



WASHINGTON STATE  
DEPARTMENT OF  
E C O L O G Y

# **Water Resource Data Management**

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## Annual Report

April 1994

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# WATER RESOURCE DATA MANAGEMENT ANNUAL REPORT

## WASHINGTON STATE DEPARTMENT OF ECOLOGY WATER RESOURCE PROGRAM DATA MANAGEMENT UNIT

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## Executive Summary

This Annual Report lists accomplishments pursuant to the Five-Year Water Resource *Data Management Plan* and other data management projects of Ecology's Water Resources Program. Information on fourteen projects is presented. The status of each project is summarized below.

### **Washington Surface Water Identification System (WASWIS) -**

WASWIS assigns addresses to lakes, streams, and other surface water bodies. The system is being pilot tested in Whatcom County. Numerous potential users of WASWIS have been identified.

### **Well Identifications and Location Systems -**

Using the Well Identification System, local governments, tribes, consultants and well drillers have identified over 7,000 wells with numbered metal tags. This project is being implemented statewide. A Technical Advisory Group will draft rules implementing legislation to improve the quality of well location data, an activity closely related to the well identification project.

### **Ground Water Information System -**

This system will implement automated methods for storage and retrieval of Well Construction Reports. This project is scheduled for completion in the 1993-95 biennium.

### **Well Driller Licensing -**

This project would result in a Well Driller Licensing Database which tracks well driller training and continuing education credits, facilitating uniform procedures for license renewal. No start date has been scheduled.

### **Water Right Application Tracking System (WRATS) -**

WRATS will retrieve information about the status of water right applications and application processing work loads. It will improve application processing efficiency. The target completion date is mid-1995.

### **Adjudication Report Writing System -**

The Adjudication Report Writing System automates water right adjudication record keeping and report writing. While much of this system is operating, additional work will be required before completion of the current adjudication in the Yakima River Basin. Additional work would also be required before another adjudication could be started. Completion of this system is not scheduled.

### **Common Data Architecture -**

This mechanism defines data in a common format for each identification and sharing of data across projects and institutions. This project has been initiated, but no additional work is scheduled.

**Water Quality Data Architecture** - This project is an extension of the Common Data Architecture specifically addressing water quality data. Work on this project has been initiated, but additional work is not scheduled.

**Water Resources Data Architecture** - This architecture was developed as a foundation for the Information Strategy Plan. Sufficient work has been accomplished to support key elements of the Information Strategy Plan. No additional work is scheduled.

**Data Needs and Availability Surveys** - The 1990 legislature mandated needs and availability surveys to support the *Five-Year Water Resource Data Management Plan*. Both surveys have been completed.

**Data Source Book** - The Data Source Book was published to provide information about the existence and availability of water resource data. Updating the content and converting to an electronic format, for example, publication on floppy disks is planned, but not scheduled.

**Clearing House** - A Clearing House of water resource data is proposed in the *five-year plan*. A pilot test and feasibility study are nearly completed.

**The Five-Year Plan** - The *Five-Year Water Resource Data Management Plan* lists, prioritizes, describes and estimates costs of fifteen water resource data management projects. The *Five-Year Plan* document was completed in July 1992.

**The Information Strategy Plan** - The Water Resources Program is developing the Information Strategy Plan as a foundation for automated systems development. Sufficient Work has been accomplished to support top priority systems development activities. No additional work is scheduled.

**Data Fields for Public Water Supply System Databases** - Ecology has cooperated with the Department of Health to identify data fields for collection of water use data from public water supply systems. This work is in anticipation of a comprehensive water use reporting system. No work on a comprehensive water use reporting system has been scheduled.

# Introduction

## Problem Statement and Response

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Washington's water resource data are scattered among a number of State and Federal agencies, tribal nations, local governments and other sources. No standard system exists for collecting, storing, or accessing data about water availability. A comprehensive strategy is being established to protect, share and efficiently use water data.

This strategy is the result of legislative enactment of Chapter 295, Laws of 1990. A Five-Year Plan and an advisory Task Force are major parts of the strategy. Implementation of the strategy will improve management of the State's water resources. Large benefits are also expected for non-state institutions and individuals whose welfare is critically dependent on water.

Non-state institutions and individuals serve with State agencies on the Data Management Task Force. Indian tribes, local governments, agricultural and environmental organizations, business, and private citizens are included. The Task Force's purpose is to assure that the data management strategy is consistent with data needs inside and outside state government. The Task Force produced the *Five-Year Water Resource Data Management Plan*.

The *Five-Year Water Resource Data Management Plan* lists fifteen projects to improve water resource data management. This Annual Report lists accomplishments pursuant to the *Five-Year Plan* and other data management projects of Ecology's Water Resources Program.

## Projects Listed in This Annual Report

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Projects in this Annual Report are listed below. Projects recommended in the *Five-Year Plan* and in Ecology's Water Resources Program Information Strategy Plan (sometimes called the Enterprise Model) are identified, to serve readers specifically interested in accomplishments of each Plan.

The *Five-Year Plan* and the Information Strategy Plan are key frameworks for water resource data management projects. Different methods and scopes were incorporated in each. The *Five-Year Plan* scope examined water resource data needs of regional and state institutions and considered findings of data availability and data needs surveys. It is a product of the broad based Water Resource Data Management Task Force.

The Information Strategy Plan's scope addressed data needs of the Department of Ecology's Water Resources Program. The methodology is highly structured, producing an integrated set of recommendations.

The Information Strategy Plan is built upon expert knowledge of the Water Resources Program's activities and data usage. The expertise committed to the Information Strategy Plan was restricted by the resources available; consequently there are limits to the use of the Plan's conclusions.

The table below lists the projects included in this Annual Report, and identifies their source, either the *Five-Year Plan* or the Information Strategy Plan.

**Five-Year Plan Project Activities or Information Strategy Plan**

<u>Project</u>	<u>Recommendations</u>
Surface Water Identification Washington Surface Water Identification System	<i>Five-Year Plan</i>
Well Identification Develop Unique Well Identification and Location Systems	<i>Five-Year Plan</i>
Ground Water Information Ground Water Information System	<i>Five-Year Plan I</i> Information Strategy Plan
Well Driller Licensing	<i>Five-Year Plan I</i> Information Strategy Plan
Water Rights - General Water Right Application Tracking	Information Strategy Plan
Water Rights - Extended Adjudication Claim Tracking	Information Strategy Plan

<u>Project</u>	<u>Recommendations</u>
Data Architecture	
Common Data Architecture	<i>Five-Year Plan</i>
Information Strategy Data Architecture	Information Strategy Plan
Water Quality Data Architecture	<i>Five-Year Plan</i>
Data Inventories	
Data Needs & Availability Surveys	<i>Five-Year Plan</i>
Data Sharing	
Publish Data Source Book	<i>Five-Year Plan</i>
Clearing House	<i>Five-Year Plan</i>
Planning	
Five-Year Plan	<i>Five-Year Plan</i>
Information Strategy Plan	
Water Use Reporting	
Define Data Fields for Public Water Supply System Databases	<i>Five-Year Plan</i>

# Annual Report Review of Projects

## Surface Water Identification

### Washington Surface Water Identification System

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The Washington Surface Water identification System, WASWIS, is being pilot tested in Western Whatcom County. Continued development includes in-house testing, quality control checking and prerelease testing by Ecology staff before being shipped to over 40 user test sites. User testing will culminate with a workshop, implementation of user suggestions, and completion of a report on feasibility for state-wide use. The feasibility report is expected by March, 1995.

Extensive interest has been shown by potential users. WASWIS will potentially be the largest and most comprehensively used data management system that Ecology has produced.

WASWIS identifies and assigns addresses to sampling or scientific observation sites on surface water bodies. Data identified by WASWIS codes can be easily shared and reused, because its geographic location is identified by a uniform system.

Initial planned uses include support of Water Resources Program activities and an on-line stream catalogue and fish database. The stream catalogue and fish database is sponsored by the Departments of Fish and Wildlife, Natural Resources, and Ecology, with the U.S. Forest Service, U.S. Parks Service, the U.S. Fish and Wildlife Service and other related entities. This catalogue and data base is scheduled for the 1995-97 biennium.

WASWIS has been tentatively adopted (contingent on successful completion of its pilot test), and is to be implemented as the standard identification system for the Integrated Land Management pilot studies of the Department of Fish and Wildlife. The U.S. Forest Service is considering WASWIS as a model for data management in their six Washington forests and possibly twelve forests in Oregon.

## Well Identification

### Develop Unique Well Identification and Location Systems

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Local governments, tribes and consultants have voluntarily identified approximately 7,000 wells with metal tags bearing six character identification numbers. Existing wells are being tagged as an additional activity during visits to well sites for other purposes.

Reconstructed and new wells are being voluntarily tagged by many of the state's well drillers. Rules implementing 1993 legislation will make tagging of new and reconstructed wells mandatory for well drillers.

The well identification system consists of securely fastening pre-numbered metal tags to wells in a readily visible place. The tag number is written on the well construction report, and that number is used thereafter to identify and reference information from a particular well.

Benefits of the well identification system include:

- Positive field identification of wells
- Easier sharing of well data
- More accurate mapping of ground water data

This project has reached statewide implementation status. Well tags are available throughout the state to organizations volunteering to affix them and report on their tagging activity to Ecology. Upon completion of administrative regulations, now pending before the statutorily established Technical Advisory Group, current voluntary tagging of new and reconditioned wells by well drillers will become mandatory.

Well Identification and well location systems are closely related. Well Construction Reports, a source of fundamental hydrogeologic information, are filed and retrieved according to the location of the well. Well locations are determined by the well driller submitting the Report. Inaccurate location data makes the remainder of the Well Construction Report data virtually useless. Ecology has determined that correct location information is a critical link to data needed for significant public and private decisions.

The *Five-Year Plan* calls for improvements in location data on Well Construction Reports. The 1993 Legislature took a significant step toward implementing this *Five-Year Plan* activity by adopting training and continuing education requirements for well drillers. When implemented, training and continuing education credits in map reading and well location derivation for well drillers will improve the quality of well location data. Continuing education credits will be a renewal condition for State well drilling licenses. The implementing regulations are being prepared by a Technical Advisory Group created by the authorizing legislation. The formal publication and public hearing process, leading to adoption of implementing regulations, is expected to begin by mid-1995.

## **Ground Water Information**

### **Ground Water Information System**

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The private sector is required to complete about 13,000 Well Construction Reports each year. Since 1973, Ecology has accumulated about 220,000 Well Construction Reports in paper files at its regional offices. These files are a primary source of the most basic hydrogeologic information. They are used daily by Ecology and the public.

Well Construction Reports are vulnerable to damage by fire, water, and theft. Public access requires an advance request or a long wait at a regional office.

Ecology proposes new methods, using optical imaging technology, for safely storing and rapidly retrieving these valuable records. Ecology and the public will benefit from this project in the following ways:

- Improved access, for Indian tribes, well drillers, consultants, researchers, governmental decision makers and others
- Greater protection of valuable data
- Better and faster decisions on water right applications

The Ground Water Information System was first identified as Project 7a in the *Five-Year Water Resource Data Management Plan*. This project was also identified as a discreet "business area" by the Water Resources Information Strategy Plan. The Ground Water Information System is scheduled for completion in the 1993-95 biennium.

## **Ground Water Information**

### **Well Driller Licensing**

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The Information Strategy Plan proposes a Well Driller Licensing Database which can track training and continuing education credits, facilitating appropriate enforcement prior to license renewal. The Well Driller Licensing Database will replace an existing interim computer system. The project is estimated to cost \$200,000 over a nine month period. No start date has been scheduled.

## **Water Rights - General**

### **Water Right Application Tracking - WRATS**

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Two to three years is a typical processing time for water right applications. The time requirements are attributed to an inefficient process (including inefficient data access), difficult access to status data for individual applicants and Ecology managers, and a substantial inventory of pending applications. The Water Right Application Tracking System (WRATS) will produce information for applicants and Ecology managers about the status of applications or the work load, and will improve processing efficiency.

WRATS is a complex, sophisticated database which models the procedures for issuance of water right permits and certificates. It will include information on application status, protests, correspondence with the applicant, staff assignments and productivity measures. WRATS will generate reports on specific applications and summary data on region wide and statewide pending applications. The target completion date is mid-1995.

Ecology staff may search for applications meeting certain geographic or other criteria, and may share information with future Geographic Information Systems. WRATS is a single user piece of software; access by multiple users (each via his or her own desktop computer) would require significant changes to the software and expenditures for equipment. The Information Strategy Plan calls for a multiuser Water Right Tracking System linked to Ecology's water right repository database.

## **Water Rights - Extended Adjudication Report Writing**

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Phases 1 and 2 of the Water Adjudication Report Writing System were substantially completed on June 30, 1993. These phases automate adjudication procedures through generation of the Report of Referee. This system tracks claims and parties, automates the conversion of investigation reports into Plaintiff's Reports, reports of Referee, a Final Decree, and Certificates of Adjudicated Water Right. The system automatically places identified data fields in unique documents, each in its own format, and updates claimant information. The system currently contains information on the Yakima River Adjudication, including over 4,500 defendants and 2,100 claims.

Phase 3 will automate issuance of a final integrated Decree (integrating all rights from all pathways in priority order) and of Certificates of Adjudicated Water Right. Phase 3 also includes generation of all documents necessary to initiate an adjudication. The adjudication initiation process of Phase 3 is not scheduled for completion. The Water Adjudication Report Writing System is a project identified by the Information Strategy Plan.

## **Data Architecture Common Data Architecture**

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A Common Data Architecture is the mechanism for defining data in a common format for easy identification and sharing. It provides an "umbrella" over all existing data, across multiple projects, and across multiple enterprises. It provides a foundation for identifying, documenting, and integrating existing and new data, tabular and non-tabular data.

The Common Data Architecture began with definition of 20 broad data subject areas and 31 data subject groups within those data subject areas. Databases from the Water Resources program and other State and Federal agencies were cross referenced to the Common Data Architecture, resulting in 3,000 data definitions.

Construction of the Common Data Architecture has just begun. Significant additional work is required to complete this project. No additional work is scheduled.

## **Data Architecture**

### **Water Quality Data Architecture**

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The Water Quality Data Architecture is a further development of the Common Data Architecture specifically addressing Water Quality data. It provides an “umbrella” over existing water quality data, across multiple projects, and across multiple enterprises. It provides a foundation for identifying, documenting, and integrating existing and new tabular and nontabular data.

The Water Quality Data Architecture Project has completed standard definitions for water quality data entities. Substantial additional work is necessary to produce a usable water quality data architecture. No resources are assigned to this project; continued work is not scheduled.

## **Data Architecture**

### **Water Resource Data Architecture**

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A data architecture was compiled to support development of the Information Strategy Plan. It represents a vision of Water Resource Program data as it should be, not how the data exists in current systems.

Subject areas and associated entities were identified using information from the Common Data Architecture and the Water Resources Program staff. Entity relationships have been documented for about ten percent of the entities. Significant additional work is required to complete this data architecture and tie it to the Common Data Architecture.

## **Data Inventories**

### **Data Need and Availability Surveys**

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Assessments of data needs and availability are fundamental tools for improving water resource data. The 1990 Legislature mandated needs and availability surveys to support the *Five-Year Water Resource Data Management Plan*.

A data needs questionnaire was distributed to representatives of many water resource data users and user groups. Needs for 48 types of water data, ranked by importance and degree of current need satisfaction, were tabulated. Respondents submitted 185 questionnaires, some representing views of multiple data-using organizations. Eight kinds of water data were identified as the most critical unmet needs. These needs are listed below.

Well Data	Stream Data
Water Right Data	Marsh, Bog, & Swamp Data
Water Resource Regulation Data	Ground Water Data
Water Pollution Data	Climate Data

Data availability was surveyed to identify data collections and facilitate data sharing. The inventory has been completed, and results have been published.

The data availability questionnaire was distributed to 126 individuals and organizations which collect water resource data. Respondents provided information on the accuracy, date range, storage media, contact person and other information. Responses were published in the *Water Resource Data Source Book*.

## **Data Sharing**

### **Publish Data Source Book**

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The *Water Resource Data Source Book* was published to provide information about the existence and availability of water resource data. It is a step toward increased sharing of water resource data.

The *Water Resource Data Source Book* publishes information about data collected by the data availability survey. The *Data Source Book* begins with an introduction, plans for enhancement of the book, and how to obtain copies. The data availability survey procedures are explained. An index provides an overview and reference tool. The body describes data maintained by each contributing organization, organized by broad data groups. Appendices present definitions of the data groups and copies of the data availability survey questionnaire.

Republication of an updated version of the Data Source Book has been considered. If republished, electronic media, such as a floppy disk, would be used in place of paper. Further work on the Data Source Book has not been scheduled.

## **Data Sharing Clearing House**

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Ecology is directed by law to collect, organize, catalogue and provide public access to information and studies related to water. Ecology has collected and catalogued such information for many years.

The *Five-Year Plan* proposed a clearing house to improve access to water resource studies prepared inside and outside the Department of Ecology. A pilot test and feasibility study for a clearing house have been virtually completed. The pilot tested a standard computerized format which could be used by researchers and librarians to compile data about water resource studies. An institutional framework to maintain and enhance the clearing house is the primary subject of the ongoing feasibility study.

## **Planning The Five-Year Plan**

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The Data Management Task Force completed the *Five-Year Water Resource Data Management Plan* in July, 1992. The *Five-Year Plan* lists, prioritizes, describes and estimates costs of fifteen water resource data management projects. Several of these projects, or activities within projects, are discussed in this Annual Report.

The *Five-Year Plan* is a strategic plan. That means it is a high level, general, and broad in scope plan. It conveys a vision and objectives for achieving that vision.

The scope of *Five-Year Plan* projects goes beyond the Water Resources Program and the Department of Ecology. *Five-Year Plan* projects address data needs at all levels of government, academia, business, environmental groups, tribes, and others. The *Five-Year Plan* vision is to link data users to decentralized data sources using a common data sharing infrastructure.

*Five-Year Plan* Projects describe the current situation or issue, and what changes are needed. Activities within Projects state a situation or need, recommendations, benefits, and dependencies on other projects/activities. Project durations and cost estimates are presented.

The *Five-Year Plan* was mandated by Chapter 295, Laws of 1990. This act directs preparation of a *Five-Year Plan* describing:

- The data requirements for effective water resource planning
- A system for collecting and providing access to water resource data on a regional and state-wide scale

The *Five-Year Plan* called for revisions or updates every two years, consistent with each new legislative session. The *Five-Year Plan* was not updated for the 1994 legislature and no additional work on the *Five-Year Plan* is scheduled.

## **Planning**

### **The Information Strategy Plan**

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The Water Resources Program is developing an Information Strategy Plan (sometimes called an Enterprise Model). The Plan is sufficiently developed to identify specific data management projects for implementation. Several projects identified by the Information Strategy Plan are included in this Annual Report.

An Information Strategy Plan and associated methods offer the following benefits for automated systems development:

- Modular construction
- Low maintenance
- Orderly, defined approach, based on business related priorities, for identifying and scoping new information systems.
- Avoidance of isolated islands of automation
- Data sharing throughout the enterprise
- Avoid gaps and duplication of systems or data collection

The Information Strategy Plan is a logical framework for Water Resources Program automated systems. It incorporates the “business” activities, data requirements, goals, critical success factors and strategies of the Program. It divides the enterprise into logically related business areas, which represent future system development projects. An Enterprise Model is an element of the Information Strategy Plan.

By a process of narrowing scope as additional layers of detail are addressed, the Information Strategy Plan has directed attention to one specific project recommendation. Other projects will be prioritized via additional work on the information Strategy Plan. That additional work is unscheduled, pending completion of the Information Strategy Plan’s first recommended project. The Ground Water Information System, a project in its early stages, is the first recommendation from the Information Strategy Plan.

## **Water Use Reporting**

### **Define Data Fields for Public Water Supply System Databases**

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Water use data is critical to a complete understanding of the state “water budget”. A system that provides water use data would greatly improve water resource planning and water availability determinations.

Only public water supply systems are required to collect water use data. Ecology has cooperated with the State Department of Health to define these data fields. This work is in anticipation of a comprehensive water use reporting system.

A comprehensive water use reporting system might include data about actual water use, source and location of water, type of use, quantity of use, time of use, location and quantity of water returned to a water body, and ties to water right information systems. Activity 10.1 of the *Five-Year Plan* proposes a water use data system. No further work on this activity is scheduled.