STATE OF WASHINGTON

WATER RESOURCE DATA MANAGEMENT PROGRAM

PRELIMINARY FINDINGS AND RECOMMENDATIONS

Of The

WATER RESOURCE DATA MANAGEMENT TASK FORCE

September 1990

DEPARTMENT OF ECOLOGY

EXECUTIVE SUMMARY

INTRODUCTION

Engrossed Substitute House Bill 2932 calls for development of a comprehensive water resource data program. This data program is to provide the information necessary for effective statewide and regional planning and management of the State's water resources. It must include an information management plan, an inventory of existing water resource data, and an assessment of information needs.

The Bill calls for establishment of a Water Resource Data Management Task Force which includes representatives of appropriate State agencies, Indian tribes, local governments, and interested parties. It directs the Task Force to evaluate data management needs, provide advice on water resource policy, provide guidance in development of the water resource data program, and make recommendations for developing a data base for water resource planning and management.

The Bill calls for a report of preliminary findings and recommendations of the Task Force by September 1, 1990. It specifies documentation of current information flows and data collection processes for State water resources data, an analysis of Task Force recommendations for developing additional information to meet water resource data needs, and an estimate of funding requirements to implement the water resources data program for consideration in future biennial budget decisions.

During June, 1990, the Department of Ecology established the Water Resource Data Management Task Force. The Task Force includes representatives from State agencies, Indian tribes, counties, public utilities, irrigators and irrigation districts, academia, environmentalists, industries, and recreation interests.

The Task Force held meetings from June through August to develop preliminary findings and recommendations, including a preliminary water data inventory and budget estimates. The Department of Information Services (DIS) facilitated Task Force meetings, provided staff support to the project, and prepared this report.

MAJOR FINDINGS

Planning and management of the State's water resources are complex activities involving a variety of interjurisdictional participants. The information needed to support these activities at a statewide and regional level is also complex, involving the collection and management of a variety of data about the State's surface water bodies, ground water resources, wells, water rights, and other related data.

Much of the water data needed are already being collected by as many as 2,000 organizations. However, coordination of these data is limited, sharing of these data is generally cumbersome and ineffective, and there is no agreed upon plan or framework in place to facilitate such coordination and sharing.

The flow of water data among organizations is not simple. Organizations collect data, acquire data from other organizations, use those data to derive additional data, and send both original and derived data to other organizations. This complex network of data flow undermines data integrity and produces incomplete and inconsistent water resource information.

There is a growing awareness among the Task Force members and their constituencies of the scope and complexity of managing the diverse water data that exist in many organizations. There is a correspondingly high interest and willingness to face and resolve these data management problems in a cooperative and constructive manner that benefits all organizations.

There is widespread agreement on the need for a comprehensive and ongoing planning process for data management and for a common framework to identify, organize, and share data. There is general agreement on a strategy of sharing data by tying data users to data sources with a common data sharing infrastructure. There is agreement not to build a single centralized data base.

Data sharing is significantly hampered by a lack of standards for identifying and locating the State's water resources and wells. Lack of standards is a major obstacle to cross-correlation of water resource data collected by different organizations.

A master inventory of the State's surface and ground water resources is needed. There is currently no master set of reference maps or data commonly agreed upon and used to identify and locate the State's water resources. Such an inventory is a fundamental need of all organizations involved in water resource policy making, planning and management.

Improvements are needed in existing data collection systems for water rights, water quantity, water quality, water use, and well data. The accuracy, completeness, consolidation, and ease of access and sharing of these data need improvement in order to provide information for water resource decision making. Additional data need to be collected for the relationships between stream flow and inwater resources, the interaction of surface water and ground water, and the relationships between water quality and water use.

PRELIMINARY RECOMMENDATIONS

The preliminary recommendations in this report augment current activities and encompass all major water data projects which need to begin during the next five years. These projects build a strong foundation of data to support effective statewide and regional water resource planning and management and serve as major building blocks for additional water data projects which may

occur over the next six to ten years. It is emphasized that these recommendations are preliminary and may be revised during development of the five-year water resource data management plan.

The pyramid on the following page shows the major groupings of these preliminary recommendations on the left, the recommended time frames for beginning their implementation on the right, and future directions for water data projects on the bottom. Achievement of the recommended time frames is dependent on funding.

The pyramid portrays relationships between the recommended projects at a very general level. The time frames and sequences shown among projects identify general precedences for orderly development and management of water data. The sequence of the recommendations within a time frame is not intended to imply a priority.

The peak of the pyramid shows the completion of this report of preliminary findings and recommendations.

The PLANNING & FRAMEWORK group contains five recommended projects for: a five-year water resource data management plan; a common water data architecture; a detailed water data inventory; standard water identification and location systems; and improved data sharing capabilities.

These recommendations establish a comprehensive plan and framework for improved management and sharing of water data, and are a critical and essential first step in a data program aimed at providing the information necessary for effective statewide and regional water resource planning and management. These recommended projects also provide a foundation for coordination with natural resources and growth management data management activities.

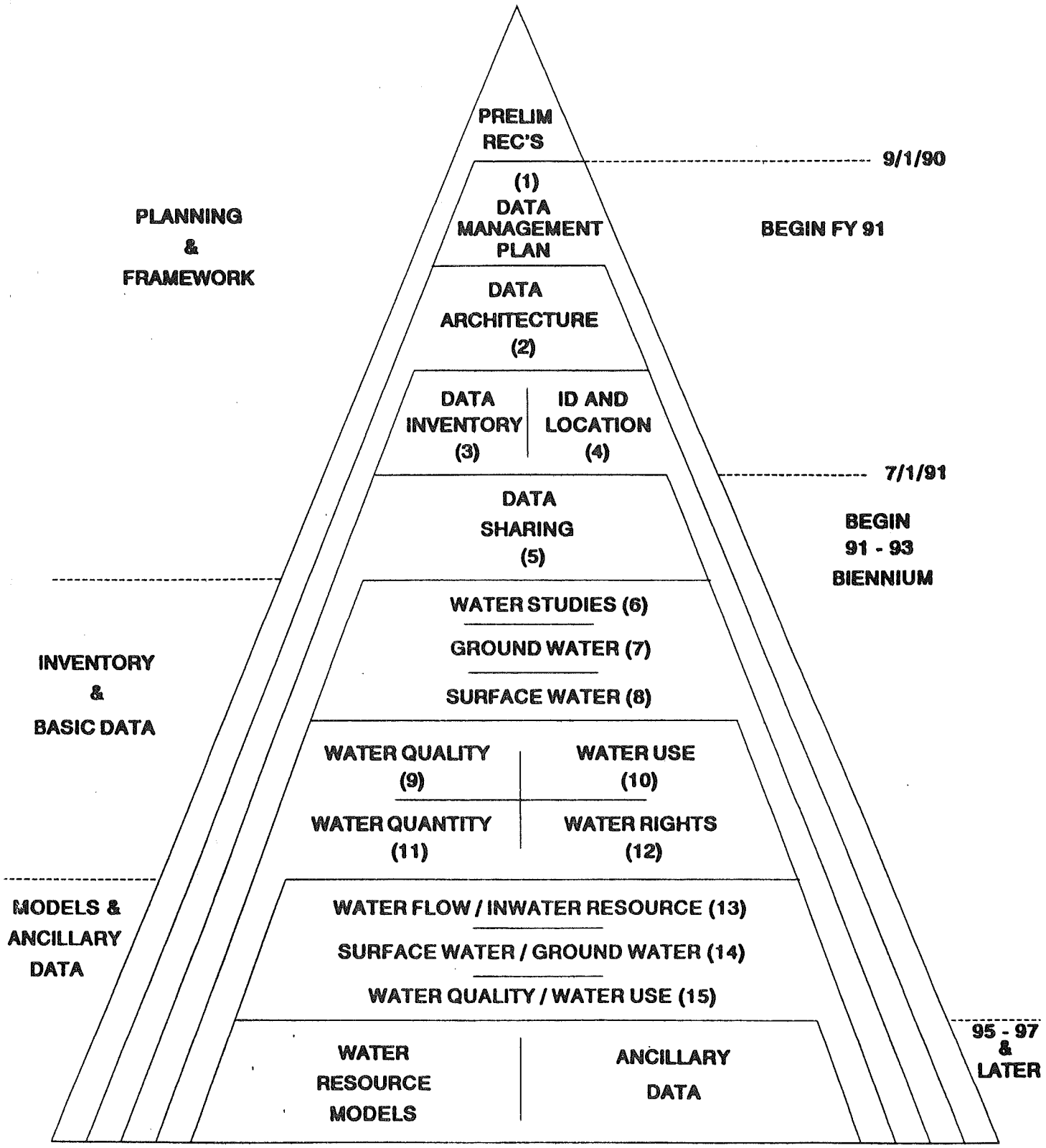
The five-year data management plan will assess, refine, focus, direct, and coordinate current water data management activities and all the remaining recommended projects in this report. It will also evaluate the need for GIS (Geographic Information System) capabilities to store and analyze water data.

The common data architecture, detailed data inventory, and water identification and location standards provide an essential framework for organizing, coordinating, integrating, and sharing water data, and are required for successful implementation of all remaining preliminary recommendations.

These first four recommended projects are heavily interdependent, i.e. one cannot be done without the other.

WATER RESOURCE DATA MANAGEMENT

PRELIMINARY STRATEGIC PLAN



The recommended project to improve data sharing capabilities is required to provide data sharing policies and standards necessary to facilitate and promote data sharing and is essential for obtaining data sharing benefits from current activities and the recommended projects.

The INVENTORY & BASIC DATA group contains seven recommendations for: coordinating water resource studies; consolidating well data; identifying the location, geology, and quantity of ground water; identifying the location and extent of surface water bodies; improving surface and ground water quality and use data; improving surface water quantity data; and improving water rights data.

These recommendations provide an inventory of the State's surface and ground water resources; coordinate, consolidate and improve the basic required data about these water resources; and fill critical gaps in the information needed for effective statewide and regional water resource planning and management.

These recommended projects should be started as soon as the five-year data management plan is developed, and the common data architecture, the detailed data inventory, and the water identification and location standards are in place.

The MODELS & ANCILLARY DATA group contains three recommendations for: water flow and inwater resource relationships, surface water and ground water interactions, and water quality and water use relationships. These recommendations collect additional essential information required for effective statewide and regional water resource planning and management.

BUDGET ESTIMATES

The estimated budget portrayed in the diagram below supports the preliminary recommendations in this report. This budget does not include funding for FY 91, but does not preclude efforts during FY 91 towards development of the five-year water resource data management plan, common data architecture, detailed data inventory, and designation of identification and location standards.

	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
PROJECTS	580,000	1,610,000	2,700,000	1,615,000	1,615,000	1,615,000
EQUIPMENT	60,000	500,000	50,000	50,000	50,000	50,000
FY TOTAL	640,000	2,110,000	2,750,000	1,665,000	1,665,000	1,665,000
BIEN TOTAL		2,750,000		4,415,000		3,330,000

The estimated budget phases the recommended projects over the 91-93, 93-95, and 95-97 biennia. Specific phases and schedules will be specified during development of the five-year water resource data management plan. The estimated budget phasing does not preclude organizations from beginning their own projects or related tasks earlier.

During FY 92 the estimated budget covers implementation of the PLANNING & FRAMEWORK preliminary recommendations, and begins feasibility studies for INVENTORY & BASIC DATA projects.

During FY 93 the estimated budget covers continued feasibility studies for INVENTORY & BASIC DATA projects, initial implementation of INVENTORY & BASIC DATA projects based on feasibility study results, and feasibility studies for MODELS & ANCILLARY DATA projects.

During the 93-95 and 95-97 biennia the estimated budget covers continued feasibility studies and implementation of the recommended projects. The result will be the ability to effectively manage, integrate, and share water data, and to provide the information needed for effective statewide and regional water resource planning and management.

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INTRODUCTION

BACKGROUND

Engrossed Substitute House Bill 2932 modifies RCW 90.54 and, among other items, calls for development of a comprehensive water resource data program and establishment of a Water Resources Data Management Task Force. The Bill calls for a report based on preliminary findings and recommendations of the Task Force, as follows:

> "(6) Prior to September 1, 1990, provide a report to the chairs of the appropriate legislative committees based on the preliminary findings and recommendations of the water resources data management task force. The report shall document the current information flows and data collection processes for state water resources data, and shall include an analysis of task force recommendations for developing additional information to meet water resource data needs. The report shall further include an estimate of funding requirements to implement the water resources data program for consideration in future biennial budget decisions;"

The purpose of this report is to present the preliminary Water Resource Data Management Task Force findings and recommendations required by the Bill. Appendix A contains a copy of the full text of ESHB 2932.

WATER RESOURCE DATA MANAGEMENT TASK FORCE

TASK FORCE FORMATION AND MAKEUP

ESHB 2932 prescribes the formation and makeup of the Water Resource Data Management Task Force as follows:

> "(5) Establish a water resources data management task force to evaluate data management needs, advise the joint select committee on water resource policy, the legislature, and the department [of Ecology] in developing an information management plan, and conduct a water resource inventory and needs assessment. The task force shall include representatives of appropriate state agencies, Indian tribes, local government, and interested parties. The task force shall include expertise in both water resources and resource data management."

During June, 1990, the Department of Ecology recruited Task Force members according to the above requirements. The groups represented by the Task Force included public utilities, irrigators, academia, irrigation districts, counties, environmentalists, industries, recreation interests, State agencies, and Indian tribes. Appendix B contains a complete list of Task Force members.

TASK FORCE ACTIVITIES AND APPROACH

The Task Force held five meetings from June 19 through August 21, 1990, to develop a preliminary water data architecture and inventory, identify major water information needs, and develop preliminary recommendations. The Department of Information Services (DIS) facilitated Task Force meetings, provided staff support to the Task Force, and prepared this report.

June 19 - Task Force Formation and Planning

At the initial Task Force meeting, members reviewed ESHB 2932 and the role and objectives of the Task Force. Senator Ken Madsen was present and provided valuable background on the intent of the Bill. An initial plan for Task Force activities through August 31 was discussed. Additionally, DIS presented an overview of the purpose and contents of a Feasibility Study.

DIS also presented an initial draft of a water data inventory. The data inventory identifies organizations which collect water resource data, and specifies a preliminary water data architecture which defines broad groupings of water data.

June 29 - Water Information Needs Initial Identification

The second Task Force meeting focused on water information needs. The scope of the information needs analysis was determined and various types of information needs were identified. A matrix for gathering information needs from the Task Force was decided upon. At this meeting the Task Force also refined the plan for Task Force activities and refined data definitions in the water data inventory.

Prior to the third Task Force meeting the Task Force provided preliminary identification of general types of water resource information needs for their constituencies and for statewide and regional water resource planning and management. DIS refined the water data inventory and compiled a preliminary analysis of information needs.

July 25 - Water Resource Planning and Management Needs

The third Task Force meeting focused on refinement of information needs for regional and statewide water resource planning and management, and on initial identification of Task Force recommendations to the Legislature.

Prior to the fourth Task Force meeting DIS compiled the Task Force information needs statements and initial recommendations statements into a set of draft preliminary recommendations to the Legislature.

August 2 - Preliminary Recommendations Identification

The fourth Task Force meeting focused on the overall scope and organization of the preliminary recommendations and on refinement of the objective, scope and expected results of each recommendation. Individual Task Force members were identified to assist in further definition and refinement of each recommendation, including estimated costs of implementation.

The Task Force also discussed and agreed on the overall organization and contents of the report of Task Force preliminary findings and recommendations to the Legislature. Additionally, an initial discussion was held of how the Task Force might approach the development of a five-year water resource data management plan.

Prior to the fifth Task Force meeting DIS prepared a draft report of the Task Force preliminary findings and recommendations, including the preliminary water data inventory. The Task Force received the draft a week before the fifth Task Force meeting to allow time for review and comment by their constituencies.

August 21 - Refinement of Preliminary Recommendations

The fifth Task Force meeting focused on refinement of the draft report of preliminary findings and recommendations. Comments by the Task Force, their constituencies and other interested parties were discussed, and revisions to the document were identified and agreed upon.

RELATIONSHIP OF PRELIMINARY REPORT TO FIVE-YEAR PLAN

Subsequent to developing the preliminary findings and recommendations identified in this report, the Task Force is charged by ESHB 2932 with assisting the Department of Ecology to develop a five-year water resource data management plan:

> "(7) Prior to implementation of any preliminary findings and recommendations pursuant to subsection (6) of this section, and contingent on legislative appropriation, develop a five-year plan for data collection and information management approved by the department of information services."

It is emphasized that this Task Force report of preliminary findings and recommendations is a preliminary report of recommended actions and the estimated funding requirements to implement those actions. It is anticipated that these preliminary findings and recommendations will be further assessed and refined by the Task Force during the development of a five-year water resource data management plan.

The Task Force recognizes that water resource policy and planning activities are in progress which may impact these preliminary recommendations. Additionally, it is anticipated that more detailed analysis during the development of a five-year plan may cause modifications to the specifics of these recommendations.

The Task Force's primary purpose in preparing this preliminary report by September 1, 1990, has been to fulfill legislative requirements to provide the Legislature with preliminary recommendations and budget estimates in time for inclusion and consideration in the 91-93 biennium budgeting process.

The Task Force and the Department of Ecology will use this preliminary report as an interim plan until the five-year water resource data management plan has been developed. The Task Force recommends that this preliminary report be reviewed by the Task Force's constituents and other interested parties, and be used as an interim guide for coordinating water resource data planning and collection activities.

PRELIMINARY FINDINGS AND RECOMMENDATIONS

INTRODUCTION

The primary objective of the Task Force between June 15 and August 31, 1990, was to develop a report of preliminary recommendations and estimated funding requirements for the Legislature. These preliminary recommendations identify both short-term and long-term actions to be taken to improve water resource data management and to provide the information necessary for effective statewide and regional water resource planning and management.

The Task Force defined *water resource planning and management* to include water allocation; ground water management; drought management; and water conservation and water use efficiency management. *Statewide and regional* was defined to mean interjurisdictional water planning and management activities related to large geographic areas.

The preliminary recommendations do not address the information needs of individual organizations, such as the day to day operations of a water utility or an irrigation district. However, the Task Force anticipates that implementation of these preliminary recommendations will provide benefits to individual organizations.

The Task Force emphasizes that these recommendations are preliminary and will continue to be validated or modified by the Task Force during the development of the 5-year water resource data management plan.

WATER RESOURCE PLANNING AND MANAGEMENT

The components of statewide and regional water resource planning and management identified by the Task Force are described below.

WATER ALLOCATION

The State of Washington has the authority and responsibility to allocate waters of the State, subject to the protection of existing water rights. Water allocation decisions are complex and often controversial, requiring consideration of instream values; existing use and future requirements; existing water rights and the status of water right filings; hydrologic system characteristics; aquifer protection needs; federal and tribal rights; and other factors. The Department of Ecology controls the allocation of water by issuing water right permits and certificates for off-stream use; setting minimum instream flows; closing certain streams and aquifers to any additional appropriation; and reserving water for specific future uses.

GROUND WATER MANAGEMENT

Ground water management requires an understanding of the extent and geologic characteristics of aquifers, and information about ground water availability. Wells are the primary source of information about geologic characteristics, the water level in aquifers, quantities of ground water withdrawn, recharge rates, trends over time, water quality, and the amounts of water that can be withdrawn.

The Department of Ecology administers water right permits for ground water withdrawals that exceed 5,000 gallons per day. Local governments regulate land use through zoning ordinances and other means, which indirectly affects the locations and quantities of ground water withdrawals. The lead agencies in Ground Water Management Areas conduct studies and maintain data for use in quantifying and protecting ground water supplies. The Department of Health and county health departments regulate water distribution systems and monitor the quality of drinking water, including ground water systems. The federal government administers the Sole Source Aquifer program and various water quality and hazardous waste laws and regulations.

DROUGHT MANAGEMENT

Drought management requires information about precipitation, stream flows, snow packs, reservoir levels, and ground water levels. This information is used to show trends in water supplies, to identify when a drought threshold is reached, and to predict the range of possible drought conditions, under different scenarios.

The Department of Ecology, in cooperation with a broad range of organizations, has developed a drought management plan that is invoked when a drought threshold is reached.

WATER CONSERVATION AND WATER USE EFFICIENCY MANAGEMENT

Water conservation activities require information about water use, water rights, water sources, water demands, water systems, and the effects of conservation on surface water bodies. Water facility development requires information about existing water rights, quantities of water diverted, and conveyance losses.

State and local governments are active in developing and implementing policies for conserving water and improving the efficiency of water distribution systems, including municipal and irrigation systems. The Department of Ecology promotes agricultural water projects that are in the public interest and improve water use efficiency through grants and loans.

WATER INFORMATION NEEDS

The emphasis in ESHB 2932 is on the assessment of needs and recommendations to improve the effectiveness of statewide and regional water resource planning and management. The information needs identified by the Task Force represent preliminary findings based on general perceptions of information needs. Detailed information needs could not be identified and verified by September 1, 1990.

INFORMATION NEEDS ANALYSIS SCOPE

The Task Force determined that the scope of preliminary information needs analysis would include information needed to support effective statewide and regional water resource planning and management, including the information needed to support: water resource policy development; the comprehensive water resources program and planning process; and ongoing assessment of water availability, use, demand, protection, and management. The scope also includes both current water information needs and those anticipated within the next five years.

Specifically excluded from the information needs analysis were the information needs of any organizations not represented on the Task Force, e.g. the information needs of federal agencies. The Task Force determined, however, that water data collected by federal agencies and other organizations not represented on the Task Force need to be understood, and documented and integrated within the common water data architecture. Also excluded were any information needs outside the data subject areas identified in the common water data architecture.

TYPES OF INFORMATION NEEDS

The Task Force identified three general types of information needs: data access and processing needs, data integration and management needs, and data collection needs.

Data Access and Processing Needs

This type in information need includes any unmet need for improved access, sharing, processing or reporting of water data, e.g. any unmet need for: receiving any kind of water data; improving the way such data are sent or received; direct online or batch access to water data; improved data analysis and modeling, reporting or graphical representation capabilities; and consolidation of water data into a flexible, integrated database.

Data Integration and Management Needs

This type of information need includes any unmet need for improved relatability, definition, coordination, or management of water data, e.g. any unmet need for: standard identification or location methods for water resources and ancillary objects; a standard framework for organizing and understanding water data; standard terminology, definitions, edits or values of water data; new or clarified policies and procedures for the planning, collection, exchange, sharing, use, coordination, custodianship, and disposal of water data.

Data Collection Needs

This type of information need includes any unmet need for improvements in data collection of water data, e.g. any unmet need for: improved automation of water data already being collected; improved quality or timeliness of water data already being collected; additional extents, precisions, or time frames of water data already being collected; collection of water data which is not being collected or is unavailable from any water resource organization; and discontinuance of unnecessary collection of water data now being collected.

INDIVIDUAL INFORMATION NEEDS

The Task Force developed an initial sense of the breadth and variety of their constituents' information needs by filling out a matrix which had the above Types of Information Needs on one axis and water Data Subject Areas on the other axis. In the matrix cells the Task Force indicated whether or not their constituents had any information needs of a given type in a given data subject area.

These matrices were summarized and reviewed by the Task Force to help identify common areas of water information needs. The Task Force then moved on to its primary focus of identifying information needs and recommendations for effective statewide and regional water resource planning and management.

STATEWIDE AND REGIONAL INFORMATION NEEDS

The Task Force identified six general categories of water information needs to support statewide and regional water resource planning and management: water data management; identification and location of water bodies; water quantity data; water quality data; inwater resources data; and water use data.

Water Data Management

A major need exists for an overall water resource data management plan, such as the five-year plan required by ESHB 2932. This plan would focus and coordinate individual and

interjurisdictional data collection and data sharing efforts, to provide better and more cost effective water information.

A need exists for a common water data architecture to provide standard names, definitions, and coded values for water data, including standard water body identification and location schemes. The common water data architecture would provide a basis for improved data sharing and integration.

A need exists for a comprehensive water data inventory which describes what water data are being collected by which organizations. The water data inventory would provide a basis for improved data sharing and reduced redundancy of data collection.

A need exists for an improved data sharing infrastructure to connect users of water data to the sources of those data. The infrastructure needs to include data sharing standards and guidelines, tools, procedures, cost recovery, and other components and information necessary for facilitating dissemination and sharing of water data.

Identification and Location of Water Bodies

A need exists for standard identification and location systems for surface water bodies, ground water, and wells. These identification and location systems are needed to provide a basis for improved cross-referencing and correlation of water data currently being collected, and for improved sharability and usefulness of new water data collected in the future.

A need exists for coherent standard databases of surface water bodies, ground water, and wells. These databases are needed to facilitate common water data analysis and reporting and to facilitate interjurisdictional water resource planning and management.

Water Quantity Data

There is a need for improved data about the extent and quantity of ground water, including data which characterizes aquifer geology and subsurface flow, ground water recharge locations and quantities, and relationships of land use to ground water recharge and quality. These data are needed to facilitate estimation, development, and protection of ground water supplies and to help avoid water shortages.

There is a need for improved data about surface water quantities, including additional streamflow data and gauging stations, and data about the relationships of land use to surface water quantities. These data are needed to facilitate estimation of surface water availability for water allocation decisions, to regulate water rights, for flood control, for drought management, and for managing inwater resources.

There is a need for improved data about the relationships between ground water and surface water, including the effects of ground water recharge, discharge or withdrawal on surface water

quantities. These data are needed to provide a basis for predicting and managing: utilization of ground water supplies, stream flows and surface water availability, and seawater intrusion into ground water supplies.

Water Quality Data

There is a need for improved data about stream flow and water use relationships to water quality, including how water quality varies with increases or decreases in stream flow, how stream flow levels impact the need for and cost of water treatment, how stream flow levels impact the quality of water on downstream water users, and how source water quality varies with source water use. These data are needed to evaluate the impacts of allocation of water for off-stream use, to set water allocation policies, and to improve water quality regulation and management.

There is a need for improved data about the vulnerability of surface and ground water to contamination and degradation, including the location and nature of point and nonpoint sources of pollution, types and amounts of pollution potential, fate and mobility of potential contaminants, and management area jurisdictions. These data are needed to protect and improve surface and ground water quality and to predict and manage the availability of water for specific uses.

Inwater Resources Data

There is a need for improved data about stream flow relationships to inwater resources and inwater resource indices, including relationships of stream flow to fish and wildlife habitats, and to other inwater uses or values such as recreational use and water aesthetics. These data are needed to determine the amount of water needed to protect fisheries and wildlife resources, for recreational activities, and to preserve aesthetics. They are also needed to set water allocation policies and help assure that water allocation decisions are in the public interest.

Water Use Data

There is a need for coherent water rights data which are accurate and current and allow summarization by specific water bodies and by a wide variety of geographic indicators or locations. These data are needed to provide improved information for water allocation decisions and for analysis and determination of water availability.

There is a need for more accurate and comprehensive data about the amounts of surface and ground water currently being used, including locations, quantities, seasonal fluctuations or other variations over time, and type or purpose of use. These data are needed to provide improved information for water allocation decisions, to improve estimates of water availability, and to help assess the effectiveness of water conservation and water use efficiency efforts.

There is a need for improved data to support forecasting of future requirements for water, including accurate data regarding past water use trends and patterns. These data are needed to

support water resource planning, for making water resource allocation and management decisions, and for coordinating water resource policy and planning with growth management.

PRELIMINARY RECOMMENDATIONS

INTRODUCTION

The preliminary recommendations identified in this section are intended to augment current activities and to encompass all of the major water data projects which need to begin during the next five years. These projects are anticipated to build a strong foundation of data to support effective statewide and regional water resource planning and management, and to serve as major building blocks for additional water data projects which may occur over the next six to ten years.

The Task Force emphasizes that these recommendations are preliminary, and anticipates that these recommendations will be validated or refined during development of the five-year water resource data management plan.

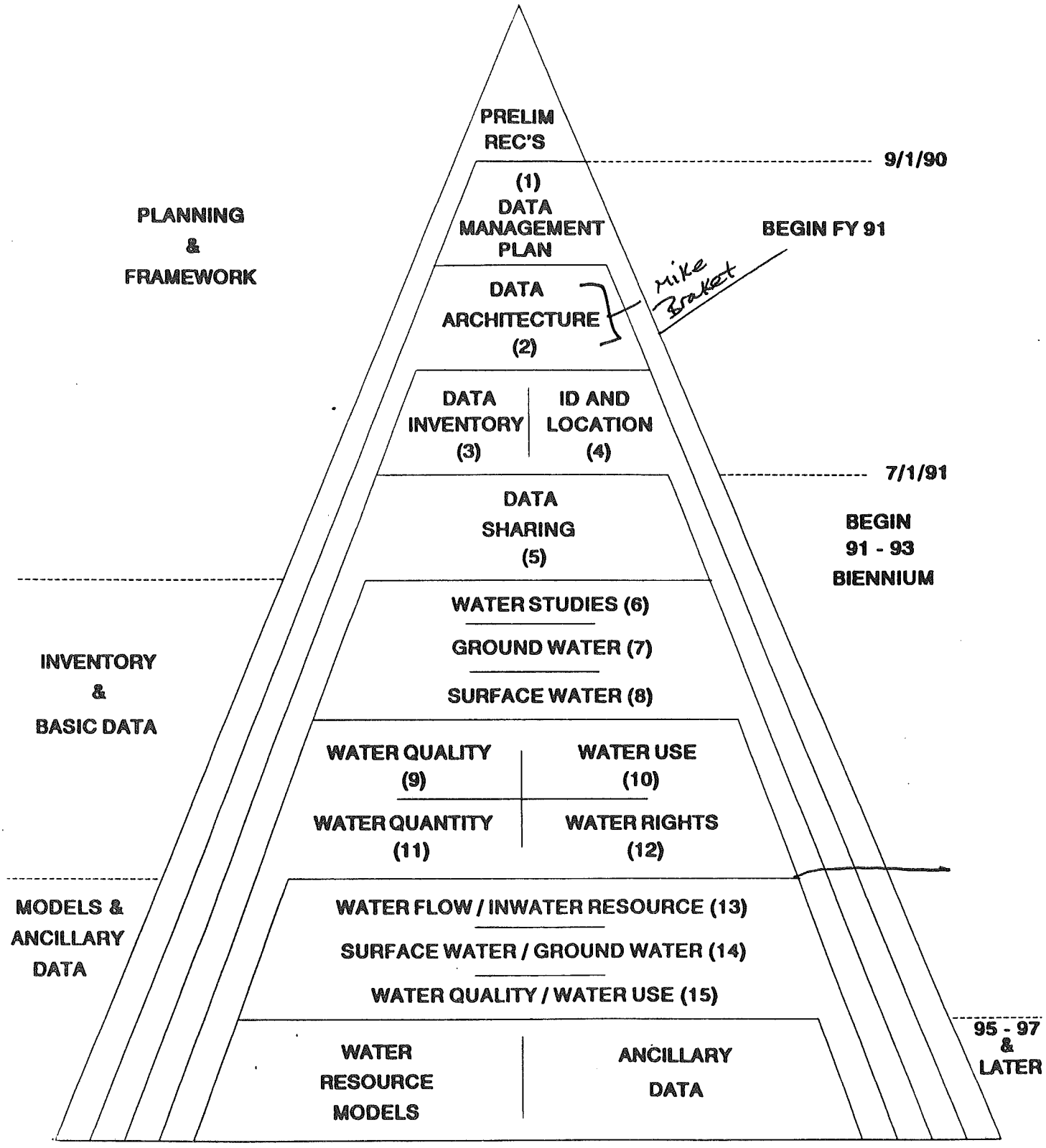
The pyramid on the following page shows the basic groupings and relationships of the preliminary recommendations in this report, and identifies potential future directions for water data projects. The pyramid is intended to portray a preliminary strategic plan for improving the management, availability, sharing, integration and cost effectiveness of water data.

The time span of the pyramid begins with FY 91 at the top and extends to the the 95-97 biennium and beyond at the bottom, and shows the recommended time frame for beginning each recommended water data project.

The pyramid is intended to portray relationships between water data projects at a very general level. The time frames and sequences shown among projects are intended to identify general precedences for orderly development and management of water data. The sequence of the recommendations within a time frame is not intended to imply a priority. Refinement of relationships and precedences among the preliminary recommendations is anticipated during the development of the five-year water resource data management plan.

WATER RESOURCE DATA MANAGEMENT

PRELIMINARY STRATEGIC PLAN



RECOMMENDATION PRECEDENCES AND RELATIONSHIPS

The left side of the pyramid identifies the three major groupings of the preliminary recommendations in this report: PLANNING & FRAMEWORK, INVENTORY & BASIC DATA, and MODELS & ANCILLARY DATA. The major groupings generally portray the precedences and relationships among the preliminary recommendations.

In general, the projects recommended within a major grouping may be undertaken in parallel, i.e. there are no substantial precedences among the recommendations within a given major grouping.

The major groupings of recommendations are chronological from the top of the pyramid to the bottom. In general, substantial progress needs to be made on the projects recommended in a given major grouping before beginning the recommended projects in the next major grouping.

The right side of the pyramid identifies the time frames the Task Force recommends for beginning implementation of each preliminary recommendation. The Task Force understands that achievement of these time frames will be dependent on availability of funding in addition to the general precedences identified on the pyramid and the details of the five-year water resource data management plan.

The peak of the pyramid portrays and recognizes the completion by September 1, 1990, of this report to the Legislature of preliminary findings and recommendations.

Just below the peak are the first four PLANNING & FRAMEWORK preliminary recommendations, scheduled to begin during FY 91. In general, the Task Force considers the availability of funding and the timing of the implementation of the first four PLANNING & FRAMEWORK recommendations to be the primary factors in determining the timing of the remaining recommended projects.

Below FY 91, the pyramid portrays implementation of the remaining preliminary recommendations in this report beginning during the 91-93 and 93-95 biennia. The Task Force recommends that these remaining projects be started as soon as funding is available and the FY 91 projects are substantially complete.

The bottom time frame on the pyramid portrays potential future directions for management of water data beginning with the 95-97 biennium or later. The Task Force has not formulated any specific preliminary recommendations for those future directions in this report.

The specific preliminary recommendations of the Task Force are described in general by major grouping below, and in detail in Appendix H.

A number of the preliminary recommendations refer to *interjurisdictional participants*. The term *interjurisdictional participants* is used in these recommendations to indicate the broad variety of

parties interested in water resource planning and management and in water data, including: federal, State, and local government, Indian tribes, public utilities, irrigators and irrigation districts, academia, industries, environmentalists, recreation interests, other interested parties and organizations, and the general public.

Some of the preliminary recommendations refer to preparation of a *feasibility study*. This term is intended in the recommendations to refer to a DIS standard feasibility study, which includes a project description, assessment of alternatives, cost benefit analysis, risk assessment, project management plan, and other related information as required by DIS feasibility study standards and guidelines.

PLANNING & FRAMEWORK

This major grouping consists of five preliminary recommendations intended to establish a comprehensive plan and framework for the improved management and sharing of water data. The Task Force considers this plan and framework to be a critical and essential first step in a data program aimed at providing the information necessary for effective statewide and regional planning and management of the State's water resources.

These five recommended projects will develop: a five-year water resource data management plan, a common water data architecture, a detailed water data inventory, standard water identification and location systems, and improved data sharing capabilities.

The first four of these five recommended projects provide a necessary foundation for implementation of all the remaining preliminary recommendations in this report. The Task Force recommends that these four projects be viewed as one unit of work with four components, as each of the four projects is essential to providing this necessary foundation.

The fifth recommended project, improved data sharing capabilities, is essential to obtaining the anticipated benefits from all the remaining recommended projects in this report.

1. Develop Five-Year Water Resource Data Management Plan

Develop and publish a five-year water resource data management plan as prescribed in Engrossed Substitute House Bill 2932.

The plan should: evaluate the preliminary findings and recommendations in this report, adding to or amending them as necessary; make visible the needs, opportunities and requirements to make water data available and to collect additional water data; assess and identify capabilities needed for storing, analyzing, and displaying water data, through a GIS (Geographic Information System) or other capability.

The plan should not be a feasibility study, but should refine the description of each project recommended in the next biennium to include at a general level most of the components of a feasibility study.

2. Develop Common Water Data Architecture

Develop a detailed data architecture of data subjects, data characteristics, and coded data values that supports management of the State's water resources. This detailed data architecture should be an extension of the initial data architecture developed and presented in this initial report to the Legislature.

The common water data architecture should include definition of all identification and location systems and all coded data values currently in use. Standard coded data values should be identified for long-term migration and a table of coded data values should be used for short-term translation.

The common data architecture should include a data dictionary of standard common data definitions, a directory identifying the location and availability of the State's water data, and a procedure to keep that directory current and make it readily available.

The common data architecture should be used as a basis for understanding, sharing, and integrating water data in all other projects where water data are used.

3. Develop Detailed Water Data Inventory

Perform a comprehensive inventory of the State's water data at the data element level, including the organizations collecting those data, the time frames and extent of those data, the organizations maintaining those data, and the contacts in those organizations.

Identify the primary sources of the State's water data and the major flows of water data between organizations. Identify points where data are altered or additional data are derived.

The water data inventory should be done within the framework of the common water data architecture, and should build on information contained in the preliminary water data inventory provided to the Legislature in this report.

4. Develop Standard Water Identification and Location Systems

There are two major pieces to development of standard water identification and location systems. The first piece pertains to standard identification and location of surface water bodies and the second piece pertains to standard identification and location of wells.

4a. Standard Surface Water Body Identification and Location

Establish a committee comprised of interjurisdictional participants with expertise about surface water body identification and location systems.

Evaluate existing identification and location systems, such as the USGS 1:100,000 stream network, the Timber Fish and Wildlife 1:24,000 stream network, and the National Wetlands Inventory digital files.

Establish a standard identification system for surface water bodies that uniquely identifies each surface water body.

Establish a standard location system for surface water bodies that provides the resolution necessary for effective water resource management.

Define initial procedures for converting existing surface water body data to the standard identification and location systems.

The standard surface water body identification and location systems should be used as a basis for sharing and integrating surface water body data in all other projects which use water data.

4b. Standard Well Identification and Location

Establish a standard identification system for wells. The standard well identification system should result from recommendations by the existing well identification committee.

Adopt a standard location system for wells. The standard well location system should coordinate with the standard surface water body location system identified in recommendation 4a and with the work of the Washington Geographic Information Council.

Define initial procedures for converting existing well identification and location data to the standard identification and location systems, including procedures for physical tagging of wells and correlation of the well standard identifiers and locations with well driller reports.

The standard well identification and location systems should be used as a basis for sharing and integrating well data in all other water data projects.

5. Facilitate Water Data Sharing

Prepare a feasibility study to identify and implement an infrastructure for sharing water data. The data sharing infrastructure should facilitate access to water data by all interjurisdictional participants.

The data sharing infrastructure should include data sharing policies, standards, guidelines, tools, and procedures, and should address data security and privacy constraints, data availability, data integrity constraints, data access cost recovery, and any other issues or information pertinent to readily sharing water data.

The data sharing infrastructure should include use of the Communications Backbone Network currently being developed by DIS to connect water data users to the primary sources of water data, and should include sharing of both tabular and spatial data.

INVENTORY & BASIC DATA

This major grouping consists of seven preliminary recommendations intended to consolidate and improve the basic data about the State's surface and ground water resources. These preliminary recommendations enhance the quality, usefulness and availability of the basic data needed for effective statewide and regional water resource planning and management.

This major grouping of preliminary recommendations includes recommendations for: coordinating water resource studies; consolidating well data; identifying the location, geology, and quantity of ground water; identifying the location and extent of surface water bodies; improving surface and ground water quality and use data; improving surface water quantity data; and improving water rights data.

These recommendations can be implemented as soon as a five-year water resource data management plan has been developed, and the common water data architecture, the detailed water data inventory, and the standard water identification and locations systems are in place.

The sequence of the preliminary recommendations in this INVENTORY & BASIC DATA grouping is <u>not</u> an indication of priority.

6. Develop Clearing House for Water Resource Studies

Identify water resource studies that are in progress or are pending that pertain to the State's water resources and make information about these studies generally available.

Develop a clearing house for water resource studies. Such a clearing house would maintain a bibliography that includes the type of study, availability, location, time frame, purpose, and results. The clearing house should also maintain and provide access to a central library of the actual physical studies.

7. Develop Improved Ground Water Data

There are two major pieces to developing improved ground water data. The first piece pertains to consolidation and automation of well data. The second piece pertains to mapping and

characterization of the State's ground water, including collecting improved data about ground water quantities.

7a. Consolidate and Automate Well Data

Implement the standard well identification and location systems according to the procedures developed in Recommendation 4b, including physically tagging wells, correlation of the well standard identifiers and locations with well driller reports, and implementing the standard systems into existing and new data collection systems.

Establish a master reference for wells that can be used to coordinate all well and well-related data.

Conduct a feasibility study for automating well driller reports and compiling well-related data. Based on the feasibility study, develop and implement an automated system for collection of well data from driller reports and other sources, and compilation and analysis of well-related data across Ground Water Management Area (GWMA) boundaries.

7b. Map and Characterize Aquifers

Develop and publish an updated version of "Principal Aquifers and Well Yields in Washington" based on USGS and Ground Water Management Area (GWMA) studies.

Begin mapping the aquifers of the State at a more detailed scale that is suitable for use for water availability assessments, water allocation decisions, aquifer vulnerability assessments, aquifer protection measures, and other uses.

Begin characterizing the aquifers, including identification of features and water quantities.

The mapping and characterization of aquifers should be based on the common water data architecture, including standard identification and location systems for aquifers.

8. Develop Surface Water Body Inventory

Implement the standard surface water body identification and location systems into existing and new water data collection systems according to the conversion procedures developed in Recommendation 4a.

Establish a master set of reference materials for the State's surface water bodies that can be used to coordinate all water data about those surface water bodies. These reference materials should: use the standard surface water body identification and location systems; include maps, photos, tabular indexes, and other data which describe the location and extent of the State's surface water bodies; and include completed maps of the State's watersheds at the appropriate scale. The

National Wetland Inventory, TFW (Timber, Fish and Wildlife) data, USGS data, and other data sets should be used as primary input to this process.

9. Develop Improved Water Quality Data

Establish a water quality committee comprised of interjurisdictional participants with expertise in reference systems for water quality parameters and parameter analysis methods. Evaluate existing water quality reference systems such as the EPA STORET, the EPA FRDS and others. Establish or adopt a uniform reference system which identifies uniform water quality parameters and parameter analysis methods, including uniform points in time and locations for water sampling.

Enhance the Department of Health and Department of Ecology data systems to include use of the standard well and surface water body identification and location systems and the uniform reference system for water quality parameters and parameter analysis methods.

Perform a feasibility study for an improved data collection and access system for water quality data, including data collected from State agencies, laboratories, and other organizations.

10. Develop Improved Water Use Data

Identify all available data on current surface and ground water use, including type of use, location of diversion or withdrawal, location of use, quantities, and time frames. The identification should be based on the detailed water data inventory.

Conduct a feasibility study for automating water use data. Based on the feasibility study results, develop and implement a database of current surface and ground water use, including reported quantities for at least a ten year period. The database should contain data about all types of water use, including recreational use.

Develop and adopt guidelines for water use reporting by interjurisdictional participants. Such interjurisdictional participants should be represented in the development and adoption of such guidelines. The guidelines should be based on the standard types of water use data identified in the common water data architecture, and should take advantage of the existing Department of Ecology, Department of Health, and other authorities and processes for collecting and reporting water use data.

11. Develop Improved Surface Water Quantity Data

Develop a plan for coordinating existing data and collecting additional data about surface water quantities. The plan should be developed by interjurisdictional participants knowledgeable about hydrologic data collection.

The surface water quantity data collection plan should address the need for additional stream flow and lake/reservoir gauging stations, including the types, locations, and priorities of where they are needed. The plan should also identify other surface water quantity data to be collected, frequency of data collection, responsible organizations, data quality control procedures, where the data will be stored, and how they will be maintained.

Implement the surface water quantity data plan, including implementation of additional needed stream flow and lake/reservoir gauging stations. Determine the supply of water in each surface water body, the variations in water supply, and the time frames for those variations. Incorporate water quantity data from gauging stations, water resource studies and other sources.

12. Develop Improved Water Rights Data

Conduct a feasibility study for improving the existing Department of Ecology water rights database. Based on feasibility study results, develop a comprehensive water rights database that provides current and accurate data for water allocation decisions, and supports the ongoing water permit process and other water resource planning and management activities.

MODELS & ANCILLARY DATA

This major grouping consists of three preliminary recommendations intended to collect additional information important for effective statewide and regional water resource planning and management.

These three recommended projects will collect information about water flow and inwater resource relationships, surface water and ground water interactions, and water quality and water use relationships.

These recommendations can be implemented when a five-year water data plan has been developed, and the common water data architecture, the detailed water data inventory, and the standard water identification and locations systems framework are in place. Their implementation may depend on implementation of some of the basic data improvements identified above.

The sequence of the preliminary recommendations in this MODELS & ANCILLARY DATA grouping is <u>not</u> an indication of priority.

13. Develop Water Flow/Inwater Resource Relationship Information

Establish a team comprised of interjurisdictional participants with instream flow expertise. The instream flow team should develop recommendations regarding the types of instream flow studies needed and the instream resource indices to be measured. The specific types of studies to be performed and instream resource indices to be measured should be based on policy decisions by the Joint Select Committee on Water Resources.

The instream flow team should coordinate with the Water Resource Policy Team to target and prioritize study locations. The instream flow team should conduct the appropriate types of instream flow studies according to the target locations and priorities, and should also collect water quality data as practical.

14. Develop Surface Water/Ground Water Interaction Information

Analyze the ground water and surface water interaction findings from the USGS, RASA, Soo Creek, and other studies. Conduct additional pilot studies in different geologic settings.

Develop models of the interaction between surface water and ground water and the movement of water between water bodies within different geologic settings.

15. Develop Water Quality/Water Use Relationship Information

Identify types of water uses that result in degradation of water quality, especially those extractions and returns which can produce significant adverse impacts on the receiving waters.

Identify regions where present water uses have significantly degraded aquatic systems and placed instream resources and downstream users at risk.

Identify instream water regimes, such as wetlands and riparian vegetation, that naturally contribute to the maintenance of water quality.

Consolidate and integrate water quality and water use relationship data with other water data.

Future Directions

The WATER RESOURCE MODELS & ANCILLARY DATA layer of the pyramid is intended to portray that additional water data management projects are likely to occur beginning during the 95-97 biennium or later. Although the Task Force has not identified any specific preliminary recommendations beyond those in this report, it has formulated the following general ideas of possible future directions for managing water data.

Future directions should include projects to fill remaining gaps in the State's water data, such as additional data regarding the relations or interaction of water or its quality, quantity or use with other factors such as land use or economic growth.

Future directions should include projects to exploit the capabilities of Geographic Information Systems or other information technology to develop topological and other models of the State's water resources, which can be utilized statewide and regionally for analysis and improved water resource planning and management.

It is anticipated that these potential future directions will be refined as part of the development and ongoing maintenance of the five-year water resource data management plan.

BUDGET ESTIMATES

BUDGET ESTIMATES

An estimated budget has been developed for the 91-93, 93-95, and 95-97 biennia to support the preliminary recommendations in this report. This budget does not include funding for FY 91. However, that lack of funding for FY 91 does not preclude the possibility of beginning development of a five-year water resource data management plan, enhancement of the common water data architecture, preparation of a detailed water data inventory, or designation of identification and location standards during FY 91.

The recommended projects are phased over the 91-93, 93-95, and 95-97 biennia. Each project begins with a requirements statement and feasibility study, and continues with design, construction, and implementation. The specific phases and schedule will be identified during development of the water resource data management plan.

The diagram below portrays an implementation approach of four phases: PLANNING & FRAMEWORK, INVENTORY & BASIC DATA, MODELS & ANCILLARY DATA, and CONTINUED IMPLEMENTATION.

The PLANNING & FRAMEWORK phase develops the five-year water resource data management plan, common data architecture, detailed data inventory, and the water identification and location standards. The five-year plan identifies priorities, funding requirements, and implementation schedules, and will be reviewed and updated annually.

The INVENTORY & BASIC DATA phase conducts feasibility studies for the development of: improved data sharing capabilities; a clearing house for water resource studies; consolidating and automating well data; mapping and characterization of the State's aquifers; a surface water body inventory; improved water quality data; improved water use data; improved surface water quantity data; and improved water rights data. This phase also includes initial implementation of projects based on the feasibility studies.

	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
PLANNING & FRAMEWORK	PLAN 350,000					
INVENTORY & BASIC DATA	FEASIBILITY 230,000	685,000				
		INIT IMP 600,000	CONTINUED IMPLEMENTATION			
MODELS & ANCILLARY DATA		FEASIBILITY 325,000	2,700,000	1,615,000	1,615,000	1,615,000
EQUIPMENT	60,000	500,000	50,000	50,000	50,000	50,000
FY TOTAL	640,000	2,110,000	2,750,000	1,665,000	1,665,000	1,665,000
BIEN TOTAL		2,750,000		4,415,000		3,330,000

The MODELS & ANCILLARY DATA phase conducts feasibility studies for the development of: water flow/inwater resource relationship information, surface water/ground water interaction information, and water quality/water use relationship information.

The CONTINUED IMPLEMENTATION phase continues implementation of projects according to the results of the feasibility studies. The result will be the ability to integrate a wide variety of water data to support statewide and regional water resource planning and management.

DATA MANAGEMENT

INTRODUCTION

Engrossed Substitute House Bill 2932 calls for development of a comprehensive water resource data program and establishment of a Water Resources Data Management Task Force. The long-term goal is to develop a common base of water resource data that supports management and utilization of the State's water resources. One task in achieving this data management goal is to inventory data that currently exist. These existing data are then compared to data needed to manage the State's water resources to determine what additional data need to be collected.

Specifically, the Bill calls for identification of water resource information flows and data collection processes. This identification of flows and collection processes requires an inventory of water resource data to identify the initial sources of data and their distribution. However, a data inventory must be conducted within some common framework to be meaningful and useful.

The common framework that is used for a data inventory, as well as for data analysis, design, construction, and use, is called a *common data architecture*. This common data architecture encompasses all data sources and destinations and includes all data that are collected and used by different organizations. It allows data to be identified in a common context so they can be readily shared between organizations. A common data architecture is the key to good data management and should be developed before a data inventory is conducted.

An initial common water data architecture has been defined to support water resource data management. It will be compatible with the common data architecture for growth management data (Engrossed Substitute House Bill 2929), the Executive Order for the Protection Of Wetlands (EO-90-04), and the efforts of the Washington State Geographic Information Council.

Development of the common water data architecture will be an evolutionary process. New things about water resource data will continue to be discovered and used to refine and enhance the data architecture. One key to a complete and successful data architecture is involvement of the community that collects and uses water resource data. Involvement of the community will lead to a commitment to develop a comprehensive data architecture, acceptance of that common data architecture, and success in managing water resource data.

COMMON DATA ARCHITECTURE

A common data architecture includes the formal names and comprehensive definitions of data, the logical and physical structure of data, the definition of data integrity rules, and the formal documentation of data. The starting point for building a common data architecture is the development of formal data names and comprehensive data definitions and the formal documentation of those data names and definitions.

An initial common data architecture has bee developed for water resource data that includes the formal data names and comprehensive data definitions. This common water data architecture encompasses all data about the State's water resources. Priorities for detailed data analysis will be set within the common data architecture. Standard data may be identified within the common data architecture.

The development of formal data names and comprehensive data definitions begins with the definition of basic terms. This section defines those terms that apply to the water resource. Definition of terms that apply to data management follow the water resource definitions. These definitions are used throughout the remainder of this document.

WATER RESOURCE DEFINITIONS

The following definitions apply to the water resource in general, to the definition of water resource data, and to the water resource data inventory. They provide a common base for development of a common water data architecture.

Water

The term *water* includes any water in the State, above or below the earth's surface, whether fresh water or salt water, that is part of the natural environment and is managed, withdrawn, diverted, stored, or returned as a consequence of human use. It includes water that has been used, is being used, can be used, or needs to be maintained for any purpose, or whose quantity, quality, use, and preservation are of concern to the citizens of the State.

Water as a Resource

Water is a renewable resource that has a limited supply and availability which results in increased competition as the demand increases. The term *water resource* refers to water that is or has the potential to be, placed in beneficial use by the people of the State and by future generations. Specifically, the water resource includes all or part of lakes and reservoirs, streams, ground water, springs, snow packs, estuaries, ocean, and those areas commonly known as marshes, swamps, and bogs. In a broad sense, geothermal resources are included in the State's water resources.

Surface Water

Surface water is that portion of the State's water resource that rests on the earth's surface. A *surface water body* is an individual object of water on the earth's surface, such as a lake, a stream or stream segment, a reservoir, etc., that is managed as part of the State's water resource. Surface water bodies include both the wetland and deep water components where they exist.

Ground Water

Ground water is that portion of the State's water resource that exists below the earth's surface in geologic structures commonly referred to as *aquifers*. Ground water is not considered a water body, but is a water resource that must be managed similar to surface water bodies.

Inwater Resource

Surface water bodies may contain resources, such as fish, wildlife, plants, habitats, etc., and may be sites that have recreation and aesthetic importance. These resources must be properly managed, and that management depends in a large part on proper management of the water body. Surface water bodies may also contain other biological, physical, or chemical resources. The term *inwater resource* applies to these resources in surface water bodies, not to water as a resource of the State.

Wetlands and Deep Water

A definition of Wetlands is presented in Classification of Wetlands and Deepwater Habitats of the United States, published by the U.S. Department of the Interior, Fish and Wildlife Service, December, 1979. As stated in that publication, the term *wetlands* has no single, correct, indisputable definition, particularly for the regulation of wetlands. However, the surface water body definitions presented in that document are accepted for water resource inventory and data collection activities and are used in the common water data architecture.

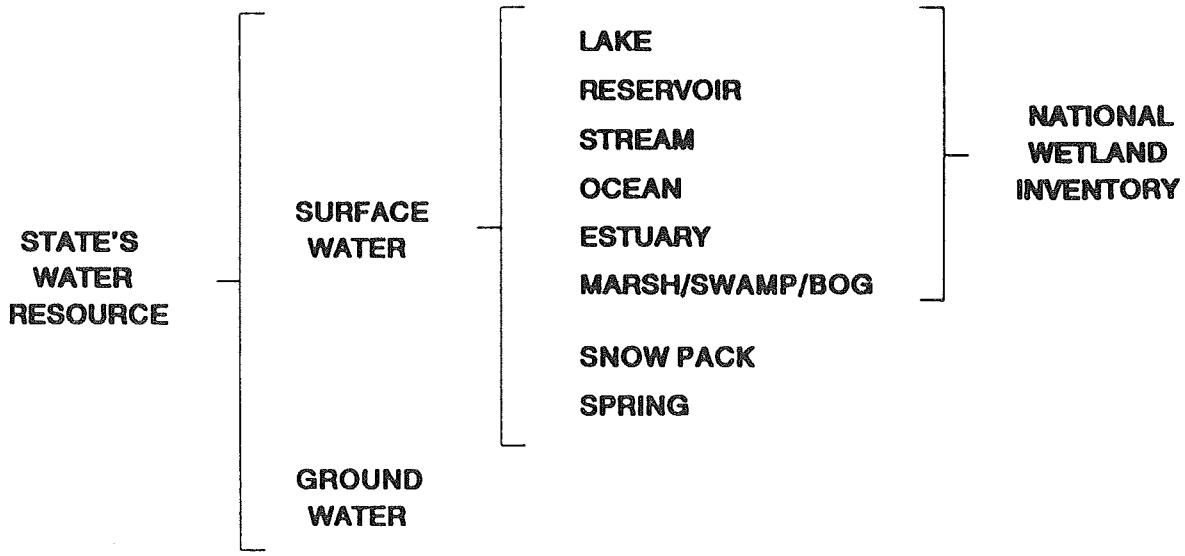
Wetlands are lands transitional between aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have one or more of the following attributes: at least periodically the land supports predominantly hydrophytes; the

substrate is predominantly undrained hydric soil; and the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Generally, wetlands are less than two meters deep. Any water over two meters deep is considered *deep water*, not wetland. Therefore, lakes, reservoirs, streams, estuaries, and oceans may have a wetland component and a deep water component. Marshes, swamps, bogs, and springs have only a wetland component. Ground water and snow packs do not have wetland or deep water components.

The National Wetlands Inventory (NWI) compiled by the U.S. Fish and Wildlife Service for Washington State includes an inventory of surface water bodies, excluding springs and snow packs. That inventory includes both the wetland and deep water components of those surface water bodies.

The diagram below shows the surface water bodies that are included in the National Wetland Inventory and the inclusion of all surface water bodies and ground water in the State's water resource.



Water Resource Inventory

The *water resource inventory* is a collection of information from various sources, including pictorial and textual information, placed in a single repository, that shows the location of surface water bodies and ground water in the State and collectively identifies the State's water resources. The information contained in the water resource inventory includes identification, location, delineation, and extent of the State's water resources, and any other characteristics necessary to support the location and identification of the State's water resources. The term *repository* does not mean a single database or information system, but refers to a common base for the identification and location of the State's water resources.

Water Supply and Demand

A variety of terms are used with respect to the supply and demand for the State's water resources. *Water Supply* is the water contained in surface water bodies and aquifers that comprise the sources for use of the State's water resource. *Water Use* is the actual use of water from surface water bodies and ground water, whether used in place or removed. *Water Rights* are the allocation of water for use, regardless of whether the water is actually used or not. *Water Availability* is the water that is available for use from the State's water resource. Availability also implies that uses are reasonable, feasible, and appropriate, and impacts of use are acceptable. *Water Demand* is the existing and future requirement for water use from the State's water resource.

DATA RESOURCE DEFINITIONS

The following definitions apply to the data resource in general and, along with the water resource definitions, provide a common base for water resource data management.

Data

Data are the individual facts and figures that are captured, manipulated, stored, retrieved, and used to support business activities. Data are designed and managed at an elemental level and can be aggregated in a variety of ways by a variety of processes to provide the information needed for business activities.

Information

Information is the aggregation of individual pieces of data at a point in time or over a period of time for a specific business activity. This aggregation of data are interpreted with respect to that business activity and provide a more complete description than the individual pieces of data. *Information processing* is the process of aggregating data to produce information.

Information Need

An *information requirement* is the requirement for information by a business activity. *Current information* is an information requirement that is being met by existing data and processing. *Current data* are the data that currently exist and support current information. An *information need* is an information requirement that is not being met, either by data, by processing, or both. Some of the data necessary to meet an information need may exist and some of those data may need to be acquired. A *data need* is the need to acquire data to support an information need.

Water Data

Water data are the individual facts and figures about the State's water. These data include identification, location, quantity, quality, use, and any other descriptive information about the State's water. They also include data about objects ancillary to the State's water resources, such as dams, water rights, regulations, studies, water facilities, etc. *Water resource data* are a subset of water data that pertain only to data about the State's water resources, excluding the ancillary data.

Water Data Inventory

The *water data inventory* is a collection of information from various sources, including pictorial and textual information, placed in a single repository, that shows the location and characteristics of the State's water data. It is a collection of data about the water data, which is referred to as *metadata*. The term *repository* does not mean a single database or information system, but refers to an organized, documented set of locations where water data are located and the characteristics about those data.

The water data inventory is not the same as the water resource inventory. The *water resource inventory* shows the identification, location, and extent of the State's water resources, and the *water data inventory* shows the location and characteristics of data about the State's water.

Water Quality Data

Water quality data are any water data pertaining to the condition of the water, including its purity; types of biological, physical, or chemical substances in the water; usefulness for specific purposes; treatments; saltwater intrusion; vulnerability to pollutants; physical properties; and the history, patterns, trends, and changes to water quality. Water quality data include the result of pollution and use, but exclude the sources of pollution. Water quality data are not limited to poor water conditions, but include both good and poor water conditions. Water quality data may include the usefulness of water for specific purposes.

Water Quantity Data

Water quantity data are any water data pertaining to the capacity, flow, and volume, or the history, patterns, trends, and changes to water quantity. Water quantity data are used to indicate the overall natural flows, levels, and volumes of water as well as the supply of water in the State's water resource. Water quantity data exclude quantities of water use, quantities specified in water rights, water demand, and water availability. These data are included under water use data.

Water Use Data

Water use data are any water data pertaining to use of the State's water resource. Water use data include quantities used, types of use, times, frequencies, and the history, patterns, trends, and changes in water use. They also include the point of diversion or withdrawal and, for water that is returned to the water resource, the point of return. Water use data include past and current use as well as future forecasts, projections, and demands.

Water may be used in place in a surface water body or it may be removed from a surface water body or ground water for use elsewhere. Water that is used in place in surface water bodies is referred to as *inbody use* and water that is removed from surface water bodies is referred to as *diverted water*. Water that is removed from ground water is referred to as *withdrawn water*. Diverted and withdrawn water are referred to as *offbody water use*. The common phrase for water that is removed from the State's water resource for use is *diverted and withdrawn water*.

The Water Resource Act of 1971 (RCW 90.54.020(1)) defines water use as '.. *domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the State...*'.

Water Location Data

Water location data are any data pertaining to the geographic location by any of a variety of location methods or systems, including altitude above or below the earth's surface. Location data for water include altitude, extent of a water resource, points of diversion or withdrawal, points of use, points of return to the water resource, well locations, and any other location data related to management of the State's water resources.

Water Identification Data

Water identification data are any data that uniquely and precisely identify surface water bodies, ground water, or any other objects related to the State's water resource, such as dams, water systems, studies, etc.

Water Description Data

Water description data are any data pertaining to the make-up, composition, appearance, classification, or other characteristics, traits, or details of the State's water resource or anything related to management of the State's water resource.

DATA DESCRIPTIONS

The initial common water data architecture contains formal data names and comprehensive data definitions for water data. These definitions were prepared by identifying broad data subject areas and more detailed data subject groups within those broad data subject areas.

A *Data Subject Area* is a major grouping of data that is identified based on a business perspective of the objects being managed. Data subject areas are identified for the State's water resources based on the perception of how those resources should be managed. A *Data Subject Group* is a major subdivision of a data subject area that represents a major grouping of data within that data subject area. They are an intermediate level between data subject areas and individual data subjects.

Identification of the data subject areas and data subject groups was oriented toward the nine types of water resources: estuaries, ground water, lakes, marshes/swamps/bogs, ocean, reservoirs, snow packs, springs, and streams. Each of these types of water resources was defined as a data subject area. Additional data subject areas that support, or are ancillary to, these water resources were also defined, such as dams, wells, hydropower sites, etc. Data subject groups were defined within the data subject areas where more detail was needed.

The data descriptions are listed in alphabetical order in Appendix C. The alphabetical sequence is for quick reference, and no priority is implied by the sequence of the definitions.

DATA INVENTORY

An initial water data inventory was conducted within the common water data architecture so that data could be identified within a common context. Due to the short time frame, the initial water data inventory only determined the scope of water data, what data were generally available, and the primary sources of those data. This initial data inventory provided information for enhancing the common water data architecture and will provide a base for a more detailed data inventory.

DATA INVENTORY PROCESS

The initial water data inventory was oriented toward identifying broad groupings of water data, the organizations that collect or use those data, and the contact people in those organizations that have knowledge about those water resource data. The data inventory was not oriented toward policy issues regarding water resources or water resource allocation issues.

The data inventory process started by identifying organizations that have water resource data and developing a matrix to identify which organizations have data in each of the data subject areas and data subject groups. The initial data inventory was prepared from matrices that were returned by Task Force members and from interviews with selected organizations. Overall, only a few of the many organizations that have water resource data were included in the data inventory. However, many additional organizations that maintain water resource data were identified during the initial water data inventory. These organizations will be contacted during a detailed water resource data inventory.

The steps that were taken to develop the common water data architecture and conduct the initial water data inventory are listed below.

Develop common data names and definitions for data subject areas and data subject groups within those data subject areas.

Identify organizations that have water data.

Develop a matrix of organizations and data to be used during the data inventory.

Identify contacts for each organization.

Conduct an initial inventory of water data in those organizations.

Modify the data names and definitions, and the organizations and contacts as necessary.

Identify the primary sources of water data.

Identify the major flows of water data.

Compile results of the data inventory.

DATA INVENTORY RESULTS

The results of the initial water resource data inventory are contained in the data inventory matrices, the list of primary data sources, and the major data flows.

Data Inventory Matrices

The matrices showing data maintained by the organizations contacted are shown in Appendix D. These matrices show, at a high level, which data are maintained by each organization. No indication is made as to the availability of those data, the area covered by those data, the time frame the data represent, or the accuracy or resolution of those data. This information can be obtained during a more detailed data inventory.

Primary Data Sources

A primary data source contains original data collected and maintained by an organization. These original data may be distributed to other organizations for their use. One objective of the water data inventory is to identify the primary sources of data so organizations that need those data can obtain them from the original source. This process assures that data integrity is maintained and that different organizations are using the same data.

Several primary sources of water data were identified during the initial water data inventory. These initial primary data sources are listed by organization in Appendix E. A more detailed data inventory will provide additional detail for these primary data sources and identify a more complete set of primary data sources for water resource data.

Major Data Flows

Data generally flow from the primary data sources to organizations that use those data. The typical perception is that there are a few major linear flows of data between organizations. However, this perception is not always true. A more common situation is a network of data flowing between many organizations.

This is the situation that exists with water data. There is a network of organizations and sets of data move between these organizations for management of the State's water resources. Organizations may collect data and they may acquire data from other organizations. They use those data to derive additional data, and often send both original and derived data to other organizations.

Therefore, the model that must be used for water data is a network that shows organizations collecting and using water data, the collection of original data by those organizations, and the movement of data sets between organizations.

Due to the complexity of this network of data and the limited time available, no data flows were identified during the initial water data inventory. A more detailed data inventory will identify the network of data flows that exist for water data.

Data Inventory Observations

Several observations were made during the initial water resource data inventory. These observations are listed below and can be used to assist the detailed water data inventory.

Development of the initial common water data architecture and preparation of the initial water data inventory resulted in increased awareness of the amount and complexity of water data that already exist, the effort involved in coordinating those data, and the value that could be obtained from those coordinated data.

As a result of this increased awareness, there was a shift in emphasis from *identifying the data needed and collecting those data*, to *organizing, defining, and sharing existing data.* Once the existing data are identified, organized, and shared, additional data can be identified and collected.

There is an increased awareness of the scope and complexity of managing large amounts of a wide variety of water data that exist in many different organizations. There may be as many as 5000 individual data elements and 2000 organizations that collect data about the State's water resources.

There is a high interest and willingness to face and resolve these data management problems in a cooperative and constructive manner that benefit all organizations.

There is an increased recognition of the need for a comprehensive planning process for data management. That planning process must be an ongoing process and must involve all the water resource data.

There is increased awareness of the need to develop a high level, common framework for managing the State's water data. Data must be identified, organized, and shared within a common context to be useful.

Task Force members that represent multiple organizations, such as counties, Indian tribes, industry, etc., need considerable coordination with the organizations they represent. The time available for the initial water data inventory did not allow sufficient time for this coordination.

The water data inventory must be an inventory in the broad sense and include data, organizations that have those data, and contacts in those organizations, as well as identification of the primary sources of data and a network of data flows between organizations.

DETAILED DATA INVENTORY

The initial water data inventory identified the general types of data that were available in various organizations. However, it did not identify the availability of data, the area covered by those data, the time frame the data represent, or the accuracy or resolution of those data. It did not provide a complete list of organizations that have data, a complete list of the primary data sources, the details of data maintained by each organization, or the network of data flows. This information needs to be obtained through a more detailed data inventory.

A more detailed common water data architecture needs to be developed to support a detailed water data inventory. The initial water data architecture needs to be expanded to include data subject and data characteristic names and definitions. It also needs to include the coded data values that are used with water data. This enhanced common water data architecture can be developed in conjunction with the detailed water data inventory.

Organizations

Development of a water data inventory requires contacting and interviewing a variety of organizations that have water resource data. The number of organizations that have data about the State's water resources may reach 2000, including several departments in 39 counties and 268 incorporated cities, irrigation districts, water districts, power companies, private irrigators, industry, Indian tribes, state and federal agencies, universities, etc.

The organizations contacted during the initial water data inventory are shown in the matrices in Appendix D. Additional organizations, or groups of organizations, that should be contacted during a more detailed data inventory are listed in Appendix F. Individual organizations within the groups need to be identified and contacted individually to determine the water data they have available.

Data Inventory Questions

Specific questions that would assist the detailed water data inventory were identified during the initial data inventory. These specific questions are listed in Appendix G and are grouped into categories to facilitate the data inventory process.

APPENDICES

APPENDIX A - Engrossed Substitute House Bill 2932

APPENDIX B - Water Resource Data Management Task Force

APPENDIX C - Data Descriptions

APPENDIX D - Initial Data Inventory Matrices

APPENDIX E - Initial Primary Data Sources

APPENDIX F - Organizations

APPENDIX G - Detailed Data Inventory Questions

APPENDIX H - Detailed Preliminary Recommendations

APPENDIX A

ENGROSSED SUBSTITUTE HOUSE BILL 2932

IN THE LEGISLATURE
of the
STATE OF WASHINGTON

CERTIFICATION OF ENROLLED ENACTMENT

SUBSTITUTE HOUSE BILL NO. 2932

Passed the House February 12, 1990 as amended
Yeas 98 Nays 0

Passed the Senate February 27, 1990 as amended
Yeas 49 Nays 0

3/3/90: House refused to concur in Senate amendments and asked Senate to recede therefrom.

3/5/90: Senate refused to recede and asked for a conference.
House granted request for a conference.

3/7/90: Senate adopted report of Conference Committee and granted powers of free conference.
House adopted report of Conference Committee and granted powers of free conference.

3/8/90: Senate adopted report of Free Conference Committee and passed bill as amended by Free Conference Committee.
Yeas: 42 Nays: 0
House adopted report of Free Conference Committee and passed bill as amended by Free Conference Committee.
Yeas: 97 Nays: 0

CERTIFICATE

I, Alan Thompson, Chief Clerk of the House of Representatives of the State of Washington, do hereby certify that the attached is enrolled SUBSTITUTE HOUSE BILL NO. 2932 as passed by the House of Representatives and the Senate on the dates hereon set forth

ALAN THOMPSON, Chief Clerk

ENGROSSED SUBSTITUTE HOUSE BILL NO. 2932
AS AMENDED BY FREE CONFERENCE COMMITTEE

State of Washington 51st Legislature 1990 Regular Session

by Committee on Natural Resources & Parks (originally sponsored by Representatives K. Wilson, Miller, Baugher, Smith, Doty, Valle, Hine and R. Fisher)

Read first time 2/2/90 and referred to Committee on Appropriations.

AN ACT Relating to regional water resource planning; amending RCW 90.54.010 and 90.54.030; adding a new section to chapter 90.54 RCW; creating a new section; and declaring an emergency.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

Sec. 1. Section 1, chapter 225, Laws of 1971 ex. sess. and RCW 90.54.010 are each amended to read as follows:

(1) The legislature finds that:

(a) Proper utilization of the water resources of this state is necessary to the promotion of public health and the economic well-being of the state and the preservation of its natural resources and aesthetic values. ~~((The legislature further finds that the availability of waters of the state is being evaluated by interests who desire to remove portions thereof from the state in a manner inconsistent with the public interest of people of the state.))~~ Although water is a renewable resource, its supply and availability are becoming increasingly limited, particularly during summer and fall months and dry years when demand is greatest. Growth and prosperity have significantly increased the competition for this limited resource. Adequate water supplies are essential to meet the needs of the state's growing population and economy. At the same time instream resources and values must be preserved and protected so that future generations can continue to enjoy them.

(b) All citizens of Washington share an interest in the proper stewardship of our invaluable water resources. To ensure that available water supplies are managed to best meet both instream and offstream needs, a comprehensive planning process is essential. The people of the state have the unique opportunity to work together to plan and manage our water. Through a comprehensive planning process that includes the state, Indian tribes, local governments, and

interested parties, it is possible to make better use of available water supplies and achieve better management of water resources. Through comprehensive planning, conflicts among water users and interests can be reduced or resolved. It is in the best interests of the state that comprehensive water resource planning be given a high priority so that water resources and associated values can be utilized and enjoyed today and protected for tomorrow.

(c) Diverse hydrologic, climatic, cultural, and socioeconomic conditions exist throughout the regions of the state. Water resource issues vary significantly across regions. Comprehensive water resource planning is best accomplished through a regional planning process sensitive to the unique characteristics and issues of each region.

(d) Comprehensive water resource planning must provide interested parties adequate opportunity to participate. Water resource issues are best addressed through cooperation and coordination among the state, Indian tribes, local governments, and interested parties.

(e) The long-term needs of the state require ongoing assessment of water availability, use, and demand. A thorough inventory of available resources is essential to water resource management. Current state water resource data and data management is inadequate to meet changing needs and respond to competing water demands. Therefore, a state water resource data program is needed to support an effective water resource management program. Efforts should be made to coordinate and consolidate into one resource data system all relevant information developed by the department of ecology and other agencies relating to the use, protection, and management of the state's water resources.

(2) It is the purpose of this chapter to set forth fundamentals of water resource policy for the state to insure that waters of the state are protected and fully utilized for the greatest benefit to the people of the state of Washington and, in relation thereto, to provide direction to the department of ecology ((~~and~~)), other state agencies and officials, and local government in carrying out water and related resources programs. It is the intent of the legislature to work closely with the executive branch, Indian tribes, local

government, and interested parties to ensure that water resources of the state are wisely managed.

Sec. 2. Section 3, chapter 225, Laws of 1971 ex. sess. as amended by section 4, chapter 47, Laws of 1988 and RCW 90.54.030 are each amended to read as follows:

For the purpose of ((~~insuring~~)) ensuring that the department is fully advised in relation to the performance of the water resources program provided in RCW 90.54.040, and to provide information and support to ((~~the--fact-finding--service--and~~)) the joint select committee established in RCW ((~~90.54.022--and~~)) 90.54.024, the department is directed to become informed with regard to all phases of water and related resources of the state. To accomplish this objective the department shall:

(1) Develop a comprehensive water resource data program that provides the information necessary for effective planning and management on a regional and state-wide basis. The data program shall include an information management plan describing the data requirements for effective water resource planning, and a system for collecting and providing access to water resource data on a regional and state-wide basis. The water resource data program shall also include a resource inventory and needs assessment pursuant to subsection (5) of this section;

(2) Collect, organize and catalog existing information and studies available to it from all sources, both public and private, pertaining to water and related resources of the state;

(((~~2~~))) (3) Develop such additional data and studies pertaining to water and related resources as are necessary to accomplish the objectives of this chapter;

(((~~3~~)) ~~--Determine-existing-and-foreseeable-uses-of,-and-needs-for,-such-waters-and-related-resources.~~))

(4) Develop alternate courses of action to solve existing and foreseeable problems of water and related resources and include therein, to the extent feasible, the economic and social consequences of each such course, and the impact on the natural environment;

(5) Establish a water resources data management task force to evaluate data management needs, advise the joint select committee on

water resource policy, the legislature, and the department in developing an information management plan, and conduct a water resource inventory and needs assessment. The task force shall include representatives of appropriate state agencies, Indian tribes, local governments, and interested parties. The task force shall include expertise in both water resources and resource data management. The task force shall make recommendations to the department on developing a data base for water resource planning throughout the state. In conducting the water resource inventory and needs assessment, the task force shall oversee the inventory of existing data and determine what additional data is needed for effective water resource planning and management. The task force shall otherwise provide continuing guidance to the joint select committee on water resource policy, the legislature, and the department in developing and maintaining an effective information management plan. The department shall coordinate the water resource data program to provide water resource information that meets the needs of the comprehensive water resources program and planning process provided for in RCW 90.54.040;

(6) Prior to September 1, 1990, provide a report to the chairs of the appropriate legislative committees based on the preliminary findings and recommendations of the water resources data management task force. The report shall document the current information flows and data collection processes for state water resources data, and shall include an analysis of task force recommendations for developing additional information to meet water resource data needs. The report shall further include an estimate of funding requirements to implement the water resources data program for consideration in future biennial budget decisions;

(7) Prior to implementation of any preliminary findings and recommendations pursuant to subsection (6) of this section, and contingent on legislative appropriation, develop a five-year plan for data collection and information management approved by the department of information services. Commencing July 1, 1991, the department shall provide annual reports to the chairs of the appropriate legislative committees on the development and implementation of the

five-year plan and progress toward completion of the water resource inventory and needs assessment; and

(8) Establish pursuant to task force recommendations a process to resolve technical issues in the development and implementation of the water resource inventory and needs assessment.

All the foregoing shall be included in a "water resources ((archive)) information system" established and maintained by the department. The department shall develop a system of cataloging, storing and retrieving the information and studies of the ((archive)) information system so that they may be made readily available to and effectively used not only by the department but by the public generally.

NEW SECTION. Sec. 3. A new section is added to chapter 90.54 RCW to read as follows:

(1) In the development and implementation of the comprehensive state water resources program required in RCW 90.54.040(1), the process described therein shall involve participation of appropriate state agencies, Indian tribes, local governments, and interested parties, and shall be applied on a regional basis pursuant to subsection (2) of this section.

(2) Prior to January 1, 1991, the department, with advice from appropriate state agencies, Indian tribes, local government, and interested parties, shall identify regions and establish regional boundaries for water resource planning and shall designate two regions in which the process shall be initiated on a pilot basis. One region shall encompass an area within the Puget Sound basin in which critical water resource issues exist. A concurrent pilot process may encompass a region east of the Cascade mountains.

(3) The department shall report to the chairs of the appropriate legislative committees prior to July 1st each year summarizing the progress of the pilot process in the two regions. The pilot process in each region shall be completed and shall produce a regional water plan by December 31, 1993.

(4) Appropriate state agencies, Indian tribes, local governments, and interested parties in regions not selected for the pilot program are strongly encouraged to commence water resource planning within

their regions.

NEW SECTION. Sec. 4. If specific funding for the purposes of this act, referencing this act by bill number, is not provided by June 30, 1990, in the omnibus appropriations act, this act shall be null and void.

NEW SECTION. Sec. 5. This act is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and shall take effect immediately.

Passed the House February 6, 1990.

Speaker of the House.

Passed the Senate March 8, 1990.

President of the Senate.

APPENDIX B

WATER RESOURCE DATA MANAGEMENT TASK FORCE

Water Resources Data Management Task Force Members

Representing	Name	Address	Phone	Fax
Public Utilities	Ken Thomas Department of Public Works Operations Division	2221 Pacific Street Bellingham, WA 98226-5398	(206) 676-6850 Scan Prefix 644	(206) 676-6679
Irrigators	Jerome Kaufman Kittitas Irrigation, Cattlemens' Association	Rt. 1, Box 685 Ellensburg, WA 98926	(509) 925-1894	(509) 925-4923 notify at home
Academia	Dr. William Funk, Director State of Washington Water Research Center	Washington State University Pullman, WA 99164-3002	(509) 335-5531	(509) 335-1590
	Rick Palmer Department of Civil Engineering	More Hall 301 University of Washington Seattle, WA 98195	(206) 685-2658	(206) 543-1543
Irrigation Districts	John Mayo Washington State Water Resources Association	P.O. Box 9249 Yakima, WA 98909	(509) 248-9210	(509) 248-9008
Counties *	Bill Lasby Paul Shallow Seattle/King County Health Department	Smith Tower Building, Rm 1627 Seattle, WA 98104	(206) 296-4795	(206) 296-0189
Environmentalists	Mike Williams Correspondence Member Washington Environmental Council	115 West 3rd P.O. Box 1492 Ellensburg, WA 98926	(206) 925-1448	
	Art Noble Washington Environmental Council	6008 4th Ave. NE Seattle, Wa 98115	(206) 524-8105 WEC - 527-1599	WEC - 527-1693 notify at home
	Vim Wright Washington Environmental Council	Inst. for Environmental Studies MS, FM-12 UW, Seattle, WA 98105	(206) 543-1812	(206) 543-2025
Industries *	Stan Cupp Bruce McComas Port Townsend Paper Company	P.O. Box 3170 100 Thomas Street Port Townsend, WA 98368	(206) 385-3170	(206) 385-0355
Recreational Interests	Tom Deschner Northwest Rivers Council	430 Southwest 206 Street Normandy Park, WA 98166-4134	(206) 824-4042	None
Indian Tribes	Dennis McDonald NW Indian Fisheries Commission	6730 Martin Way East Olympia, WA 98506	(206) 438-1180	(206) 753-8659
	Mike Mackay Lummi Indian Tribes	2616 Kwina Road Bellingham, WA 98226	(206) 647-6230	(206) 384-4737
State Agencies	Don Haring Department of Fisheries	Mail Stop: AX-11 Olympia, WA 98504	(206) 753-2984 Scan Prefix 234	(206) 586-8884 Scan Prefix 321
	Steve Starlund Department of Parks & Recreation	Mail Stop: KY-11 Olympia, WA 98504-5711	(206) 753-1810 Scan Prefix 234	(206) 753-1594
	Hal Beecher Department of Wildlife	Mail Stop: GJ-11 Olympia, WA 98501-1091	(206) 753-3318 Scan Prefix 234	(206) 586-0248

* Alternates
December 17, 1991

Water Resources Data Management Task Force Members

Representing	Name	Address	Phone	Fax
State Agencies (cont.)	Bob Edwards DNR - Information Management Division	Mail Stop: EV-31 P.O. Box 47020 Olympia, WA 98504-7020	(206) 753-1308 Scan Prefix 234	(206) 586-5456 Scan Prefix 321
	Peggy Johnson Department of Health	Mail Stop: LD-11 P.O. Box 47822 Olympia, WA 98504-7822	(206) 753-3528 Scan Prefix 234	(206) 586-5529 Scan Prefix 321
	Amy Bell State Energy Office	Mail Stop: FA-11 Olympia, WA 98506	(206) 956-2005	(206) 753-2397
	Bob Monn Department of Ecology	Mail Stop: PV-11 P.O. Box 47600 Olympia, WA 98504-7600	(206) 438-7565 Scan Prefix 585	(206) 493-9147
	Mike Brackett Department of Information Services	Mail Stop: PC-11 P.O. Box 49019 Olympia, WA 98504-9019	(206) 586-0221	(206) 586-8607
Non-member Participant	John Segerson	2845 Schirm Loop NW Olympia, WA 98502	(206) 866-4165	(206) 866-4165 (same as phone)
Facilitator	Emmett P. Fiske Department of Rural Sociology	Washington State University Pullman, WA 99164-4006	(509) 335-8623	(509) 335-0116
Facilitator	Kay Haaland WSU Cooperative Extension/Skagit County County Administration Building, Room 112	700 South 2nd Street Mount Vernon, WA 98273-3864	(206) 336-9322	(206) 336-9478
Lead Staff	Marilyn Blair Department of Ecology	Mail Stop: PV-11 P.O. Box 47600 Olympia, WA 98504-7600	(206) 459-6121 Scan Prefix 585	(206) 459-6995
Staff	Roger von Gohren Department of Ecology	Mail Stop: PV-11 P.O. Box 47600 Olympia, WA 98504-7600	(206) 493-2840 Scan Prefix 585	(206) 459-6995 Scan Prefix 585
	Keith Johnson Department of Ecology	same as above	(206) 493-9565 Scan Prefix 585	(206) 459-6995 Scan Prefix 585
	Maryrose Livingston Department of Ecology	same as above	(206) 493-9226 Scan Prefix 585	(206) 459-6995 Scan Prefix 585
Administration	Robin Shoal Department of Ecology	same as above	(206) 493-9564 Sacn Prefix 585	(206) 459-6995 Scan Prefix 585

APPENDIX C

DATA DESCRIPTIONS

Climate Data Subject Area

Climate is the meteorological conditions, including temperature, precipitation, wind, barometric pressure, evaporation, transpiration, etc., that prevail in a specific area or region. Weather is the meteorological conditions at a specific location or in an area, at a specified time or during a time interval. Climate includes glacier data but excludes snow pack data.

The Climate Data Subject Area includes any data pertaining to either the prevailing meteorological conditions of an area or region, or the specific meteorological conditions at a particular location and time.

Dam Data Subject Area

A *dam* is a man-made structure of any size built across a stream that blocks, alters, adjusts, or otherwise controls the flow of water in that stream or the level of water upstream of that structure. A dam includes any such structure that is proposed, planned, under construction, in use, or abandoned and still existing in some form. A dam does not include a natural formation or condition that blocks, alters, or adjusts the flow or level of a stream. If any portion of a dam is located within the State it is considered to be part of the State's water resource data inventory.

The Dam Data Subject Area includes any data pertaining to the identification, location, and description of a dam, excluding hydropower production, stream data, and reservoir data.

Estuary Data Subject Area

An *estuary* (estuarine environment) is a surface water body that is semienclosed by land but has open, partly obstructed, or has sporadic access to open salt water, and is at least occasionally diluted by fresh water. Salinity may periodically increase higher than ocean waters due to evaporation. Estuaries continue upstream to the point where salinity measures less than 0.5 o/oo of average annual low flow. An estuary is any estuarine environment and may include wetland and deep water components. Puget Sound is considered an estuary, not an ocean.

The Estuary Data Subject Area includes any data pertaining to the location, identification, description, quantity, quality, or use of estuary water.

Ground Water Data Subject Area

Ground water is that part of the State's water resource that exists beneath the earth's surface, or beneath the bed of any stream, lake, reservoir, or other body of surface water, or in the pores or fractures of rocks or unconsolidated material. Ground water may be static, or it may flow, percolate, or move in some manner.

The Ground Water Data Subject Area includes any data pertaining to the location, identification, description, quantity, quality, or use of ground water.

Ground Water Descriptive Data Subject Group

Any location, identification, or description data about ground water, or other data about ground water that do not fit into the other data subject groups.

Ground Water Quality Data Subject Group

The condition of ground water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and the water quality history, patterns, trends, and changes.

Ground Water Quantity Data Subject Group

Any data pertaining to the capacity, flow, and volume, or the history, patterns, trends, or changes of those data for any ground water. Ground water quantity data show the supply of ground water, including artificial recharge of ground water.

Ground Water Use Data Subject Group

Any data pertaining to the use of ground water in place below the earth's surface, or the collective or summarized use of ground water, but excludes the specific use of ground water. The specific uses are included in the method of withdrawal, such as Water Wells, Springs, and Water Systems.

Hydropower Site Data Subject Area

A *hydropower site* is any location where power is being generated by water, including power generation that is proposed, planned, under construction, in use, or where such generation has been abandoned and the facility still remains in some form. A hydropower site generally consists of diversion of water by a dam or other structure, a delivery of water to the generation facility, and a return of the water.

The Hydropower Site Data Subject Area includes any data pertaining to the identification, location, description, and any other characteristics of a hydropower site, excluding information about dams that produce hydropower and reservoirs behind those dams.

Lake Data Subject Area

A *lake* (lacustrine environment) is a surface water body that is situated in a natural topographic depression, including all lacustrine environments where the salinity is below 0.5 o/oo. A lake

includes permanently flooded lakes and tidal lakes up to the high water lines, but excludes areas of abnormal flooding. A lake may have wetland and deep water components.

A wide portion of a stream where the width and depth are significantly increased and the water flow is significantly reduced is considered to be a lake. A lake differs from a reservoir in that it occurs naturally rather than by a man-made structure. If any portion of a lake is within the State it is considered part of the State's water resource.

The Lake Data Subject Area includes any data pertaining to the identification, location, description, quantity, quality, or use of lake water.

Lake Descriptive Data Subject Group

Any location, identification, or description data about a lake, or other data about lakes that do not fit into the other data subject groups.

Lake Quality Data Subject Group

The condition of lake water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and quality history, patterns, trends, and changes.

Lake Quantity Data Subject Group

Any data pertaining to the capacity, flow, and volume, or the history, patterns, trends, or changes of those data for any lake. Lake quantity data represent the water supply in a lake. Monitoring stations are included as lake quantity data.

Lake Resource Data Subject Group

Any biological, physical, or chemical resource that exists in a lake or has a high dependency on a lake.

Lake Use Data Subject Group

The use of water in a lake or removed from a lake. Lake use data include points of diversion, quantities, frequency, duration, and points of return, and any quality changes resulting from use. Lake water use data do not include data about Water Systems or the specific offbody use of water, but include summarized data about offbody water use.

Marsh/Swamp/Bog Data Subject Area

Marshes, *swamps*, and *bogs* (palustrine environment) are surface water bodies that include nontidal areas dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and areas lacking such vegetation, where the salinity is less than 0.5 o/oo. These palustrine environments include the areas commonly known as marshes, swamps, bogs, fens, mires, moors, and small, shallow, permanent or intermittent ponds. They may have wetland and deep water components.

The Marsh/Swamp/Bog data subject area includes any data pertaining to the identification, location, description, quantity, quality, or use of these palustrine areas.

Ocean Data Subject Area

An *ocean* (marine environment) is a surface water body in the form of open salt water overlying the continental shelf and their associated high energy coastline where the salinity exceeds 30 o/oo with little or no dilution outside the mouths of estuaries. These marine environments include subtidal areas that are continuously submerged and intertidal areas that are periodically exposed and flooded by the tides. Ocean waters continue shoreward to the limit of tidal inundation by the extreme high water of spring tides. Oceans may contain wetland and deep water components.

The Ocean Data Subject Area includes any data pertaining to the location, identification, description, quantity, quality, or use of oceans.

Reservoir Data Subject Area

A *reservoir* (lacustrine environment) is a surface water body of any size that is formed with a man-made structure that controls the water level or down-stream flow for any purpose, regardless of the period of time it holds water, where the salinity is below 0.5 o/oo. A reservoir includes permanently flooded reservoirs and tidal reservoirs up to the high water lines, but excludes areas of abnormal flooding. A reservoir is a lacustrine environment the same as a lake and may have wetland and deep water components.

A reservoir includes any reservoir that is proposed, planned, under construction, in use, or abandoned and still existing in some form. A reservoir differs from a lake in that it is formed by a man-made structure rather than being formed naturally. If any portion or a reservoir is within the State, it is considered part of the State's water resource.

The Reservoir Data Subject Area includes any data pertaining to the identification, location, description, quantity, quality, or use of reservoir water.

Reservoir Descriptive Data Subject Group

Any location, identification, or description data about a reservoir, or other data about reservoirs that do not fit into the other data subject groups.

Reservoir Quality Data Subject Group

The condition of reservoir water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and quality history, patterns, trends, and changes.

Reservoir Quantity Data Subject Group

Any data pertaining to the capacity, flow, and volume, or the history, patterns, trends, or changes of those data for any reservoir. Reservoir quantity data represent the water supply in a reservoir. Monitoring stations are included as reservoir quantity data.

Reservoir Resource Data Subject Group

Any biological, physical, or chemical resource that exists in a reservoir or has a high dependency on a reservoir.

Reservoir Use Data Subject Group

The use of water in a reservoir or removed from a reservoir. Reservoir use data include points of diversion, quantities, frequency, duration, points or return, and any quality changes resulting from use. Reservoir use data do not include data about Water Systems or the specific offbody use of water, but include summarized data about offbody water use.

Snow Pack Data Subject Area

A *snow pack* is a surface water body in the form of a snow formed from the annual solid precipitation of ice crystals that remain in crystalline form on the earth's surface for a portion of the year, but are ultimately released as water through melting. A snow pack is usually annual, but may be perennial, and does not substantially move during its existence. A snow pack includes water held in the snow pack but excludes glaciers.

The Snow Pack Data Subject Area includes any data pertaining to the identification, location, description, quantity, quality, or use of snow packs.

Snow Pack Descriptive Data Subject Group

Any location, identification, or description data about snow packs, or other data about snow packs that do not fit into the other data subject groups.

Snow Pack Quality Data Subject Group

The condition of a snow pack, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollution; and quality history, patterns, trends, and changes.

Snow Pack Quantity Data Subject Group

Any data pertaining to the and volume, or the history, patterns, trends, or changes of those data for any snow pack. Snow pack quantity data represent the water supply in snow.

Spring Data Subject Area

A *spring* is a surface water body in the form of a natural flow of water from below the earth's surface to the earth's surface, including natural artesian and man-made springs, but excluding artesian wells, regardless of the period of time, frequency, or length of time that water flows. A spring is also defined as the natural intersection of ground water with the earth's surface. Springs may be visible or they may be hidden beneath other water bodies, such as lakes, streams, marshes and swamps.

The Spring Data Subject Area includes any data pertaining to the identification, location, description, quantity, quality, or use of a spring or spring water.

Spring Descriptive Data Subject Group

Any location, identification, or description data about springs, or other data about springs that do not fit into the other data subject groups.

Spring Quality Data Subject Group

The condition of spring water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and quality history, patterns, trends, and changes.

Spring Quantity Data Subject Group

Any data pertaining to the flow and volume, or the history, patterns and trends of those data for any spring, excluding the use of water from a spring. Spring quantity data represent the water supply in springs.

Spring Resource Data Subject Group

Any biological, physical, or chemical resource that exists in a spring or has a high dependency on a spring.

Spring Use Data Subject Group

The use of water in a spring or removed from a spring. Spring use data include points of diversion, quantities, frequency, and duration, and any quality changes resulting from use. Spring use data do not include data about Water Systems or the specific offbody use of water, but include summarized data about offbody water use.

Stream Data Subject Area

A *stream* (riverine environment) is a surface water body in the form of a body of water moving over the earth's surface in a bed or channel that is naturally or artificially created which periodically or continuously contains water or which forms a connecting link between two bodies of standing water. Streams end at the point where the salinity exceeds 0.5 o/oo of average annual low flow or where it enters a lake or reservoir. A stream begins where the tributary originates or where it leaves a lake or reservoir. A stream need not originate or terminate in the State, but does need to flow within the State at some point on its course to be part of the State's water resource.

A stream includes any body of water regardless of its size, such as a river, stream, creek, brook, or rivulet, whether the flow is year-round or intermittent. A stream is supplied by surface runoff, near-surface quick flows, and ground water discharges. Discharges from urban development, such as road ditches, storm drains, gutters, etc., are a source of stream water, but are considered part of Water Facilities, not streams. A stream is any riverine environment and may have wetland and deep water components.

The Stream Data Subject Area includes any data pertaining to the identification, location, description, quantity, quality, or use of stream water.

Stream Descriptive Data Subject Group

Any location, identification, or description data about streams, or other data about streams that do not fit into the other data subject groups.

Stream Quality Data Subject Group

The condition of stream water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and quality history, patterns, trends, and changes.

Stream Quantity Data Subject Group

Any data pertaining to the capacity, flow, and volume, or the history, patterns, trends, or changes of those data for any stream. Stream quantity data represent the water supply in a stream. Monitoring stations are included as stream quantity data.

Stream Resource Data Subject Group

Any biological, physical, or chemical resource that exists in a stream or has a high dependency on a stream.

Stream Use Data Subject Group

The use of stream water, whether instream or out of stream, including points of diversion, quantities, frequency, duration, points of return, and any quality change resulting from use. Stream water use data do not include data about Water Systems or the specific offbody use of water, but include summarized data about offbody water use.

Upland Data Subject Area

Upland is the solid ground of the earth's surface that is exposed and is not covered or saturated by water.

The Upland Data Subject Area includes any data pertaining to the upland, including natural features, topography, soil, vegetation, use, classification, etc.

Water Facility Data Subject Area

A *water facility* is an infrastructure that is created or constructed to deliver, move distribute, store, or discharge water. A water facility includes the physical works for withdrawal or diversion, conveyance to delivery at the point of use, the actual use, release from use, return to the water resource, and discharge into the water resource. Water facilities include pipes, tanks, ditches, culverts, channels, canals, siphons, as well as systems of facilities involved in the supply, distribution, and return of water. Water facilities also include sewage collection and treatment systems that discharge into the water resource, storm drains, wasteways, etc. Water facilities may combine water from several sources and may split water into several places of use or discharge.

The Water Facility Data Subject Area includes any data pertaining to the characteristics and details of a water facility from the point of diversion or withdraw to the point of return.

Water Management Area Data Subject Area

A *water management area* is any natural or arbitrary area, or set of areas, with specific boundaries, defined by any person or organization that has jurisdiction to establish such areas and boundaries, that is used, has been used, or will be used in any manner for the management of the State's water resources.

The Water Management Area Data Subject Area includes any data pertaining to the identification, location, description, or purpose of any management area.

Water Pollution Data Subject Area

Water pollution is the contamination of a water resource by the discharge or introduction of any biological, physical, or chemical substance, that adversely affects the condition of water, or makes that water harmful or unfit to living things, or limits its usefulness in any manner. Water pollution includes the source of a pollutant, the hazard created by that pollutant, the risk that pollutant will reach water, the tracking and monitoring of pollutants, and the toxic fate and mobility of pollutants. It excludes the vulnerability of surface water or ground water to pollutants.

The Water Pollution Data Subject Area includes any data pertaining to the identification, location, and description of any pollutants to any water resource, including history, patterns, trends, and changes.

Water Resource Organization Data Subject Area

An *organization* is any group of one or more people organized for a specific social or legal purpose. An organization may be for business or pleasure, and it may exist in a variety of legal forms, such as unincorporated, incorporated, sole proprietorship, etc. An organization may be profit or nonprofit, social, commercial, industrial, professional, governmental, and may be centralized or decentralized.

A *water resource organization* includes governmental agencies, universities, individuals, companies, laboratories, well drillers, owners, purveyors, Indian tribes, etc., who control, manage, use, contribute, monitor, evaluate, or are otherwise involved in management of, or are concerned about, the State's water resources.

The Organization Data Subject Area contains any data pertaining to the characteristics of an organization that is involved in any way with the State's water resource.

Water Resource Regulation Data Subject Area

A *water resource regulation* is any statement, directive, permit, or order from an authority that has jurisdiction regarding the use, control, quantity, quality, or other conditions about a water resource. Water resource regulations include use, capacity, design, minimum flows and levels, and quality regulations.

The Water Resource Regulation Data Subject Area includes any data pertaining to the details of a water resource regulation.

Water Resource Study Data Subject Area

A *water resource study* is any study, report, thesis, presentation, plan, technology transfer, proposals, project, or any other document that contains data, projections, trends, history, or other information about the State's water resource. Projects may be planned, in progress, or completed. The study may be from any organization, individual, government agency, or university.

The Water Resource Study Data Subject Area includes any data about the study itself, the extent of the study area, the authors, the organization producing the study, or acquisition information, including bibliography and abstract. It does not include the specific water resource data contained in the study.

Water Right Data Subject Area

A *water right* is any formal document specifying the terms and conditions that authorize an individual or organization to withdraw or divert a specified amount of water from a specified place for a specific beneficial purpose on a specific piece of property. A water right includes applications, permits, certificates, claims to continuous use since 1917, and the relinquishment and recession of any water right.

The Water Right Data Subject Area includes any data pertaining to characteristics and details of a water right, including the location of withdraw or diversion, the amounts, frequencies, use, and point of return.

Well Data Subject Area

A *well* is any excavation, hole, or shaft of any size, depth, or construction that is dug, drilled, cored, bored, washed, driven, or jetted by any means into the earth to locate, divert, artificially recharge, or withdraw ground water for any use, whether or not it is actually used. A well includes water supply wells, resource protection wells, and test wells. It includes wells that are under construction, in use, removed, or abandoned, as well as geothermal and hydrocarbon wells. Wells that are proposed or planned are not included.

The Well Data Subject Area includes any data pertaining to the identification, location, description, or lithography of a well, including the quantity, quality, and use of water withdrawn from that well.

Well Descriptive Data Subject Group

Any location, identification, description, or lithography data about water wells, or other data that do not fit into the other data subject groups.

Well Quality Data Subject Group

The condition of well water, including its purity; types of biological, physical, and chemical substances; its usefulness for specific purposes; its vulnerability to pollutants; any treatments to improve water quality; and quality history, patterns, trends, and changes.

Well Quantity Data Subject Group

Any data pertaining to the size, shape, capacity, and depth, or the history, patterns, trends, and changes of those data for any well. These quantity data exclude data about ground water supplying the well.

Well Use Data Subject Group

The use of water from a well include quantities, frequency, duration, destination, and quality changes resulting from that use. Well use also includes any artificial recharge of ground water and any quality changes resulting from artificial recharge.

APPENDIX D

INITIAL DATA INVENTORY MATRICES

WATER RESOURCE DATA MANAGEMENT TASK FORCE
DATA BY ORGANIZATION
AUGUST 27, 1990

ORGANIZATION	DATA																				
				GROUND WATER						LAKE						RESERVOIR					
	CLIMATE	DAM	ESTUARY	GROUND WATER DESCRIPTIVE	GROUND WATER QUALITY	GROUND WATER QUANTITY	GROUND WATER RESOURCE	GROUND WATER USE	HYDROPOWER SITE	LAKE DESCRIPTIVE	LAKE QUALITY	LAKE QUANTITY	LAKE RESOURCE	LAKE USE	MARSH/SWAMP/BOG	RESERVOIR DESCRIPTIVE	RESERVOIR QUALITY	RESERVOIR QUANTITY	RESERVOIR RESOURCE	RESERVOIR USE
DEPARTMENT OF NATURAL RESOURCES		X								X					X					
DEPARTMENT OF HEALTH					X	X					X	X					X	X		
STATE ENERGY OFFICE									X											
PARKS AND RECREATION														X						X
DEPARTMENT OF FISHERIES																				
DEPARTMENT OF WILDLIFE																				
DEPARTMENT OF ECOLOGY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
US GEOLOGIC SURVEY				X		X														
US BUREAU OF RECLAMATION																		X		X
DEPARTMENT COMMUNITY DEVELOPMENT																				
SOIL CONSERVATION SERVICE															X					
US FISH & WILDLIFE SERVICE			X							X					X	X				
US WEATHER SERVICE	X																			
INTERAGENCY COUNCIL OUTDOOR REC														X						X
BONNEVILLE POWER ADMINISTRATION									X						X					
UNIVERSITIES																				
INDIAN TRIBES																				
ENVIRONMENTAL / RECREATIONAL																				
INDUSTRY - PULP & PAPER																				
COUNTIES	X															X		X		
PUBLIC UTILITIES - WATER	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X

WATER RESOURCE DATA MANAGEMENT TASK FORCE
DATA BY ORGANIZATION
AUGUST 27, 1990

ORGANIZATION	DATA																			
	SNOW PACK			SPRING					STREAM											
	SNOW PACK DESCRIPTIVE	SNOW PACK QUALITY	SNOW PACK QUANTITY	SPRING DESCRIPTIVE	SPRING QUALITY	SPRING QUANTITY	SPRING RESOURCE	SPRING USE	STREAM DESCRIPTIVE	STREAM QUALITY	STREAM QUANTITY	STREAM RESOURCE	STREAM USE	UPLAND	WATER FACILITY	WATER MANAGEMENT AREA	WATER POLLUTION	WATER RESOURCE ORGANIZATION	WATER RESOURCE REGULATION	
DEPARTMENT OF NATURAL RESOURCES									X		X			X		X				
DEPARTMENT OF HEALTH					X	X		X		X	X		X							
STATE ENERGY OFFICE																			X	
PARKS AND RECREATION													X							
DEPARTMENT OF FISHERIES										X	X	X								
DEPARTMENT OF WILDLIFE																				
DEPARTMENT OF ECOLOGY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
US GEOLOGIC SURVEY											X									
US BUREAU OF RECLAMATION											X		X		X					
DEPARTMENT COMMUNITY DEVELOPMENT																				
SOIL CONSERVATION SERVICE	X		X																	
US FISH & WILDLIFE SERVICE									X											
US WEATHER SERVICE																				
INTERAGENCY COUNCIL OUTDOOR REC								X					X							
BONNEVILLE POWER ADMINISTRATION											X									
UNIVERSITIES																				
INDIAN TRIBES										X	X									
ENVIRONMENTAL / RECREATIONAL											X									
INDUSTRY - PULP & PAPER									X	X	X	X	X							
COUNTIES					X	X				X	X					X				
PUBLIC UTILITIES - WATER													X		X					

WATER RESOURCE DATA MANAGEMENT TASK FORCE
DATA BY ORGANIZATION
AUGUST 27. 1990

ORGANIZATION	DATA																					
			WELL																			
	WATER RESOURCE STUDY	WATER RIGHT	WELL DESCRIPTIVE	WELL QUALITY	WELL QUANTITY	WELL USE																
DEPARTMENT OF NATURAL RESOURCES		X																				
DEPARTMENT OF HEALTH	X	X	X	X	X																	
STATE ENERGY OFFICE	X																					
PARKS AND RECREATION																						
DEPARTMENT OF FISHERIES	X	X																				
DEPARTMENT OF WILDLIFE	X																					
DEPARTMENT OF ECOLOGY	X	X	X	X	X	X																
US GEOLOGIC SURVEY	X				X																	
US BUREAU OF RECLAMATION			X		X	X																
DEPARTMENT COMMUNITY DEVELOPMENT	X																					
SOIL CONSERVATION SERVICE																						
US FISH & WILDLIFE SERVICE																						
US WEATHER SERVICE																						
INTERAGENCY COUNCIL OUTDOOR REC																						
BONNEVILLE POWER ADMINISTRATION	X																					
UNIVERSITIES	X																					
INDIAN TRIBES																						
ENVIRONMENTAL / RECREATIONAL	X																					
INDUSTRY - PULP & PAPER	X	X	X	X	X	X																
COUNTIES	X	X		X	X																	
PUBLIC UTILITITIES - WATER	X	X	X	X	X	X																

APPENDIX E

INITIAL PRIMARY DATA SOURCES

APPENDIX E - INITIAL PRIMARY DATA SOURCES

Irrigation Districts

Keep water use data and send annual reports to USBR.
List of irrigation districts available in 1974 report by URS / Hill, Ingman, Chase & Co.

State Energy Office

Pacific Northwest Rivers Study.
Hydropower projects for anyone connecting to the grid.
Water resource studies.

Bonneville Power Administration

Pacific Northwest Hydropower Database and Analysis System.

Department of Ecology

Inventory of dams impounding over 10 acrefeet of water.
Water right data.
Well reports from drillers.
Miscellaneous stream flow measurements and lake levels at selected sites.
Periodic water level measurements at selected wells.
Water resource regulations.
Wetland and deep water inventory.
Water resource studies.

Community Development

Historical database of natural features, landmarks, etc.
Pacific Northwest River Assessment Study.

US Geologic Survey

Gross mapping of aquifers in Eastern Washington.
Periodic inventory of selected wells in Eastern Washington.
Stream gage data.
Water resource studies.

US Census Bureau

Irrigated land data.

Department of Health

Surface and ground drinking water.
Quality data after treatment; limited data before treatment.
Water well inventory and water quality.

Department of Natural Resources

Land resource (GIS).
Aerial photography.
Ground control.
Statewide public land survey (GIS).
County boundaries (GIS).
Water resource inventory areas (GIS).
USGS hydrologic units (GIS).
Soils, transportation, and hydrology data on State and private forest land.
Stream data.
Watershed data.
Eastern Washington irrigation data.
Navigable marine and fresh water data.

Recreation

Stream flow studies.

Department of Wildlife

Hydraulic Project Approvals.
Nongame data system.
Pacific Northwest Rivers Study.

Universities

Water resource studies and reports.

Water Utilities

Water treatment data.
Infrastructure, projections, and source data.
Water resource studies and reports.

US Geological Survey

Hydrographic data.
Water quality data.
Stream flow measurements at gauging stations.

US Bureau of Reclamation

Annual Irrigation District reports

Local (Cities and Counties)

Land use.
Tax parcels.
Census data.
Miscellaneous data

Department of Fisheries

Catalog of Washington Streams for Puget Sound.
GIS for salmon habitat.
Stream quality at hatcheries.
Hydraulic Project Approvals for streams.
Stream flow data.
Puget Sound spawning ground survey information..

Washington State Water Resource Association.

Water diversions by district.
On-farm deliveries.
Computed evaporation / conveyance losses.
Drains and return flow to streams.

GWMA Lead Agencies

Ground water management area data for wells.
Stream gage data.
Rainfall data.

APPENDIX F

ORGANIZATIONS

APPENDIX F - ORGANIZATIONS

Department of Agriculture
Northwest Indian Fisheries Commission
Water Research Center (WSU)
Corps of Engineers
Environmental Protection Agency
Trade and Economic Development
US Forest Service
National Park Service
National Oceanic & Atmospheric Administration
Northwest Power Planning Council
US Census Bureau
Washington Association of Water and Sewer Districts
Association of Washington Cities
Washington State Association of Counties
Cities (multiple)
Irrigation Districts (multiple)
Irrigation Non-Districts (multiple)
Industry (multiple)
    Food Processing (multiple)
    Chemical, Smelting (multiple)
    Other
Counties (multiple)
    Local Health Departments (multiple)
    Planning / Engineering (multiple)
    Recreation (multiple)
Public Utility Districts (multiple)
    Power Utilities (multiple)
Private (multiple)
    Hydropower (multiple)
    Domestic (multiple)
    Recreation (multiple)

APPENDIX G

DETAILED DATA INVENTORY QUESTIONS

APPENDIX G - DETAILED DATA INVENTORY QUESTIONS

General Questions: The following questions apply to water resource data inventory in general, data subject definitions, and organizations that have water resource data.

Are there any adjustments to the data subject area or data subject group definitions?

Are there any other data subject areas or data subject groups that need to be defined?

Are there any other organizations that need to be interviewed?

Who is the contact person for follow-up questions regarding the details about water resource data in your organization?

Who is the contact person or persons for general information about your water resource data?

Current Data Questions: The following questions apply to the data currently maintained by an organization.

What data do you have by data subject area or data subject group?

What is the extent (area covered) by these data?

What time frames (periods of time) do these data represent?

Are these data tabular or spatial?

If the data are spatial, are they point, line, or area data?

What is the scale of these data?

What is the accuracy or resolution of these data?

What is the general platform where these data reside?

What is the geographic reference method for defining locations?

What is the method of unique identification of water resources?

Data Flow Questions: The following questions apply to the flow of data between organizations and the sources and distribution of data.

Are these data collected or acquired?

If the data are acquired, who supplies the data?

Have acquired data been altered in any manner and how have they been altered?

If the data are collected, what is the frequency of collection?

Are these data distributed to other organizations?

What data are distributed and what organizations receive those data?

Are there any criteria for confidentiality, acquisition, or use of your data?

Detail Data Questions: The following questions apply to detailed information about data maintained by an organization.

What specific data do you have in each data subject area or data subject group?

Do you have definitions of data and definitions of coded data values?

Do you have formats, integrity rules, or other detail about these data ?

Future Data Questions: The following questions apply to the need for future data requirements.

Are there any data you plan to have in the near future?

What data do you need that you don't already have?

APPENDIX H

DETAILED PRELIMINARY RECOMMENDATIONS

APPENDIX H - DETAILED PRELIMINARY RECOMMENDATIONS

This section describes in more detail the Water Resource Data Management Task Force's preliminary recommendations to the Legislature. Each recommendation includes Findings, Recommendation, Benefits, and Impacts.

The Findings briefly describe the situation as it exists today and the problem with that situation. The Recommendation description explains what is desired or needed to resolve the problem. The Benefits description explains the anticipated benefits of implementing the recommendation. The Impacts description explains the anticipated results of not implementing the recommendation.

A number of the preliminary recommendations refer to *interjurisdictional participants*. The term *interjurisdictional participants* is used in these recommendations to indicate the broad variety of parties interested in water resource planning and management and in water data, including: federal, State, and local government, Indian tribes, public utilities, irrigators and irrigation districts, academia, industries, environmentalists, recreation interests, other interested parties and organizations, and the general public.

Some of the preliminary recommendations refer to preparation of a *feasibility study*. This term is intended in the recommendations to refer to a DIS standard feasibility study, which includes a project description, assessment of alternatives, cost benefit analysis, risk assessment, project management plan, and other related information as required by DIS feasibility study standards and guidelines.

The preliminary recommendations are grouped according to the three major groupings described in the body of this report: PLANNING & FRAMEWORK, INVENTORY & BASIC DATA, and MODELS & ANCILLARY DATA.

PLANNING & FRAMEWORK

Preliminary recommendations 1 through 5 are intended to establish a comprehensive plan and framework for the improved management and sharing of water data. The Task Force considers this plan and framework to be a critical and essential first step in a data program aimed at providing the information necessary for effective statewide and regional planning and management of the State's water resources.

These five recommended projects will develop: a five-year water resource data management plan, a common water data architecture, a detailed water data inventory, standard water identification and location systems, and improved data sharing capabilities.

1. Develop Five-Year Water Resource Data Management Plan

Findings:

A consistent, comprehensive five-year plan for the management of the State's water data is needed and is legislatively mandated.

Specific planning needs to be completed before informed management decisions can be made as to how water data would be best made available and shared among the various organizations interested in the planning, management and use of the State's water. Regulatory and oversight bodies need assurance that funds and public resources used for water data management will be well spent.

Recommendation:

Develop and publish a five-year water resource data management plan as prescribed in Engrossed Substitute House Bill 2932. The five-year plan should be based on specific water resource planning and management responsibilities, and should include a refined analysis of water information needs and recommendations for carrying out those responsibilities. The plan should have a regional and statewide orientation for managing the State's water data, and should identify the responsibilities of various organizations for water data management.

The plan should evaluate the preliminary findings and recommendations in this report, adding to or amending them as necessary.

The plan should make visible the needs, opportunities and requirements to make water data available and to collect additional water data.

The plan should assess and identify GIS (Geographic Information System) or other capabilities needed for storing, analyzing, and displaying water data.

The plan should not be a feasibility study, but it should refine the description of each project recommended in the next biennium at a general level to include: refined anticipated benefits; refined budget estimates; alternative approaches to accomplishing the project; refined project schedules which include estimated elapsed months, major project phases and key decision points; critical success factors; project risks and ways to mitigate those risks; a project work plan which includes project tasks, deliverables, and participating organizations.

The Department of Ecology should take the lead in development of the plan, with participation and support from DIS and the Water Resource Data Management Task Force.

Benefits:

A five-year water resource data management plan will: Improve interagency and interjurisdictional understanding of water resource information needs.

Provide coordinated focus and direction to interagency and interjurisdictional water data management activities.

Facilitate progress toward improved availability of water data and information for regional and statewide water resource planning and management.

Provide the Legislature with improved visibility of water data management directions, activities, and costs.

Reduce the costs of water data management through improved planning and reduced redundancy of water data collection and processing.

Lead to improved compatibility of water data systems and improved sharing of water data and information.

Impacts:

The Legislature has recognized the importance of developing a five-year water resource data management plan by legislatively mandating such a plan in ESHB 2932. Failure to develop a plan will lead to continued lack of focus and direction to water data collection and management, continued unnecessary expense due to redundant and uncoordinated water data collection, and continued inability to provide the information necessary for effective statewide and regional water resource planning and management.

2. Develop Common Water Data Architecture

Findings:

Water data exist in many different forms and in many organizations. Many of these data have different names and definitions. There is no easy way to identify these data and to share these data in a consistent, efficient manner.

Recommendation:

Develop a detailed data architecture of data subjects, data characteristics, and coded data values that supports management of the State's water resources. This detailed data architecture should be an extension of the initial data architecture developed and presented in this initial report to the Legislature.

The common water data architecture should include definition of all identification and location systems and all coded data values currently in use. Common coded data values should be identified for long-term migration and a table of coded data values should be used for short-term translation.

The common data architecture should include a data dictionary of standard common data definitions, a directory identifying the location and availability of the State's water data, and a procedure to keep that directory current and make it readily available.

The common data architecture should be used as a basis for understanding, sharing, and integrating water data in all other projects where water data is used.

DIS should have lead responsibility for the development of this common water data architecture.

Benefits:

The common water data architecture will: Provide a framework for the definition, collection, consolidation, sharing, and use of the State's water data. The data architecture will be used for the major projects defined in this report as well as for individual projects done by water resource organizations.

Set a long-term direction for the structure of the State's water data that complies with the State's strategic directions for information technology.

Provide a base for a detailed inventory of water data that currently exist in a variety of organizations.

Promote the consistent and efficient sharing of water data between water resource organizations and provide a base for development of a data sharing infrastructure for water data.

Provide a base for the identification of a standard location system for water bodies, a standard identification system for water bodies, and the use of standard coded data values.

Impacts:

Not implementing this project will lead to collection of additional data that are not compatible with existing data, limited or difficult data sharing, data that are not readily identified, inappropriate use of data, and redundant data capture and maintenance.

3. Develop Detailed Water Data Inventory

Findings:

Water data are currently being collected or are planned to be collected by many organizations across the State. There are opportunities to reduce or control the cost of making informed decisions by using water data already available.

Recommendation:

Perform a comprehensive inventory of the State's water data at the data element level, including the organizations collecting those data, the time frames and extent of those data, the organizations maintaining those data, and the contacts in those organizations.

Identify the primary sources of the State's water data and the major flows of water data between organizations. Identify points where data are altered or additional data are derived.

The water data inventory should be done within the framework of the common water data architecture, and should build on information contained in the preliminary water data inventory provided to the Legislature in this report.

DIS should have lead responsibility for the development of the detailed water data inventory.

Benefits:

The water data inventory will: Facilitate and promote the sharing of water data.

Provide improved data availability for implementing many of the other Task Force preliminary recommendations identified in this report.

Provide detail information for developing a water data sharing infrastructure.

Identify data that already exist and assist in identifying additional data that need to be collected to properly manage the State's water resources.

Impacts:

Not implementing this project will result in continued duplicate efforts and costs of water data collection, ongoing misunderstanding of the condition of the State's water resources, and ongoing difficulty in making informed water resource policy and management decisions.

4. Develop Standard Water Identification and Location Systems

There are two major pieces to development of standard water identification and location systems. The first piece pertains to standard identification and location of surface water bodies and the second piece pertains to standard identification and location of wells.

4a. Standard Surface Water Body Identification and Location

Findings:

Considerable data have been collected for surface water. However, it is very difficult to compile and correlate these data because of a lack of standardized identification systems for surface water bodies. Due to the different systems for defining location, it is often impossible to determine if these data pertain to the same water body without considerable effort.

Although many maps exist for surface water bodies, no one series of maps has been adopted as the standard for cross-referencing information. In the case of wetlands, National Wetlands Inventory maps are readily available, but access to local maps is limited. No sets of widely accessible maps contain standardized and unique stream or lake numbers, or river miles, that could be used for cross-referencing.

The lack of standardized identification systems for surface water bodies has resulted in tremendous inefficiencies as the data are analyzed. It also results in limited data sharing and frequent duplication of data collection.

Recommendation:

Establish a committee comprised of interjurisdictional participants with expertise about surface water body identification and location systems.

Evaluate existing identification and location systems, such as the USGS 1:100,000 stream network, the Timber Fish and Wildlife 1:24,000 stream network, and the National Wetlands Inventory digital files.

Establish a standard identification system for surface water bodies that uniquely identifies each surface water body.

Establish a standard location system for surface water bodies that provides the resolution necessary for effective water resource management.

Define initial procedures for converting existing surface water body data to the standard identification and location systems.

The standard surface water body identification and location systems should be used as a basis for sharing and integration of surface water body data in all other projects where water data is used.

DIS or Department of Ecology should have lead responsibility for the development of the standard surface water body identification and location systems.

Benefits:

The common surface water body identification and location systems will: Provide a base for coordinating all data about surface water bodies.

Provide a base for sharing surface water body data in an efficient and timely manner.

Enhance the common water data architecture and the detailed water data inventory.

Impacts:

Not implementing this project will result in continued inability to assess the condition of surface water bodies, and continued confusion and miscommunication about surface water body management.

4b. Standard Well Identification and Location

Findings:

Nearly all of the State's information on ground water resources originates from wells. Currently, there is no standardized system for identifying and locating wells.

Reported well locations are often inaccurate, and insufficient information about the well makes it nearly impossible to correlate water quality, water rights, water quantity, and water use information for wells.

A well identification committee comprised of persons from the natural resource agencies, local governments, the Department of Health, the well drilling industry, the USGS, and other organizations has been active for several months. This committee has drafted procedures for identifying and tagging both new and existing wells.

Recommendation:

Establish a standard identification system for wells. The standard well identification system should result from recommendations by the existing well identification committee.

Adopt a standard location system for wells. The standard well location system should coordinate with the standard surface water body location system identified in recommendation 4a and with the work of the Washington Geographic Information Council.

Define initial procedures for converting existing well identification and location data to the standard identification and location systems, including procedures for physical tagging of wells and correlation of the well standard identifiers and locations with well driller reports.

The standard well identification and location systems will be a basis for sharing and integrating well data in all other water data projects.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

A standard well identification and location system will: Provide a base for coordinating all data about wells.

Provide a base for sharing well data in an efficient and timely manner.

Enhance the common water data architecture and the detailed water data inventory.

Assist in the recommended project 7b to map and characterize the State's aquifers.

Impacts:

Not implementing this project will result in a continued inability to identify wells and coordinate data about wells, including data about water quality, water rights, water quantity and water use.

5. Facilitate Water Data Sharing

Findings:

Sharing of water data among the various interjurisdictional participants which collect or need water data is currently without much structure and has not received much focused attention. Locating and gaining access to water data from another organization is often a difficult and time consuming process. It may require traveling to multiple locations, searching and copying of

paper files, and the time and assistance of the organization which has the data to find and sort through the data.

When such data are obtained they may not be in a readily usable format and they may not be directly relatable to other water data already collected. In many cases these obstacles cause water data to be redundantly collected instead of being shared.

Recommendation:

Prepare a feasibility study to identify and implement an infrastructure for sharing water data. The data sharing infrastructure should facilitate access to water data by all interjurisdictional participants.

The data sharing infrastructure should include data sharing policies, standards, guidelines, tools, and procedures, and should address data security and privacy constraints, data availability, data integrity constraints, data access cost recovery, and any other issues or information pertinent to readily sharing water data.

The data sharing infrastructure should include use of the Communications Backbone Network currently being developed by DIS to connect water data users to the primary sources of water data, and should include sharing of both tabular and spatial data.

DIS should have lead responsibility for implementation of this recommendation.

Benefits:

Identifying and implementing a water data sharing infrastructure will: Provide an improved process and standards for sharing water data.

Prevent unnecessary redundant water data capture and the associated costs of redundantly collecting and editing water data.

Reduce the time and expense of gaining access to needed water data.

Improve the usefulness and quality of water data by basing data sharing on a common water data architecture.

Increase the amount and types of water data available for sharing as organizations begin to take advantage of data sharing capabilities and opportunities.

Impacts:

Not implementing this project will result in continued difficulty and unnecessary expense in gaining access to needed water data, continued costs for redundant data collection, limited

improvement in the quality and usefulness of available water data, and failure to establish a base for subsequent projects to improve and utilize water data.

INVENTORY & BASIC DATA

Preliminary recommendations 6 through 12 are intended to consolidate and improve the basic data about the State's surface and ground water resources. These preliminary recommendations enhance the quality, usefulness and availability of fundamental data needed for effective statewide and regional water resource planning and management.

This major grouping of preliminary recommendations includes recommendations for: coordinating water resource studies, consolidating well data, identifying the location, geology, and quantity of ground water, identifying the location and extent of surface water bodies, improving surface and ground water quality and use data, improving surface water quantity data, and improving water rights data.

6. Develop Clearing House for Water Resource Studies

Findings:

A wide variety of water resource studies have been conducted, are in progress, or are pending. These studies are often uncoordinated, overlapping or redundant. Results from separate study projects lack integration, leading to inconsistent findings and fragmentation of data about the State's water resources.

Recommendation:

Identify water resource studies that are in progress or are pending that pertain to the State's water resources and make information about these studies generally available.

Develop a clearing house for water resource studies. Such a clearing house would maintain a bibliography that includes the type of study, availability, location, time frame, purpose, and results. The clearing house should also maintain and provide access to a central library of the actual physical studies.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

Implementation of water resource study clearing houses will: Begin coordination and integration of studies related to the State's water resources.

Prevent possible overlap and redundant effort that might be involved in water resource studies.

Promote minimum expenditures for obtaining information about the State's water resources.

Assist collection of water data within a common data architecture.

Impacts:

Not implementing this project will lead to continued overlapping study projects, unnecessary expenditures, inconsistent findings, redundant effort, and fragmentation of information about the State's water resources.

7. Develop Improved Ground Water Data

There are two major pieces to developing improved ground water data. The first piece pertains to consolidation and automation of well data. The second piece pertains to mapping and characterization of the State's ground water including collecting improved data about ground water quantities.

7a. Consolidate and Automate Well Data

Findings:

Nearly all of the State's information on ground water resources originates from wells. Data from wells reveal the subsurface geologic materials, ground water locations and extents, water levels, water quantities likely to be available, and much more.

Well data are collected and used by a wide variety of organizations: cities, counties, state agencies, federal agencies, utilities, Indian tribes, and others. Currently these data are scattered and often inaccessible to others. In addition, well data are not always stored in consistent formats that allow easy sharing.

The most fundamental data about wells are from the driller reports for each well drilled in the state. The driller report contains information on the well location, well depth, water levels, geologic materials penetrated by the well, and other key information. Well data from driller reports are in constant demand for analysis by a wide variety of organizations, and are currently transferred manually, at great time and expense.

Since 1987, the lead agencies for Ground Water Management Areas (GWMAs), normally the counties, have been collecting, compiling, and maintaining well-related data for use in quantifying and protecting ground water supplies at the local level. There is currently no mechanism for

compilation and sharing of these data across GWMA boundaries, or for combining these data with well data from other sources.

Recommendation:

Implement the standard well identification and location systems according to the procedures developed in Recommendation 4b, including physically tagging wells, correlation of the well standard identifiers and locations with well driller reports, and implementing the standard identification and location systems into existing and new data collection systems.

Establish a master reference for wells that can be used to coordinate all well and well-related data.

Conduct a feasibility study for automating well driller reports and compiling well-related data. Based on the feasibility study, develop and implement an automated system for collection of well data from driller reports and other sources, and compilation and analysis of well-related data across Ground Water Management Area (GWMA) boundaries.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

Development and implementation of an automated system for well data will: Improve the State's ability to analyze, assess and manage the quality and quantity of its ground water resource, and to make informed water allocation decisions.

Reduce the need for collecting additional well data and allow the full value to be extracted from existing well data.

Reduce the currently enormous effort, time and expense involved in manual transference of well data.

Impacts:

Not implementing this project will result in continued piecemeal, inefficient, and costly ground water resource assessments, and continued inability to make informed water allocation decisions. Widely used data from well driller reports will continue to be cumbersome and costly to share, and organizations will continue to redundantly collect already existing well-related data. Additionally, it will not be possible to map and characterize the State's aquifers, as described in Recommendation 7b below.

7b. Map and Characterize Aquifers

Findings:

The delineation of the State's aquifers is largely unknown and detailed information about the State's aquifers is lacking.

The amount of water available from ground water supplies is not clear for many parts of the State. In many areas of western Washington, surface water has been the traditional source of supply. As these surface water supplies are restricted or fully utilized, ground water will become the likely source for future supplies. However, a lack of understanding of the State's hydrogeology and the unknown effects of ground water withdrawals on stream flows and seawater intrusion in coastal areas has hampered development of these supplies. Development of future water supplies requires long lead times. Lack of understanding of ground water availability contributes to delays in developing those supplies, which can result in water shortages as the population increases.

There is currently insufficient information on aquifers in the State to allow a standard set of reference maps and a standard aquifer identification system to be adopted. The existing sources of information for aquifer locations and extents consist of a very generalized map of the state entitled "Principal Aquifers and Well Yields in Washington" published by the Department of Ecology and the USGS in 1980 (Molenaar, et. al. 1980) at a scale of 1:1,000,000, and scattered reports for specific areas at various scales by the USGS, Department of Ecology, local governments, Ground Water Management Areas, consultants, and others.

Only limited information exists of aquifer recharge areas and how the State's water travels through the subsurface. A knowledge of aquifer recharge areas and subsurface water movement allows predictions of water quantity and the potential spread of water contamination. This information is needed for aquifer and water well protection measures.

The USGS has recently completed extensive studies of the aquifers of the Columbia Basin, and has begun a similar study in the Puget Sound Lowlands. The Department of Natural Resources is currently undertaking a similar type of effort in mapping the geology of the State. Ground Water Management Area reports provide additional information about the aquifers in the state.

Recommendation:

Develop and publish an updated version of "Principal Aquifers and Well Yields in Washington" based on USGS and Ground Water Management Area studies.

Begin mapping the aquifers of the State at a more detailed scale that is suitable for use for water availability assessments, water allocation decisions, aquifer vulnerability assessments, aquifer protection measures, and other uses.

Begin characterizing the aquifers, including identification of features and water quantities.

The mapping and characterization of aquifers should be based on the common water data architecture, including standard identification and location systems for aquifers.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

An updated map of the State's aquifers provides the basic information to assess the large, regional picture of the State's ground water resources, is a fundamental source of information for water resource planning and management, and helps fulfill the State's role of providing information to State and local agencies and the public on our water resources.

Aquifer mapping and characterization provides a base for determining the availability of water from aquifers and analyzing the interaction between surface and ground water, and meets recently developed ground water quality standards which require aquifers to be mapped and characterized so that critical areas can be protected from contamination.

Impacts:

Not implementing this project will result in a continued major void in fundamental water resource information, a continued inability to assess, protect and manage the State's ground water resources, a continued inability to assess water availability and make informed water allocation decisions, and the State will not be fulfilling its responsibility to provide ground water information that can be used for statewide and regional policy development and decision making.

8. Develop Surface Water Body Inventory

Findings:

There is currently no one set of standard data or maps which identify and locate the State's surface water bodies, and
no one standard source of data about surface water bodies.

Recommendation:

Implement the standard surface water body identification and location systems into existing and new water data collection systems according to the conversion procedures developed in Recommendation 4a.

Establish a master set of reference materials for the State's surface water bodies that can be used to coordinate all water data about those surface water bodies. These reference materials should: use the standard surface water body identification and location systems; include maps, photos, tabular indexes, and other data which describe the location and extent of the State's surface water bodies; and include completed maps of the State's watersheds at the appropriate scale. The National Wetland Inventory, TFW (Timber, Fish and Wildlife) data, USGS data, and other data sets should be used as primary input to this process.

The five-year water resource data management plan should determine who has lead responsibility for implementation of this recommendation.

Benefits:

A single standard set of identification and location data and maps about surface water bodies will: Provide a common basis and framework for collection and consolidation of other surface water body data, including water quality, quantity, use, and water rights data.

Reduce the current time and expense of cross-correlating surface water body data which uses different identification and location systems.

Provide a common basis for identifying and locating surface water bodies when setting water resource policy and making water resource management decisions.

Provide improved capabilities for analyzing and evaluating surface water body information on a statewide and regional basis.

Provide the basis and framework for implementing other Recommendations in this report which address needed improvements in surface water body data.

Impacts:

Not implementing this project will result in continued inability to effectively cross-correlate, consolidate, and analyze surface water body data on a statewide and regional basis, continued confusion when setting water resource policy and making water resource management decisions, and inability to implement related recommendations in this report which address needed improvements to surface water body quality, quantity, use, water rights, and other water data.

9. Develop Improved Water Quality Data

Findings:

Substantial amounts of water quality data are currently being collected which cannot be readily cross-correlated to the State's surface water bodies and aquifers. Various data about sources of pollution and types and amounts of potential pollution or degradation do not have common locational frames of reference. As a result, the overall ability to analyze and assess water quality from a statewide and regional perspective is limited and requires more effort than is necessary.

There is a potential for tremendous growth in water quality data. The Safe Drinking Water Act specifies water quality standards for drinking water, including maximum contaminant levels allowable in water samples. A single water sample can be analyzed for a wide variety of water quality parameters.

Water quality data for regional water management is primarily significant in comparison to recent data of the same kind. It is necessary to develop and build up a time series of water quality data in order to analyze and assess changes to water quality in a given locale.

More than one reference system of water quality parameters and analysis methods are currently in use, e.g. the EPA STORET system, which is used primarily for water quality research, and the EPA FRDS system, which is primarily used for federal reporting of water quality data. As a result, water quality analysis and assessment is hampered because water quality data currently being collected use different identification systems for water quality parameters and analysis methods.

Lack of coherent water quality data makes it difficult to predict the need and cost for water treatment, and allows water quality to be compromised, potentially affecting entire downstream systems and large areas and populations, jeopardizing inwater values such as fisheries and wildlife habitat, and putting a variety of water uses at risk.

Recommendation:

Establish a water quality committee comprised of interjurisdictional participants with expertise in reference systems for water quality parameters and parameter analysis methods. Evaluate existing water quality reference systems such as the EPA STORET, the EPA FRDS and others. Establish or adopt a uniform reference system which identifies uniform water quality parameters and parameter analysis methods, including uniform points in time and locations for water sampling.

Enhance the Department of Health and Department of Ecology data systems to include use of the standard well and surface water body identification and location systems and the uniform reference system for water quality parameters and parameter analysis methods.

Perform a feasibility study for an improved data collection and access system for water quality data, including data collected from State agencies, laboratories, and other organizations.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

Implementing uniform reference systems into water quality data collection systems will: Provide improved ability to analyze, assess, protect and manage surface and ground water quality from a statewide and regional perspective.

Reduce the costs for collecting and cross-correlating water quality data.

Provide improved data for predicting the need and cost for water treatment.

Provide an improved basis for managing water quality and reducing the risk to a wide variety of water uses and inwater values, such as fisheries and wildlife habitat.

Impacts:

Not implementing this recommendation will continue the current inability to assess and manage water quality from a statewide and regional perspective.

10. Develop Improved Water Use Data

Findings:

In order to make prudent surface and ground water resource allocation decisions, data about the amounts of water allocated through water rights and the amounts of water currently used are needed.

Many water rights remain on the books, but the water is no longer being used. In some cases, water may be used without proper water rights. Ground water withdrawals of less than 5000 gallons/day do not require a water right, and therefore no comprehensive record of their use is available. Additionally, instream water uses are not amenable to direct measurement and require a more complex assessment as to quantities used. As a result, actual water usage is often estimated from inadequate data.

The lack of good comprehensive information on water use makes it difficult to evaluate whether water is available, hampers water allocation decisions, and results in allocation decisions that may not be in the best public interest.

Improvements in water use efficiency and conservation are difficult to define, implement, and measure without good water use data.

Information about future requirements for water use is needed to support water resource planning, for making water resource allocation and management decisions, and for coordinating water resource policy and planning with growth management.

Recommendation:

Identify all available data on current surface and ground water use, including type of use, location of diversion or withdrawal, location of use, quantities, and time frames. The identification should be based on the detailed water data inventory.

Conduct a feasibility study for automating water use data. Based on the feasibility study results, develop and implement a database of current surface and ground water use, including reported quantities for at least a ten year period. The database should contain data about all types of water use, including recreational use.

Develop and adopt guidelines for water use reporting by interjurisdictional participants. Such interjurisdictional participants should be represented in the development and adoption of such guidelines. The guidelines should be based on the standard types of water use data identified in the common water data architecture, and should take advantage of the existing Department of Ecology, Department of Health and other authorities and processes for collecting and reporting water use data.

Department of Ecology, in concert with the Department of Health, should have lead responsibility for implementation of this recommendation.

Benefits:

Developing and implementing a water use database and water use reporting guidelines will: Provide an improved basis for assessing water availability, assessing the effectiveness of water conservation and water use optimization efforts, and making water allocation decisions in the public interest.

Provide improved data for water resource planning, setting water resource policy, and coordinating water resource policy and planning with growth management.

Impacts:

Not implementing this project will result in continued inability to assess water availability, and continued uncertainty as to whether water allocation decisions are in the public interest.

11. Develop Improved Surface Water Quantity Data

Findings:

Data about surface water quantities are obtained from stream flow and lake/reservoir gauging stations, and are needed to make water allocation decisions. Stream flow data are also used to monitor extreme high and low flows, to regulate water rights that are tied to a minimum flow, for flood control, for drought management, and for managing instream resources.

There are currently about 175 continuous gauges operated in the State by the U.S. Geological Survey, but there are many areas without gauges. Stream flow levels for the critical low flow period of late summer and early fall are difficult to estimate without gauges because there is often considerable variation from basin to basin.

Inadequate stream flow data hampers water allocation decisions because the amount of water available for allocation is not known. It also impairs drought management, water right regulation, and management of instream resources.

Recommendation:

Develop a plan for coordinating existing data and collecting additional data about surface water quantities. The plan should be developed by interjurisdictional participants knowledgeable about hydrologic data collection.

The surface water quantity data collection plan should address the need for additional stream flow and lake/reservoir gauging stations, including the types, locations, and priorities of where they are needed. The plan should also identify other surface water quantity data to be collected, frequency of data collection, responsible organizations, data quality control procedures, where the data will be stored, and how it will be maintained.

Implement the surface water quantity data plan, including implementation of additional needed stream flow and lake/reservoir gauging stations. Determine the supply of water in each surface water body, the variations in water supply, and the time frames for those variations. Incorporate water quantity data from gauging stations, water resource studies and other sources.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

Developing and implementing a surface water quantity data acquisition plan will: Provide an improved basis for water availability assessments and water allocation decisions.

Provide improved data for flood control, drought management, enforcing minimum flows, and other water resource management functions.

Impacts:

Not implementing this project will result in continuing gaps in fundamental data needed for effective water resource planning and management decisions.

12. Develop Improved Water Rights Data

Findings:

Data about the amount of water allocated through water rights is necessary for assessing water availability and making water allocation decisions. Water rights data are used for nearly every water resource study, to determine who may be at risk when contamination is discovered in a water body, and to notify water right holders when activities occur that may affect the quality of their water, including lake herbicide applications and forest practice applications.

Water rights data currently are in a very cumbersome form, require extensive manual analyses to be of value for specific geographic areas and specific water bodies, do not identify the precise locations of water use, diversion or withdrawals, and are not always current and accurate.

The lack of well organized and accurate water rights data results in unnecessary expenditures by State and local agency staff to manually manipulate large amounts of data. In some cases, actual water allocation amounts can not be calculated, resulting in uncertainties about water availability.

Recommendation:

Conduct a *feasibility study* for improving the existing Department of Ecology water rights database. Based on feasibility study results, develop a comprehensive water rights database that provides current and accurate data for water allocation decisions, and supports the ongoing water permit process and other water resource planning and management activities.

Department of Ecology should have lead responsibility for implementation of this recommendation.

Benefits:

An improved water rights database will: Identify where water rights are being used, allow water rights data to be summarized for specific water bodies and for a variety of geographic areas of interest, and provide improved data for making water allocation decisions.

Provide a basis for improved statewide and regional water resource planning and management.

Improve the efficiency of the day-to-day operations of issuing and denying water right permits and certificates.

Allow reduced manual manipulation of water rights data by researchers and other users of water rights data in a variety of organizations.

Enable effective notification of water right holders when activities may threaten their water supply.

Impacts:

Not implementing this project will result in continued inefficient and costly manual manipulation of water rights data, ongoing incompleteness and inaccuracy of water rights data, continued inability to effectively analyze and assess water availability statewide, regionally, for specific water bodies, or for other geographic areas of interest, and ongoing inability to effectively identify and notify water right holders when activities may threaten their water supply.

MODELS & ANCILLARY DATA

Preliminary recommendations 13 through 15 are intended to collect additional information important for effective statewide and regional water resource planning and management.

These three recommended projects will collect information about water flow and inwater resource relationships, surface water and ground water interactions, and water quality and water use relationships.

13. Develop Water Flow/Inwater Resource Relationship Information

Findings:

The relationship of stream flow to inwater resource indices shows how inwater values vary with changes in stream flow. The relationships allow determination of the amount of water that is needed to protect fisheries and wildlife resources, for recreational activities, and to preserve aesthetics. It also shows trade-offs if water were to be allocated off-stream. The relationships will vary for different fish and wildlife species and life states and different recreational activities.

Without an understanding of the relationships of inwater resource indices to stream flow, it is not possible to evaluate the impacts of off-stream allocation, determine where surplus surface water is available for allocation, or accurately establish minimum instream flow protection levels.

This lack of information makes it difficult to set water allocation policies, plan future water supplies, or make informed water allocation decisions in the public interest, and results in inefficiencies when dealing with proposed water diversions on a case by case basis.

Instream flow studies take at least one year to complete and often more than one year. Lack of data regarding the relationships of instream flow to inwater resource indices exists for a large number of surface water bodies throughout the State.

Recommendation:

Establish a team comprised of interjurisdictional participants with instream flow expertise. The instream flow team should develop recommendations regarding the types of instream flow studies needed and the instream resource indices to be measured. The specific types of studies to be performed and instream resource indices to be measured should be based on policy decisions by the Joint Select Committee on Water Resources.

The instream flow team should coordinate with the Water Resource Policy Team to target and prioritize study locations. The instream flow team should conduct the appropriate types of instream flow studies according to the target locations and priorities, and should also collect water quality data as practical.

The five-year water resource data management plan should determine who has lead responsibility for implementation of this recommendation.

Benefits:

Initiating instream flow studies to identify the relationships between stream flow and inwater indices will: Make data available for setting allocation policies for the State's water resources and for making improved and more timely allocation decisions.

Allow determination of the amount of water that is needed to protect fisheries and wildlife resources, for recreational activities, and to preserve aesthetics.

Provide data for evaluating the impacts of off-stream allocation and determining where surplus surface water is available for allocation.

Increase the certainty that water resource allocation policies and decisions are in the public interest.

Impacts:

Not implementing this project will result in inevitable major delays on all significant water allocation decisions, continued difficulty and inability in setting water allocation policy, and continued uncertainty that water allocation decisions are in the public interest.

14. Develop Surface Water/Ground Water Interaction Information

Findings:

Surface water and ground water are in constant interaction. Surface water becomes ground water when rainfall penetrates the earth's surface or when a stream or lake recharges an adjacent aquifer. Ground water becomes surface water when it emerges in the form of springs or seeps into wetlands, or when it discharges below the surface into lakes, streams or the ocean. Whenever ground water is withdrawn, the discharge to surface water bodies is reduced.

In coastal areas, withdrawal of ground water can cause seawater intrusion, or the movement of the fresh water interface landward. Without an understanding of the hydrologic systems, it is not possible to quantify the effects of ground water withdrawals on surface water bodies or seawater intrusion, either in amount of water or the time frame of the impact.

Lack of understanding of the relationship between ground and surface water hampers utilization of ground water supplies. To define ground water availability, the effects of ground water withdrawals need to be known and evaluated. Extended pumping in one area may result in lower stream flows in a nearby stream or seawater intrusion into coastal areas. Without knowledge of the relationship between ground water and surface water, the amount of water that should be allocated can not be evaluated.

A number of studies are currently being conducted that will give insight to surface and ground water interaction: several by the U.S. Geological Survey (USGS), a Puget Sound Regional Aquifer System Analysis (RASA) study, and a Soos Creek study. These studies will continue into the 91-93 biennium.

Recommendation:

Analyze the ground water and surface water interaction findings from the USGS, RASA, Soo Creek, and other studies. Conduct additional pilot studies in different geologic settings.

Develop models of the interaction between surface water and ground water and the movement of water between water bodies within different geologic settings.

The five-year water resource data management plan should determine who has lead responsibility for implementation of this recommendation.

Benefits:

Developing improved surface water and ground water interaction data will: Provide an improved basis for managing utilization of ground water supplies, and for predicting and managing seawater intrusion into ground water supplies.

Provide improved data for predicting stream flows and surface water availability, and for making water allocation decisions.

Impacts:

Not implementing this project will result in continued uncertainty in determining water availability for allocation.

15. Develop Water Quality/Water Use Relationship Information

Findings:

The relationship between water use and water quality shows how source water quality varies with source water use. The establishment of this relationship is the basis for determining what uses a water system may support while still protecting instream resources and downstream use. It shows what the tradeoffs are among various uses of the same sources as well as what potential cumulative effects result from subsequent downstream uses.

Without an understanding of the relationships of water use and water quality, it is impossible to evaluate the impacts of off-stream allocation on the aquatic system, on instream resources, and on downstream users. This lack of information prevents the setting of State allocation policies in a manner that protects the public interest. Fisheries and water quality may be sacrificed, and downstream users may be put at risk.

Recommendation:

Identify types of water uses that result in degradation of water quality, especially those extractions and returns which can produce significant adverse impacts on the receiving waters.

Identify regions where present water uses have significantly degraded aquatic systems and placed instream resources and downstream users at risk.

Identify instream water regimes, such as wetlands and riparian vegetation, that naturally contribute to the maintenance of water quality.

Consolidate and integrate water quality and water use relationship data with other water data.

The five-year water resource data management plan should determine who has lead responsibility for implementation of this recommendation.

Benefits:

Identifying extraction and return water uses which adversely impact receiving waters will enable the State to set a water allocation policy which protects fisheries and water quality.

Locating significantly degraded regions where instream resources and downstream users are at risk from specific water uses will indicate areas for special attention and potential remedial action, and for possible shifts in uses to those which avoid immediate and cumulative adverse effects.

Identifying and augmenting natural processes that contribute to the maintenance of water quality allows for the expansion of potential uses of that water, the establishment of conservation areas, and long range planning for emulation and enhancement of such natural processes.

Consolidated and integrated water quality and water use relationship information will contribute to efficient, coherent decision and policy making.

Impacts:

Not implementing this project will result in continued difficulty in setting water allocation policy, and continued inability to evaluate the impacts of off-stream allocation on the aquatic system, on instream resources, and on downstream users.