efforts have shown a significant reduction in sediment loading since 1980. The ongoing data colklection and results could have a far reaching impact on similar programs across the country. The water quality monitoring done by the State Division of Environment demonstrated significant reductions in pollutants going into Rock Creek. Total sediment going into Rock Creek from the subbasins monitored was down 46% from 1980 levels. Subbasin 7, which has the most BMPs installed had an 89% reduction in sediment loading.

464 Snake River Soil and Water Conservation District. 1984. Snake River Soil and Water Conservation District newsletter, 1983 Annual Report. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1983 annual report for the Snake River Soil and Water Conservation District. The results of this year's activities on the Rock Creek Rural Clean Water Project were listed: Three supervisors of the Twin Falls District, Tom Kunkel, Melvin Jangels, and Maurice Fuller, served on the Rock Creek Rural Clean Water Project Board in 1983. The Rock Creek Project includes 107 acontracts signed by landowners and operators farming 12,668 acres in the Rock Creek Drainage. This includes 33 percent of the estimated 34,800 acres of farmland contributing sediment to Rock Creek. Water sampling during 1983 showed a 50 percent reduction in the volume of sediment entering Rock Creek from the project area compared with that of previous years.

465 Snake River Soil and Water Conservation District. 1985. Snake River Soil and Water Conservation District newsletter, 1984 Annual Report. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1984 annual report for the Snake River Soil and Water Conservation District. The Rock Creek Rural Clean Water Program again was an important section of the newsletter. The year 1984 was another successful one for the Rock Creek RCWP. An additional 39

contracts, involving about 4,800 acres, were approved. BMPs used were vegetative filter strips, sediment basins, mini-basins, I/T slots, burried pipe runoff systems, runoff control systems, concrete ditch, pipline, gated pipe, and irrigation water management. Amounts contracted and implemented during 1984 and total were given.

466 Snake River Soil and Water Conservation District. 1986. Rock Creek Rural Clean Water Program. Snake River Soil Water Cons. Dist. Newsletter. Pp. 3-4.

This newsletter represents the 1985 annual report of the Snake River Soil and Water Conservation District, Twin Falls, ID. An update was given on the status of the Rock Creek Rural Clean Water Program. There are 165 contracts with farmers to implement best management practices and this is shown in table form. This year marks the first of a five year extension on the monitoring activities and more emphasis on conservation tillage. Notice was made to let farmers know that they could still contract on the project until September 30, 1986.

467 Snake River Soil and Water Conservation District. 1987. Snake River Soil and Water Conservation District Annual Report for 1986. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1986 annual report for the Twin Falls Soil Conservation District. The Rock Creek Rural Clean Water Project has completed the sign-up phase for conservation practices. There are cost-share funds available for no-till and minimum-till if some one wants to change their plans. A total of 185 long term water quality contracts were approved, involving 21,147 acres since 1980. Over 4,000 individual BMPs were planned and 2,000 have been implemented. IDHW-DOE reports a continued reductiion of sediment loading from cropland runoff into Rock Creek. Their studies also indicate an increase of wild trout populations in several segments of the stream. About 1,650 acres of conservation tillage was planned. Soil erosion can be reduced from 50-90% under minimum tillage, depending upon the crops involved and tillage used.

468 Snake River Soil and Water Conservation District. 1988. Snake River Soil and Water Conservation District Annual Report for 1987. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter is the 1987 annual report for the Snake River Soil and Water Conservation District. Included is a notice of the Rock Creek Rural Clean Water Project Board which consists of Tom Kunkel, Maurice Fuller, Jim Lanting, Mel Jagels, Roy Jesser, Tom Sharp, Brian Olmstead and Ron Jones. The September 17 dedication of the Rock Creek Project at Rock Creek Park was also covered. The sign made of the Gary Stone painting was described. The program for the dedication was outlined. The conservation tillage tour

taken in July was described. A noontime talk by Bill Clark discussed some of the latest challenges and results of the current monitoring activities especially in relation to fisheries research on Rock Creek. In addition sections were included on conservation tillage in the Rock Creek, an award to Roy Jesser, and engineering and RCWP.

469 Snake River Soil and Water Conservation District. 1989. Snake River Soil and Water Conservation District Annual Report for 1988. Snake River Soil Water Cons. Dist. Newsletter. 4 pp.

This newsletter is the 1988 annual report for the Snake River Soil and Water Conservation District. The Rock Creekd Rural Clean Water Project Board members are listed: Roy Jesser, Tom Sharp, Brian Olmstead, Ron Jones, Tom Kunkel, Maurice Fuller, Gerrit Peters, and Jim Lanting. The creel census begun during 1988 as a cooperative venture between the Idaho Division of Environmental Quality and the Soil Conservation Service was described. A photograph of a creel survey box installation at Pole Line Road (near Station S-2) was shown. The LICA Field Dsy at the Stricker Cabin historic site was described and illustrated with a photograph and map. About $10,000 worth of volunteer labor and over $500,000 worth of machinery were donated for the weekend of streambank stabelization. Also discussed were conservation awards for the Rock Creek RCWP.

470 Snake River Soil and Water Conservation District. 1990. Snake River Soil and Water Conservation District Annual Report for 1989. Snake River Soil and Water Cons. Dist. Newsletter. 4 pp.

This newsletter is the 24th annual report for the Snake River Soil and Water Conservdation District. It covers the year 1989. The Rock Creek Rural Clean Water Project Board is made up of four members from the Snake River SCD: Roy Jesser, Chairman,1 Tom Sharp, Brian Olmstead, and Ron Jones. Representing the Twin Falls CSD are Tom Kunkel, Jim Lanting, Maurice Fuller, and Gerrit Peters. The newsletter mentions that the Board members saw more activity and involvement with the Rock Creek Rural Clean Water Project as well as other projects this year.

471 Soil Conservation Districts. 1989. Agency progress reports, Soil Conservation Districts, pp. 27-37, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

The Soil Conservation Districts (Twin Falls and Snake River) produced this report as their agency progress report for the 1989 Rock Creek Rural Clean Water Program annual report. They discussed technology transfer (audio visual, exhibits, written articles and reports, and special projects and concerns from 1989 are discussed).

472 Soil Conservation Districts. 1989. Agency progress reports, Soil Conservation Districts, pp. 70-79, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This report is a portion of the 1988 annual progress report for the Rock Creek RCWP. The Soil Contechnology transfer and conservation tillage data collection. Technology transfer consisted of audio visual (video tape projects); events such as outstanding RCWP cooperators, posters, LICA Field Day, demonstration field tours, assistance with the creek census survey of Rock Creek fishermen, and classes in basic water quality); exhibitions (Rock Creek poster and conservation tillage signs); news media (featured articles, radio and TV coverage);and written articles and reports (with an average of 325 copies of the Rock Creek Review newsletter mailed five times during 1988). Other written reports included reports to meetings, conservation tillage promotionals, and fact sheets. Examples of written documents are included.

473 Soil Conservation Service. 1980. Rural Clean Water Project Monitoring Plan, Rock Creek Twin Falls County, Idaho. Soil Cons. Svce., Twin Falls, ID. 34 pp.

This is the final comprehensive monitoring plan for the Rock Creek Rural Clean Water Program. The following sections are included: applications; problem; background of the project including irrigation system and available data base; monitoring objectives; monitoring strategy including approach, ambient, intensive, on field monitoring and BMP evaluation; modeling; data management and analysis including - data management, data analysis and quality assurance; socioeconomic strategy including scope, approach, and outline of work; institutional aspects; educational aspects; total comprehensive monitoring costs; references; and list of ARS publications.

474 Soil Conservation Service. 1981. Annual report Rock Creek RCWP intensive monitoring. Soil Cons. Svce., Twin Falls, ID. 23 pp.

This brief paper represents the first annual report of the Rock Creek RCWP. It contains the following sections: Work Plan A, evaluation of best management practices for improving irrigation return flow quality for the Rock Creek intensive monitoring program (ARS); Work Plan B, development of a sediment generation and routing model for irrigation return flow Rock Creek intensive monitoring program (Univ. ID); and Work Plan C, intensive monitoring work plan Rock Creek Rural Clean Water Project, (DOE).

475 Soil Conservation Service. 1982. Rock Creek Rural Clean Water Project annual progress report. Soil Cons. Svce., Boise, ID. 12 pp.

This report represents the executive summary of the first Rock Creek RCWP annual report. The following sections are included: background; status of implementation; water quality monitoring and evaluation; and project changes. A monthly report (ASP-305) is enclosed (current to September 30, 1982). A copy of RCWP project needs, goals and accomplishments is also enclosed. Fund sources and estimated costs of RCWP projects is the final enclosure.

476 Soil Conservation Service. 1983. Rock Creek Rural Clean Water Project annual progress report. Soil Cons. Svce., Boise, ID. 21 pp.

This is the summary of the second annual report of the Rock Creek RCWP. This report is intended to give an accurate assessment of the progress of the project and revisions in the work plans and project goals to date. Material contained in previous annual reports is not repeated unless repetition of such material is necessary to explain a revision or adjustment. The following sections are covered: background; status of implementation; project map showing contract locations; summary of BMPs installed; critical area treatment; and report forms (monthly progress report, project needs, goals, and accomplishments, fund sources and estimated costs; and RCWP status report).

477 Soil Conservation Service. 1984. Rock Creek Rural Clean Water Program annual progress report - 1984, executive summary. Soil Cons. Svce., Twin Falls, ID. 33 pp.

This is the executive summary for the 1984 Rock Creek annual report which consists of a water quality, ARS, and economic appendix. The Rock Creek RCWP has significantly reduced sediment loading into Rock Creek and the subbasin drains achieved by a combination of sediment retention and irrigation improvement practices. There are 146 contracts in effect, covering 17,517 acres. Participation has been higher than expected due to a successful I&E effort, a need for the cost share practices, and the positive results of BMP implementation and monitoring data. Practice application has occurred mostly in accordance with agreed timetables, although continuing poor economic trends are causing some landowners to delay some practices. The pollutant load in Rock Creek has not changed accordingly.

478 Soil Conservation Service. 1985. Rock Creek Rural Clean Water Program annual progress report - 1985. U.S. Dept. Agr., SCS, Twin Falls, ID. 32 pp.

This is the executive summary for the 1985 Rock Creek RCWP report. It consists of a water quality appendix and an economic appendix. The executive summary discussed: background, status of implementation, water quality monitoring, data analysis and interpretation, socioeconomic evaluation, project changes (ongoing RCWP project, information and education, demonstrate new BMP technology), comprehensive monitoring, comprehensive monitoring program,

and a general assessment. The general assessment is that the Rock Creek RCWP has been extremely successful in reducing pollutant levels in Rock Creek. An increased program emphasis will be placed on reducing erosion through the aid of planned crop rotations and reduced tillage.

479 Soil Conservation Service. 1987. Rock Creek Rural Clean Water Program 1986 annual progress report. U.S. Dept Agr., SCS, Twin Falls, ID. 56 pp.

This is the executive summary for the 1986 annual report. It consists of an ARS appendix, water quality appendix, and an economic appendix. This report is supposed to be a summary of the project since 1981. The summary consists of a review of implementation progress, water quality monitoring, Agricultural Research Service activity; economic benefits and costs, funds expended and needed, and other programs.

480 Soil Conservation Service. 1988. Rock Creek Rural Clean Water Program fact sheet. USDA Soil Cons. Svce, Boise, ID. 2 pp.

This fact sheet was published in September and includes the following types of information on the Rock Creek RCWP: background; project location; history; the project beginnings; and results. Reducing sediment and associated agricultural pollutants in Rock Creek has resulted in an improved stream system. Rainbow and brown trout populations in Rock Creek have increased significantly since the beginning of the project. Rock Creek is fishable once again.

481 Soil Conservation Service. 1988. Rock Creek Rural Clean Water Program 1987 annual progress report. Soil Cons. Svce., Twin Falls, ID. 84 pp.

This is the executive summary for the 1987 Rock Creek RCWP annual report. The 1987 report contains a report on the status of contracts and BMP implementation (Appendix A) water quality report (Appendix B). The executive summary contains an excellent history of the project, other programs affecting RCWP, project changes, and agency progress reports (Soil Conservation Service, Soil Conservation Districts, Division of Environment, Agricultural Research Service, and the Agricultural Stabilization and Conservation Service).

482 Soil Conservation Service. 1989. Agency progress report, executive summary, pp. 2-17, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

This section ofs the 1989 annual progress report for the Rock Creek Rural Clean Water Program consists of a summary of the work done to date. Status of BMP implementation, history of the project, other programs affecting the RCWP,

post project analysis of rock Creek RCWP, and comprehensive and evaluation data plan of work) were included.

483 Soil Conservation Service. 1989. Agency progress reports, Soil Conservation Service, pp. 18-46, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID.

This section of the Rock Creek Rural Clean Water Program annual progress report was done by the Soil Conservation Service. Status of program implementation was discussed in detail. The relationship of suspended sediment loading, crop trends, and best management practices implementation was also examined. Various tables and graphs were included to show this information.

484 Soil Conservation Service. 1989. Agency progress reports, Soil Conservation Service, pp. 25-69, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This is the land treatment section of the 1988 annual progress report for the Rock Creek RCWP. A total of 185 long term contracts have been approved (with three cancelled) covering 21,147 acres. Over 4,600 individual BMPs have been planned and 2,850 implemented. Conservation tillage now accounts for 6,664 acres planned and/or implemented. SCS worked on several special projects during 1988: the Idaho Chapter of Land Improvement contractors of America cooperative work on streambank erosion control at the Stricker Cabin site; and assessment of the Harrington Fork burn area in the upper Rock Creek watershed. SCS included a quality assurance section briefly stating how BMPs are audited. Analysis of changes in water quality and BMP implementation data is discussed. It is confounded by storm runoff; non-RCWP contracted BMP implementation, etc.

485 Soil Conservation Service. 1989. Rock Creek Rural Clean Water Program 1989 annual progress report. Soil Cons. Svce, Twin Falls, ID. 127 pp.

The 1989 annual report for the Rock Creek Rural Clean Water Program contained several sections: Executive summary, history, other programs affecting the RCWP, post-project analysis - plan of work, and the agency progress reports. The agency reports consisted of the Soil Conservation Service (status of implementation, quality assurance, and relationship of water quality and BMP effectiveness); Soil Conservation Districts (technology transfer); Division of Environmental Quality (Comprehensive water quality monitoring); Agricultural Research Service; Agricultural Stabilization and Conservation Service (Financial Management and RCWP Funds Received, allocated and paid); and the Rock Creek bibliography.

486 Soil Conservation Service. 1989. Rock Creek Rural Clean Water Program annual progress report - 1988, executive summary, pp. 1-3, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This is the main executive summary to the entire 1988 annual progress report for the Rock Creek RCWP. A total of 185 long term contracts have been approved (with three cancelled) covering 21,147 acres. Over 4,600 individual BMPs have been planned and 2,850 implemented. Conservation tillage now accounts for 6,664 acres planned and/or implemented. Technology transfer activities continued including articles and presentations, the LICA field day and EPA reviews. DEQ continued water quality monitoring and are showing significant suspended sediment reductions and increased fish populations. ARS has shown that conservation tillage can decrease up to 100 percent of soil loss from a field. ASCS continued to administer funds for the project. A groundwater study is to be funded from unused BMP funds.

487 Soil Conservation Service. 1990. Rock Creek Rural Clean Water Program 1990 annual progress report. Soil Cons. Svce., Twin Falls, ID. 9 pp.

This brief summary report of the Rock Creek Rural Clean Water Program for 1990 lists an executive summary on the status of implementation of best management practices, a section by the Soil Conservation Service and Soil Conservation Districts on technology transfer, a section by the Division of Environmental Quality on water quality monitoring, and a section by the Agricultural Stabilization and Conservation Service on the RCWP funds received, allocated, and paid.

488 Soil Conservation Service. n.d. Rock Creek Rural Clean Water Program, Fact Sheet. Soil Conservation Service, Twin Falls, ID. 2 pp.

A fact sheet printed early in the Rural Clean Water Program to inform farmers of the Program and the method of receiving cost-share funds.

489 Soil Conservation Service. various dates. Water supply outlook for Idaho. U. S. Soil Cons. Svce., Boise, ID.

This monthly publication is usually published from 1 January through 1 June. The data comes from SNOTEL (snow telemetry) and gives snow depths and water contents of that snow for various stations. The Magic Mountain station in the upper Rock Creek drainage provides water forecast information for Rock Creek. Information can be obtained from the Soil Conservation Service, National Technical Center, Room 510, 511 NW Broadway, Portland, OR 97209.

490 Soil Conservation Service. 1989. Proposal for post-project

analysis of the data from the Rock Creek RCWP-Comprehensive and evaluation, pp. 21-24, IN: Soil Conservation Service, Rock Creek Rural Clean Water Program, 1988 annual progress report. USDA, Soil Cons. Svce, Twin Falls, ID. 190 pp.

This proposal worked out by Donald M. Martin, William H. Clark and Michael Somerville, was included as part of the Rock Creek RCWP 1988 annual report. There is a need for a comprehensive analysis of the data collected during the ten years (FY 1980-90) on the Rock Creek Rural Clean Water Program study. The current funding is and has been adequate for annual analysis but a more comprehensive look at the data is needed to meet the intent of the RCWP.

491 Sorg, C.F., J.B. Loomis, D.M. Donnelly, G.L. Peterson, and L.J. Nelson. 1985. Net economic value of cold and warm water fishing in Idaho. U. S. D. A. Forest Service Resour. Bull. RM-11., Fort Collins, CO. 26 pp.

Net willingness to pay for cold and warm water fishing in Idaho was estimated at $42.93 and $42.18, respectively, with the Travel Cost Method, and at $22.52 and $16.35 per trip, respectively, with the Contingent Value Method. Willingness to pay was greater for increased catch or fish size. Rock Creek is included in the Bruneau fishing area and has a base value of $38.28 for net willingness to pay for current conditions under the Travel Cost Method.

492 Spooner, J. 1989. International Symposium on the design of water quality information systems, conference report. NWQEP Notes #39: 4-5.

This report gave a brief outline of the contents of the International Symposium on the Design of Water Quality Information Systems held June 7-9, 1989, at Fort Collins, CO. Two papers were presented using Rock Creek RCWP results: Bill Clark from the Idaho Department of Health and Welfare, Division of Environmental Quallity presented a case study paper entitled: "Rock Creek Rural Clean Water Program" and Jean Spooner from the National Water Quality Evaluation Project, North Carolina State University, Raleigh, NC, presented a paper showing the results of trend analysis from both the Florida and Idaho (Rock Creek) RCWPs entitled: "Determining and Increasing the Statistical Sensitivity of Nonpoint Source Control Grab Sample Monitoring Programs".

493 Spooner, J., C.J. Jamieson, R.P. Maas, and M.D. Smolen. 1987. Determining statistically significant changes in water pollutant concentrations. Jour. Lake Reservoir Manage. 3: 195-201.

The Rock Creek RCWP was selected from a group of 20 RCWP projects for analysis. Water quality variability can be examined to estimate the magnitude of changes in water quality needed to detect significant differences over time. Adjustments include: accounting for changes in

meteorologic and hydrologic conditions through covariate variables in trend analyses; changing the sampling frequence; increasing the number of years of monitoring; and use of other statistical trend analyses, such as t-tests, linear regression, and time series analyses. Generally a 30-60% change in unadjusted geometric mean concentration is required to document a significant change in water quality, but adjustments can bring the change to 20-40%.

494 Spooner, J., C.J. Jamieson, R.P. Maas, and M.D. Smolen. 1987. Increasing the sensitivity of nonpoint source control monitoring programs. Symposium on Monitoring Modeling, and Mediating Water Quality, Amer. Water Res. Assoc. May. pp. 243-257.

This paper presents the results of a paper presented at the Symposium on Monitoring, Modeling and Mediating Water Quality hosted by the American Water Resources Association. The RCWPs used as examples were: Tillamook Bay, Oregon; Snake Creek, Utah; and Rock Creek, Idaho. Statistical analysis has shown that a 30-60% change over a five year time from an unadjusted geometric mean pollutant concentration is required to document a significant trend. This is due to meteorological, hydrological, temporal, spatial and sampling variability. They found significant reductions of 51-78% for adjusted geometric mean concentrations at 5 or 6 paired stations in the irrigation canal stations at Rock Creek from 1981-1984.

495 Spooner, J., D.A. Dickey, L.A. Nelson, and J.W. Gilliam. 1989. Determining and increasing the statistical sensitivity of nonpoint source control grab sample monitoring programs, pp. 11, IN: Abstracts, International Symposium on the Design of Water Quality Information Systems, Colorado State Univ., Fort Collins. 60 pp.

This was the abstract of a paper presented on 7 June 1989 by J. Spooner, D. A. Dickey, L. A. Nelson, and J. W. Gilliam at the International Symposium on the Design of Water Quality Information Systems, held at Colorado State University, Fort Collins, CO, 7-9 June. The entire paper is scheduled to be published in a proceedings of the symposium later this year. This paper used data from the Rock Creek Rural Clean Water Program and the Lower Kissimmee River RCWP in Florida. The paper shows that a measured change in water quality is statistically significant if it exceeds a value defined in this research as the "minimum detectable change" (MDC). Due to the high within year and year-to-year variability, at least 2-3 years of both pre- and post-BMP monitoring data is requried to determine if a measured change is real.

496 Spooner, J., D.A. Dickey, and J.W. Gilliam. 1989. Determining and increasing the statistical sensitivity of nonpoint source control grab sample monitoring programs, pp. 119-135, IN: Ward, R.C., J.C. Loftis, and G.B. McBride,

eds., Design of water quality information systems. Proc. Internat. Sympos., June 7-9, 1989, Fort Collins, CO.

This paper was presented on 7 June 1989 by J. Spooner at the International Symposium on the Design of Water Quality Information Systems, held at Colorado State University, Fort Collins, CO, 7-9 June. The entire paper is scheduled to be published in a proceedings of the symposium later this year. This paper used data from the Rock Creek Rural Clean Water Program and the Lower Kissimmee River RCWP in Florida. The paper shows that a measured change "Minimum Detectable Change (MDC)" in water quality is statistically significant if it exceeds a value defined in this research as the MDC. Methods of MDC calculations are compared using grab sample monitoring from these two projects. Due to the high within year and year-to-year variability, at least 2-3 years of both pre- and post-BMP monitoring data is requried to determine if a measured change is real.

497 Spooner, J., L. Wyatt, S.L. Brichford, A.L. Lanier, S.W. Coffey, and M.D. Smolen. 1990. Nonpoint sources. Resear. Jour. Water Poll. Cont. Fed. 62(4):537-564.

This annual review article contains some information concerning the Rural Clean Water Program. The Rural Clean Water Program has contributed much information on the effectiveness of a broad range of BMPs on water quality in 20 projects across the nation. Specific individual projects conducted in Vermont, Idaho, Oregon and Michigan were reported on. The article "Geology and survival on the Snake River Plain" by Charles Little (Journal of the Soil and Water Conservation, 1989, was listed. Refer to abstract elsewhere in this bibliography.

498 Spooner, J., R.P. Maas, S.A. Dressing, M.D. Smolen, and F.J. Humenik. 1985. Appropriate designs for documenting water quality improvements from agricultural NPS control programs. pp. 30-34. IN: U. S. Environmental Protection Agency, Perspectives on nonpoint source pollution, proceedings of a national conference. U. S. Environmental Protection Agency, Washington, D.C. 514 pp.

Appropriate experimental designs are a function of the questiion to be answered. In the case of agricultural NPS control programs, the question is usually: How does BMP implementation affect the magnitude of pollutant concentrations or loads? This paper discusses the assumptions, analysis techniques, and advantages and disadvantages of three basic experimental designs that can be used. Monitoring above and below and implementation site is generally more useful for documenting the severity of an NPS than for documenting BMP effectiveness. Time trend designs may be helpful but many variables must be accounted for. Paired watershed designs have the greatest potential because they account for meteorologic and hydrologic variablity.

499 State of Idaho. 1975. Idaho environmental overview, summary report. ID Dept. Water Resour., ID Dept. H&W, ID Dept. Fish & Game, Div. Budget, Poicy, Planning & Coord., Boise. 17 pp.

This is a brief report (a summary of the longer State of Idaho, 1975, Idaho environmental overview) published for more general public distribution. For the Upper Snake region the report states that the aquatic habitat was historically outstanding. Irrigation diversions, channelization and water pollution have degraded many of the aquatic resources. In summary the aquatic habitat remains stable or in a slightly deteriorating condition.

500 State of Idaho. 1975. Idaho environmental overview. ID Dept. Water Resour., ID Dept. H&W, ID Dept. Fish & Game, Div. Budget, Poicy, Planning & Coord., Boise. 261 pp.

This report prepared by Jame M. Montgomery, Consulting Engineers, Inc., provides an inventory of available data and evaluations of existing and potential environmental conditions in Idaho. The fisheries resources of Rock Creek are described as rainbow trout. Limiting factors - good populations in headwater areas, depressed in agricultural and urban areas from grazing, pollution, and siltation. Rock Creek is also listed as flood prone near Twin Falls and water quality problems are mentioned. The Cottonwood-McMullen Creek area is described as overgrazed leading to water quality problems. Rock Creek is also listed as having potential for recreational development and improved water quality. Water quality problems include silt and nutrients from agricultural return flows. Maps show aquatic habitat, flood hazard areas, critical soil/slopes, etc.

501 Stearns, H.T., L. Crandall, and W.G. Steward. 1938. Geology and ground-water resources of the Snake River Plain in southeastern Idaho. U. S. Geol. Surv., Water-Supl. Pap. 774. 268 pp.

Rock Creek, Cottonwood Creek, and McMullen Creek are listed as ephemeral streams tributary to the Snake River between Salmon Falls Creek and Goose Creek. At the edge of the foothills, in the drainage basin of Rock Creek, warm (96 and 101°F) artesian water has been obtained from wells. The average annual discharge in acre-feet of these tributaries is given as: Rock Creek, 28,000; McMullen Creek, 4,000; and Cottonwood Creek, 4,000.

502 Sterling, R.P. 1983. Stream channel response to reduced irrigation return flow sediment loads. Master's thesis, Univ. Idaho, Moscow. 113 pp.

Water quality in Rock Creek is seriously affected by sediment inputs from irrigation. The HEC-6 model showed predicted channel erosion rates higher than observed and deposition, which occurs frequently, was not predicted by the model. About 85% of the sediment in the stream is wash

load and cannot be modelled. The irregular nature of the stream and frequent hydraulic and sediment variations throughout the stream make sediment transport a local phenomenon that cannot be simulated using gross hydraulic and sediment conditions. In Rock Cr. suspended sediments from farms are much finer than streambed sediments, existing deposits are eroded by clean water, and flow rate/sediment concentration are not related, indicating improvements in stream water quality will parallel improvements in return flow quality.

503 Stone, B. 1987. The way it was...Rock Creek water--cleaned... Sept. 11. East County Chronicle. Pp. 6.

This article announces the 17th of September unveiling of a large sign (constructed by Gary Stone) at Rock Creek Park commemorating the efforts of the many people and agencies involved with the cleanup of Rock Creek. The sign and dedication commemorate the Rock Creek Rural Clean Water Program and its results in improving the water quality in Rock Creek.

504 Stone, B., ed. 1987. Stricker's Rock Creek Trading Post. Friends of Stricker Ranch News, Spring. pp.1-3.

An historical overview of the founding of the Rock Creek Store and Trading Post in 1865 and the subsequent formation of the Friends of Stricker Ranch in 1984 to help preserve and restore the homestead. Includes information on pictoral histories and pictures of the homestead.

505 Stover, G. 1986. Cleanup rests with Rock Creek farms. Magic Valley Farm Lines. September. pp. 18-19.

Background for the Rock Creek Rural Clean Water Program is given. Cost share funds are available for farmers who install BMPs to reduce soil erosion and improve the water quality in Rock Creek. Photographs show streambank erosion; Rich Morrison sampling macroinvertebrates; and a large immature stonefly. The water quality monitoring program is explained with emphasis on biological monitoring.

506 Stover, G. 1986. Final conservation plans set for cleanup on Rock Creek. Times-News, Twin Falls, ID. October 26. 1 pp.

This announcement stated that the Rock Creek Rural Clean Water Program had concluded its contracting period with farmers for installation of best management practices. Since October 1980, 184 contracts have been signed. $1.9 million has been obligated by ASCS to participating farmers (the landowners themselves will be investing close to $1.5 million over the life of the project). Much work remains to be done and some of the conservation plans will continue to be implemented through 1994. Over 20,000 acres of

irrigated cropland are involved to date. More than 80% of the sediment which was carried into Rock Creek in the past had been reduced in one of the subbasins. Cleaner water in Rock Creek has been one result of the project.

507 Stover, G. 1986. Reduced tillage is here to stay. Magic Valley Farm Lines. June. pp. 8, 21.

For years, soil conservationists have stressed the benefits of saving soil in terms of future pay-offs. Now, with the growing use of conservation tillage, the benefits are immediate, and much more cost-effective. Getting farmers in the Magic Valley to switch to conservation tillage has been slow. But through the efforts of the Rock Creek Rural Clean Water Program, conservation tillage is being used more. The result is less cost to the farmer, more soil saved, and improved water quality in Rock Creek.

508 Stover, G. 1986. Rock Creek RCWP programs contracts set. Magic Valley Farmlines. December. pp. 6, 26.

The contracting period for the Rock Creek Rural Clean Water Program was brought to a successful conclusion recently. The article goes on to give some background of the project and to mention that over 20,000 acres were served. Money obligated was listed as was the fact that conservation plans will continue to be implemented through 1994. Those using Rock Creek and the Snake River for recreation or those who simply appreciate the aesthetics of a cleaner, pollution-free stream and river will benefit from this multiagency, long-range, experimental water quality project.

509 Stover, G., ed. 1986. Rock Creek Review, Project Newsletter. June. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contained a message from the chairman, Roy Jesser, information on vegetative filter strips; cost share information for conservation tillage; other information on conservation tillage; a fact sheet on the Rock Creek RCWP; animal waste permits; commonly cost-shared items; two outstanding Rock Creek RCWP cooperators; and a calendar of events.

510 Stover, G., ed. 1986. Rock Creek Review, Project Newsletter. August. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 6 pp.

This issue of the newsletter contained several articles on conservation tillage including the results of the recent tour; Rock Creek water quality monitoring and data analysis; deadline for RCWP contracting; BMPs; demonstration plots; animal waste permits by EPA; Rock Creek Park and a calendar of events.

511 Stover, G., ed. 1986. Rock Creek Review, Project

Newsletter. December. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contains a review of the 1986 RCWP annual report; plans for a conservation tillage conference; results of a presentation made to the Magic Valley Fly Fishermen's Association; results of selenium sampling; the future for Rock Creek RCWP, information on concrete ditch maintenance; the results of demonstration plot research; and an explanation of the new farm bill.

512 Stover, G., ed. 1986. Rock Creek Rural Clean Water Program Project Newsletter. April. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This is the first Rock Creek RCWP newsletter. It gives some background on the success of the RCWP. Other items discussed are: conservation tillage seminar; on the light side; profiles of Ron Jones, Karl Joslin, Matt Nail, Bob Moore and Gayle Stover.

513 Stover, G., ed. 1987. Rock Creek Review, Project Newsletter. November. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contains information on the dedicatiion in Rock Creek Park of the new sign and of the project; the proposed streambank stabilization project at Stricker cabin site; Roy Jesser receiving Governor's award for leadership in conservation; weed control; conservation tillage; BMPs; the Harrington Fork streambank erosion control project; and a new assignment for the RCWP Project Coordinator.

514 Stover, G., ed. 1987. Rock Creek Review, Project Newsletter. May. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This newsletter contained a review of the March fish population survey (electrofishing); a definition of highly erodible land; the outstanding conservationist for the year; explanation of the conservation reserve program in Twin Falls County, deadline for filter strips; the Vinyard Creek Water Quality Project; information on the natural resources camp scholarships, information on SCS staff; and more information on conservation tillage.

515 Stover, G., ed. 1987. Rock Creek Review, Project Newsletter. July. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contains an article on the new Rock Creek sign; the Rock Creek story on TV, "Idaho Outdoors"; the uncertainties of water quality monitoring; two outstanding conservationists; BMPs; the "gully-washer" precipitation event of June 7; conservation tillage; and protection for set-aside acres.

516 Stover, G., ed. 1987. Rock Creek Review, Project Newsletter. September. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contained articles on the Soil Conservation Society of America annual meeting; farm program benefits; conservation tillage tour; conservation tillage; Rock Creek park; sign dedication; concrete ditches; demonstration fields; residue management; BMPs; and calendar.

517 Stover, G., ed. 1987. Rock Creek Review, Project Newsletter. March. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 6 pp.

This issue contains articles on the conservation tillage conference held in February; reduced tillage for dry beans; a definition of conservation tillage; ARS research on non-traditional row spacings for sugar beets and dry beans; conservation tillage with potato crops; conservation tillage class at the College of Southern Idaho; sediment retention practices (sediment basins; vegetative filter strips; I-slots and mini-basins); irrigation water management; animal waste management workshop planned; highlights from 1986 Rock Creek RCWP water quality monitoring report (fish populations and sediment); change in emphasis of Rock Creek RCWP - towards more conservation tillage; clean water act passes; calendar; and personnel notes.

518 Stover, G., ed. 1988. Rock Creek Review, Project Newsletter. July. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 5 pp.

This issue of the newsletter contains articles on the upcoming conservation tillage tour; poster contest winners; trout populations in Rock Creek; water quality class; conservation tillage benefits; BMPs; filter strips; prehistoric rock art in Rock Creek canyon and the proposed groundwater study.

519 Stover, G., ed. 1988. Rock Creek Review, Project Newsletter. May. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contains articles on the outstanding conservationists in the Rock Creek RCWP; filter strips approved for CRP; results of the March electrofishing study; natural resources camp; tips on pouring concrete ditches; and the proposed field day at Stricker Ranch.

520 Stover, G., ed. 1988. Rock Creek Review, Project Newsletter. March. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter contains articles on the 1987 annual report; the weed law; gated pipe use; low interest loans to farmers; compliance plan deadline; outstanding conservation farmers of the year; concrete ditches; conservation tillage; CRP sign-up complete; and new water quality monitoring (groundwater and Harrington Fork) for Rock Creek.

521 Stover, G., ed. 1988. Rock Creek Review, Project Newsletter. October. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue contains articles on the LICA Field Day at Stricker Cabin, Rock Creek; cover crops; conservation tillage; Rock Creek poster displayed at the RCWP workshop in St. Paul, MN; a gated pipe modification; the planned creel census; a note that the deadline for modifying contracts to include conservation tillage has been extended to December 1989; a reminder to be planning any additions or revisions to RCWP contracts; and personnel notes.

522 Stover, G., ed. 1989. Rock Creek Review, Project Newsletter. January. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the newsletter concentrates on the 1988 Annual Report. The main items discussed are the two-thirds sediment reduction; proposed project changes (cost/sharing of BMP 15, fertilizer management); and intensive groundwater monitoring, to supplement data gathered in 1988 from the monitoring of wells and drains; a brief report of the comprehensive monitoring and evaluation portion (fishing pressure believed to be important in a reduction of wild trout numbers, and the new creel census to help evaluate those numbers); pesticide results; and streambank erosion/suspended sediment reductions. ARS continued with conservation tillage (CT) trials and reported good results. Other items covered were Perrine Coulee project, CT, "stewards of the environment", a legislative luncheon, calendar of events, & personnel notes.

523 Stover, G., ed. 1989. Rock Creek Review, Project Newsletter. August. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the Rock Creek RCWP Newsletter includes an article by Ernie Hendricks (SCS) concerning various aspects of the Rock Creek project: Sediment practices - a reminder that the Rock Creek RCWP contract calls for the installation of a sediment practice each year that a field is row cropped; annual status reviews - each year SCS conducts annual status reviews with the owners or operators having RCWP contracts, normally in the fall; and life spans of cost-shared practices - there is an established life span for any cost-shared practice. Most irrigation practices have a life-span of 10 years. Yearly maintenance is needed on many. Various information concerning BMPs is

included in this issue such as information on a straw mulcher which is used to place a straw mulch on cropland to reduce erosion.

524 Stover, G., ed. 1989. Rock Creek Review, Project Newsletter. April. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue contains information on two outstanding conservationists selected by the Soil Conservation Districts; new part along Rock Creek; Bill Clark moving on to a new job; Terry Maret taking over as Rock Creek Monitoring Coordinator; a water quality monitoring update; straw mulch demonstrations; and some information on pest weeds and aphids.

525 Stover, G., ed. 1990. Rock Creek Review, Project Newsletter. December. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue of the Rock Creek Review gives information from the last year of water quality monitoring of the project. Data show that the stream has shown an 82% reduction in suspended sediment since the beginning date of the project. Additional articles request that compliance plans be turned in, more explanation be given on the neutron probe for measuring soil water content, and a plea for nominations for an award for Dal Ames (Super Citizen). An article on RCWP contracts states that many are in their 9th year and some in their 10th year.

526 Stover, G., ed. 1990. Rock Creek Review, Project Newsletter. July. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This edition of the project newsletter contains information on the use of straw mulches to cut erosion and save water and the results of a school poster contest. Double cropping and conservation tillage are featured in another article. Additional notes discuss the need to get compliance plans in on lands in the Rock Creek watershed and a plea is put out for volunteers at the Soil Conservation Service Office.

527 Stover, G., ed. 1990. Rock Creek Review, Project Newsletter. May. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue lists Dean Ruhter, Curt Sligar, and Dave Sommer as recently receiving Outstanding Conservationists awards "In recognitioin of outstanding contributions in furthering the goals of the Rock Creek Rural Clean Water Program". Information is also presented on straw mulchers which can be used to reduce erosion, and a video which explains additional BMPs. A short note on the use of a neutron probe to examine soil moisture is included. Cindy Hodges is the water quality monitoring technician assisting Terry

Maret with the project. There is a short summary of the 1989 Water Quality monitoring results. In 1989 Rock Creek is carrying 78% less sediment than at the beginning of the project.

528 Stover, G., ed. 1989. Rock Creek Review, Project Newsletter. December. Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 4 pp.

This issue highlights information from the Rock Creek RCWP Annual Progress Report for 1989, and gives an update of tunnel drain monitoring. Also included are reports on mulching as a cost shared practice, new grain varieties for cover crops and filter strips, basin area meetings, and conservation plans completed in 1989.

529 Struthers, T. 1976. Final report on archaeological and historical resorces of the Bureau of Reclamation's Upper Snake River Project, Salmon Falls Diversion, Twin Falls and Cassia Counties, Idaho. ID State Univ. Mus. Nat. Hist, Pocatello. 24 pp.

This report is the result of the area being surveyed for irrigation canal and wasteway alignments and other sites of the Bureau of Reclamation's Salmon Falls Division project. Rock Creek was a source of water for the aboriginal sites.

530 Stuebner, S. 1990. Water-quality cuts divdide Idahoans, Rock Creek--a clean, model project. February 27, 1990, Idaho Statesman, Boise, ID. 1 pp.

Cuts in water quality budges for the State of Idaho are discussed. The Rock Creek project was presented as a model project. At one time the most polluted tributary of the Snake River, Rock Creek is now the state's shining example of how good farm practices can prevent stream pollution and keep valuable topsoil in the fields.

531 Thomas, C.A. 1969. Inflow to Snake River between Milner and King Hill, Idaho. ID Dept. Reclam., Water Info. Bull. 9. 39 pp.

The total inflow to the Snake River between Milner and King Hill, Idaho, during the water years 1910-1966 averaged 7,400 cfs or 5.4 million acre-feet per year. Rock Creek contributed 200-300 cfs.

532 Thomas, C.A., H.C. Broom, and J.E. Cummans. 1963. Magnitude and frequency of floods in the United States. Part 13. Snake River Basin. U. S. Geol. Surv. Water-Supp. Pap. 1688. 250 pp.

Information on station location, drainage area, gage information, stage-discharge relation, bankfull stage and misc. remarks are given for two sites on Rock Creek: Rock Creek near Rock Creek, Idaho; and Rock Creek near Twin Falls, Idaho. The bankfull stage is listed as 6 feet for

the near Rock Creek site and is not subject to overflow for the lower site near Twin Falls which is confined by the canyon. Peak stages and discharges are given for both sites. The peaks for the near Rock Creek site were 10.4 feet on May 21, 1912 (429 cfs) and 2.77' on May 20, 1957 (315 cfs). Most of the peak flows were in the months of April and May with two in June. The Twin Falls site had peaks of 4.5' on Sept. 21, 1927 (984 cfs); 4.7' on Jan. 29, 1925 (939 cfs); 3.66' on Feb. 21, 1936 (861 cfs); and 3.5/3.42' on Mar. 3, 1929/May 9, 1930 for 749 cfs each.

533 Torf, M. 1989. Environmental concerns. Univ. ID College of Agriculture, Centennial Symposium, Pesticide Issues: Today and Tomorrow, Boise, ID.

This paper was presented January 25, 1989, in Boise, ID, at the University of Idaho, College of Agriculture, Centennial Symposium on "Pesticide Issues: today and Tomorrow". The Rock Creek Rural Clean Water Program was cited as the major source of pesticide data in aquatic ecosystems in the State of Idaho. The main points of the presentation were that more pesticide data are needed from around the state and that we really don't know what all of the problems related to pesticides may be because of the dearth of information on them in our environment.

534 Trout, T.J., and B.E. Mackey. 1988. Furrow flow measurement accuracy. Jour. Irrig. Drain. Eng. 114: 244-255.

This research was conducted in the Rock Creek watershed. The primary source of error in properly calibrated, constructed, and installed flow measurement devices is due to reading error or uncertainty. Head measurement uncertainty in small head:discharge-type flow measurement devices measured in the field by closely supervised technicians on a relatively smooth flowing water surface was ±3mm. Volumetric time measurement uncertainty increased with the square root of the container fill time. Flow measurement uncertainty with three tested devices generally exceeded 5% and exceeded 10% over parts of their range. Desired measurement range or allowed head loss constraints must often be limited to achieve desired flow measurement accuracy.

535 Trout, T.J., and B.E. Mackey. 1988. Furrow inflow and infiltration variability. Trans. ASAE 31: 531-537.

This research was conducted on Portneuf silt loam soils under dry bean and sugar beet crops in the Rock Creek area. The information was compared with that from Colorado and Oregon. The furrow-to-furrow variability of irrigation water inflows is about twice as great with gated pipe and feed ditches as with siphon tubes. The average furrow infiltration coefficient of variation measured on 25 fields in southern Idaho was 25%. As a result of both variabilities, irrigation times and application rates must

be increased to insure adequate water application to a desired portion of the field. Crops which utilize water from more than one furrow will experience 20-30% less water availability variability. So furrow inflow and infiltration variability causes farmers to apply excess water in order to adequately irrigate a field.

536 Trout, T.J., and B.E. Mackey. 1988. Inflow-outflow infiltration measurement accuracy. Jour. Irrig. Drain. Eng. 114: 256-265.

This research was conducted in the Rock Creek watershed. Furrow infiltration and channel seepage are often measured with inflow-outflow measurements. Inaccuracy in the flow measurement will cause a larger uncertainty in the calculated infiltration. The infiltration rate determination uncertainty increases rapidly as the percent of the inflow that is infiltrated decreases. The effect of measurement uncertainty on infiltration measurements can be estimated so that the confidence interval of a mean or the actual infiltration variability level can be determined.

537 Twin Falls Soil Conservation District. 1980. Detailed work plan Rock Creek, Twin Falls County. Twin Falls Soil conservation District, Twin Falls, ID. 12 pp.

This document was the original work plan for the Rock Creek Rural Clean Water Program. It contained a flow chart of activities and listed objectives, goals, and tasks for the project. The original objectives were: "To reduce water pollution from agricultural activities on Rock Creek"; "To meet State water quality standards"; and "To achieve these water quality objectives in the most cost-effective manner possible in keeping with the provision of adequate supplies of food and fiber and a quality environment." The Idaho Department of Health and Welfare, Division of Environment was assigned the task of environmental assessment (water quality).

538 Twin Falls Soil Conservation District. 1982. Twin Falls Soil Conservation District Annual Report 1981. Twin Falls Soil Cons. Dist. Newsletter. 5 pp.

This newsletter represents the 1981 annual report for the Twin Falls Soil Conservation District. The issue introduces the Rock Creek Rural Clean Water Program. Mention is made of various staff members working on the project. The spring of 1980 started off fast and furious for the Rock Creek RCWP. Water quality plans were developed with individual farmers so they could install best management practices prior to the irrigation season. Twenty-two plans were written and many BMPs installed. All of athe plans written in the spring were implemented and had a noticeable effect on keeping sediment from reaching Rock Creek. At the end of the irrigation season, approximataely 12,000 tons of sediment had been trapped on the 22 farms and prevented frrom reaching Rock Creek. WQ

monitoring is done to show the effectiveness of BMPs.

539 Twin Falls Soil Conservation District. 1983. Twin Falls Soil Conservation District Annual Report 1982. Twin Falls Soil Cons. Dist. Newsletter. 3 pp.

This newsletter represents the 1982 annual report for the Twin Falls Soil Conservation District. The Rock Creek Rural Clean Water Project Board is described. During 1982 andother 47 wataer quality plans were developed and approved for a total of 80. Over 300 separate practices were implemented. Intensive monitoring efforts have shown a significant reduction in sediment loading since 1980. The ongoing data collection and results could have a far reaching impact on similar programs across the country. The water quality monitoring done by the State Division of Environment demonstrated significant reductions in pollutants going into Rock Creek. Total sediment going into Rock Creek from the subbasins monitored was down 46% from 1980 levels. Subbasin 7, which has the most BMPs installed had an 89% reduction in sediment loading.

540 Twin Falls Soil Conservation District. 1984. Twin Falls Soil Conservation District Annual Report for 1983. Twin Falls Soil Cons. Dist. Newsletter. 3 pp.

This newsletter represents the 1983 annual report for the Twin Falls Soil Conservation District. The results of this year's activities on the Rock Creek Rural Clean Water Project were listed: Three supervisors of the Twin Falls District, Tom Kunkel, Melvin Jangels, and Maurice Fuller, served on the Rock Creek Rural Clean Water Project Board in 1983. The Rock Creek Project includes 107 acontracts signed by landowners and operators farming 12,668 acres in the Rock Creek Drainage. This includes 33 percent of the estimated 34,800 acres of farmland contributing sediment to Rock Creek. Water sampling during 1983 showed a 50 percent reduction in the volume of sediment entering Rock Creek from the project area compared with that of previous years.

541 Twin Falls Soil Conservation District. 1985. Twin Falls Soil Conservation District Annual Report 1984. Twin Falls Soil Cons. Dist. Newsletter. 5 pp.

This newsletter represents the 1984 annual report for the Twin Falls Soil Conservation District. The Rock Creek Rural Clean Water Program again was an important section of the newsletter. The year 1984 was another successful one for the Rock Creek RCWP. An additional 39 contracts, involving about 4,800 acres, were approved. BMPs used were vegetative filter strips, sediment basins, mini-basins, I/T slots, burried pipe runoff systems, runoff control systems, concrete ditch, pipeline, gated pipe, and irrigation water management. Amounts contracted and implemented during 1984 and total were given.

542 Twin Falls Soil Conservation District. 1986. Rock Creek

Rural Clean Water Program. Twin Falls Soil Cons. Dist. Newsletter. Pp. 5.

This newsletter represents the 1985 annual report of the Twin Falls Soil Conservation District, Twin Falls, ID. An update was given on the status of the Rock Creek Rural Clean Water Program. There are 165 contracts with farmers to implement best managaement practices and this is shown in table form. This year marks the first of a five year extension on the monitoring activities and more emphasis on conservation tillage. Notice was made to let farmers know that they could still contract on the project until September 30, 1986.

543 Twin Falls Soil Conservation District. 1987. Twin Falls Soil Conservation District Annual Report 1986. Twin Falls Soil Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1986 annual report for the Twin Falls Soil Conservation District. The Rock Creek Rural Clean Water Project has completed the sign-up phase for conservation practices. There are cost-share funds available for no-till and minimum-till if some one wants to change their plans. A total of 185 long term water quality contracts were approved, involving 21,147 acres since 1980. Over 4,000 individual BMPs were planned and 2,000 have been implemented. IDHW-DOE reports a continued reduction of sediment loading from cropland runoff into Rock Creek. Their studies also indicate an increase of wild trout populations in several segments of the stream. About 1,650 acres of conservaton tillage was planned. Soil erosion can be reduced from 50-90% unader minimum tillage, depending upon the crops involved and tillage used.

544 Twin Falls Soil Conservation District. 1988. Twin Falls Soil Conservation District Annual Report for 1987. Twin Falls Soil Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1987 annual report for the Twin Falls Soil Conservation District. Included is a notice of the Rock Creek Rural Clean Water Project Board which consists of Tom Kunkel, Maurice Fuller, Jim Lanting, Mel Jagels, Roy Jesser, Tom Sharp, Brian Olmstead and Ron Jones. The September 17 dedication of the Rock Creek Project at Rock Creek Park was also covered. The sign made of the Gary Stone painting was described. The program for the dedication was outlined. The conservation tillage tour taken in July was described. A noontime talk by Bill Clark discussed some of the latest challenges and results of the current monitoring activities esspecially in relation to fisheries research on Rock Creek. In addition sections were included on conservation tillage in the Rock Creek area and engineering and RCWP.

545 Twin Falls Soil Conservation District. 1989. Twin Falls Soil Conservation District Annual Report for 1988. Twin Falls Soil Cons. Dist. Newsletter. 4 pp.

This newsletter represents the 1988 annual report for the Twin Falls Soil Conservation District. Rock Creek Rural Clean Water Program board members were listed in this issue. The RCWP saw 708 referrals processed by the engineering section. A conservation tillage tour was held in July and attracted 75 people. The tour was excellent. Conservation tillage can be cost shared under the guidelines of the Rock Creek RCWP; current flat rates are $17/acre for reduced till and $22/ascre for no-till. Anyone with a RCWP contract is eligible, even if the present contract doesn't include conservation tillage.

546 U.S. Bureau of Reclamation. 1979. Draft environmental impact statement authorized Salmon Falls Division Upper Snake River Project Idaho-Wyoming. U.S. Bur. Rec., Boise, ID. 192 pp.

The Salmon Falls Division is located south of the Snake River in Twin Falls and Cassia Counties. Congress authorized construction of the division in an area already developed for agriculture. Several additional diversion dams, pumping plants, canals and development of a well field would be needed to supply the 264,000 acre-feet of water needed annually. A diversion dam was planned on Rock Creek just above the Rock Creek townsite. The height was 12 feet and the diversion capacity was 820 cfs. The diversion would discharge into the Rock Creek Feeder Canal. Water quality data is presented for Lower (page 3-11) and Upper Rock Creek (page 3-10) for seven monthly samples taken during 1975. No fish screens were planned but a fish diverter would be constructed in the Rock Creek Feeder Canal to return entrained fish to the creek.

547 U.S. Environmental Protection Agency. 1973. Report on effects of waste discharges on water quality of the Snake River and Rock Creek, Twin Falls area, Idaho. U.S. Eviron. Protect. Agency, Denver, CO and Seattle, WA 54 pp.

Information is provided on point sources entering Rock Creek. They include: the Twin Falls municipal wastewater treatment plant; Independent Meat Company; Idaho Frozen Food, Inc.; Colonial Concrete, Inc.; The Amalgamated Sugar Company; and trout farms and hatcheries in the area. BOD, suspended solids, COD, coliform bacteria, and oil and grease problems were reported. Rock Creek increased the total coliform bacterial density in the Snake River by 20 times. Operators of fish hatcheries in the Twin Falls area should be advised that permit conditions will require removal of solids from the wastewater discharge during cleaning operations.

548 U.S. Environmental Protection Agency. 1974. Biostimulation characteristics of wastes and receiving waters of the Snake River basin. U.S. Environ. Protec. Agen., Denver, CO. 65 pp.

A study of nutrient caused algal growth problems in the Snake River was done in 1973. Emphasis was placed on American Falls, Brownlee, Milner and Minidoka reservoirs. Rock Creek was sampled near the Amalgamated Sugar Company (RCWP station S-4, #2060144). Inorganic nitrogen (1.08 initial and 0.84 mg/L autoclaved) and total phosphorus of 0.09 initial and 0.08 mg/L autoclaved for March. Rock Creek water was also examined in August 1972 and had values of 1.31 mg/L and 0.08 mg/L for initial inorganic nitrogen and total phosphorus respectively. Idaho State water quality standards are being violated for DO and nuisance aquatic growthis in the reservoirs. Agricultural sources of nutrients must be controlled. Soil erosion resulting from irrigation must be minimized. Irrigation practices must minimize demands on the Snake River.

549 U.S. Environmental Protection Agency. 1978. Inventory of significant discharge points for irrigation return flow, Middle and Upper Snake River Basins. Volume 2. U.S. Environ. Protect. Agency, Seattle, WA. unpaged.

These large 3-ring binders give valuable background data for Rock Creek. The major drains flowing into Rock Creek are illustrated with color slides and their location (by river mile) is given. Data is also available for the Snake River near the Rock Creek confluence. In addition a sampling date along with turbidity and suspended solids data are given for many of the sites. Sampling was done in July, August 1974; and March, June, July, August 1975.

550 U.S. Environmental Protection Agency. 1978. Inventory of significant discharge points for irrigation return flow, Middle and Upper Snake River Basins. Volume 6. U.S. Environ. Protect. Agency, Seattle, WA. unpaged.

These large 3-ring binders give valuable background data for Rock Creek. A few drains flowing into Rock Creek are illustrated with color slides and their location (by river mile) is given. Data is also available for the Snake River near the Rock Creek confluence. In addition a sampling date along with turbidity and suspended solids data are given for many of the sites. Sampling was done in August 1977.

551 U.S. Environmental Protection Agency. 1978. Inventory of significant discharge points for irrigation return flow, Middle and Upper Snake River Basins. Volume 4. U.S. Environ. Protect. Agency, Seattle, WA. unpaged.

These large 3-ring binders give valuable background data for Rock Creek. The major drains flowing into Rock Creek are illustrated with color slides and their location (by river mile) is given. Data is also available for the Snake River near the Rock Creek confluence. In addition a sampling date along with turbidity and suspended solids data are given for many of the sites. Sampling was done in July, August 1974; and June, July, August 1975.

552 U.S. Environmental Protection Agency. 1978. Inventory of significant discharge points for irrigation return flow, Middle and Upper Snake River Basins. Volume 5. U.S. Environ. Protect. Agency, Seattle, WA. unpaged.

These large 3-ring binders give valuable background data for Rock Creek. Rock Creek is sampled from river mile 3.6 (Poleline Road) to river mile 26.3 (3500 East Road). Sampling was done in June 1974; and July, August 1975; and August 1977. This volume contains tables of water quality data for flow, temperature, conductivity, suspended solids, turbidity, nitrate, ammonia, and total phosphorus. In addition the lower portion of Rock Creek was sampled for pesticides during August 1975. BHC, Dieldrin, HE, endrin, DDE, DDD, DDT and TCP were examined. All but dieldrin, HE, and endrin were found in the water column.

553 U.S. Environmental Protection Agency. 1979. Environmental assessment, Idaho agriculture and grazing practices, Idaho statewide water quality management plan. EPA 910/9-79-061. U.S. Environ. Protect. Agency, Seattle, WA. 244. pp.

The Twin Falls irrigation tract is given as a case study in nonpoint source pollution. A review of the water balance, salt balance, nitrate, phosphate, and sediment is given. Much of the data summarized is from Carter et al. 1973 and 1974.

554 U.S. Environmental Protection Agency. 1985. Rock Creek Rural Clean Water Program. Monitoring and Wasteload Allocation Program Status Report. May 31. U.S. Eviron. Protect. Agency, Washington, D.C. Pp. 5.

The Rock Creek Rural Clean Water Program, Comprehensive Monitoring and Evaluation is monitoring Rock Creek in southcentral Idaho to determine the effectiveness of furrow irrigated agricultural best management practices. Water chemistry, benthic macroinvertebrates, and fish populations are being monitored by the State Division of Environment.

555 U.S. Environmental Protection Agency. 1989. Review of the management and water quality lessons of the Rock Creek, Idaho Rural Clean Water Program. Draft Report. U.S. Environ. Protect. Agency, Seattle, WA. 14 pp.

556 U.S. Environmental Protection Agency. 1989. Water Division nonpoint source solutions. U.S. Environ. Protec. Agency, Seattle, WA. 1 pp.

This one page summary of Fiscal Year 1989 accomplishments of the U.S. Environmental Protection Agency's Region 10 office lists the major achievements in nonpoint source work. Included under actions to prevent impacts and protect aquatic ecosystems is: "Conducted field reviews and documented "Lessons Learned" from Rock Creek, Idaho, and

Tillamook Bay, Oregon, Rural Clean Water Programs, which are two of the most successful programs nationally".

557 U.S. Environmental Protection Agency. 1990. Rural Clean Water Program. Lessons learned from a voluntary nonpoint source control experiment. EPA 440/4-90-012, U.S. Environ. Protec. Agen., Washington, D.C. 29 pp.

This publication represents a summary of the Rural Clean Water Program (RCWP). It lists the Rock Creek, Idaho project as one of five projects with comprehensive monitoring and evaluation. Three major lessons learned from the RCWP were: 1. Best management practices improve water quality; 2. A voluntary program with cost-sharing incentive can improve water quality; and 3. Federal, state, and local agencies can cooperate to implement a water quality program effectively. The Rock Creek project is cited frequently in the report. With 75% of the 28,000 acre irrigation tract under treatment, suspended sediment has decreased significantly in five of six sub-basins. Total phosphorus loads have decreased also. Further analysis is needed to sort out the impacts of BMPs and natural streambank erosion and weather.

558 U.S. Environmental Protection Agency. 1991. What is water pollution? Idaho Clean Water, spring 1991: 14-15.

The 1977 photograph of the confluence of Rock Creek with the Snake River in August of 1977 prior to the state's Rural Clean Water Program was used in this primer for the lay person concerning water pollution. The photography by Robert L. Braun shows visually the turbid water from Rock Creek impacting the Snake River. The photograph has been widely used as a demonstration of the severity of some agricultural pollution.

559 U.S. Geological Survey. 1950. Filer Quadrangle, Idaho-Twin Falls County. 7.5 minute series (topographic). U. S. Dept. Interior, U.S. Geol. Surv. Denver, CO. 1 sheet.

This 7.5 minute topographic map covers Rock Creek from just south of the mouth (confluence with the Snake River) to Highway 93 just west of the city of Twin Falls. The map shows seepage tunnel locations and part of the Low Line Canal. Topographic and cultural features are shown.

560 U.S. Geological Survey. 1962. Surface water records of Idaho, 1961. U.S. Geol. Surv. Boise, ID. 277 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1960-September 1961.

561 U.S. Geological Survey. 1963. Surface water records of Idaho, 1962. U.S. Geol. Surv. Boise, ID. 291 pp.

Discharge data are provided for Rock Creek near Rock Creek

for water year October 1961-September 1962.

562 U.S. Geological Survey. 1964. Surface water records of Idaho, 1963. U.S. Geol. Surv. Boise, ID. 290 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1964-September 1965.

563 U.S. Geological Survey. 1964. Twin Falls Quadrangle, Idaho-Twin Falls County. 7.5 minute series (topographic). U. S. Dept. Interior, U.S. Geol. Surv. Denver, CO. 1 sheet.

This 7.5 minute topographic map covers Rock Creek from just west of Twin Falls to a few miles south of Twin Falls just south of 3500 North Road. The map shows seepage tunnel locations and part of the Low Line Canal. Topographic and cultural features are shown.

564 U.S. Geological Survey. 1966. Surface water records of Idaho, 1964. U.S. Geol. Surv. Boise, ID. 281 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1963-September 1964.

565 U.S. Geological Survey. 1967. Water resources data for Idaho, 1967. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 288 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1967-September 1968.

566 U.S. Geological Survey. 1967. Water resources data for Idaho, 1966. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 288 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1966-September 1967.

567 U.S. Geological Survey. 1969. Water resources data for Idaho, 1968. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 297 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1968-September 1969.

568 U.S. Geological Survey. 1970. Catalog of information on water data, index to water quality section. U. S. Geol. Surv., Washington, D. C. 443 pp.

This catalog lists the following types of information: identification and location of sample stations; major types of data collected; frequency of data collection; in what form the data are stored; and agencies reporting the activities. Station #13093730 (Rock Creek at Twin Falls Idaho) and #13093000 (Rock Creek near Twin Falls Idaho) are listed

569 U.S. Geological Survey. 1970. Water resources data for Idaho, 1969. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 299 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1969-September 1970.

570 U.S. Geological Survey. 1971. Index of surface-water records to September 30, 1970. Part 13.--Snake River Basin. U.S. Geol. Surv. Circ. 663. Washington, D. C. 29 pp.

Rock Creek near Rock Creek, Idaho (station #13092000) [near Rock Creek RCWP station #2060143], with a drainage area of 80 square miles has a period of record of surface water records from 1909-13; 1938-39; and 1943 to present. McMullen Creek near Rock Creek, Idaho (station #13092500) with a drainage area of 22.7 square miles) has a period of record of 1910 and 1912. Rock Creek near Twin Falls, Idaho (station #13093000) [Rock Creek RCWP station #2060146] with a total drainage area of 277 square miles has a period of record of from 1922-1947 (current as of 1970).

571 U.S. Geological Survey. 1971. Index of surface-water records to September 30, 1970. Part 13.--Snake River Basin. U.S. Geol. Surv., Circ. 663 Washington, D.C. 29 pp.

Rock Creek near Rock Creek (station #13092000) is listed as including a drainage area of 80 sq. mi. and a period of record of 1909-13; 1938-39; and 1943-present). McMullen Creek near Rock Creek (station 13092500) has a drainage of 22.7 sq. mi. and a period of record of 1910 and 1912. Rock Creek near Twin Falls (station 13093000) has a drainage area of 277 sq. mi. and a period of record of 1922-1947.

572 U.S. Geological Survey. 1971. Surface water supply of the United States, 1961-65. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1934. 776 pp.

This report gives data for Rock Creek near Rock Creek for water years 1961 through 1965. The maximum discharge reported during this period was 429 cfs on May 17, 1964. The minimum discharge reported during the same period was 2.7 cfs on July 23, 1961. Small ranch diversions from Rock Creek exist above this sample station.

573 U.S. Geological Survey. 1971. Water resources data for Idaho, 1970. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 295 pp.

Discharge data are provided for Rock Creek near Rock Creek for water year October 1970-September 1971.

574 U.S. Geological Survey. 1972. Water resources data for Idaho, 1971. Part 1. Surface water records. U.S. Geol.

Surv. Boise, ID. 301 pp.

Discharge data are provided for Rock Creek near Rock Creek and discharge and water quality data are provided for various sites along Rock Creek for water year October 1971-September 1972.

575 U.S. Geological Survey. 1973. Water resources data for Idaho, 1972. Part 1. Surface water records. U.S. Geol. Surv. Boise, ID. 289 pp.

Discharge data are provided for Rock Creek near Rock Creek for the water year October 1971-September 1972.

576 U.S. Geological Survey. 1974. Catalog of information on water data, water resources region 17 (Pacific Northwest). U. S. Geol. Surv., Reston, VA. 289 pp.

This catalog contains information on water data (stations) for streamflow and stage, quality of surface water, and quality of ground water. The Rock Creek near Rock Creek station is listed as USGS station #13092000 for streamflow. The following stations are given for surface water quality: Rock Creek at Twin Falls (#13092730)(USGS), Rock Creek near Twin Falls (#151053)(Idaho Department of Environmental and Community Services), Rock Creek near Twin Falls (#13093000)(USGS), and Rock Creek at mouth near Twin Falls (#13093100)(USGS). A variety of wells in the Twin Falls area are also listed.

577 U.S. Geological Survey. 1974. Surface water supply of the United States, 1966-70. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 2134. 821 pp.

This report gives data for Rock Creek near Rock Creek for water years 1966 through 1970. The maximum discharge reported during this period was 461 cfs on May 19, 1970. The minimum discharge reported during the same period was 4.1 cfs on September 1-2, 1966. Small ranch diversions from Rock Creek exist above this sample station.

578 U.S. Geological Survey. 1974. Water resources data for Idaho, 1973. Part 1. Surface water records. Part 2. Water quality records. U.S. Geol. Surv. Boise, ID. 289 pp. and 274 pp.

Discharge data are provided for Rock Creek near Rock Creek and discharge and water quality data are provided for various sites along Rock Creek for water year October 1972-September 1973.

579 U.S. Geological Survey. 1975. Water resources data for Idaho, 1974. Part 1. Surface water records. Part 2. Water quality records. U.S. Geol. Surv. Boise, ID. 295 pp. and 302 pp.

Discharge and water quality data are provided for Rock

Creek near Rock Creek and various sites along Rock Creek for water year October 1973-September 1974.

580 U.S. Geological Survey. 1976. Water resources data, Idaho, water year 1975. U.S. Geol. Surv., Water-Data Rpt. ID-75-1. Boise, ID. 684 pp.

Discharge and water quality data are provided for various sites along Rock Creek for water year October 1974-September 1975.

581 U.S. Geological Survey. 1977. Water resources data, Idaho, water year 1976. U.S. Geol. Surv., Water-Data Rpt. ID-76-1. Boise, ID. 634 pp.

Discharge data for Rock Creek near mouth, near Twin Falls, for water year October 1975-September 1976. Additional discharge and water quality data are provided for various sites along Rock Creek.

582 U.S. Geological Survey. 1979. Hub Butte Quadrangle, Idaho-Twin Falls County. 7.5 minute series (topographic). U. S. Dept. Interior, U.S. Geol. Surv. Denver, CO. 1 sheet.

This 7.5 minute topographic map covers Rock Creek from about River Mile 15 to approximately 19.5 (just below the confluence of Cottonwood Creek). The map shows the Cottonwood Creek drainage. Much of the High Line and Low Line Canals are shown. Topographic and cultural features are shown.

583 U.S. Geological Survey. 1979. Water resources data, Idaho, water year 1978. Volume I. Great Basin and Snake River Basin above King Hill. U.S. Geol. Surv., Water-Data Rpt. ID-78-1. Boise, ID. 457 pp.

Discharge data for Rock Creek near mouth, near Twin Falls, for water year October 1977-September 1978. Additional discharge and water quality data provided for various sites along Rock Creek.

584 U.S. Geological Survey. 1979. Water resources data, Idaho, water year 1977. U.S. Geol. Surv., Water-Data Rpt. ID-77-1. Boise, ID. 634 pp.

Discharge data for Rock Creek near mouth, near Twin Falls, for water year October 1976-September 1977. Additional discharge data provided for various sites along Rock Creek.

585 U.S. Geological Survey. 1980. Water resources data, Idaho, water year 1979. Volume I. Great Basin and Snake River Basin above King Hill. U.S. Geol. Surv., Water-Data Rpt. ID-79-1. Boise, ID. 385 pp.

Discharge data for Rock Creek near mouth, near Twin Falls, for water year October 1978-September 1979. Additional

discharge and water quality data provided for various sites along Rock Creek.

586 U.S. Geological Survey. 1981. Water resources data, Idaho, water year 1980. Volume I. Great Basin and Snake River Basin above King Hill. U.S. Geol. Surv., Water-Data Rpt. ID-80-1. Boise, ID. 375 pp.

Discharge and water quality data for Rock Creek near mouth, near Twin Falls, for water year October 1979-September 1980. Additional discharge and water quality data provided for various sites along Rock Creek.

587 U.S. Geological Survey. 1982. Water resources data, Idaho, water year 1981. Volume I. Great Basin and Snake River Basin above King Hill. U.S. Geol. Surv., Water-Data Rpt. ID-81-1. Boise, ID. 447 pp.

Discharge and water quality data for Rock Creek near mouth, near Twin Falls, for water year October 1980-September 1981. Additional discharge data provided for various sites along Rock Creek.

588 University of Idaho. 1978. Irrigation return flow study, final report. Univ. ID, Res. Extension, Agr. Eng., Kimberly. 30 pp.

A water quality monitoring network was established to evaluate the impact of implementation of BMPs on the water quality of the LQ Drain in Twin Falls County, Idaho. The results after two irrigation seasons show that significant progress can be achieved in reducing sediment and nutrients in irrigation return flows with present technology. Sediment ponds are the most readily adopted and most visual BMP. They remove 70-90% of the sediment. Vegetative buffer strips remove up to 75% of the sediment. The model was tested on a large sediment pond with reasonable success.

589 Walker, D. 1987. Rock Creek quality drop said possible. Times News, Twin Falls, ID. (Associated Press). July 19. 1 pp.

It is possible that the water quality of Rock Creek will drop after the federal assistance (Rural Clean Water Program) ends. The assumption is that farmers will not spend the money to continue the BMPs after the RCWP ends.

590 Walker, D.J., B.L. Calkins, E.L. Michalson, and J.R. Hamilton. 1981. Economic evaluation of sediment reduction in irrigation return flows: LQ Drain study area. Univ. ID Dept. Agr. Econ., Moscow. 77 pp.

Compared with 1977, the sediment discharged into the Snake River was 40% in 1978, 20% in 1979, and 24% in 1980. Large sediment ponds located in the drains provide treatment of the entire watershed. The large ponds removed 60% of the

sediment at a cost only slightly higher than the field level BMPs chosen in the linear programming model.

591 Walker, D.J., B.L. Calkins, and J.R. Hamilton. 1988. Cost effectiveness analysis for nonpoint source water quality control. West. agric. Econ. Assoc., Honolulu, HI. Univ. ID Agric. Econ. Resear. Ser. 264. 18 pp.

This is a selected paper presented at the 1988 summer meetings of the Western Agricultural Economics Association, Honolulu, Hawaii, July 12, 1988. The study was done on the LQ Drain and technology applied to the Rock Creek Rural Clean Water Program. Sediment in irrigation return flows significantly degrades water quality. This study proposes and applies a cost efficiency frontier that evaluates practices for achieving alternative levels of sediment control. Inefficient practices are dominated by cost effective practices on the frontier and therefore are irrelevant. For most control levels, treatment practices which clean up runoff are more cost effective than preventive practices which control erosion. If the objective of soil conservation is assigned high priority more research will be required to develope/improve BMPs.

592 Walker, D.J., D.T. Noble, and R.S. Magleby. 1990. Effective cost-share rates and the distribution of social costs in the Rock Creek, Idaho, Rural Clean Water Project. Jour. Soil Water Conserv. 45(4):477-479.

The effective federal cost-share rate for conservation practices often differs markedly from the nominal rate. The effective cost-share rate affects practice adoption, economic efficiency of the subsidy, and the distribution of water quality costs between public and private sectors. Using a linear programming model, this study estimates the effective federal cost-share rate and thus the distribution of water quality improvement costs for the Rock Creek Rural Clean Water Program watershed in Idaho. The federal government paid 62% of farmer cost through subsidies. The public share of total project costs is 84%, & the private share is 16%. This effective federal cost-share rate of 84% compared to a nominal rate of 56%. Government subsidies are instrumental under voluntary programs for farmer adoption of water quality practices.

593 Walker, D.J., J. Hamilton, and P. Patterson. 1982. Economic evaluation of the Rock Creek Idaho RCWP project. U.S.D.A. Econ. Resear. Svce., Washington, D.C. 49 pp.

This report represents the final section (Appendix V) of the 1982 RCWP annual report. The report covers the period from October 1, 1981 to September 30, 1982. The report has three main sections consisting of: 1) University of Idaho Agriculture Economics progress on the Rock Creek RCWP project; 2) FY 83 work plan, showing the proposed work area for the coming year; and 3) the appendix section with supporting information for selected topics discussed in the

progress report (Appendix I, evaluation of the non-harvest option of vegetative filter strips; Appendix II, evaluation of splitting the irrigation run length using gated pipe; and Appendix II, summary of preliminary per acre costs of BMPs).

594 Walker, D.J., P.E. Patterson, and J.R. Hamilton. 1986. Costs and benefits of improving irrigation return flow water quality in the Rock Creek, Idaho, Rural Clean Water Project. Resear. Bull. 139. Coll. Agric., Agric. Expt. Sta., Univ. ID., Moscow. 30 pp.

The analysis showed that reduced drain and lateral canal cleaning costs are a potential benefit of the RCWP on Rock Creek. This is a benefit of up to $1.02 per field acre realized by the Twin Falls Canal Company. Preliminary analysis suggests, and further research may confirm, that in the Rock Creek project, onsite productivity damage of erosion may exceed offsite sediment damage in dollar value. This possibility clashes with the reality that most cost effective practices currently available for cost sharing in Rock Creek are treatment oriented. By only removing sediment from runoff water but doing nothing to prevent erosion, these practices ignore a major potential correlative benefit of clean water; erosion reduction & enhanced soil productivity in the future. Most cost effective preventive practices are needed as approved practices.

595 Walker, D.J., and D.T. Noble. 1987. Distribution of social costs on the Rock Creek Idaho Rural Clean Water Project. West. agric. Econ. Assoc., Manhattan, KS. Univ. ID Agric. Econ. Resear. Ser. 259. 13 pp.

This paper is very similar to Walker and Noble (1987) but is slightly shorter in total length and is a paper presented at the 1987 annual meeting of the Western Agricultural Economics Association, Manhattan, KS, July 13, 1987. This paper examines the distribution of social costs for improving water quality on the Rock Creek project, and irrigated tract in southern Idaho. The analysis relies on a linear programming model of the watershed that incorporates cost-share payments and income taxes. The result implies that government cost-share payments could be instrumental, under a voluntary program, for encouraging farmer adoption of water quality practices. It further implies that should cost-share payments cease following and implementation phase of a program, farmers might suspend annual practices that reduce farm income.

596 Walker, D.J., and D.T. Noble. 1987. Distribution of social costs on the Rock Creek Idaho Rural Clean Water Project. West. agric. Econ. Assoc., Manhattan, KS. Univ. ID Agric. Econ. Resear. Ser. 259. 14 pp. + appendix.

This is a paper presented at the 1987 annual meeting of the Western Agricultural Economics Association, Manhattan, KS, July 13, 1987. This paper examines the distribution of

social costs for improving water quality on the Rock Creek project, and irrigated tract in southern Idaho. Rock Creek is one of five intensively monitored projects under the Rural Clean Water Program. The analysis relies on a linear programming model of the watershed that incorporates cost-share payments and income taxes. The result implies that government cost-share payments could be instrumental, under a voluntary program, for encouraging farmer adoption of water quality practices. It further implies that should cost-share payments cease following and implementation phase of a program, farmers might suspend annual practices that reduce farm income.

597 Water Resources Branch. 1946. Surface water supply of the United States, 1944. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1013. 226 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. Summary statistics were not given. A runoff of 23,780 acre-feet was reprted. Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1944. The discharge ranged from 100 cfs (April 1) to 377 cfs (June 9). The mean flow was given at 209 cfs with a total run-off of 151,400 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second -foot-days was 76,314. Data are given for 1943 calendar yr.

598 Water Resources Branch. 1947. Surface water supply of the United States, 1945. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1043. 248 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A min. of 7.7, max. of 306 cfs & runoff of 30,450 acre-feet was reprted. Daily discharge, in second-feet, measurements are presented for Rock Creek near Twin Falls for the water year ending September 30, 1945. The discharge ranged from 116 cfs (March 6-7, 9-10) to 440 cfs (May 24). The mean flow was given at 208 cfs with a total run-off of 150,300 acre-feet. A note was made that normal summer flow was entirely diverted for irrigation several miles upstream. Waste water from South Side Twin Falls Low Line Canal, which crosses Rock Creek 12 mi. above, causes abrupt fluctuations in stage at times. Irrigation waste water & return flow from project lands enter above gage. Total number of second -foot-days was 75,788. Data are given for 1944 calendar yr.

599 Wells, J.V.B. 1955. Surface water supply of the United States, 1952. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1247. 259 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 6.0 and a maximum of 294 cfs, a mean of 41.4 cfs, and runoff of 30,040 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1952. Data are also presented for calendar year 1951. Small ranch diversions above station are noted.

600 Wells, J.V.B. 1956. Surface water supply of the United States, 1953. Part 13. Snake River Basin. U. S. Geol. Surv. Water-Supl. Pap. 1287. 255 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 8 and a maximum of 194 cfs, a mean of 36.6 cfs, and runoff of 26,530 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1953. Data are also presented for calendar year 1952. Small ranch diversions above station are noted.

601 Wells, J.V.B. 1956. Compilation of records of surface waters of the United States through September 1950. Part 13. Snake River Basin. U. S. Geol. Surv. Water-Supl. Pap. 1317. 566 pp.

This report is a summary of data for Rock Creek near Rock Creek (1910-1950), McMullen Creek near Rock Creek (1910-1912), and Rock Creek near Twin Falls (1922-1947). Monthly and yearly mean discharges (cfs), monthly and yearly runoff (acre-feet), and yearly discharge in cfs are given. Notes indicate that there are small ranch diversions above Rock Creek at Rock Creek. No such diversions appear above the McMullen Creek sample station. Rock Creek at Twin Falls has practically all normal summer flow diverted several miles upstream for irrigation. Waste water from South Side Twin Falls low-line canal, which crosses Rock Creek 12 miles upstream, causes abrupt fluctuations in stage at times. Irrigation waste water and return flow from project lands enter above station.

602 Wells, J.V.B. 1956. Surface water supply of the United States, 1954. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1347. 297 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 5.6 and a maximum of 74 cfs, a mean of 16.2 cfs, and runoff of 11,720 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1954. Data are also presented for calendar year 1953. Small ranch diversions above station are noted.

603 Wells, J.V.B. 1957. Surface water supply of the United States, 1955. Part 13. Snake River Basin. U. S. Geol.

Surv., Water-Supl. Pap. 1397. 311 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 4.7 and a maximum of 152 cfs, a mean of 21.3 cfs, and runoff of 15,440 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1955. Data are also presented for calendar year 1954. Small ranch diversions above station are noted.

604 Wells, J.V.B. 1958. Surface water supply of the United States, 1956. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1447. 261 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 6.0 and a maximum of 147 cfs, a mean of 28.7 cfs, and runoff of 20,850 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1956. Data are also presented for calendar year 1955. Small ranch diversions above station are noted.

605 Wells, J.V.B. 1959. Surface water supply of the United States, 1957. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1517. 261 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 7 and a maximum of 309 cfs, a mean of 39.1 cfs, and runoff of 28,310 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1957. Data are also presented for calendar year 1956. Small ranch diversions above station are noted.

606 Wells, J.V.B. 1960. Surface water supply of the United States, 1959. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1637. 271 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 4.5 and a maximum of 65 cfs, a mean of 16.4 cfs, and runoff of 11,890 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1959. Data are also presented for calendar year 1958. Small ranch diversions above station are noted. Discharge measurements are also given for Rock Creek near Twin Falls (now Poleline Road): September 30, 1958 - 304 cfs; March 25, 1959 - 152 cfs; and August 6, 1959 - 282 cfs.

607 Wells, J.V.B. 1960. Surface water supply of the United States, 1958. Part 13. Snake River Basin. U. S. Geol. Surv., Water-Supl. Pap. 1567. 273 pp.

Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek. A minimum of 6.8 and a maximum of 283 cfs, a mean of 33.7 cfs, and runoff of 24,420 acre-feet was reported. Daily discharge, in second-feet, measurements are presented for Rock Creek near Rock Creek for the water year ending September 30, 1958. Data are also presented for calendar year 1957. Small ranch diversions above station are noted.

608 Western States Water Council. 1988. Responses to the WSWC questionnaire regarding non-point source pollution control programs in the Western States. West. States Water Coun., Midvale, UT. 219 pp.

The section of the questionnaire concerning Idaho's nonpoint source pollution (NPSP) control programs list the Rural Clean Water Program (RCWP) on Rock Creek as one of a non-regulatory nature which results in the mitigation of NPSP in Idaho.

609 Whitehead, R.S., and D.J. Parliman. 1979. A proposed ground water quality monitoring network for Idaho. U.S. Geol. Surv. Open-File Rpt. 79-1477. 67 pp.

The Rock Creek area is given a priority ranking of 4th because most of the area is privately owned agricultural land (including urbanized areas).

610 Wilkins, D. 1988. Caldwell Ag Expo expected to draw big. Feb. 3. ID Press-Tribune, Nampa. Pp. 4B.

The Ag Expo planned for later in the week is expected to bring in 6,000-7,000 farmers and ranchers from the northwest to Caldwell. The article previews the various activities taking place at the event including a presentation on Thursday (Feb. 4) by Bill Clark on the water quality study in the Rock Creek area near Twin Falls. The experimental study which began in 1981 was one of only 13 original projects across the country. The study is to see if best management practices could be placed on the land which would save soil and improve the water quality of Rock Creek.

611 Wisecaver, S. "Shocking" fish provides look at water quality. Buhl Herald, Buhl, ID. March 30. Page 2, Sec. C.

Photograph and article on March electrofishing survey on Cedar Draw and Rock Creek.

612 Wolf, G. 1986. Water quality monitoring station helping clean up local creek. ID State Jour. Nov. 26. 1 pp.

The 10 year water quality monitoring project on Rock Creek is in its 6th year of progress. Data shows when and where improvements can be made in the best management practices farmers use to keep runoff to a minimum. The quality of

the water in Rock Creek has improved since the study began in 1980. Fish populations (wild trout) have increased at most study sites. A similar study is need on dryland agriculture in Idaho.

613 Wood, W.W., and W.H. Low. 1987. Solute geochemistry of the Snake River Plain regional aquifer system, Idaho and eastern Oregon. U. S. Geol. Surv., Open-File Rpt. 86-247. 146 pp.

The water for the eastern Snake River Plain aquifer system is of local meteoric and not juvenile of formation orgin. About 20% of the solutes are derived from reactions with rocks forming the aquifer framework. Calcite and silica are precipitated in the aquifer. Olivine, pyroxene, pyrite, and anhydrite are being dissolved and plagioclase is being weathered. Irrigatiion water has altered solute concentrations and isotope rations in the eastern Snake River Plain aquifer. Radiocarbon dating of geothermal water in the Salmon Falls and Bruneau-Grand View areas suggests that the residence time of the geothermal water is about 17,700 years. Solute concentrations are given for Rock Creek for a period 1960-1982.

614 Woodland, D. 1987. T. F. man honored for conservation measures. Magic Valley Farm Lines. Nov. 2 pp.

Roy Jesser. one of the key figures in the Rock Creek Rural Clean Water Program, was honored with a citation and a letter from Gov. Andrus at the dedication to the Rock Creek Sign and Rock Creek Project at Rock Creek Park, in Twin Falls. The article reviews some of Jesser's accomplishments including early work on the LQ Drain project as well as the RCWP.

615 Woodland, D. 1987. Water project is watched closely. Magic Valley Farm Lines. Sept.: 8-9.

This is a review article concerning the Rock Creek Rural Clean Water Program. Emphasis was placed on BMPs and some of the results of the project such as sediment reductions and increased fish populations.

616 Woodland, D. 1988. No till tour educates farmers. Magic Valley Farm Lines. Aug. 1 pp.

The conservation tillage tour was available to local farmers as part of the Rock Creek Rural Clean Water Program. Various aspects of conservation tillage were observed on several different farms. At each farm the landowner explained what he had done and how well it had worked for him. Dr. David Carter explained the results of side by side field experiments. Sediment leaving the fields can be reduced by 90%. Carter said that by using conservation tillage costs were reduced by 30% and out of 36 trials the yields were virtually the same.

617 Worstell, R.V. 1976. An experimental multiset irrigation system. Trans. ASAE. 19: 1122-1128.

Criteria for the design, construction, and operation of an experimental buried lateral, gravity multiset irrigation system are presented in this paper. The system operates without automatic controls and has a potential water application efficiency of 80% with very little runoff or erosion. With the addition of automatic controls efficiencies of 90-95% can be achieved. Estimated cost and benefits indicate that this system would be economically feasible. The research was conducted on the Twin Falls Tract.

618 Wroten, J., and B. Clark. 1980. Stream channel stability evaluation for Rock Creek, Twin Falls County, Idaho. ID Dept. H&W, Div. Environ., Boise. 12 pp.

A field survey was conducted to determine stream channel stability of Rock Creek during March 19-20, 1980, from the Sawtooth National Forest Boundary to the Low Line Canal. The study showed that the stream channel of Rock Creek is severely unstable and subject to continuous bank cutting and eroding. Some stabilization might be achieved by resloping banks, allowing riparian vegetation to become established; and removal of livestock from the streambanks.

619 Wyatt, L., J. Spooner, W. Berryhill, S.L. Brichford, and A.L. Lanier. 1988. Fate and effects of pollutants, nonpoint sources. Jour. Water Poll. Cont. Fed., 60: 925-933.

The nonpoint source literature for 1987 is reviewed in this article. Several examples drawing from the Rural Clean Water Program are presented. Young and Magleby (1987) which used a great deal of Rock Creek RCWP data is included, as are other RCWPs.

620 Yankey, R. 1989. Rock Creek: Born again for browns. ID Wildlife 9(3): 27-28.

Rock Creek has come a long way since 1971 when the Idaho Department of Fish and Game listed it as a "Wildlife Habitat Obituary" in the Idaho Wildlife Review. During the 1970s point source pollution was eliminated from the stream. Then during the 1980s the Rock Creek Rural Clean Water Program (RCWP) went to work on the main nonpoint source of pollution - agricultural runoff. The article gives a brief background of pollution problems in Rock Creek and the RCWP. Fish arae one of the best indicators of the health of a stream, hence the fish populations in Rock Creek have been monitored as part of the RCWP. Brown and rainbow trout have increased dramatically in both numbers and size since the project began. Today, local anglers are rediscovering Rock Creek. The stream is fished every day.

621 Yankey, R., S. Potter, T. Maret, J. McLaughlin, D. Carter, C. Brockway, R. Jesser, and B. Olmstead. 1991. Rock Creek Rural Clean Water Program final report 1981-1991. U.S. Dept. Agric., ID Div. Environ. Qual., and Twin Falls and Snake River Soil Cons. Dist., Twin Falls, ID. 328 pp.

This interagency report describes the results of a ten year study of Rock Creek under the Rural Clean Water Program. The report contains an executive summary, and sections on project findings and recommendations, introduction and project background, implementation results, project information and education activities, evaluation of institutional relationships and economics, water quality monitoring program description, and water quality monitoring results. A literature cited section is included for the water quality chapters. A glossary of technical terms and conversion factors are included. Appendicies include the Rock Creek bibliography of 618 references, subbasin trend analysis of sediment and fish poulation estimates.

622 Yankey, R.L. 1990. Project implementation, complications in implementation, interaction with farmers and landowners and project success. Abstract of paper presented at the 45th Annual Meeting of the Soil and Water Conservation Society, July 29-August 1, 1990, Salt Lake City, Utah. pp. 1-2.

This paper was presented as the Soil Conservation Service View and a reactor to the overview given by D.L. Carter under a session on the Rock Creek Rural Clean Water Program moderated by Jan Jinings. An introduction to the project was presented. It was estimated that 217 long term contracts would be written with landowners on the project. The installation of best management practices has resulted in better than anticipated water quality improvements. Rock Creek sediment contributions to the Snake River have been reduced by 78 percent.

623 Young, C.E. and R.S. Magleby. 1986. Economic benefits of three Rural Clean Water Projects. pp. 134-142, IN: T. E. Waddell, ed., The off-site costs of soil erosion. The Conservation Foundation, Washington, D.C. 284 pp.

This book contains the proceedings of a symposium held in Washington, D.C. in May 1985. A comprehensive economic evaluation of three selected Rural Clean Water Program projects was undertaken by the Economic Research Service in 1980. This paper discusses the nature of the water quality problems and use impairments in the Idaho, Ilinois and Vermont RCWPs and discusses the estimated benefits resulting from implementing the projects in the three areas. Off-site benefits for Rock Creek were estimated at $596,000. This value included recreation and water conveyance structures.

624 Young, C.E., and R.S. Magleby. 1987. Agricultural

pollution control: Implications from the Rural Clean Water Program. Water Resour. Bull 23: 701-707.

The Rural Clean Water Program (RCWP) has provided a unique opportunity to study the economics of agricultural nonpoint source pollution control. Five of the RCWP projects were chosen for study including the Rock Creek RCWP. Reduced siltation of power-generation reservoirs behind dams on the Snake River was identified as a significant potential benefit from the Rock Creek project. However, subsequent evaluation revealed that reductions in erosion in the Rock Creek watershed were unlikely to significantly affect the water storage facilities 100 miles downstream. Although measurable reductions in sediment delivery to the Snake River occur, the river itself will tend to pick up replacement sediment from streambanks and the river bottom. The total benefits for Rock Creek are given as 1.6 while total costs are given as 6.7 (benefit/cost ratio of 0.2).

625 Zack, R.S., and H.P. Brown. 1989. First record of a dryopid (Coleoptera: Dryopidae) from Washington and notes on the distribution of the family in the northwestern United States. Pan-Pacific Entomol. 65(1): 77-78.

The aquatic dryopid beetle, Helichus striatus LeConte, (Coleoptera: Dryopidae) is reported from Rock Creek, Twin Falls County, Idaho, for the first time (although specific collection data was not included in this paper). The beetle was collected as part of the benthic invertebrate sampling on the Rock Creek Rural Clean Water Program.

626 Zimowsky, P. 1990. Rebirth of a stream. March 21, 1990, Idaho Statesman, Boise, ID. pp. 1E, 3E.

An article on the Rock Creek Rural Clean Water Program project is presented along with a color photograph of Ruel Stayner fishing in the stream and a color chart showing the relationship between water quality and aquatic biology. A summary of the progress of the project is given. Mr. Stayner recalls when the stream was choked with pollution and could not be fished.