1991|10

IDAHO WATER PROJECT UPDATE

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SPRING 1991 No. 1

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AGRICULTURE

BMP'S

1.1 Bedrock Creek Implementation Project

Terry White, Clearwater SCS; Bruce Hanson, SCS

Bedrock Creek State Water Quality Project is a cooperative effort on the part of the Clearwater and Nez Perce Soil and Water Conservation districts to address the critical problem of soil erosion now impacting area water quality and topsoil loss. A total of 5,551 acres are treated annually for soil and water conservation in the watershed. • The land treatments occurring on most of these farms are combinations of crop sequence, tillage systems, residue management, nutrient and pesticide management, and seeding of permanent cover.

1.2 Upper Conant Creek Implementation Project

Neal Hughes, Yellowstone SWCD; Howard Johnson, SCS; Mark Hogen, ISCC

Conant Creek is a major tributary to Falls River, a river designated as a Stream Segment of Concern in the Idaho Agricultural Pollution Abatement Plan. Highly erodible deep silt loam soil types predominate within the Upper Conant Creek Watershed. The terrain surrounding Conant Creek consists of slopes ranging from 2-25 percent. Snow melt, spring rains, and summer thundershowers create the potential for heavy erosion. • The goal of this project is to apply land treatment conservation practices to 75 percent of the Upper Conant Creek Subwatershed critical area. Seventy percent of the 11,007 critical acres within the project are currently under contract.

1.3 Bancroft State Agricultural Water Quality Project (SAWQP)

Harry Ozburn, Caribou SWCD; David Modersitzki, Bancroft SAWQP; Robert Clark, SCS

Bancroft subwatershed is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segments 326, 327 & 328. Bancroft subwatershed annually delivers large amounts of sediment and nutrients from cropland and rangeland to the receiving waters of the Portneuf River. The pollutants of sediment and nutrients are reducing the quality of irrigation and recreational opportunities in the river. • The objectives of this project are to reduce the sediment entering the Portneuf River from dry and irrigated cropland operations, to improve the aesthetics of the Portneuf River and its community, and to improve fish and wildlife habitat throughout the watershed. These goals will be achieved by applying Best Management Practices (BMP's) to 75 percent of the Bancro' ibwatershed area which is critical in terms .vater quality.

1.4 Squirrel Creek Implementation Project

Neal Hughes, Yellowstone SWCD; Howard Johnson, SCS; Mark Liogen, ISCC

Squirrel Creek is a major tributary to Falls River, a river designated as a Stream Segment of Concern in the Idaho Agricultural Pollution Abatement Plan. Heavy snow melt, spring rains, and summer thundershowers create the potential for annual heavy runoff. • The goal of this project is to apply land treatment conservation practices to 75 percent of the Squirrel Creek Subwatershed critical area. Twenty-two percent of the 14,444 critical acres within the project are currently under contract.

DEAR READER,

Water, the lifeblood of Idaho, sustains Idaho's fish and wildlife, agriculture, industry, mining, forestry, hydropower, and recreation. Idaho's rivers and lakes, renowned for their water sports, provide some of the most spectacular natural scenery in the world. Water is precious, and its management determines the quality of Idaho's environment.

Idaho Water Project Update is a semi-annual newsletter for people concerned with water and water-related issues in Idaho. The importance of these issues is reflected by the involvement of over 100 federal, state, and local agencies in water quality and water management investigations and research. Information exchange and education programs are receiving greater attention as well. Exploring solutions for problems and sharing the information is critical to good management. Idaho Water Project Update is designed to foster communication between professionals and to enhance existing and future programs by providing a resource that affords a comprehensive look at water programs in Idaho.

The inaugural issue of Idaho Water Project Update, representing contributions from over 60 agencies, contains information on more than 150 current water-related projects. An additional 20 agencies have committed to be included in the Fall 1991 issue.

Investigators are identified with each project to serve as a source of information for other professionals. For ease of locating items of interest, projects are placed in categories and subcategories. An index is also included to make Idaho Water Project Update user-friendly.

The Idaho Water Resources Research Institute (IWRRI) and the University of Idaho Cooperative Extension System (CES) are pleased to present Idaho Water Project Update, produced through their combined efforts.

We welcome all comments and contributions.

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1.5 Tensed/Lolo Creek Implementation Project

Ted Agidius, Benewah SWCD; Larry Cooke, SCS

Lolo Creek, a tributary of Hangman Creek, is designated as a high priority stream segment in the Idaho Pollution Abatement Plan. Water quality in Lolo Creek is severely impacted by sediment and chemical pollution related to soil erosion and runoff from agricultural lands. • The objective of this project is to apply land treatment BMP's to 75% of the Tensed/Lolo Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation.

1.6 Mission Creek/Sheep Creek Implementation Project

Ted Agidius, Benewah SWCD; Larry Cooke, SCS

Mission Creek/Sheep Creek is designated in the Idaho Agricultural Pollution Abatement Plan and is rated as a First Priority Stream Segment. Water quality is severely affected by sediment from agricultural chemicals, including nitrogen, phosphorus, insecticides and herbicides. Pollutants of sediment and nutrients are reducing the quality of recreational opportunities. • The objective of this project is to apply land treatment BMP's to 75% of the Mission Creek/Sheep Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation.

1.7 Upper Hangman Implementation Project

Ted Agidius, Benewah SWCD; Larry Cooke, SCS

Upper Hangman Creek is designated as a high priority stream segment of the Hangman Creek project area, in the Idaho Pollution Abatement Plan. Water quality in Upper Hangman Creek is severely impacted by sediment and chemical pollution related to soil erosion and runoff from agricultural lands. Much of the sediment delivered to the creek remains lodged in the main channel and causes streambank and channel instability. • The objective of this project is to apply land treatment BMP's to 75% of the Upper Hangman Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation.

1.8 Cascade Reservoir Clean Lakes Project

Valley SWCD; Gwen Burr, Michael Ingham, Trish Klahr, DEQ

This is an ongoing study to determine baseline data for the implementation of BMP's within the Cascade Reservoir watershed. The reservoir is in a eutrophic state, with algal blooms in late summer causing decreasing levels of dissolved oxygen. The data will be used to determine the effectiveness of BMP's after implementation.

1.9 Conway Gulch, SAWQP

Michael Ingham, Trish Klahr, DEQ

In 1982 the Conway Agriculture Pollution Abatement Project was initiated to help improve water quality in the Lower Boise River drainage. The project is a cost share program with area farmers, local operators and SCS implementing BMP's for controlling field erosion and nutrient loading. The 1988-89 study was initiated to better understand the effects the established BMP's may be having on water quality. The draft report should be completed in the spring of 1991.

1.10 Wide Hollow Implementation Project

Lowell R. Davis, Oneida SWCD; Richard Spencer, SCS

The objective of the Wide Hollow SAWQP is to reduce sediment and related pollutants entering "The Little Malad River" from agricultural lands by applying BMP's. Pollutant reductions in the subwatershed as practices are applied include sediment, 75%; phosphorus, 60%; pesticides, 65% and herbicides, 65%. In addition to reducing the pollutants, the project will also reduce nitrogen levels. There are 7,390 acres of critical cropland acres. Contracts have been written and signed on 90 percent of the critical acres.

1.11 Dairy Creek Implementation Project

Lowell R. Davis, Oneida SWCD; Rich Spencer, SCS

Dairy Creek and Wrights Creek drain the entire subwatershed area and are major sediment contributors to the Little Malad River, a first priority stream segment in the Agricultural Pollution Abatement Plan. • The objective of the Dairy Creek project is to apply land treatment BMP's to 75 percent of the watershed area which is critical in terms of water quality. Project goals are to improve water quality for the Little Malad River and tributaries, improve fisheries and wildlife habitat, preserve long-term soil productivity by reducing the rate of erosion and sediment transport, and preserve storage capacity in the Daniels Reservoir.

1.12 Daniels Implementation Project

Lowell R. Davis, Oneida SWCD; Richard Spencer, SCS

Daniels Reservoir has been designated as a Stream Segment of Concern by the State of Idaho. Roughly 5,000 acres of untreated cropland are a continuing source of sediment pollution. • The objective of the Daniels Project is to apply land treatment BMP's to 75 percent of the watershed area which is critical in terms of water quality. Project goals are to improve fisheries in the reservoir, improve water quality for the Little Malad River and tributaries, improve wildlife habitat, preserve long-term soil productivity by reducing the rate of erosion and sediment transport, and preserve storage capacity in the Daniels Reservoir.

1.13 Vineyard Creek Implementation Project

North Side SWCD; SCS

Vineyard Creek annually delivers large amounts of sediment, nutrients, and pesticides from irrigated cropland to the receiving waters of the Snake River. The pollutants of sediment, nutrients, and pesticides have severely reduced water quality in the stream and have degraded the fishery habitat. • The objective of this project is to apply land treatment BMPs to 75 percent of the Vineyard Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation.

1.14 East Upper Deep Creek Implementation Project

Gary Grindstaff, Balanced Rock SWCD; Kevin Davidson, SCS; Gary Andrus, ISCC

Deep Creek has been identified as a priority stream segment in the Idaho Agricultural Pollution Abatement Plan. The purpose of the project is to correct water quality degradation from agricultural non-point sources within the proposed project area, and to promote recognition and voluntary compliance with regard to State Water Quality Standards. • The objective of this project is to apply land treatment BMPs to 75% of the East Upper Deep Creek watershed area, Twin Falls County, which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation.

1.15 Lone Pine

Portneuf SWCD; SCS; IDL-ISCC

Lone Pine is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. Lone Pine is a subwatershed that annually delivers large amounts of sediment and nutrients from cropland, rangeland, and forestland into the receiving waters of Marsh Creek. The sediment loads are reducing the water quality of Marsh Creek. • The objective of this project is to apply and treatment BMPs to 75% of the Lone Pine watershed which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, salmonid spawning, and secondary contact recreation.

1.16 Upper Rapid Creek Implementation

Project Portneuf SWCD; DEQ; ISCC

Upper Rapid Creek is designated in the Idaho Agricultural Pollution Abatement Plan as a second priority stream segment. Upper Rapid Creek annually delivers large amounts of sediment and nutrients from cropland, rangeland, and forestland to the receiving waters of the Portneuf River. • The objective of this project is to apply land treatment BMPs to 75 percent of the Upper Rapid Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, and secondary contact recreation.

1.17 Arkansas Basin

Portneuf SWCD; EPA

Arkansas Basin is designated in the Idaho Agricultural Pollution Abatement Plan as a first priority stream segment. Arkansas Basin annually delivers large amounts of sediment and nutrients from cropland, rangeland, and forestland to the receiving water of Marsh Creek. • The objective of this project is to apply land treatment BMPs to 75 percent of the Arkansas basin watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply and cold water biota.

1.18 Cedar Draw Implementation Project

Ken Tverdy, Balanced Rock SWCD; Kevin Davidson, SCS; Gary Andrus, ISCC

Irrigation return flows and animal wastes impair usage of Cedar Draw for contact recreation and fishing. Irrigation return flows contribute sediment and phosphorous, and increase turbidity. Subsurface irrigation return flows contain high concentrations of nitrate. Animal wastes from cattle grazing increase fecal bacterial concentrations above the standards for the protection of public health. • The objective of this project is to apply land treatment BMPs to 75% of the watershed which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation.

1.19 Crane Creek Implementation Project

Frank Land, Weiser River SWCD; Tom Yankey, SCS; ISCC

Through a previous planning project, the Crane Creek watershed was determined to be a large source of sediment and nutrients to the Weiser River. • The objective of the project is to reduce the amounts of sediments and nutrients that get into the stream and later are transported into the Weiser River system. This will be accomplished by using a wide variety of BMP's, some of which are stream channel stabilization, seedings, and animal waste systems.

EDITORS' CORNER

In this inaugural issue of Idaho Water Project Update, we have tried to develop a format that makes it easy to locate abstracts of interest, provides all pertinent information, and makes maximum use of space. We have abbreviated the names of agencies and institutions according to the key on the last page. For future issues, we urge contributors to submit their abstracts in this format, using these abbreviations to identify their agencies. Our goal is to receive abstracts in a form that can be printed as sumbitted.

We do reserve the right to edit your contributions, primarily for length, but also for spelling, grammar, and punctuation. In the next call for contributions to Idaho Water Project Update, we intend to supply specific guidelines for submitting abstracts. Idaho Water Project Update will be published twice a year, with the Fall issue planned for December.

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1.20 Badger Creek Implementation Project

William S. Stanger, East Side SWCD; Dennis Hadley, SCS

Willow Creek, of which Badger Creek is a subwatershed, is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. The pollutants of sediment and nutrients from Badger Creek are reducing the quality of recreational opportunities in Ririe reservoir and have degraded the fishery habitat of the stream. • The objective of this project is to apply land treatment BMP's to 75 percent of the Badger Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation and secondary contact recreation.

1.21 Meadow Creek Implementation Project

William S. Stanger, East Side SWCD; Dennis Hadley, SCS

Willow Creek, of which Meadow Creek is a subwatershed, is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. The pollutants of sediment and nutrients from Meadow Creek are reducing the quality of recreational opportunities in Ririe reservoir and have degraded the fishery habitat of the stream. • The object of this project is to apply land treatment BPM's to 75 percent of the Meadow Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation.

1.22 Tex Creek Implementation Project

William S. Stanger, East Side SWCD; Dennis Hadley, SCS

Willow Creek, of which Tex Creek is a subwatershed, is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. The pollutants of sediment and nutrients from Tex Creek are reducing the quality of recreational opportunities in Ririe reservoir and have degraded the fishery habitat of the stream. • The object of this project is to apply land treatment BMP's to 75 percent of the Tex Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's beneficial uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation.

1.23 Antelope Creek Implementation Project

William S. Stanger, East Side SWCD; Dennis Hadley, SCS; Tom Abel, ISCC

Antelope Creek is designated as a stream segment of concern with a primary purpose designation of Agriculture/Grazing. Antelope Creek annually delivers large amounts of sediment from non-irrigated cropland to the South Fork of the Snake River. • The objective of this project is to apply land treatment BMP's to 75 percent of the Antelope Creek watershed area which is critical in terms of water quality. Project goals are to protect and enhance the stream's partially supported cold water biota and salmonid spawning and to protect and enhance the South Fork's beneficial uses.

1.24 Conway Gulch Implementation Project

Richard Gunning, Canyon SWCD; John W. Gleim, SCS

Conway Gulch is a tributary to the Boise River, which is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. Conway Gulch annually delivers large amounts of sediment and nutrients as a result of irrigation return flows. • The objective of this project is to apply land treatment BMP's to 75% of the Conway Gulch watershed that is critical in terms of water quality. Project goals are to protect and enhance the Boise River's beneficial uses of cold water biota, salmonid spawning, agricultural water supply, primary contact recreation, and secondary contact recreation.

1.25 Sand Hollow West Project Number AG-20

Richard Gunning, Canyon SWCD; John W. Gleim, SCS; David Blew, ISCC

The Sand Hollow West Drain is a tributary to the Snake River, which is designated in the Idaho Pollution Abatement Plan. The project area consists primarily of surface and sprinkler irrigated cropland. Sand Hollow Drain annually delivers large amounts of sediment and nutrients to the Snake River. • The objective of this project is to apply land treatment BMP's to 75% of the Sand Hollow West project area that is critical in terms of water quality. Treatment goal is to reduce the quantity of sediment, phosphorous, nitrogen, and toxins in the water flowing from the project area. This should enhance the stream's beneficial uses of cold water biota, agricultural water supply, and secondary contact recreation.

EROSION/ SEDIMENTATION

1.26 Scotts Pond Planning Project

North Side SWCD; SCS

Scotts Pond Planning Project is comprised almost entirely of irrigated cropland. Runoff from the cropland enters the Snake River where the pollutants of sediment, nutrients, and pesticides have severely reduced water quality and degraded the fishery habitat. Groundwater contamination is also a potential problem because of dairies and feedlots in the area. • The first objective of this study is to investigate the nonpoint source pollution to the Snake River, and to identify and select an effective treatment to protect and enhance the beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation and secondary contact recreation. • The second objective is to protect the domestic and industrial water supply from contamination by agricultural activities by identifying and selecting effective treatments to protect the groundwater and assessing support for the treatment alternatives.

1.27 Teton Canyon Water Quality Planning Project

Glen Nelson, Teton SWCD; Steve Smart, SCS; Biff Burleigh, ISCC; Blaine Drewes, DEQ

The Teton Canyon Watershed Area includes seven subwatersheds of the Teton River. The entire length of the Teton River within the study area has been designated as a stream segment of concern. Erosion from croplands, unstable streambanks, rangeland, and forestland deposit sediment and nutrients into the Teton River and its tributaries. This pollution adversely affects beneficial uses such as agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation. • This study will investigate and measure the nonpoint source pollution from the Teton Canyon Watershed Area and determine its origin. The study will identify treatment alternatives and select one that will best protect and enhance beneficial uses of the Teton River.

1.28 Teton River Basin Study

Garl Drake, Teton SWCD; Steve Smart, SCS; Brad Merrill-Exton, USFS; DEQ; IFG; ISCC

The objective of this project is to assess the resource conditions, problems, and potential project actions within the Teton River Basin Area. The assessment is related to sediment sources and the impact of sediment on water quality and fisheries. • The study area includes the upper Teton River, a stream segment of concern, and its tributaries. Approximately 285,000 acres of public and private land are included. The Idaho Fish & Game Fisheries Enhancement Project is interrelated with this study.

1.29 Riparian Area Demonstration Project

Glen Nelson, Teton SCD; Steve Smart, SCS; Irv Cowley, DEQ; ISCC

The objectives of this project are to demonstrate the feasibility of cattle management systems in riparian areas, and to demonstrate that cattle can use riparian areas without degradation if properly managed. Three sites within the Teton Canyon Water Quality Project have been selected as demonstration areas.

1.30 Middle Little Wood River Planning Project

Carl Pendleton, Robin Lezamiz, Fred Brossy, John Power, Dan Durand, Rod Hubsmith, Roland Jones, Rusty Gillette, Joyce M. Koeppen, Gale Roberts, Steve Thompson, Wood River SWCD; SCS; ISCC

In the Little Wood River watershed (Lincoln and Blaine counties), nonpoint source impacts are from activities related to irrigated and non-irrigated crop production, rangeland, and pastureland. These activities have caused riparian vegetation removal and streambank modification. The primary pollutants in this watershed are nutrients, sediment, organic enrichment, and bacteria from agricultural activities. • The objective of this study is to investigate the nonpoint source pollution to the Middle Little Wood River and its origins in order to identify and select an effective treatment to protect and enhance the beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, and secondary contact recreation, and to assess support for this treatment alternative.

1.31 Lower Payette River Water Quality Planning Project

Dianne Lansing, Payette SWCD; Michael A. Raymond, SCS-Payette

The segment of the Payette River SWB-340 has been identified as a second priority stream segment moderately to severely impacted by sediment from agricultural pollution sources, primarily from irrigated cropland. Runoff from agricultural land carries sediment and associated pollutants to drainage ways in the project area and subsequently to the Payette River. • The objective of this study is to investigate the non-point source pollution to the Lower Payette River by examining the overall project area to determine problem severity, current land use, critical areas, and develop cost-effective Best Management Practices.

1.32 South Fork of the Palouse River Implementation Project

Kyle Hawley, Latah SWCD; Ken Houska, SCS; Shelly Gilmore, ISCC

The South Fork of the Palouse River is designated in the Idaho Agricultural Abatement Plan as first priority stream segment. The South Fork of the Palouse River delivers sediments and nutrients to the Palouse River from dryland agricultural cropland and rangeland. • Several land-use issues have emerged as especially important. These include restriction of development in the flood plain, erosion prevention and wildlife enhancement on agricultural cropland, wildlife habitat protection in riparian and natural areas, and controlled growth at the periphery of the urban centers.

1.33 Little Potlatch Creek/Apendale Subwatershed Implementation Project

Kyle Hawley, Latah SWCD; Ken Houska, SCS; Shelly Gilmore, ISCC

The Little Potlatch Creek is designated in the Idaho Agricultural Pollution Abatement Plan as a first priority stream segment. Little Potlatch Creek delivers sediment and nutrients from cropland, rangeland and forestland, and has a great impact on non-point source pollution in the Clearwater River. • The proposed treatment plan provides for the use of erosion control practices which will reduce water pollution, help meet water and soil standards, improve fish and wildlife habitat, improve recreation, and decrease sediment accumulation in Lower Granite Pool. All treatments will be done in a cost-effective manner.

1.34 Bear River Planning Project

Franklin SWCD; SCS; ISCC

Bear River is designated in the Idaho Agricultural Pollution Abatement Plan as second priority stream segment. Bear River is impacted by sediment and nutrients from cropland, rangeland and forestland. • The objective of this study is to investigate the nonpoint source pollution to Bear River, to identify and select an effective treatment for protection and enhancement of the beneficial uses of agricultural water supply, cold water biota, salmonid spawning, primary contact recreation and secondary contact recreation, and to assess support for treatment alternatives.

1.35 Lake Lowell Special Water Quality Project

John W. Gleim, SCS; Larry Silver, ASCS

Lake Lowell is an irrigation storage reservoir located in Canyon County. It is also the site of a National Wildlife Refuge and is used extensively for recreation. Irrigation return flows deliver large quantities of sediment, nutrients and possibly pesticides to the lake. • The objectives of this project are to reduce nonpoint source pollution from land within the Lake Lowell watershed, and provide information and education to farmers within the project area about conservation practices to improve water quality.

1.36 Camas Creek Planning Project

Steve Miller, Camas SWCD; Brian Miller, SCS; Bitt Burleigh, ISCC

Camas Creek is designated in the Idaho Agricultural Pollution Abatement Plan as a priority stream segment. Camas Creek annually delivers large amounts of sediment and nutrients from cropland, rangeland, and forestland to the receiving waters of Magic Reservoir. The pollutants of sediment and nutrients are reducing the quality of the water in the reservoir and the holding capacity of the reservoir, and are degrading riparian areas on the creeks that feed Camas Creek. • The objective of this study is to investigate the nonpoint source pollution of four subwatersheds of Camas Creek including Corral, Soldier, Elk, and Willow Creeks, to identify and select effective treatments for protection and enhancement of the beneficial uses, and to assess support of this important water source.

1.37 Rock Creek, Blaine County, Implementation Project

Dick Payne, Blaine SWCD; Gale Roberts, SCS

An Agricultural Pollution Abatement Plan for Rock Creek was completed in January 1991. The plan established the following goals for the project: (1) To reduce the amount (tons) of sediment entering Magic Reservoir from 7,700 tons per year to 4,200 tons per year (a 46 percent reduction). (2) To increase the fishery habitat and eliminate physical barriers to areas where trout can survive in the entire length of Rock Creek. Currently only 20% of Rock Creek supports trout. (3) To improve the overall riparian condition of Rock Creek from poor to good.

1.38 Decreasing Sedimentation in Riparian Zones from Adjacent Arable Land with Vegetative Filter Strips

T. A. Tindall, UI CES Twin Falls; D. Lucas, UI CES Dubois; J. Mosely, UI Range Science

Riparian zones are those vegetative areas associated with free flowing water over a period of time during the growing season. Because these areas are used heavily by wildlife, livestock, recreationists, and farmers, their management is of high priority. The greatest pollutant of these zones is sedimentation from adjacent soils. The objective of this study was to establish an effective vegetative filter strip between an agronomic field and the riparian zone.

1.39 Alternatives to Burning Grass Residue for Continued Seed Production of Kentucky Bluegrass

G. A. Murray, UI AES Plant Science

Kentucky bluegrass and other grasses are produced on 60,000 acres in northern Idaho and eastern Washington. These grasses provide continuous ground cover which reduces soil losses and, when compared to annual cropping systems, improves quality of surface water. If alternative methods of residue removal and/or production practices allowing economical seed production without burning are not found, this valuable, environmentally sound crop may be lost from this area. The general objectives of this study are: 1) To evaluate bluegrass cultivar response to burning. If cultivars are identified that require less or no burning, techniques allowing incorporation of those genetic traits will be studied, 2) To utilize existing techniques and develop new techniques of residue removal, including enhanced microbial decomposition.

GROUNDWATER

1.40 Artificial Recharge in the Oakley Fan Area, Cassia County, Idaho

H. W. Young, USGS

The Oakley Fan area includes four critical groundwater areas that have been so designated by the state because of declining groundwater levels. Since 1976, water levels have declined an average of about five feet/year, and pumping lifts are 400-600 feet. Continued water-level declines will soon render pumping of ground water for irrigation economically unfeasible. • The objectives of the study are to: (1) describe the geohydrology of the area; (2) develop a groundwater model to evaluate effects of simulated recharge practices on the aquifer system; and (3) establish a water level and water quality monitoring program following injection testing to evaluate possible impacts of recharge on the hydrologic system.

1.41 Modification of Phosphorus Transport through Soil Materials

Denny Naylor, UI AES Soil Science; Steve McGeehan, UI AES Soil Science

This research will evaluate the factors which control the rate and extent of phosphorus transport through various soil types. The soil and waste water properties which influence the movement of P through the soils will be identified, and management practices which alter transport will be determined. • Specific objectives of this research are: 1) to determine the soil properties that control phosphorus solution levels via sorption reactions and to recommend specific soil analyses that can evaluate these soil properties, 2) to evaluate the reliability of P sorption data for predicting P transport through soil materials under low and high P loading, and 3) to determine the management and environmental factors which modify or enhance the transport of P through the soils materials.

1.42 Idaho Snake River Plain Water Quality Demonstration Project

Minidoka SWCD; East Cassia SWCD; West Cassia SWCD; SCS; ASCS; UI CES; IDL-ISCC; IDA; IDWR; DEQ

The Snake River Plain is an agricultural area characterized by extensive chemical management. Groundwater monitoring surveys have shown that agrichemicals are contaminating aquifers in the state. • The objectives of this study will be to assist cooperators in setting new BMP's; demonstrate new techniques of reducing levels of nutrient, pesticide and water usage while retaining an acceptable return on investment; monitor water quality characteristics with the adoption of state-of-the-art BMP's; gain on-farm acceptance, adoption, and experience through demonstration and education; and to evaluate the economic and social impact of this program through a complete evaluation process.

IRRIGATION MANAGEMENT

1.43 Department of the Interior Irrigation Drainage Reconnaissance Study of American Falls Reservoir, Idaho

Walton H. Low, USGS

Irrigation drainage into American Falls Reservoir may have the potential to cause harmful effects on human health or fish and wildlife resources. The objective of the study is to determine whether elevated amounts of selected toxic compounds exist in water, bottom sediments, and biota at American Falls Reservoir.

1.44 A Transfer Function Model for Prediction of Solute Transport in Surface Irrigated Fields

Behzad Izadi, Bradley King, UI AES Ag Engineering; Ian McCann, UI AES Aberdeen

The purpose of this research is to determine whether a simple stochastic model can be adopted and successfully used for prediction of solute transport through soil. This research is unique in terms of adopting a newly developed field-scale stochastic model for use in a surface irrigated field. The second year will determine whether the stochastic model can be used in a cropped field. If such a task is feasible, simple methods can be adopted for prediction of nitrogen movement under surface irrigated field. These methods will be beneficial in the future development of irrigation and nitrogen management practices for preserving ground water quality.

1.45 Pumping System Monitoring for Water District 1, Idaho Power Company, U.S. Bureau of Reclamation

Charles Brockway, UI AES Ag Engineering

Timely management of water storage and delivery systems is becoming more critical in Idaho and the western states as competition for finite water supplies increases. Currently, only surface water diversions are measured to assure compliance with water rights both for natural flow and storage. • The goal of this project is to evaluate procedures for using daily power-use data on pumping systems to obtain daily time-tagged discharge data with minimum field time and minimum manual data reduction, and to develop a pilot program for demonstrating the use of power data from pumping systems to provide discharge data for river and/or aquifer management.

1.46 Evaluation of the Aberdeen-Springfield Irrigation System

Charles Brockway, UI AES Ag Engineering

Within the past few years, the Aberdeen-Springfield Canal Company has accommodated users who have converted to sprinkler irrigation. Consequently, it has been difficult for canal management to maintain uniform flow to all users without jeopardizing the canal and lateral system. • This study is evaluating the current hydraulic capabilities of the canal system to determine whether system and management changes will allow the Company to let users adopt either continuous or non-continuous flow diversion. The aim is to determine possible individual users system changes as well as Company distribution system changes which could be implemented to reduce or eliminate adverse hydraulic impacts on the canal system.

1.47 Nitrogen and Irrigation Management to Decrease Nitrate Leaching in a Potato Cropping System

T. A. Tindall, UI CES Twin Falls; J. Stark, I. McCann, UI AES Aberdeen; D. Westermann, ARS Kimberly

Nitrate leaching out of potato cropping systems is a potential contributor to groundwater contamination. In the Snake River Plain of southern Idaho, irrigation management and N management can be correlated to decreasing leaching problems. • Objectives of this study include: (1) To determine N rates and timing in correlation to irrigation level on minimizing N loss to leaching in potatoes, and (2) to determine N cycling and necessary N budgets in potatoes.

1.48 Minimizing Potential Groundwater Contamination by Nitrogen-Irrigation Management of High Nutrient-Demand Crops

J. C. Stark, I. McCann, UI AES Aberdeen; B. Izadi, UI AES Ag Engineering; T. A. Tindall, UI CES Twin Falls; D. T. Westermann, ARS Kimberly

There is currently a great deal of interest in identifying irrigation and fertilizer management practices which minimize the potential for nitrate pollution of groundwater. This is of particular concern with a shallow-rooted, high nutrient-demand crop such as potatoes. • The primary objectives of this study are to: (1) determine the effects of irrigation management on nitrogen uptake, yield, and quality of Russet Burbank potatoes, (2) determine the interactive effects of irrigation and nitrogen management on the potential for nitrate leaching below the root zone of potatoes, and (3) develop a data base for future development and validation of computer models which will aid in the identification of Best Management Practices to maintain profitable potato production while minimizing the potential for groundwater contamination.

1.49 Irrigation and Nutrient Management in Southern Idaho

I. McCann, UI AES Aberdeen

Irrigated agriculture is a major user of water and energy in southern Idaho, and a likely contributor to groundwater contamination by agricultural chemicals. Ongoing irrigation research projects at the University of Idaho Research and Extension

Center in Aberdeen include: improving crop water use efficiency by better irrigation scheduling, automation of irrigation machinery for optimal irrigation management based on measurements and feedback control, and irrigation and nutrient management to control surface runoff and leaching while maintaining productivity and profitability.

NITRATES

1.50 Franklin County Ground Water Quality Study

Joe Baldwin, Bruce Wicherski, DEQ

The purposes of this investigation were to examine ground water quality in the Franklin County area and the potential for storage and transport of agricultural chemicals in local soil. • Results showed that nitrates ranged from below the detection limit to 8.7 mg/L with a mean concentration of 3.5 mg/L. Of water sources of known depth and construction, spring sources had the highest mean concentration (4.2 mg/L), followed by shallow wells (3.7 mg/L) and deep wells (1.8 mg/L). The maximum contaminant level for nitrates is 10 mg/L. The only pesticide detected was a trace amount of DDE, a metabolite of DDT, in one well. Sandy soils under flood irrigation and row crop cultivation had the highest soil nitrate concentrations.

1.51 Ground Water Surveys, Ada and Canyon Counties, Idaho

Joe Baldwin, Bruce Wicherski, DEQ

The purpose of these ground water surveys was to determine the extent and severity of nitrate contamination in ground water in an area north of State Highway 44, between Eagle and Star, and an area northwest of Melba, Idaho. The area is primarily agricultural and includes a wastewater treatment plant, commercial feedlot, scattered housing developments, and a former fertilizer distribution facility. Nitrate concentrations in 21 wells in the Eagle-Star area ranged from less than 0.001 to 62 milligrams per liter (mg/L). Sources of nitrate in ground water in the Eagle-Star area have not been well identified at this time. Nitrate concentrations in 55 wells in the Melba area ranged from less than 0.02 mg/L to about 240 mg/L. The data indicate that there is a background concentration of about 8 mg/L throughout the Melba area, with a few areas having concentrations above the drinking water limit (10 mg/L). Follow-up investigation during 1991 is proposed by DEQ for both areas.

1.52 Lindsay Creek Water Quality Study, Lewiston Orchards, Idaho

Mark Von Lindern, DEQ, Lewiston; Joe Baldwin, DEQ; Paul Guenther, HD, Lewiston

The purpose of the study was to investigate ground water and surface water quality in the area of Lindsay Creek, Lewiston Orchards, Idaho. Initial surface water samples showed a large increase in bacteria where Lindsay Creek flowed through a feedlot. • Nitrate as nitrogen concentrations ranged from 0.01 to 8.0 mg/L in drilled wells, from 2.0 to 10.6 mg/L in dug wells, and from 2.8 to 11.9 mg/L in springs. The maximum contaminant level for nitrates is 10 mg/L. The data indicated that both failed septic tanks and the feedlot were the sources of nitrate to the ground water. Best management practices were recommended for the feedlot operation to remediate surface water impacts.

1.53 Mass Sampling of Ground Water in Canyon County in Cooperation with Idaho Farm Bureau Federation

Gerry Winter, Mike Rupert, DEQ; Jim Yost, IFB, Boise

Ground water quality has been impacted in the area of investigation. Reconnaissance level investigations conducted by the Division of Environmental Quality in 1990 indicate that nitrate concentrations exceed drinking water standards at many of the sites sampled. • Objectives for the mass sampling to be conducted in February 1991 include the following: 1) to conduct a mass sampling of ground water for nitrate analysis, 2) to evaluate nitrate concentrations and well users information sheets to screen possible causes of high nitrate concentrations, 3) to use the data to validate the vulnerability mapping that has been done in the same area, and 4) to foster better interagency relationships on ground water issues.

1.54 Cooperative Ground Water Monitoring Project in Minidoka, Cassia, and Jerome Counties

Jim Yost, IFB, Boise; Gerry Winter, Mike Rupert, John Cardwell, DEQ; Greg Moller, Kim Anderson, UI AES-Lab; Robert Mahler, UI CES; Jim Jergens, Bobet Parsons, SCS Jerome

Portions of Minidoka, Cassia, and Jerome Counties have been identified to be susceptible to ground water contamination by the Idaho Ground Water Vulnerability project. In this area of highly intensive agriculture, water quality concerns focus on the potential of agricultural chemicals, nutrients, and fertilizers to impact ground water quality. • The overall objective of this project was to perform a general ground water quality reconnaissance study. The data generated will aid in the development of a ground water quality data base to be used during the design and development of future ground water quality programs in the area. An additional benefit obtained from this project was the establishment of a coordinated interagency approach to address agricultural non-point source contamination of ground water.

1.55 Ground Water Trend Monitoring in Parts of Minidoka, Cassia, and Jerome Counties

Mike Rupert, John Cardwell, DEQ

Portions of Minidoka, Cassia, and Jerome counties have been identified to be susceptible to ground water contamination by Idaho's Ground Water Vulnerability project. In this area of highly intensive agriculture, water quality concerns focus on the potential of agricultural chemicals, nutrients, and fertilizers to impact ground water quality. • The objective of this project is to establish a ground water monitoring network to study the area's ground water quality through the agricultural season. Samples will be analyzed for total nitrogen (NO_2 + NO_3 - N) and a selection of pesticides common to the area.

1.56 Fruitland Ground Water Quality Study

Cheryl Grantham, Mike Cook, DEQ

The Fruitland area, located in western Idaho, is one of several areas of intense agricultural activity in Idaho. Past sampling by various agencies has indicated elevated nitrate nitrogen levels and the presence of the herbicide dacthal. There are two major aquifers in the area. The purpose of this study was to survey several municipal, domestic, and industrial wells for the presence of nitrate nitrogen and pesticides including dacthal, which may have the potential to be a health threat to certain residents. • Concentrations of pesticides found in ground water in this study were far below those which would indicate potential health concerns. Nitrates may indicate a potential health concern in two of the sampled wells.

1.57 Weiser Ground Water Quality Study

Joe Baldwin, Bruce Wicherski, DEQ

The particular crops grown in the Weiser area are significant users of nitrogen fertilizer and the herbicide dacthal. The purpose of this study was to investigate the occurrence of nitrate nitrogen and dacthal contamination of ground water in two areas around Weiser, Idaho. • Seven out of ten samples in the Sunnyside area were higher than the maximum contaminant level (MCL) of 10 mg/L. The herbicide dacthal was found in nine of the ten samples. Only one out of eight samples in the Weiser Flats area was higher than the MCL of 10 mg/L. The herbicide dacthal was found in three of the eight samples in trace amounts. Concentrations of pesticides found in ground water in this study were far below those which would indicate potential health concerns. Several of the wells, however, have nitrate concentrations exceeding the MCL.

1.58 Plant and Soil Test Calibration for Irrigated Crops in Southern Idaho

B. D. Brown, UI AES Parma

The project has the general objective of determining the nitrogen management practices for irrigated crops that are the most effective for reducing the risk of groundwater contamination while providing for optimum production and economic returns to producers. The project involves the study of (1) nitrogen application rate, method, timing, and source, (2) the development of soil and plant analysis procedures for identifying nitrogen requirements, and (3) the cultural practice influence on nitrogen use by crops.

PESTICIDES

1.59 Fort Hall Ground Water Quality Study—Pesticides

Gerry Winter, DEQ

The Fort Hall Indian Reservation, located in southeastern Idaho, is one of several areas of intense agricultural activity in Idaho. The purpose of this study was to do a reconnaissance survey of pesticides and volatile organic compounds (VOC's) in ground water of Fort Hall Indian Reservation in order to make a preliminary assessment of possible health concerns related to use of ground water. • VOC's were found in seven out of 12 wells in 1989 and in nine wells in 1990. Trace levels of pesticides were detected in nine of 12 wells in 1989 and in eight wells in 1990. Pesticides that were found include dinoseb, metribuzin, and dacthal. • Concentrations of pesticides found in ground water in this study were far below those which would indicate potential health concerns.

1.60 Burley Irrigation District Ground Water Quality Study-Pesticides

Cheryl Grantham, Mike Cook, DEQ

This study of ground water in the Burley Irrigation District was a cooperative effort between the Idaho Division of Environmental Quality and the U.S. Geological Survey, which was contracted to do the sampling of the wells. The purpose of this study was to investigate the potential correlation between areas of intensive agricultural use and the occurrence of agricultural chemicals, namely pesticides, in groundwater. Results of the 19 sampled wells yielded trace levels of three pesticides, levels far below those which would indicate potential health concerns.

1.61 Minidoka Irrigation District Ground Water Quality Study—Pesticides

Cheryl Grantham, Mike Cook, DEQ

This study of ground water in the Minidoka Irrigation District was a cooperative effort between the Idaho Division of Environmental Quality and the U.S. Geological Survey, which was contracted to do the sampling of the wells. The purpose of this study was to investigate the potential correlation between areas of intensive agricultural use and the occurrence of agricultural chemicals, namely pesticides, in groundwater. In the 20 wells sampled, endosulfan and 1,2 dichloropropane were found in trace amounts far below those which would indicate potential health concerns.

1.62 Role of Mobile Soil Colloids in the Transport of Synthetic Organic Pesticides

Matthew Morra, UI AES Soil Science; Ray von Wandruszka, UI Chemistry; John Hammel, UI AES Plant Science

We propose to make direct measurements of organic contaminant interactions with colloidal materials isolated from soils using fluorescence polarization and fluorescence quenching techniques. • Specifically, the objectives will be to 1) produce a well-characterized pool of inorganic and organic colloids to facilitate interpretation of binding and transport studies, 2) determine interactions of colloidal materials with synthetic organic contaminants, 3) determine the potential for soil colloids to alter contaminant mobility in soil systems, and 4) determine pesticide-alone and colloid-pesticide mobilities using calculated retardation parameters and an existing model.

1.63 Microbial Detoxification of Pesticide Containers and Rinseates

R. L. Crawford, UI AES Bacteriology/Biochemistry; D. Thill, UI AES Plant Science; H. Homan, UI CES Entomology

This is a research and development project intended to develop commercial preparations of immobilized microbial cells that can be used to destroy toxic residues of pesticides, herbicides, and carrier chemicals remaining in used chemical containers and/or agricultural industry rinse waters. These types of preparations will be an inexpensive and effective means to decrease non-point source pollution by agricultural chemicals. Users of the technology will include agricultural chemical applicators, particularly large service-based companies and aerial applicators. Initial target chemicals include the phenoxy alkanoic herbicides and the insecticide parathion.

SURFACE WATER

1.64 Plummer Creek Planning Project

Arlo Slack, Benewah SWCD; Larry Cooke, SCS; Merton Burleigh, ISCC

Plummer Creek is designated in the Idaho Agricultural Pollution Abatement Plan as first priority stream segment. Plummer Creek annually delivers large amounts of sediment and nutrients from cropland, rangeland, forestland and a small urban center to the receiving waters of Chatcolet Lake and Coeur d'Alene Lake. • The objectives of this study are to investigate the nonpoint source pollution to Plummer Creek and its origin, to identify and select an effective treatment to protect and enhance the beneficial uses of agricultural water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation, and to assess support for this treatment alternative.

1.65 Tunnel Drain Water Quality Project—Rock Creek RCWP

William Clark, Terry Maret, DEQ-WQB

A part of the Rock Creek Rural Clean Water Project (RCWP), a ten year study, has been to characterize ground water in the area coming from tunnel drains, and to assess the magnitude of agricultural impacts to this resource. Selected domestic wells were also sampled as part of this study. • Results of sampling yielded minute amounts of several classes of pesticides. Two drains showed elevated fecal coliform counts. Elevated nitrate levels were also found. Concentrations of both pesticides and nitrates found in ground water in this study were far below those which would indicate potential health concerns. Eleven domestic wells were sampled for total coliform, three of which indicated possible contamination.

1.66 Offsite Ecological-Economic Impact Assessment of a Non-Point-Source Polluted Stream in Northern Idaho

Merlyn Brusven, UI AES Entomology; Dave Walker, UI AES Ag Economics

In order to contribute to the scientific base of how non-point-source agricultural pollution affects offsite imports, the following objectives were undertaken: 1. To assess longitudinal changes in water quality, habitat, and ecosystem processing on an agriculturally perturbed stream. 2. To develop and apply economic models which will assess offsite benefits for non-point-source mitigation in an integrated watershed framework.

1.67 Effects of Agricultural Nonpoint Source Pollution Impacts on Biology and Ecology of Aquatic Benthic Communities

M. A. Brusven, UI AES Entomology

The objectives of this project were to (1) inventory land-use practices (especially agricultural) in selected nonirrigated watersheds in the Palouse region of Idaho for the purpose of relating these uses to water quality parameters, (2) determine the temporal and spatial nonpoint pollution loads of selected parameters in receiving waters, and (3) determine the effects of nonpoint source perturbations from agricultural lands on aquatic benthic communities and the general health and productivity of receiving waters.

EDUCATION & INFORMATION

1.68 The Idaho Adopt-A-Stream Program

Linda Boyle, DEQ; Joan Meitl, DEQ-WQB

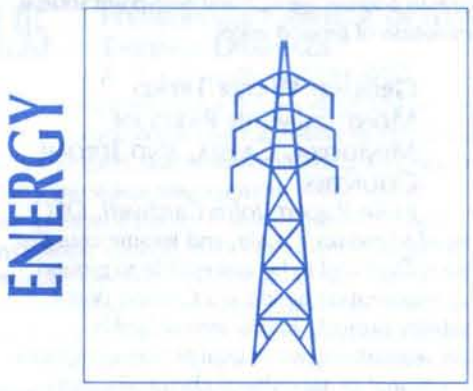
The Division of Environmental Quality is establishing a one-year pilot program called Adopt-A-Stream. Small grants will be given to nonprofit citizen groups or educational institutions for projects that will improve water quality, enhance riparian areas, or monitor the quality of and impacts on streams and lakes.

TEACHER DEVELOPMENT

1.69 Education for Idaho's Youth in Water Quality Management

Leland Mink, UI IWRRI

Project Water Education for Teachers (WET) Idaho is an interdisciplinary, supplementary water education program for Idaho youth education. Public and private school teachers, 4-H leaders, science methods instructors, high school agricultural teachers, Boy Scout and Girl Scout leaders, and other group leaders will use WET resources and services. WET resources are designed for learners of all ages, although primary emphasis is given to providing teaching aids for kindergarten through grade 12.



GEOTHERMAL

1.70 Fractured Aquifer Delineation Using High Resolution Seismic Methods, Boise Geothermal System, Warm Springs Area, Idaho

Charles Waag, Spencer Wood, BSU Geology

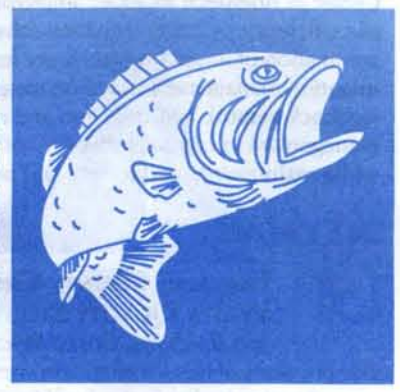
Overdrafts of the geothermal system focus attention upon the question of recharge to the aquifer and how that recharge is routed through the system to the producing wells. • As an essential first step in the development of a predictive groundwater model, the Warm Springs area of the aquifer was targeted for a detailed subsurface study. The principal objective of this research was to delineate the fracture network and resulting geologic and hydrologic segmentation of the aquifer using primarily shallow seismic reflection and gamma ray bore-hole geophysical methods.

WATER FLOW

1.71 Electronic Pump Monitors for Municipal Systems

C. E. Brockway, C. W. Robison, S. J. Kolar, UI Civil Engineering and AES

Microprocessors were installed on two municipal pumping systems during a six-month period to evaluate pumping parameters, water use patterns, and system efficiency. Two wells, a single-speed well pump in the City of Sun Valley water system and a variable-speed well pump in the City of Ketchum system were both evaluated. Data provided included time distribution of pumping volumes, pump efficiency for all discharges, and pumping costs. The variable speed pump experienced system efficiencies from below 30 percent to 65 percent, whereas the single-speed pump, pumping against a relatively constant head, produced a narrow range of efficiencies averaging approximately 55 percent.



COMMERCIAL FISH

1.72 The Use of the Freshwater Crayfish, *Pacifasticus leniusculus*, for the Improvement of Aquaculture Effluent Quality

E. Brannon, Catherine Collins, UI Aquaculture

Idaho's commercial fish farms produce approximately 20,000 metric tons of trout (*Oncorhyncus mykiss*) annually, at a value of $88 million to the state. Between 11,000-12,000 metric tons of uneaten feed and fish fecal material are created in the state per year. These waste materials are similar to human sewage and must be disposed of properly. If the fish fecal wastes and undigested feed can be utilized, the farmers' costs can be reduced, effluent quality improved, and possibly a second cash crop added to the farm facility. One possibility is to utilize crayfish, *P. leniusculus*, which can feed on these wastes. • This project will attempt to answer the following questions: (1) Will *P. leniusculus* grow on a diet of fish waste? (2) What are optimal stocking rates of *P. leniusculus*? (3) What is the food conversion ratio for fish fecal wastes? (4) What are the best application rates for fish manure? (5) What effects do crayfish have on quality parameters? (6) How much waste can P. leniusculus be expected to process?

FISH HABITAT

1.73 Beneficial Use Monitoring of Stream Segments of Concern

Cindy Robertson, IDFG

The intent of the monitoring program is to determine the relationship between nonpoint source pollution resulting from land use activities (mining, forestry, agriculture, and urban/domestic/industrial development) and changes in aquatic populations and habitat. Monitoring will be conducted on selected stream segments throughout the state. Baseline aquatic habitat conditions and populations will be determined and status changes monitored over time. Sources of pollution and transport mechanisms will be tracked and related to changes in aquatic biota. • We hope to establish a predictive relationship between nonpoint source pollution and changes in stream biota. This would allow land managers to evaluate land use alternatives and design activities to avoid or minimize impacts to aquatic resources.

1.74 Monitoring of Cobble Embeddedness for the Lowman-North Fire Recovery Project

Linda Boyle, DEQ; Terry Hardy, Lowman USFS RD

To evaluate impacts of sediment to fish habitat on the South Fork Payette River by DEQ and Lowman Ranger District. Cobble embeddedness is a surrogate measurement of the interstitial space volume of streambed cobble habitats. The interstitial space found in cobble habitats is important to juvenile salmonids primarily for overwintering habitat, but also for feeding and refuge cover during summer months. The monitoring will be performed above and below the burn area for five years.

1.75 Teton River Fisheries Enhancement Project

Jody Brostrom, IDFG; Teton SWCD; Steve Smart, SCS

The collapse of the Teton Dam in 1976 caused severe damage to the Teton River fishery, and IDFG wishes to restore the fishery to previous levels. The goals of this four-year project are to restore catch rates to 1.5 fish per hour, to increase the minimum size of fish caught to 14 inches, and to improve river access. Improvement of fish habitat in the upper Teton River (Segment 116, a stream segment of concern in Water Quality Advisory Working Committee Designated Stream Segments of

Concern) and its tributaries is considered a key to improving the entire Teton River fishery. Fencing and implementation of grazing management techniques is a prime requirement to improve fish and spawning habitat in this portion of the river.

INSTREAM FLOWS

176 Development of a Hydraulic Model for the Snake River in the Vicinity of Deer Flats National Wildlife Refuge and Birds of Prey Areas to Determine Water-Surface Elevations for Minimal Allowable Streamflows at Swan Falls Dam

Luther J. Kjelstrom, USGS-WRD

Islands in the Snake River below Swan Falls Dam serve as habitat for birds and other wildlife. Flows of 3,900 cubic feet per second or less from Swan Falls Dam will drop the water surface in the river sufficiently to connect these islands with the river banks and offer easy access to the wildlife by predators. White sturgeon in the river could also be endangered by reduced streamflows. The objectives of the study are to: (1) Develop a hydraulic model to identify water-surface elevations of island nesting areas below Swan Falls Dam at varied streamflows; (2) collect data on velocity distribution, dissolved oxygen, temperature, and specific conductance at selected locations; data to be used by other agencies to assess impacts of reduced flows on the white sturgeon and other resident fish populations.

1.77 Hydrology of the Clearwater and Salmon River Basins, Idaho, in Support of Federal and Indian Tribal Claims for Reserved Instream Water Rights

Stephen W. Lipscomb, USGS-WRD

The Clearwater River and Salmon River basins are vulnerable to development for agriculture, increased recreation, and rural growth including mining, logging, and hydropower development. The study will provide criteria for maintaining and enhancing fish populations in the two basins and provide a means for assessing the impacts of future development on native and anadromous fish habitat. The objectives of the study are to (1) Categorize streams, and (2) Provide necessary hydrologic/hydraulic information required for development of Instream Flow Incremental Method (IFIM) model at specified study sites to identify streamflows and habitat required to protect and enhance fish populations.

WILDLIFE HABITAT

1.78 Hydrology of the Indian Bathtub Area, Owyhee County, Southwestern Idaho

H. W. Young, USGS-WRD

Indian Bathtub Spring is the habitat of a unique species of snail, the Bruneau Hot Springs snail. Hydraulic heads in the hot-water system that supplies the spring are declining rapidly, and discharge from the spring has been reduced to zero by about July in recent years. Loss or imminent loss of the hot spring habitat threatens extinction of this unique species of snail. • The objective of the study is to determine the cause or causes of rapidly declining hot spring discharges along Hot Creek.

1.79 Effects of Water Use on Recharge/Discharge Relations in the Mud Lake Area, Southeastern Idaho

Joseph M. Spinazola, USGS-WRD

Wildlife managers are concerned that present and planned water use practices near Mud Lake could adversely impact the quantity and quality of water needed by fauna and flora in their management areas. • The objectives of the study are to (1) analyze the potential, continued, and expanded development of local water resources for irrigated agriculture; (2) assess the potential effects of changing irrigation practices outside the study area; and (3) identify the presence or absence of selected naturally occurring and agricultural chemical constituents in the local water supply and in lake and wetland bottom sediments.

FLOOD & SEDIMENTATION CONTROL

FLOOD CONTROL

1.80 Salmon River Ice Jam Study, Idaho

Jerry Roediger, ACE Walla Walla

The city of Salmon is plagued by ice jam flooding on the average of about once in every 3 years. The Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL) is evaluating an ice control structure to be placed upstream of the city to trap frazzle ice and reduce the availability of ice to form jams. CRREL is currently testing a prototype ice boom with promising results. Testing by CRREL is scheduled to continue through the winter of 1991-1992.

1.81 Big Lost River at Moore, Idaho

Jerry Roediger, ACE Walla Walla

The study is being conducted under Section 14 of the Flood Control Act of 1946. This authority is limited to providing streambank protection to public facilities such as county roads, bridges, and schools if found to be economically feasible. The project would involve revetment of the streambank along the Big Lost River to protect the approaches of a county bridge. Loss of the bridge approaches would threaten the City of Moore's sewage treatment plant. A feasibility report is scheduled to be completed by April 1991.

1.82 Big Lost River Basin Feasibility Study

Gareth Clausen, ACE Walla Walla

Flood damages occur frequently in the 28-mile reach along the Big Lost River between Mackay Dam and Arco, Idaho. Twelve major floods have occurred since 1943. The flood of May-June 1967 was the largest to date and inundated some 7,000 acres. Smaller, frequent floods damage agricultural lands, bridges, roads, and Idaho National Engineering Laboratory property downstream of Arco.
• The general objective of the study is to identify a technically and economically feasible and environmentally acceptable flood abatement project for the Big Lost River Basin.

1.83 Little Wood River Project, Idaho

Jerry Roediger, ACE Walla Walla

A 1976 feasibility report evaluated flood problems within the Big Wood River Basin. The report recommended construction of two separate facilities on the Little Wood River to divert flood water. The project was authorized for construction by the Water Resource Development Act of 1986, Public Law 99-362. Due to the long delay between the feasibility study and project authorization the project formulation is being reviewed to reflect current development and needs of the community. Detailed design of the project will then continue if the project is economically justified and supported by a local sponsor.

SEDIMENT CONTROL

1.84 Lower Granite Lock and Dam, Snake River, Washington and Idaho: Sedimentation Feasibility Study

Gregory S. Graham, ACE Walla Walla

Sediment accumulation in Lower Granite Reservoir has reduced, and continues to reduce, the design capacity of the Lewiston levee system. Interim dredging has stabilized the problem since 1986, but a long-term solution is needed. Hydraulic, economic, and environmental studies are currently underway and include prototype in-water disposal tests within an involved environmental monitoring program.

WARNING SYSTEMS

1.85 Boise Flood Warning and Preparedness Planning Study

Gary G. McMichael, ACE Walla Walla

The Boise foothills are susceptible to thunderstorm and snowmelt floods which threaten property and life in the City of Boise and Ada County. The study is one of four test studies nationwide by the Corps of Engineers on potential warning system installations.

FORESTRY

WASTE DISPOSAL

1.86 Local Management Options Development for Wood Log Yard Waste

Edgar O. Hale, Ken W. Lustig, PHD

The Panhandle Health District, in concert with Kootenai County, Idaho, and four wood products mills, has formed a committee to develop management alternatives for log yard woodwaste. These include land application, batch composting and incineration. Several prototype programs have begun utilizing University of Idaho researchers.
• The objectives are to run some experimental projects, develop a data base, establish management alternative protocols, and generate guideline/regulations based on the protocols.

INDUSTRY

GROUNDWATER

1.87 Hydrology of Subsurface Waste Disposal, Idaho National Engineering Laboratory, Idaho

Larry J. Mann, USGS-WRD

The Idaho National Engineering Laboratory obtains its water supply from the Snake River Plain aquifer and disposes radioactive and chemical wastes to the environment. • The objectives of the study are to (1) describe, evaluate and assess the effects of radioactive and chemical waste disposal on the ground water resources; (2) contribute to the technology of the effects of waste disposal and determine principles of water and solute movement in fractured rocks; (3) map and describe distribution patterns of waste products in the ground water so predictions of future patterns can be made; (4) evaluate the hydrogeochemical controls on the subsurface migration of solutions from bodies of buried solid radioactive waste; and (5) evaluate the hydrologic properties of deeper zones in the Snake River Plain.

1.88 Remedial Investigations of Hydrocarbon Contaminated Ground Water

Tim Mosko, Rob Howarth, DEQ-WQB

The Water Quality Bureau has conducted several ground water investigations at leaking underground storage tank facilities across the state. The investigations are designed to locate the source of the contamination and to characterize the site hydrogeology. Investigations include soil gas, ground water, and soil sampling and analysis for benzene, toluene, xylene, ethylbenzene, total petroleum hydrocarbons, and other petroleum product chemicals. Locations include Twin Falls, Challis, Clayton, Lava Hot Springs, Pocatello, McCall, Caldwell, St. Anthony, Buhl, Preston, Ketchum, Lewiston, Wallace, Sandpoint, Elk City, and Rose Lake.

MINING

GROUNDWATER

1.89 Mine Waste Management—Dissolution Mechanisms

R. D. Doepker, E. G. Zahl, USBM-SRC

This project has four primary objectives: 1) to determine dissolution and reprecipitation mechanisms that are the controlling influence on contamination at U. S. nonfuel mining operations, 2) to develop and evaluate remedial and preventative control techniques, 3) to develop laboratory assessment methods that more realistically reflect site-specific environmental conditions, and 4) to coordinate activities with other organizations. As part of this effort, laboratory studies will investigate how such factors as oxidation-reduction, unsaturated conditions, pH, and biological activity influence the contamination process.

1.90 Mine Waste Management—Hydrogeologic Phenomena

B. M. Stewart, USBM-SRC

The first objective is to determine the influence of the hydrogeologic environment as a function of such variables as increasing depth, temporal history of recharge, and air and oxidant availability on acid production, leaching and transport of heavy metals and other contaminants from mine waste tailings. The second objective is to perform detailed site investigations to determine the geological and hydrogeochemical properties that either improve or exacerbate groundwater contamination downgradient from variably saturated tailings impoundments.

1.91 Environmental Impacts of Backfill—Metal

C. K. M. Boldt, USBM-SRC

The objectives of this work are to determine the contamination potential of placed mine waste in an underground environment, understand the mechanisms of groundwater flow through or around filled mine areas, and determine possible containment or remediation measures for placed mine waste backfill.

1.92 Part 1: Hydrogeological Factors in Mine Waste

C. M. K. Boldt, J. A. Riley, USBM-SRC

The objectives of this work are to enhance the Bureau's technical capabilities in assessing and evaluating mine waste contamination, develop workable remediation techniques for controlling or altering groundwater flow, and formulate risk assessment methodologies associated with data gathering and remedial options.

1.93 Mining Waste Management—Contaminant Fate

J. C. Franklin, USBM-SRC

The program has three objectives: 1) to determine the influence of site-specific variables on the migration of contaminants from metal and non-metal waste disposal sites; 2) to develop data evaluation techniques to detect impacts on and changes in water quality; and 3) to develop a sampling protocol for use in obtaining representative samples at mine waste sites.

1.94 Part 1: Hydrogeological Factors in Mine Waste

C. M. K. Boldt, J. A. Riley, USBM-SRC

The objectives of this work are to enhance the Bureau's technical capabilities in assessing and evaluating mine waste contamination, develop workable remediation techniques for controlling or altering groundwater flow, and formulate risk assessment methodologies associated with data gathering and remedial options.

1.95 Hydrologic Control of Mine Tailings Drainage

R. E. Connolly, USBM-SRC

The overall objective is the development of effective hydrologic control measures for contaminant transport, use in mine planning and design and mine waste management. This will be achieved in 4 steps: 1) assessment of current hydrologic control practices; 2) evaluation of research needs for hydrologic control technology; 3) development and evaluation of air injection as a treatment for heavy metal contamination of ground water; 4) development and evaluation of hydrologic control techniques as determined by step 2.

1.97 Spatial Characterization of Mine Waste Sites Leading to Remediation Design

Stanley M. Miller, UI Geology; John E. Hammel, UI AES Soil Science

The objective of this research is to focus on the measurement and description of the physical properties of mine waste materials critical to understanding the nature of contamination (and its migration) and subsequent design of a prudent remediation scheme(s).

SURFACE WATER

1.98 Natural Polymers in Hazardous Waste Treatment

David J. Oliver, UI AES Bacteriology/Biochemistry; Batric Pesic, UI Metallurgical Engineering

This research will adapt proven technologies from other industries into mining in order to solve the problems caused by heavy metal wastes. Specifically, techniques will be developed for crosslinking chitosan to decrease its acid solubility while maintaining high binding affinity. In addition we will increase the binding capacity of this polysaccharide and decrease its affinity for nontoxic ferric ion in these waters, a problem that often makes alternative technologies impractical. The chitosan derivatives will then be tested, first with artificial mine waters, and then with waters from the Bunker Hill Mine and the Blackbird Mine to determine their ability to detoxify these waste streams.

1.99 Characterization of Physical, Chemical, and Colloidal Phenomena of the Lateral Lakes of the Coeur d'Alene River in North Idaho for Future Possible in Situ Remediation Procedures

V. E. Chamberlain, K. F. Sprenke, UI Geology; D. V. Naylor, UI AES Soil Science

The lateral lakes of the Coeur d'Alene River have a long history of exposure to heavy metal pollution by dissolved load and solid load from the Coeur d'Alene mining area. Research is required to determine the amount, distribution, and heavy metal content of contaminated sediments in the lateral lakes in order to analyze potential metal pollution problems in the Coeur d'Alene surface and subsurface hydrologic system. The general objective of this study is to characterize the physical, chemical, and colloidal or adsorption phenomena and parameters of the lake bottom environment (soil/water/strata) that may affect future remediation and/or management of the lateral lakes.

RECREATION

FISHING/BOATING

1.100 Cascade Reservoir Watershed Project

Barry Holloway, Valley SWCD; Russ Manwaring, SCS; Tony Bennett, Tony May, David Erew, SCC; Dale Anderson, Environmental Planning Engineers, Inc.

Cascade Reservoir is one of Idaho's prime recreational attractions and sport fisheries. Major land uses are forest and agriculture. The primary water quality problem is undesirable algae blooms which interfere with fishing, swimming and other recreational uses. • This study's objective was to identify non-point sources of phosphorus pollution, locate critical areas and propose appropriate Best Management Practices (BMPs) that reduce pollution of streams flowing into Cascade Reservoir.

URBAN/ DOMESTIC

GROUNDWATER

1.101 Ground Water Contamination in Garden City

Phil Bandy, Joe Baldwin, Bruce Wicherski, DEQ-WQB; Joe Wroten, DEQ

Recently imposed Federal and State regulations requiring periodic testing of municipal water supplies for volatile organic compounds (VOCs) have lead to the discovery of ground water contamination in Garden City. • Twelve of the thirty samples showed contaminant concentrations of Perk (a commonly used solvent) ranging from 0.77 to 225 ppb. The maximum contaminant level for Perk is 5 ppb. The exact location of the sources cannot be determined from the data collected at this time. The Water Quality Bureau is currently evaluating remediation alternatives and funding sources for this situation.

1.102 VOC Contamination in Ground Water, Western Boise, Idaho

John Wroten, DEQ; Bruce Wicherski, Joe Baldwin, DEQ-WQB

State drinking water regulations, enacted in 1989, required water purveyors to analyze for certain volatile organic compounds in water supplies. In May 1990, a water sample from a mobile home park well in western Boise was analyzed and found to contain 134 micrograms per liter (µg/L) of Perk, a commonly used solvent. The EPA drinking water standard for Perk is 5 µg/L. Sampling to date indicates that Perk in the mobile home park area is the downgradient extension of a known Perk contaminant plume previously identified in the Westpark area. This part of the plume is currently being remediated. Investigations on contaminant sources are in progress.

1.103 Idaho Wellhead Protection Program

Elizabeth Cody, DEQ-WQB

The objective of the state wellhead protection program is to develop guidelines for local governments. These guidelines will address the following issues: (1) defining the roles of state and local governments, (2) delineating wellhead protection areas, (3) inventory of potential contamination sources, (4) management of potential contamination sources, (5) development of drinking water contingency plans, and (6) development of wellhead protection plans for new wells.

1.104 High Resolution Seismic Reflection and Borehole Geophysics to Delineate Aquifers in an Area of Water-Right Protests, Boise River Valley, Idaho

Spencer Wood, J. Pelton, BSU Geology and Geophysics

Applications for drilling new wells in the NE Eagle, Idaho, area have been protested by domestic-water well owners in the adjacent foothills. Specific capacity of wells in this setting is less than 1 gpm/ft. Density of wells in subdivisions (many spaced only 300 ft apart) has led to local interference and reported declining water levels. The objective of the study is to utilize appropriate geophysical methods to study the geologic framework of the disputed aquifers.

SEPTIC TANKS

1.105 Development of Management Tools for Community Septic Systems

Barry Burnell, DEQ-WQB

The project will identify and map all known Community Septic Systems (CSS) in Ada County. A rating system will be developed to prioritize the CSS as to their potential to adversely affect ground water and drinking water wells. A comprehensive ground water monitoring effort will help determine the reliability of predicting problem sites. The result will be a tool which can be used by the Ada County Planning and Zoning Commission in establishing wellhead protection criteria.

1.106 Individual On-Site Wastewater Treatment and Disposal as It Relates to House Concurrent Resolution (HCR) No. 53

Barry Burnell, SDHD

The 1990 State Legislature through House Concurrent Resolution No. 53 intended for the State Board of Health to modify the rules and regulations for individual and subsurface sewage disposal systems. This paper, though an extensive bibliographical search, addresses the environmental implications and economic impacts of the current regulations.

1.107 Results of a Water Quality Sampling Project in Bonneville County, Idaho; Effects of Seepage Pit Effluent on Ground Water Quality

Phil Bandy, DEQ-WQB

Bonneville County, Idaho is the focus of controversy concerning the effects of wastewater effluent from standard septic tank drainfields versus seepage pits on ground water quality. The Division of Environmental Quality conducted a water quality sampling project in the county to determine the effects on ground water of seepage pit wastewater effluent. • Interpretation of the limited data generated by this study suggests a slight increase in nitrate levels in downgradient wells. This increase of nitrate levels may be the result of contamination by seepage pit effluent. The results of this study must be tempered by the fact that this preliminary study is of limited scope and was conducted during the irrigation season. Further studies are planned.

1.108 Innovative Subsurface Sewage Management: A Program to Protect Idaho's Rathdrum Prairie Sole Source Aquifer

Ken W. Lustig, PHD

Idaho's Panhandle Health District has undertaken a unique septic system management program to protect drinking water supplied by a sole source aquifer. The program combines general regulations and contractual agreements to achieve both environmentally and economically sound sewage waste disposal planning consistent with local needs.

WASTE DISPOSAL

1.109 Susceptibility of Pend Oreille Lake, Idaho to Cultural Eutrophication

Paul F. Woods, USGS-WRD

Cultural development within Pend Oreille Lake's drainage basin and along its shoreline has created excessive loadings of nutrients. This has led to degradation of lake water quality, especially in the nearshore areas. Water quality management agencies need quantitative information about the lake's trophic state in order to formulate realistic waterquality management goals. • The objective of the study is to conduct a large-scale limnological investigation of Pend Oreille Lake to determine its susceptibility to cultural eutrophication from nutrient sources within its drainage basin.

1.110 Ground Water Survey, Southeastern Pocatello Area, Idaho

Joe Baldwin, Bruce Wicherski, DEQ-WQB; George Spinner, DEQ Pocatello

The purpose of this ground water survey was to investigate nitrate contamination in an area of southeastern Pocatello. Land use in the area is primarily urban. All residences are served by private or community wells. A mobile home park in the area had a lagoon for wastewater disposal, but hooked up to the city sewer in 1980. All other residences are served by onsite disposal systems. • The drinking water standard of 10.0 milligrams per liter (mg/L) nitrate as nitrogen was exceeded for 11 of 29 wells sampled in 1990. The data indicate that nitrate in ground water is from failed onsite disposal systems.

1.111 Solid Waste Management Plan: Panhandle Region

Edgar O. Hale, Ken W. Lustig, PHD

In July 1990 the State of Idaho Legislature provided limited funding to the Health Districts to create a solid waste plan for the state. The funds were accompanied by a six month deadline for a final report to the legislature. The seven districts responded by agreeing to a format for the plan and utilizing Regional Solid Waste Advisory Committees. These committees form a network for quickly collecting data at the local level and will ultimately provide the essential link for local implementation of a statewide program.

1.112 Stormwater Runoff Control on the Rathdrum Prairie Aquifer

Edgar O. Hale, PHD

The Panhandle Health District has developed a program to protect the area's "sole source" Rathdrum Aquifer from contamination due to underground injection of storm water runoff. The program involves cooperation between the Idaho Department of Water Resources, the Health District, Kootenai County, and three cities located over the aquifer. Problems are addressed in a single uniform management solution that allows each agency to meet their responsibilities to the public.

1.113 Feasibility of Land Application of Municipal Wastewater on the Rathdrum Prairie Aquifer

Brian D. Painter, John A. Sutherland, DEQ Coeur d'Alene

The Rathdrum Prairie Aquifer is the economically most significant aquifer in North Idaho. The aquifer was designated as a sole source of drinking water for the region by the U.S. EPA in 1978. As part of the overall protection project the DEQ has contracted a firm to study the feasibility of application of secondarily treated municipal wastewater at agronomic rates without groundwater degradation. A pilot study will follow the feasibility study.

1.114 Modification of Phosphorus Transport Through Soil Materials

D. V. Naylor, UI AES Soil Science

Low population density makes many parts of Idaho well suited to land application of wastes. A major concern associated with this method of waste disposal is the control of phosphorus (P) leaching. Shoreline and regional development place water resources at risk due to the generation and disposal of associated waste materials. This investigation will evaluate the factors which control the rate and extent of P transport through various soil types. The soil and wastewater properties which influence the movement of P through the soils will be identified and management practices which alter transport will be determined.

GROUNDWATER

1.115 Snake Plain Aquifer Groundwater Model

C. E. Brockway, C. W. Robison, UI Civil Engineering

The finite-difference groundwater flow model developed by the University of Idaho Department of Water Resources was updated. Data management routines based on a commercially available relational database program were developed. Data entry is facilitated by on-screen editing on a cell by cell basis. The model, running on a personal computer, now includes graphics routines to assist in output evaluation and error checking.

1.116 National Water-Quality Assessment Program (NAWQA)

Walton H. Low, USGS

The U.S. Geological Survey has initiated the National Water Quality Assessment (NAWQA) Program, whose objectives are to: (1) Provide a nationally consistent description of current water quality conditions for a large part of the nation's water resources; (2) define long-term trends (or lack of trends) in water quality; and (3) identify, describe, and explain, to the extent possible, the major natural and human factors that affect observed water quality conditions and trends. NAWQA program activities will occur in 60 hydrologic study units including the upper Snake River basin in Idaho.

1.117 Regional Aquifer System Analysis of the Northern Rocky Mountain Intermontane Basins, Montana and Idaho

Deborah J. Parliman, USGS

Ground water in most intermountain basins in the Northern Rocky Mountains is used for public, rural-domestic, livestock, irrigation, and industrial supplies. Increases in use are likely. Increases in water use have the potential to affect the quantity and quality of both ground water and surface water in the basins. The objectives of the study are to document and describe (1) the hydrogeologic systems in a group of intermontane basins; (2) the relation between ground water and surface water in individual basins; (3) the hydrologic relations between selected basins; and (4) baseline water quality.

1.118 Rathdrum Prairie Aquifer Protection Program

Brian D. Painter, John A. Sutherland, DEQ Couer d'Alene

The EPA has funded a multi-year effort to devise and implement aquifer protection for the Rathdrum Prairie prior to widespread groundwater degradation from intensified land uses as a result of population increase. The Idaho Division of Environmental Quality is the main investigator for parts of the study. These include agricultural chemical use, feasibility of land application of municipal wastewater, underground storage tank controls, development of technical information about the aquifer, water quality assessment, and numerous other smaller tasks to protect the aquifer.

1.119 A Hydrologic Assessment of the Snake River Plain Regional Aquifer, Southern Idaho

Gerald F. Lindholm, USGS-WRD

A number of problems have arisen in relation to increased groundwater usage on the Snake River Plain. Management problems concern having predictive ability to control development and to enable optimum use of the water resources. • Major objectives of the study are to describe the geologic, hydrologic, and chemical quality aspects of the aquifer system; to evaluate the water supply potential of the system; and to predict responses of the system to changes in groundwater development, through use of hydrologic system models.

1.120 National Ground Water Atlas, Segments 7 and 8 (Idaho, Montana, North Dakota, Oregon, South Dakota, Washington, and Wyoming)

Richard L. Whitehead, USGS-WRD

The National Ground Water Atlas will summarize, in one publication, the most important ground water information the survey has collected and published over many years. The objectives of the study are to (1) To provide a summary of the nation's ground water resources for an audience that includes the lay public, consultants, planners, colleges and universities, congressional staffs, and other governmental agencies; and (2) to synthesize ground water information that now exists at many scales into a single document that can be used to respond to requests for information from the above groups and others.

1.121 Idaho Ground Water Vulnerability Assessment Project

Michael G. Rupert, Bruce Wicherski, DEQ-WQB; Tana Dace, IDWR; Molly Maupin, USGS Boise

The Idaho Ground Water Vulnerability project is an interagency cooperative effort that incorporates the expertise of the Idaho Department of Health & Welfare, the Idaho Department of Water Resources, the U.S. Geological Survey, and the U.S. Soil Conservation Service. The Vulnerability project evaluates areas within a particular study area for relative susceptibility to ground water contamination. Environmental and geologic factors are being evaluated to produce vulnerability maps using a computerized geographic information system (GIS). Areas with a high vulnerability rating can be given highest priority.

1.122 Municipal Ground Water Supply of the Boise, Idaho, Area: Phase II - Aquifer Testing, Leakage, Aquifer Parameters, and Pressure Level

Spencer Wood, Charles Waag, BSU Geology and Geophysics; Jim Osiensky, UI Boise Geology and Geological Engineering

This research is in the second phase of a 2.5 year study having the principal objective of constructing a computer model of the ground water system of the Boise Valley using the U.S. Geological Survey MODFLOW programs. In addition to pump testing, production and water levels will be monitored for at least one year for the entire system. Much of this is an automatically accumulated data base of the Boise Water Corporation, but it has never before been utilized to evaluate aquifer behavior.

1.123 Evaluation of Recharge from Paradise Creek to the Basalt Aquifers at the UI Ground Water Research Site

Dale R. Ralston, UI Geology and Geological Engineering

The purpose of this research is to better understand the characteristics and controls for ground water recharge to basalt aquifers in the Columbia Basin in general and the Pullman-Moscow Basin in particular. • The general objective is to utilize existing wells and a newly constructed well at the UI Groundwater Research Site (GRS) to document the hydraulic responses at various depths and locations to stream flow in Paradise Creek.

1.124 Ion Speciation in Low Redox Soils

D. V. Naylor, UI AES Soil Science

The transport, bioavailability, and fate of soil constituents depends upon the composition of the soil solution. The general objective of this project is to evaluate changes in ionic species in soil under reducing conditions as it would influence the movement of inorganic chemical materials through soils into ground or surface water supplies.

POLICY/ MANAGEMENT

1.125 Upper Snake River Water Use Accounting

C. E. Brockway, B. Sandoval, UI Civil Engineering

A water accounting program, written by the Idaho Department of Water Resources, is used to allocate natural flow and storage water and to provide information for accounting and billing to individual irrigation water users. • An operations manual for the water use accounting program is being prepared. All subroutines for storage allocations, time lags for diversion return flow, determination of reservoir losses, and natural flow determinations are being updated and documented. Incorporation of new procedures for determination of Snake Plain Aquifer spring inflow in specific reaches is being developed and implemented.

1.126 Flow Simulation and Operation Analysis for the Water Distribution Network of the University of Idaho

Jim C. P. Liou, R. T. Hinthorn, UI Civil Engineering

The water distribution network of the University of Idaho (UI) is quite complex. Recommendations on system operation and improvements are established through a series of scenario simulations. A computer software package was developed for managing general water supply infrastructure. The unique feature of the package is that the status inquisition, the system modification, and the simulation can all be accomplished in a graphical environment. With further development, it will become an effective tool for infrastructure management.

1.127 Water Resources of the Upper Bannock Creek Area, Fort Hall Indian Reservation, Power County, Idaho

Joseph M. Spinazola, USGS-WRD

Despite the absence of any quantitative hydrologic analyses in the basin, an average annual yield of 84,000 acre-feet has been assigned in the State's adjudication of the Snake River Plain. Unless a more reliable determination of yield for the basin is obtained, future development of the water resources may be curtailed and Indian water rights threatened. The objective of the study is to describe the general hydrology and determine the water yield from the Bannock Creek basin on the Fort Hall Indian Reservation.

1.128 Hauser Lake Management Plan (Draft) in Conformance with the Clean Lakes Coordinating Council

Ed Javorka, PHD

The Hauser Lake Phase I Diagnostic and Feasibility Analysis released in February 1990 was the first EPA approved Phase I baseline study in north Idaho. Based on data, analysis, and recommendations from this effort and subsequent public involvement, a basin-specific lake management plan was developed by the Idaho Clean Lakes Coordinating Council. • Through public and agency involvement during 1989-1990, a list of nine primary issues and concerns was developed. These issues provide the focus for goal setting and specific management recommendations. Public involvement to date supports an aggressive "maintain and improve water quality" direction.

1.129 Coeur d'Alene Basin Interagency Group (CBIG): A Local Management Option (Formation, Funding and Authorization)

Ken W. Lustig, PHD; Ed Javorka, CBIG

The CDA Basin is a vast hydrologic network with ten small lateral lakes off of the main Coeur d'Alene River, plus the St. Joe and smaller tributaries draining to Lake Coeur d'Alene. This basin has all the inherent problems of cultural nutrient loading complicated by over one hundred years of mine tailings and mining activity. The basin is a mosaic of ownerships and jurisdictional authorities from private through federal. The function of the CBIG is to help develop a process in which agency efforts can be tracked via a timetable and integrated into a mosaic of management implementation. Successful implementation will be monitored, and corrections or adjustments made as required.

1.130 Preventing Groundwater Pollution and Opening Channels of Communication through a Local, Facilitative Regulation

Richard G. Martindale, PHD

The Panhandle Health District has implemented regulations that require fixed facilities that store, use, or handle chemicals (critical materials) to satisfy two needs: chemical reporting and the use of secondary containment systems. Proper chemical reporting facilitates communication between industry and government agencies.

1.131 Task Force on Salmon and the Columbia River System

J. R. Hamilton, UI AES Agricultural Economics; J. O'Laughlin, UI PAG; E. Brannon, UI Aquaculture

The Task Force is a group of faculty from the University of Idaho, Oregon State University, and Washington State University with interest and expertise in issues related to possible endangered species classification of some runs of salmon and steelhead in the Columbia River System. They have the following charge: (1) to identify research and educational missions, capabilities, and resource bases, (2) to identify resources and create working networks in each state to address these issues, and (3) to develop a working plan to organize research and public education programs.

REMEDIATION

1.132 Use of Immobilized Bacteria to Degrade Aromatic Compounds in Industrial Waste Waters

Roger A. Korus, UI Chemical Engineering; R. L. Crawford, UI AES Bacteriology/Biochemistry

Microorganisms can degrade and thereby detoxify many hazardous synthetic compounds. A primary goal of our research is to harness these catabolic abilities to remove toxic chemicals from polluted water. Our research has focused on the biodegradation of polyaromatic hydrocarbons and chlorinated aromatics such as pentachlorophenol (PCP). PCP and its sodium salt are the second most heavily used pesticides in the United States. The most significant source of PCP-containing waste waters is the wood preserving industry. Studies indicate that it should be possible to customize bioreactors for decontamination of specific waste streams by immobilizing the proper bacteria.

1.133 Computer-Assisted Characterization of Contaminant Distributions

Margrit von Braun, UI Chemical Engineering; John Hammel, Matt Morra, Tom Dechert, UI AES Soil Science

Three to five models to predict contaminant flow, distribution, and fate will be selected that can be incorporated into GIS. They will be tested with data from a site which will be selected in collaboration with the Division of Environmental Quality. The GIS-based models developed will be tested against the results of the same models applied in a non-GIS format, and against the results of other models applied at the research site. • This research will result in the development of a GIS-based multimedia model that will be used on contamination remediation efforts to assess both the extent of the contamination and the effectiveness of remediation efforts.

1.134 Rapid Methods and Automation of Biodegradation Assays

Scott Kellogg, UI AES Bacteriology/Biochemistry; Matt Morra, UI AES Soil Science

An important analytical problem exists in that a large number of hazardous chemicals, isomers, and potential interactions are found in the environment, yet there are no ways to rapidly and inexpensively assay or study their degradation. The solution is to develop new, rapid methods, amenable to automation that retain or improve on current analytical capability. Bioremediation studies with microorganisms and the resultant biotransformations desperately require new and improved approaches for chemical analysis. This project addresses novel methods that are derived from currently available microassay plates.

1.135 *In-Situ* Dehalogenation of Synthetic Organic Compounds

Matthew Morra, UI AES Soil Science; Cindy S. Orser, UI AES Bacteriology/Biochemistry; Peter R. Griffiths, Leszek Czuchajowski, UI Chemistry

Halogenated synthetic organic compounds are widespread contaminants of soils and ground water throughout the U.S. One of the major obstacles for in situ remediation of these contaminated sites is the inability to control unexpected reactions of the contaminant with soil or ground water matrices. We will use two model system directed toward the *in situ* remediation of halogenated aliphatic and aromatic compounds to develop the analytical methods for monitoring degradative products in complex matrices.

1.136 Microbead Transport Characteristics in Saturated Subsurface Environments: Phase I

Dale R. Ralston, Christian Petrich, UI Geology and Geological Engineering; Ron L. Crawford, UI AES Bacteriology/Biochemistry

The purpose of this research is to outline a multiphase program in characterizing subsurface encapsulatedcell migration. Techniques will be developed for detecting and monitoring particle migration. This study is the first step in providing a quantitative description of particle transport characteristics in unconsolidated aquifers, using a range of particle compositions and sizes under various stress arrays. Subsequent phases of this project will focus on extensive intermediate-and field-scale tracer experiments in various unconsolidated aquifer types.

1.137 New Approach to Enhance the Biodegradability of Recalcitrant Azo Dyes and Polystrene Polymers

Don L. Crawford, Andrzej Paszczynski, UI AES Bacteriology/Biochemistry; Stefan Goszcynski, UI HWC

Xenobiotic azo dyes are environmental pollutants which are extremely resistant to biodegradation. Preliminary studies in our laboratory have shown these dyes may, however, be made biodegradable by slightly altering their chemical structures. The changed chemistry involves introducing naturally occurring lignin-like chemical substitution patterns into a dye's molecular structure. The recalcitrant dye is thereby converted to a modified molecule that is much more readily degraded by microorganisms. Chemical, spectrometric, and radioisotopic methods will be used to monitor degradation.

1.138 Stabilization of Microorganisms for In Situ Degradation of Toxic Chemicals

Ronald Crawford, UI AES Bacteriology/Biochemistry

The goal of this research is to determine a method of immobilization of pollutant-degrading bacteria in polymeric matrices in order to stabilize the bacteria for use in in situ bioremediation of contaminated aquifer systems.

1.139 Biological Destruction of Nitroaromatic Contaminants in Large Volumes of Soil and Sludge: Novel Anaerobic Processes

R. L. Crawford, D. L. Crawford, UI AES Bacteriology/Biochemistry

Soils at many agricultural sites in the Northwest USA are contaminated by nitroaromatic herbicides, particularly dinoseb. Vast amounts of soil and sludge nationwide are contaminated by wastes of the defense industry, particularly trinitrotoluene (TNT) and related molecules. We are field testing a novel anaerobic bioremediation process that degrades these contaminants to innocuous products like CO_2 and acetate. Experiments are being performed at the pilot plant scale.

1.140 Containment of Genetically Engineered Microorganisms in Subsurface Environments

S. Kellogg, C. S. Orser, D. Crawford, R. Crawford, UI AES Bacteriology/Biochemistry; D. Ralston, UI Geology/Geological Engineering

Our objective is to develop cell immobilization procedures that will contain genetically engineered microorganisms (GEMS) introduced into soils and/or waters. Ideally, these procedures will (a) prevent GEMS from physically entering subsurface environments, (b) prevent GEM DNA from being transferred to natural microbial populations, while (c) allowing the GEMS to interact metabolically (e.g., degrade pollutants) with their surrounding ecosystems. This research should lead to development of low-risk technologies using GEMS to remediate subsurface environments contaminated by hazardous chemicals.

1.141 New Approach to Enhance the Biodegradability of Azo Dyes and Polystyrene Polymers

R. L. Crawford, UI AES Bacteriology/Biochemistry; R. A. Korus, UI Chemical Engineering

Azo dyes and polystyrenes are synthetic chemicals that are resistant to decomposition by microorganisms. Large amounts of these chemicals are disposed of and as a result introduced into the environment each year. Much of these wastes, particularly azo dye wastes, eventually contaminate surface waters and/or aquifers. Studies are being conducted to determine if minor chemical changes can be introduced into the azo dye and polystyrene molecular structures to make these chemicals more biodegradable by soil and aquatic bacteria and fungi.

1.142 Promoting *in situ* Dechlorination of Aromatic Compounds through Catalysis by Extracellular Enzymes

C. S. Orser, B. Trumble, UI AES Bacteriology/Biochemistry; M. Morra, UI Soil Science

Chlorinated aromatic compounds present at Superfund sites are relatively resistant to degradation by the natural microbial component of the contaminated soils. The overall project objective is to enhance the degradation of chlorinated aromatics *in situ* through the promotion of dechlorination reactions. Enzymes responsible for the dechlorination of aromatic compounds will be produced in large quantities through innovative recombinant DNA techniques. The *in situ* dechlorination of aromatic compounds will be catalyzed by amendment of extracellular enzymes to contaminated soils, exclusive of the engineered organism.

1.143 Stabilization of Microorganisms for In Situ Degradation of Toxic Chemicals

R. L. Crawford, UI AES Bacteriology/Biochemistry

Bacteria that might be used to degrade toxic chemicals that have contaminated subsurface environments often do not survive when introduced artificially into subsurface systems. We are developing methods to encapsulate bacteria into microspheres prior to their introduction into the subsurface. This will provide protection to the cells against unfavorable conditions that might otherwise decrease their effectiveness.

SURFACE WATER

1.144 Middle Snake River Water Quality Study

C. E. Brockway, C. W. Robison, S. J. Kolar, UI Civil Engineering

The reach of the Snake River between Milner Dam and King Hill includes fish hatcheries, irrigation return flows, and dams. This reach has experienced serious algae blooms and water quality problems, which are detrimental to recreational and other uses of the river. • Water quality parameters are being determined at thirteen stations on the main river, on twelve tributary streams, 20 major irrigation return flow sites, and 10 fish hatcheries on processing plants. Nutrient loading based on these measurements will be determined for the six month sampling period.

1.145 Twin Lake Management Plan (Draft) in Conformance with the Clean Lakes Coordinating Council

Shireene Sementi, CLCC, PHD

Declining water quality in Twin Lakes is perceived to be a significant problem. Residents have become concerned about decreased water clarity, algal blooms, oxygen depletion, lake shallowing and increased aquatic vegetation coverage. • This plan is based on the data provided by Falter and Hallock, and on public input obtained through a workshop, through consultations with agency and lake association representatives, and through a questionnaire completed by 75 concerned citizens. The goal of this plan is to improve lake water quality and then maintain it at this improved level.

1.146 North Fork Payette River Special Study

Michael Ingham, Linda Boyle, Trish Klahr, DEQ

The study was initiated to gain current data for water quality in the North Fork of the Payette River and the possible impacts from two point source discharges, the McCall Sewage Treatment Plant and the Idaho Fish and Game fish hatchery. The data was also to be used in correlation with the ongoing Cascade Reservoir study. Most of the data did not indicate an accurate conclusion of nutrient loading from the river. Draft report is completed, final report due out in mid-March.

1.147 Final Basin Report, Upper Snake River and Tributaries

Gareth Clausen, ACE Walla Walla

This study was authorized under Resolution of the Senate Committee on Public Works adopted March 19, 1954. The purpose was to investigate flood damage reduction, hydropower potential, instream flow, irrigation, and municipal and industrial water supply needs in the Upper Snake River Basin. Numerous reports and studies were done under this authority. The objective of this report is to summarize the history of Corps of Engineers interim studies conducted under this authority and identify any problems or unmet opportunities within the basin.

For agencies or organizations with more than one office/branch, unless indicated otherwise, the main branch is indicated, i.e., Boise office for state agencies, Moscow campus for UI.

ACE	U.S. Army Corps of Engineers
AES	Agricultural Experiment Station (UI)
AES-Lab	Analytical Services Lab (UI)
ARS	Agricultural Research Service
ASCS	Agricultural Stabilization and Conservation Service
ARS	Agricultural Research Service
BIA	Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BSU	Boise State University
CBIG	Coeur d'Alene Basin Interagency Group
CES	Cooperative Extension System (UI)
CLCC	Clean Lakes Coordinating Council
DEQ	Division of Environmental Quality (Idaho)
DOT	Department of Transportation (Idaho)
EPA	U.S. Environmental Protection Agency
HD	Health District (Idaho)
HWC	UI Center for Hazardous Waste Remediation Research
IDA	Idaho Department of Agriculture
IDE	Idaho Department of Education
IDEQ	Idaho Division of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDHW	Idaho Department of Health and Welfare
IDL	Idaho Department of Lands
IDPR	Idaho Department of Parks and Recreation
IDOT	Idaho Department of Transportation
IDWR	Idaho Department of Water Resources
IFB	Idaho Farm Bureau
IRSUSFS	Intermountain Research Station
ISCC	Idaho Soil Conservation Commission
ISU	Idaho State University
IWRRI	Idaho Water Resources Research Institute (UI)
NCHD	North Central Health District
PAG	Policy Analysis Group, College of Forestry, Wildlife, and Range Sciences (IU)
PHD	Panhandle Health District
PSES	Department of Plant, Soil, and Entomological Sciences (UI)
RD	Ranger District
SCC	Soil Conservation Commission (Idaho)
SCS	Soil Conservation Service
SDHD	Southeast Health District
SRC	Spokane Research Center, USBM
SWCD	Soil and Water Conservation District
UI	University of Idaho
USBM	United States Bureau of Mines
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
WQB	Water Quality Bureau
WRD	Water Resources Division

1.148 Assessment of the Severity and Spatial Variability of the 1980s Idaho Drought

Dennis Horn, UI Civil Engineering

The specific objectives of this project are (1) to examine the characteristics of the 1980's Idaho drought, as determined from streamflow records from long-term gages within Idaho and adjacent areas; (2) to assess, at each gage, the severity of the drought in terms of return periods assigned to the streamflow deficit for various levels, using the theory of runs applied to the entire drought period; (3) to assess the return periods of the maximum streamflow deficit for the single worst drought year within this drought sequence; (4) to compare the 1980s drought event with other significant droughts recorded at the same gaging stations; and (5) to determine the spatial variability of the return periods of the 1980's drought for comparison with the spatial variability of the Drought Potential Index defined in the prior streamflow study, and with the other major drought events.

1.149 Lolo/Ford's Creek Planning Project

Terry White, Clearwater SWCD; Bruce Hanson, SCS; Mike Hoffman, ISCC

Lolo Creek and Jim Ford's Creek have been designated stream segments of concern in the Idaho Agricultural Pollution Abatement Plan. Suspected water quality impacts are tied to sediment load, and nitrates and pesticides from cropland, rangeland, and forestland. Riparian areas are also impacted and are of great concern. The area has valuable trout habitat and is a spawning area for anadromous fish. • The object of this study is to investigate the non-point source pollution to the Lolo/Ford's Creek Watershed through an intensive water quality monitoring program. This will give the necessary information needed to identify and select effective treatments to protect and enhance the beneficial uses of these resources.

1.150 Identification of Eutrophication Trends with Shoreline Periphyton Indices in Lake Pend Oreille, Idaho

C. Michael Falter, Dale Olson, UI Fisheries and Wildlife Resources

Reports of increased algal growth on docks, boats, and shoreline have raised the question of increased rate of change in Lake Pend Oreille's trophic status. Objectives of this study are to assess littoral production via attached algae and aquatic macrophytes, determine nutrient levels and physical/chemical conditions, and assess bacteria levels in order to develop baseline data from which current and future trends can be monitored.

1.151 Spokane River Monitoring

C. Michael Falter, UI Fisheries and Wildlife Resources

The purpose of this research is to provide a comprehensive river water quality assessment by collecting water quality data which will be used to calibrate a waste allocation mathematical model. The model results will provide a means to predict the effect of point and nonpoint sources of ammonia and other oxygen demanding materials on downstream beneficial uses.

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