

Water Resources Research Institute

Annual Technical Report

FY 1998

Introduction

Research Program

We support and direct water research for the State of Idaho and the region. Our research results routinely lead to cutting-edge discoveries in such vital areas as water quality, water supply and water management. More importantly, these discoveries regularly lead to a greater understanding of our surroundings, offering sensible solutions toward maintaining a healthy balance between the economy and the environment.

Basic Project Information

Basic Project Information	
Category	Data
Title	Near Surface Hydrology of the Eastern Palouse Region
Project Number	1434-0 HQ96GR02667-01
Start Date	09/01/1997
End Date	08/31/1999
Research Category	Ground-water Flow and Transport
Focus Category #1	Hydrology
Focus Category #2	Solute Transport
Focus Category #3	Water Quality
Lead Institution	Water Resources Research Institute

Principal Investigators

Principal Investigators			
Name	Title During Project Period	Affiliated Organization	Order
John E. Hammel	Professor	University of Idaho	01
Paul McDaniel	Associate Professor	University of Idaho	02

Problem and Research Objectives

Most soils in the eastern Palouse region of northern Idaho contain hydraulically restrictive subsurface layers such as fragipans and argillic horizons. These horizons cause percolating precipitation to perch

above them in shallow water tables. These shallow perched water tables (PWTs) are present during the winter months when the majority of precipitation is received and potential evapotranspiration is minimal. Perched water tables represent a significant seasonal, near-surface aquifer throughout the region. Furthermore, because of their proximity to surface-applied agrichemicals and their ability to promote rapid, lateral water flow, PWTs may potentially impact surface water quality. The overall objective of this research is to conduct a landscape-based study of PWTs and model their impacts on subsurface-to-surface return flow and surface water quality. Specific objectives are: 1. Conduct detailed monitoring of seasonal perched water tables in a representative catchment of the region receiving 850 mm of annual precipitation; 2. Determine rates and patterns of lateral flow of perched water within the catchment, and; 3. Obtain necessary data to develop and validate models for predicting the impacts of perched water tables on local water resources in managed agricultural ecosystems.

Methodology

A 2.5-ha catchment near Troy, Idaho was selected for use in this study. The catchment has been instrumented with a grid of 120 shallow wells and a full weather station. Within each well, a pressure transducer was placed at the interface between the hydraulically restrictive horizon and the overlying soil horizons. Transducers were calibrated to read the thickness of the perched zone of saturation and wired to dataloggers. Dataloggers were programmed to collect readings every 12 hours. In addition, a flume was installed in an ephemeral drainage channel contained within the catchment to measure surface runoff. Data collected from the catchment is being used to develop and validate a soil moisture routing model that predicts perched water table responses to climatic and landscape variables. In addition, Br- and Cl- tracers were applied in trenches on the upper part of the catchment. The direction and rate of their movement is being monitored.

Principal Findings and Significance

Three years (1995-96; 1996-97; 1997-98; 1998-99) of perched water table data have been collected and evaluated. Results demonstrate that the PWTs form in late November to mid December and persist into mid May or early June. PWTs respond very rapidly to climate fluxes such as precipitation and snow melt, and are present at or near the soil surface several times during the season. It is during these short-duration events that rapid transport of applied tracers occurs in the more-permeable surface horizons. PWT dynamics are closely tied to the depth of the hydraulically restrictive subsoil below the soil surface; PWTs rise and fall more rapidly in areas of the landscape where restrictive layers are closer to the surface. The soil moisture routing model is able to predict PWT dynamics in upland positions on relatively gentle slopes; prediction is poor for positions located on the steepest slope segments. The most significant finding of this research is that the hydraulically restrictive subsoils cause substantial redistribution of the precipitation received. It appears that water is not able to percolate vertically through these horizons and, therefore, little recharge occurs on the uplands of the region. Most of the precipitation received recharges the shallow PWT, where it is then routed laterally downslope. It is therefore in the lowland positions where the potential for contamination of surface water and recharge of deep aquifers exists.

Descriptors

Contaminant Transport; Hydrogeology; Soil Physics; Water Quality

Articles in Refereed Scientific Journals

No reports have been published. It is anticipated that a publication will result at the conclusion of this project.

Book Chapters

None

Dissertations

Will be published at the conclusion of the project.

Water Resources Research Institute Reports

Will be published at the conclusion of the project.

Conference Proceedings

Boll, J., E.S. Brooks, C.R. Campbell, S.K. Young, J.E. Hammel, P.A. McDaniel. 1998. Progress toward development of a GIS-based water quality management tool for small rural watersheds: modification and application of a distributed model. Paper no. 982230. ASAE Annual International Meeting, Orlando, FL. ASAE, 2950 Niles Road, St. Joseph, MI. Barndt, S.L., P.A. McDaniel, J.E. Hammel, M. Regan, and A.L. Falen. 1999. Solute movement through a perched water table in the Palouse region. p. 42. In Western Soc. Soil Sci.-Pacific Div. Am. Assoc. Advance. of Science Program with abstracts. San Francisco. McDaniel, P.A., J.E. Hammel, S.K. Young, S. Rockefeller, R. Reuter, and A.L. Falen. 1998. Near-surface hydrological processes in sloping landscapes of the northwestern USA. Proceedings of 16th World Congress of Soil Science. 20-26 August, 1998. Montpellier, France.

Other Publications

None

Information Transfer Program

A vital component in the institute's mandate is to distribute its research results to the general public. In addition to formal research reports published in technical journals, our scientists regularly publish results and make presentations designed for a lay audience. We sponsor a range of timely conferences and short-courses and produce audio-visual materials including educational videos. Education workshops such as Idaho Streamwalk, Project WET and EMPower are listed as conference projects under Information Transfer.

Basic Project Information

Basic Project Information	
Category	Data
Title	Project WET (Water Education for Teachers)
Description	K-12 Teacher Education Program for Water Education
Start Date	03/01/1998
End Date	02/28/1999
Type	Conferences
Lead Institution	Water Resources Research Institute

Principal Investigators

Principal Investigators			
Name	Title During Project Period	Affiliated Organization	Order
Leland L. Mink	Professor	Water Resources Research Institute	03
Julie Scanlin	Professional Staff	Water Resources Research Institute	04

Problem and Research Objectives

Project WET (Water Education for Teachers), Idaho, an interdisciplinary, supplementary water education program for Idaho educators, was established this past year. The goal of Project WET is the facilitate and promote an awareness, appreciation, and understanding of Idaho's water resources through the development and dissemination of classroom-ready teaching aids. Like other successful natural resource education programs, Project WET emphasizes teaching students how to think, not what to think.

Methodology

Over twenty workshops were conducted throughout Idaho. Two-day and three-day sessions were conducted for teachers both in-class and in the field. Classes have 20-30 teachers participating.

Principal Findings and Significance

Approximatly 400 teachers were trained this past year.

Articles in Refereed Scientific Journals

None

Book Chapters

None

Dissertations

None

Water Resources Research Institute Reports

None

Conference Proceedings

None

Other Publications

None

Basic Project Information

Basic Project Information	
Category	Data
Title	Idaho Streamwalk
Description	Adult Education Curriculum detailing physical, biological and chemical characterization of streams
Start Date	03/01/1998
End Date	02/28/1999
Type	Conferences
Lead Institution	Water Resources Research Institute

Principal Investigators

Principal Investigators			
Name	Title During Project Period	Affiliated Organization	Order
Leland L. Mink	Professor	Water Resources Research Institute	03

Problem and Research Objectives

Idaho Streamwalk, a citizen volunteer monitoring program, also contributes strength to the IWRRI's outreach program. This program, coordinated through the Institute, was designed by the Environmental Protection Agency, Region 10. The goals of Streamwalk are to encourage citizen commitment to protecting streams, educate people about the relationship between streams and the watersheds, equip individuals with a screening tool to identify potential problem areas, provide a standardized data collection method so regional and trend comparisons can be made, and focus experts' limited resources on suspected problem areas.

Methodology

Idaho Streamwalk was presented at the Boise River Festival.

Principal Findings and Significance

Approximately 200,000 people attend the festival annually.

Articles in Refereed Scientific Journals

None

Book Chapters

None

Dissertations

None

Water Resources Research Institute Reports

None

Conference Proceedings

None

Other Publications

None

Basic Project Information

Basic Project Information	
Category	Data
Title	EM Power
Description	A Waste Managment Youth Education Curriculum
Start Date	03/01/1998
End Date	02/28/1999
Type	Conferences
Lead Institution	Water Resources Research Institute

Principal Investigators

Principal Investigators			
Name	Title During Project Period	Affiliated Organization	Order
Leland L. Mink	Professor	Water Resources Research Institute	03

Problem and Research Objectives

EM*Power is a Waste Management youth education program. The 4-H youth component curriculum is well rounded so that youth can be taught "how to think, not what to think" in relation to waste management. This provides 4-H youth with hands-on activities to gather factual information, make informed decisions and develop creative solutions in the realm of waste management.

Methodology

EM Power workshops were conducted at five different conferences and workshops nationally and a one poster display was presented.

Principal Findings and Significance

Approximately 700 participants were involved in five different workshops and conferences and 1600 were presented to in the poster presentation.

Articles in Refereed Scientific Journals

None

Book Chapters

None

Dissertations

None

Water Resources Research Institute Reports

None

Conference Proceedings

None

Other Publications

None

Student Support

Student Support					
Category	Section 104 Base Grant	Section 104 RCGP Award	NIWR-USGS Internship	Supplemental Awards	Total
Undergraduate	0	0	0	0	0
Masters	0	4	0	0	4
Ph.D.	0	0	0	0	0
Post-Doc.	0	0	0	0	0
Total	0	4	0	0	4

Awards & Achievements

NA

Publications from Prior Projects

Articles in Refereed Scientific Journals

None

Book Chapters

None

Dissertations

None

Water Resources Research Institute Reports

None

Conference Proceedings

None

Other Publications

None