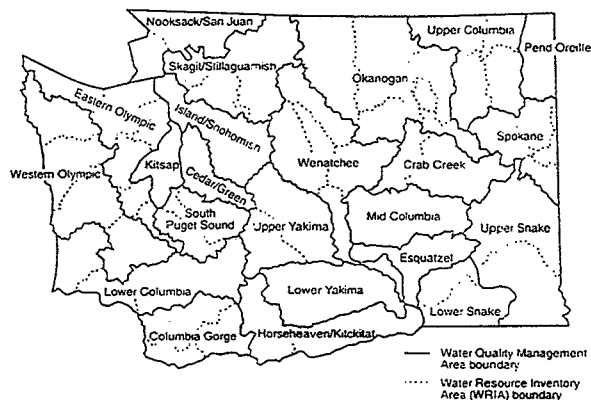


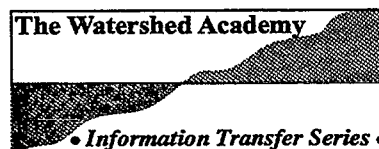


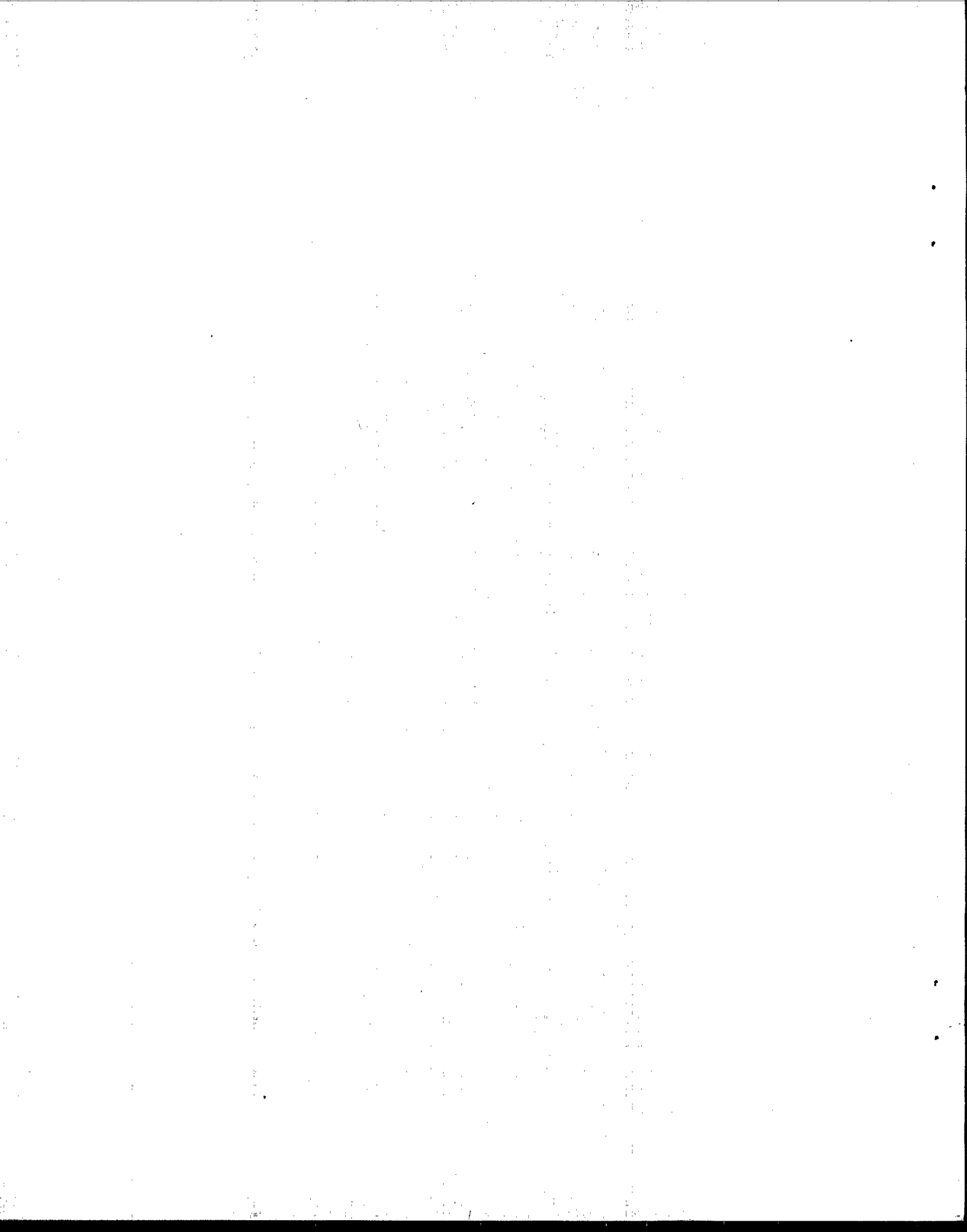
Information Management for the Watershed Approach in the Pacific Northwest



Activities Schedule for Watersheds Under 5-year Cycle								
Water Quality Management Areas	State Fiscal Year (July 1 through June 30)							
	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Skagit/Stillaguamish, Columbia Gorge, Horseheaven/Klickitat, Upper Columbia, Pend Oreille	S	D	A	R	I	S	D	A
Island/Snohomish, South Puget Sound, Okanogan, Crab Creek, Esquatzel		S	D	A	R	I	S	D
Nooksack/San Juan, Western Olympic, Wenatchee, Upper Snake, Lower Snake			S	D	A	R	I	S
Kitsap, Lower Columbia, Upper Yakima, Mid Columbia				S	D	A	R	I
Cedar/Green, Eastern Olympic, Lower Yakima, Spokane					S	D	A	R

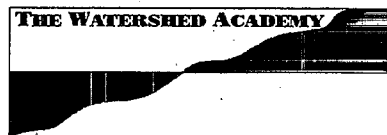
- I = Permits Issued; Other Actions Started
- S = Scoping
- D = Data Collection
- A = Data Analysis
- R = Technical Report





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May 1997



• *Information Transfer Series, No. 6* •

Information Management for the Watershed Approach in the Pacific Northwest

**Assessment and Watershed Protection Division,
Office of Wetlands, Oceans and Watersheds (4503F)**

and

**Permits Division,
Office of Wastewater Management (4203)**

**Office of Water
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460**

FOREWORD

The watershed approach has changed the way that the U.S. Environmental Protection Agency (EPA) and other federal, tribal and state agencies formerly managed water resources programs. We now generally recognize that the critical environmental issues facing society are so intertwined that a comprehensive, ecosystem-based and community-based approach is needed. We also recognize that solving environmental problems depends increasingly on local governments and local citizens. Thus, the need to integrate across traditional water program areas (e.g., flood control, wastewater treatment, nonpoint source pollution control) and to cooperate across levels of government (federal, state, tribal, local) and across public and private sectors is leading toward a watershed approach.

Public and private organizations, academic institutions, and citizens and their governments in thousands of communities across the nation are forming partnerships and learning new ways to manage their watersheds together. These groups seek guidance and examples of watershed approach success stories after which to model their own activities. The EPA Office of Water established the Watershed Academy to help address these needs by providing training for watershed managers based on local, state, tribal, and federal experiences in implementing watershed approaches throughout the past decade.

The Watershed Academy provides technical watershed information and outreach through live training courses, the Internet, and published documents. The Academy offers live training courses on the basics of watershed management and maintains a training catalogue concerning where to obtain more advanced training. An Internet distance learning program called Academy 2000 is being developed to help serve the training needs of those who cannot attend the live courses. The Watershed Academy also provides watershed approach reference materials, such as this document, through the Watershed Academy Information Transfer Series.

This document, number 6 in the Series, centers on a series of interviews with leaders and key participants in the statewide watershed approach activities in the State of Washington. The document reviews Washington's statewide watershed activities in case study fashion. Following this review, the document describes how a watershed information clearinghouse can serve multiple planning, information management and communication roles for watershed groups.

The Information Transfer Series titles include:

- no. 1: *Watershed protection: a project focus*
(EPA841-R-95-003)
- no. 2: *Watershed protection: a statewide approach* (EPA841-R-95-004)
- no. 3: *Monitoring consortiums: A cost-effective means to enhancing watershed data collection and analysis*
(EPA841-R-97-006)
- no. 4: *Land cover digital data directory for the United States* (EPA841-B-97-005)
- no. 5: *Designing an information management system for watersheds*
(EPA841-R-97-005)
- no. 6: *Information management for the watershed approach in the Pacific Northwest* (EPA841-R-97-004)
- no. 7: *Watershed Academy catalogue of watershed training opportunities*
(EPA841-D-97-001)

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This EPA report may also be available on the Internet for browsing or download at:

<http://www.epa.gov/OWOW/watershed/wacademy/its.html>

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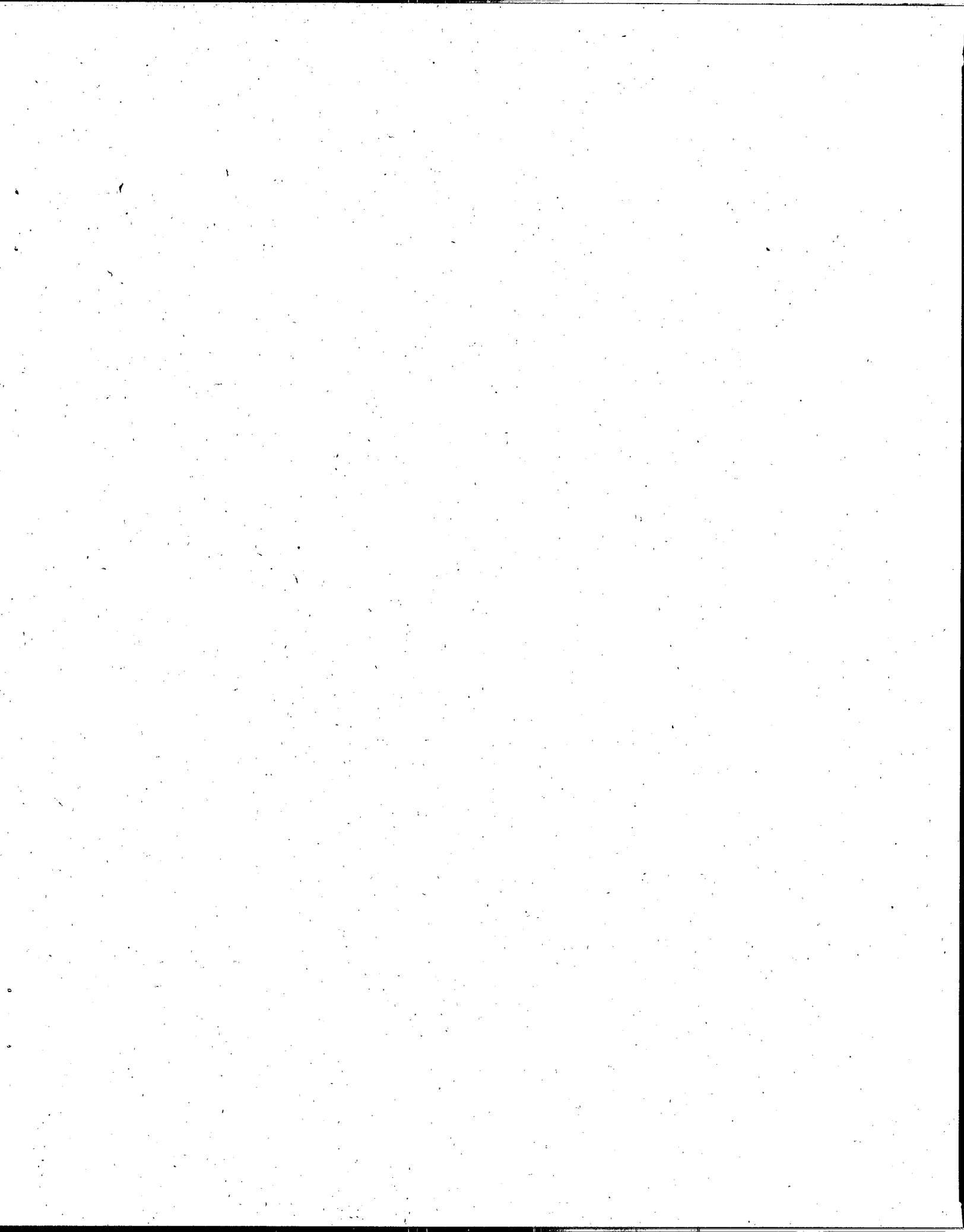
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SECTION 1. INTRODUCTION AND BACKGROUND

Watershed approaches to managing natural resources have had a remarkable resurgence in the Pacific Northwest in the last few years. The trend towards an environmental management system that is community-based and geographically-targeted is likely to continue. The watershed approach has great appeal because it incorporates the principles of ecosystem management, and has been successful in stirring the interest and involvement of citizen volunteers and agency staff. There remain, however, several significant issues related to communication and information management that could limit the success of the watershed approach. This project responds to the need for a method of improved information management and communication among local, state, federal, and tribal watershed partners.

The Pacific Northwest has proven to be fertile ground for many watershed initiatives. Watershed groups or associations have been formed by citizens throughout the Pacific Northwest to address local water quality problems. Coeur d'Alene Lake, Henrys Fork, Lake Sammamish, Nisqually River, and Tillamook Bay are a few of the locations where citizens have taken the lead seeking comprehensive solutions to water quality problems. There are also many other state and federal watershed initiatives that are occurring, including the Washington State WAC 400-12 process, Oregon Watershed Councils, and the President's Forest Plan. These are only a few of the many local, state, tribal and federal watershed initiatives that represent a significant shift in the management of natural resources in the Pacific Northwest.

The purpose of this project was to evaluate the potential for increasing coordination and integration among emerging and established watershed partners. It examines how independent local, state, tribal and federal groups can continue to use the watershed approach to become more effective partners on a voluntary basis. The report findings are based on information gathered from participants involved in a wide range of watershed activities.

1.1 Statewide Watershed Frameworks in EPA Region 10

Water quality programs in the states that comprise EPA Region 10 (Washington, Oregon, Idaho, and Alaska) have all taken steps to develop and implement statewide watershed frameworks. The goal of these watershed initiatives is to provide a framework that will integrate the water quality management activities of local, state, and federal partners. Successfully implemented, this approach systematically incorporates the principles of watershed management into the daily operations of water quality programs. A statewide watershed framework allows those agencies to better coordinate their support for existing and emerging watershed projects. In some states, the statewide watershed frameworks of the water quality programs have been designed to complement the many existing and ongoing watershed activities of other stakeholders.

The state water quality programs started the watershed framework development process without a well defined mandate. There was not sufficient agreement among stakeholders to enable one agency or group to lead the development of a statewide watershed framework. Therefore, the water quality programs were careful to define the limits of their initiatives so that they did not encroach on other agencies' program areas.

The statewide watershed frameworks were developed by work groups having representatives from participating programs. The work groups considered a series of topics pertaining to the elements of a watershed approach. The elements most watershed planning and implementation processes share in common are detailed in Section 1.2. These common elements include: stakeholder involvement, geographic management units, statewide cycle, strategic monitoring, basin/watershed assessment, priority setting and targeting, management strategy development, watershed plans, and implementation.

These elements were used as design tools by the work groups to help structure the statewide watershed framework development process. The work group results are compiled into a framework document that describes the schedule and procedures for a watershed approach.

The framework developed by each state is tailored to its specific circumstances. Substantial differences exist between states based on the descriptions of their approaches provided in draft or final framework documents. Alaska, for example, is the only state that used a framework development work group which included representatives from other agencies, native corporations, industry associations, and environmental groups. In other states such as Washington, the agencies focus on more effectively organizing their own activities, and on increasing the level of public involvement in managing water quality. This internal focus can, nevertheless, encourage voluntary interagency collaboration. Regardless of differences between states, each watershed framework is based on a number of common elements. Table 1-1 summarizes the status of the framework for each Region 10 state water quality program.

1.2 Common Elements of a Watershed Approach

The elements of a watershed approach described in this section are shared by both the statewide framework and individual small scale watershed projects. The following element summaries (illustrated in Figure 1-1) provide the context for further evaluation of watershed communication and information management needs in Region 10.

- *watershed management units*: Participating stakeholders adopt geographic management units using commonly defined boundaries to provide spatial coordination for management activities. Often, ground water aquifers as well as surface waters and their watersheds comprise these management units. The watershed management units must include smaller hydrologic units, "nested" units, that integrate activities from the smallest project scale to large river basins and ecoregions.

STATE	FRAMEWORK DOCUMENT STATUS	IMPLEMENTATION STATUS	SPONSORING / PARTICIPATING AGENCIES
WA	Statewide framework document completed 1992. Update based on experiences to date being considered.	First statewide transitional cycle completed July 1997.	Washington State Ecology - Water Quality Program (Permits). Other program elements being added (NPS), Additional partnerships being established through Governor's Watershed Coordinating Council.
ID	Draft framework document revised and codified as Idaho Code §39-3601 et. seq. in 1995.	Basin Advisory Groups established for all 6 Idaho major river basins. EPA Region 10 sequencing NPDES permits to basin schedules.	Idaho Department of Environmental Quality, Basin Advisory Groups composed of participating interest groups and environmental groups. Watershed Advisory Groups composed of all affected interests within a given watershed. EPA Region 10 for NPDES permits. Basin Advisory Groups advise DEQ on monitoring priorities, revisions to beneficial uses, assign priorities to waterbodies within basin, and review development and implementation of TMDLs. Watershed Advisory Groups (targeted watersheds) recommend specific actions to control point & nonpoint sources to restore beneficial uses.
AK	Alaska Watershed Partnerships (statewide watershed approach framework document) due Fall/Winter 1996.	Implementation will begin Fall / Winter 1996.	AK Department of Environmental Conservation. The statewide framework work group included representatives from local, state, and federal agencies; tribal corporations; industry and environmental groups; among others.
OR	Internal Oregon Watershed Strategy document completed 1995. Development of public review draft proceeding.	No implementation date has been proposed.	Strategy development is currently focused within OR Department of Environmental Quality - Water Quality Program.

Table 1-1. Status of state water quality program statewide watershed approaches in EPA Region 10.

- *watershed management cycle*: The watershed management cycle provides temporal coordination to stakeholder activities and is made up of three components: 1) a series of steps for building and implementing Watershed Management Plans; 2) a common schedule of activities within these steps; and 3) a sequence for addressing watersheds. The cycle is voluntary and can easily accommodate more complex schedules.
- *stakeholder involvement*: Stakeholder involvement is an open process that provides meaningful roles to all interested parties. A watershed approach should include administrative structures and procedures for incorporating a broad range of partners in the watershed management planning and implementation cycle.
- *strategic monitoring*: Strategic monitoring addresses information needs identified by stakeholders and supports watershed goals and objectives. This element supports both development of specific environmental objectives, indicators, and measures of success and implementation of the priority setting feature of the watershed approach. Strategic monitoring and information gathering occur throughout the watershed cycle to support decision-making with up-to-date scientific data on watershed condition
- *watershed assessment*: A comprehensive watershed assessment provides a scientific basis for identifying priority issues in the watershed, and for developing management strategies. Program priorities are evaluated relative to watershed conditions. Assessment precedes decision-making regarding the implementation of program requirements.
- *prioritization and targeting*: This element recognizes that environmental management needs will vary from location to location, and that these needs will consistently exceed the resources available to address them. This element provides procedures for assigning scarce resources more effectively and efficiently. It should be an educational and consensus building step that includes all watershed partners.
- *developing management strategies*: Watershed teams composed of a broad range of stakeholders provide the capability to develop comprehensive solutions to targeted watershed issues. The objective in using teams is to encourage collaborative solutions, reduce redundancies, integrate the efforts of watershed partners, and increase the number of possible resource management options.
- *watershed management plans*: A Watershed Management Plan (Plan) consolidates assessment data, documents decisions on targeted priorities, describes management strategies, and presents schedules and agreements for implementing management strategies. The Plan documents the consensus building process, and serves as a guide for stewardship, or as an "owner's manual" for watershed stakeholders. If the Plan is compiled as the watershed process proceeds, it can serve as a central collection point for information, and be used as a resource for developing other communication products.

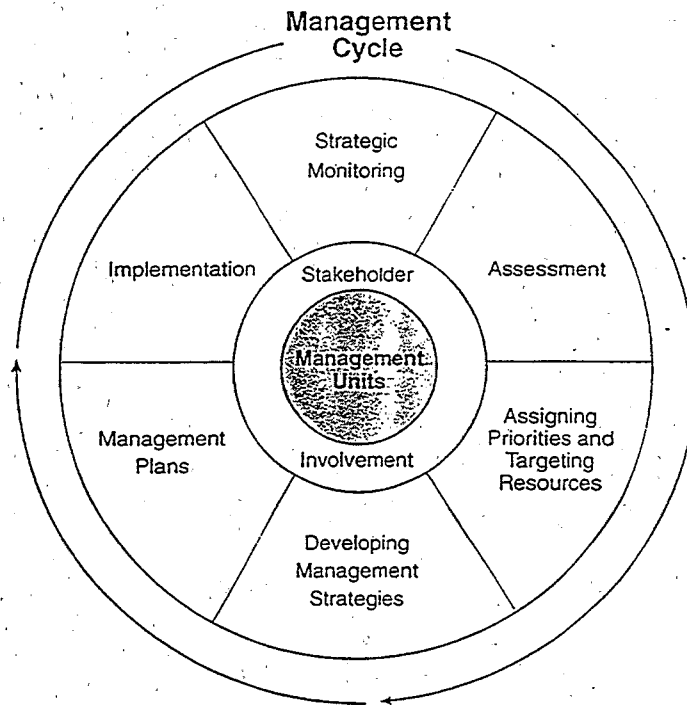


Fig. 1-1. Common Elements of A Watershed Approach.

Watershed Management Plans may also provide a common product for stakeholders that fulfills many local, state, and federal requirements.

- *implementation:* The implementation element focuses the process on practical solutions and provides a horizon for planning activities. Watershed Management Plans include information describing specific implementation responsibilities, agreements, and schedules.

A single element does not stand alone; the activities of any one element are keyed to those of the others. For example, a Watershed Management Plan cannot be successful in the absence of other elements. The Plan is built by and contributes to the other elements. The Plan is comprised of accumulated background information that can be used for priority setting and targeting. The Watershed Management Plan communicates the information (e.g., schedules, agreements, technical information) necessary for the implementation actions that directly or indirectly result in water quality improvements.

Watershed Management Plans may serve many different purposes and fulfill a variety of requirements. Watershed Management Plans can serve as a common reference document for the planning and implementation cycle that has been adopted by participating watershed partners.

The status of watershed resources is reported, priority issues are identified, and recommended management strategies are described. Agreements between watershed partners that define collaborative activities may also be included in the Plan. Watershed Management Plans may be used as a guide for implementing water quality management activities. An example outline of a Watershed Management Plan is shown in Appendix A.

Many different approaches to watershed planning and Watershed Management Plans are being developed in states around the country. Experience indicates that Watershed Management Plans can fulfill a broad range of requirements for agency partners. In some states, Watershed Management Plans have been useful as a common product for watershed partners, making it less likely for anyone to "drift" away from the watershed process.

1.3 The Case of Washington State

In 1992, the Washington State Department of Ecology (Ecology) Water Quality Program was involved in a process to develop a statewide watershed approach. Its goal was to organize Ecology's Water Quality Program permitting activities on a geographic basis. The initiative was viewed as the first phase of a more comprehensive watershed approach; and thus, the scale and focus of the initial effort included only some of Ecology's water quality activities.

The Water Quality Program identified a list of potential barriers to the watershed approach in Washington, and requested the assistance of EPA Region 10 in overcoming these barriers. Ecology and EPA Region 10 staff met in Tacoma to discuss them. At the meeting, the Director of the Region 10 Water Quality Division made a commitment to help Ecology address the barriers to the watershed approach. Several of the problems were resolved at the Tacoma meeting, and others have been addressed since that time.

Ecology indicated that the numerous individual program reporting requirements mandated by the Clean Water Act tied up resources unnecessarily, and redirected the communication emphasis in remote locations from watershed residents to reporting officials. Ecology proposed that program reporting requirements be consolidated into a single watershed report, similar to the Watershed Management Plans. The primary purpose of this document would be to provide watershed assessment data, and information on Ecology's activities to watershed residents and other stakeholders.

This proposal raised many important questions relating to reporting requirements directly mandated by the Clean Water Act. Region 10 agreed to review program reporting requirements, and where possible, allow watershed reports to fulfill the reporting function. This project initiates the consideration process of consolidation of reporting requirements. This pilot analysis considers information and communication requirements/needs for several programs responsible for implementing Clean Water Act sections; the analysis also extends beyond Ecology and EPA

and includes the information/communication needs of several other water quality and resource management stakeholders.

1.4 Project Purpose

U.S. EPA is seeking opportunities to help state and local agencies meet Clean Water Act (CWA) and Endangered Species Act (ESA) requirements through the watershed approach. Examples of CWA requirements that can be addressed through the watershed approach include: 303(d) Total Maximum Daily Loads listing and mitigation strategy requirements; 305(b) water quality assessment reports; Triennial Standards Review and Update; NPDES permitting and wet weather programs; Comprehensive State Ground Water Protection Program - Wellhead Protection; and Nonpoint Source Management Plans. Other region-wide initiatives such as the Salmon Strategy and the Forest Plan also involve a watershed approach. In addition, it may be possible to meet some of the requirements of the Endangered Species Act using the watershed approach. This project examines the feasibility of using the watershed approach to fulfill the goals and meet the requirements of these acts and programs.

The initial project focus was on the potential for using Watershed Management Plans to better coordinate the activities of multiple partners. This project responds to Ecology's request for better understanding how Watershed Management Plans can consolidate a variety of communication and reporting requirements with one product. Thus, another objective of the project is to improve understanding of the use of Watershed Management Plans in the Pacific Northwest by soliciting information on opportunities for, and barriers to, using Watershed Management Plans from a variety of agency staff and watershed team participants.

Washington is the Region 10 state selected for a case study in this report. The diverse array of watershed projects and approaches being implemented in Washington state offers an opportunity to explore common information needs and efficiency achievable through sharing of information. The scope of this report provides for discussion of some of the watershed projects in Washington. Watershed approaches and projects in Alaska, Idaho, and Oregon were not within the scope of this project.

The Washington case study may be useful to Region 10 in determining how it can promote opportunities and remove barriers to more effectively use Watershed Management Plans elsewhere in the region. The project report may also be useful to others as a reference document for decision-making relating to the watershed approach.

Section 1 of the report provides background information on the status of the statewide watershed framework in EPA Region 10 states, and describes the common elements of the watershed approach, and in particular, Watershed Management Plans. Section 1 also describes the project approach.

Section 2 provides brief descriptions of numerous watershed initiatives and programs in Washington state, and considers opportunities and barriers to the use of the watershed approach by these agencies and groups. The complexity of information and communication needs that exist within watersheds is depicted by a mosaic of watershed activities. It is the complexity of this mosaic that raises doubts regarding the use of a single Watershed Management Plan to fulfill all information and communication needs within a watershed.

Section 3 proposes an alternative information management and communication model -- termed here the "watershed information clearinghouse." This section describes areas of consensus regarding the use of information clearinghouses in lieu of Watershed Management Plans to serve as a single product (e.g., assessment report, cooperative management strategy, implementation guide, accounting report) for watershed planning and implementation initiatives.

Section 4 briefly describes two example program areas and evaluates how the watershed clearinghouse model could lead to more effective implementation of these programs.

Section 5 presents several recommendations for next steps to take in establishing watershed information clearinghouses in Washington state that were suggested by project participants in their interviews.

1.5 Project Approach

To evaluate how Watershed Management Plans can consolidate a variety of communication and reporting requirements, this pilot analysis solicited information on opportunities for, and barriers to, using Watershed Management Plans from a variety of agency staff and watershed team participants. The information and communication needs of various potential watershed partners resulted in an unanticipated recommendation for a model to address those needs.

Interviews were scheduled with individuals who have had experience in watershed projects or activities sponsored by the program areas of interest. The project team attempted to obtain a balanced sample of interviews representing individuals with local, state, federal, and private citizen perspectives. One gap in the analysis is the perspective of tribal representatives, an omission that should be corrected in any future analysis.

Each interview candidate was mailed an interview information packet that contained background information on project objectives, background information on watershed approaches, and interview questions. The interview questions were designed to identify the watershed information needs and products of those interviewed. The interview questions also aimed to identify the communication requirements and objectives of the programs, agencies, and volunteer watershed groups that were evaluated. The eight-page packet is included here as Appendix A.

The project team contacted each interview candidate and confirmed a meeting time and location. Some interviews were conducted over the telephone. Most of the personal interviews were completed during the week of September 9th through 13th in Olympia, Yakima, and Seattle, (and vicinity) Washington. Supplemental interviews were completed later in September and in November. In all, 43 interviews were completed. The roster of people interviewed is included as Appendix B.

It is important to note that after the first few interviews, the project team recognized that a single Watershed Management Plan would not fulfill the information and communication needs of interview participants. A single Plan was viewed as having too many limitations to fulfill the needs of all partners. A written document such as a Watershed Management Plan was also viewed as requiring a level of commitment that was not sustainable by newly developing partnerships. In the second day of interviews a different concept emerged -- a central information base that could make essential information available to watershed partners and facilitate communication and decision-making among partners. When subsequent participants were presented with this concept, they responded favorably and expanded to meet their needs. Therefore, the project focus was revised to explore an alternative "watershed information clearinghouse." The project report reflects this shift in emphasis.

Not all project participants were concerned with the same watershed issues (i.e., The Endangered Species Act, the multiple Clean Water Act requirements, the Salmon Strategy, the Forest Plan). However, participants had objectives or needs that could potentially be fulfilled through the use of watershed approaches. By identifying mutual and overlapping objectives among potential watershed team members, the project evaluates whether or not watershed partnerships can sustain a commitment to a common process and product. Towards this end, the project interviews aimed to identify participants' information and communication needs (e.g., spatial scale, technical detail, regulatory versus voluntary).

The project report is a synthesis of the completed interviews as reconstructed from notes written by the project team and the authors' thoughts. It represents an integration of concepts rather than any one model currently under development. There has been no attempt to identify individual responses. Each interview participant was sent a copy of the draft report for review. Their comments were included in the final project report.

This report synthesizes interview concepts shared by and between interviewees, to enhance communication and information element of the watershed approach. In some states, this element has been fulfilled through the development of a Watershed Management Plan. However, the interviews conducted for this project suggest that a more dynamic forum for promoting communication and meeting information needs will be necessary for a comprehensive watershed approach to be successful.

In addition to conducting interviews, the project team selected two program areas for extended analysis (Section 4):

- The Endangered Species Act
- National Pollutant Discharge Elimination System (NPDES) Wet Weather programs

SECTION 2. THE DIVERSITY OF WATERSHED ACTIVITIES IN WASHINGTON STATE

To understand the use of watershed plans or an alternative form of information management and communication, it is necessary to consider the partners potentially involved in a watershed approach, and what the partners' needs are. Section 2 describes a small sample of programs, projects, and initiatives that represent the rich mix of resource management activities occurring in Washington watersheds. The purpose of the interviews described in Section 1.5 was to assess the possibility of establishing a coordinated and cooperative process for developing a common watershed document. The interview participants were encouraged to identify opportunities and barriers to becoming partners in a broadly-defined watershed approach. The programs described briefly in the following subsections do not encompass all of the geographically-based programs focused on water quality or quantity protection. Although not a comprehensive survey, the program descriptions provide the reader with an impression of the diversity of efforts currently operating in the state.

Washington state provides an opportunity to evaluate watershed planning from a variety of perspectives. The state may be unique in the number and diversity of its geographically-based environmental protection programs. Washington serves as an appropriate case study because of the numerous and diverse programs which exist for the protection of watersheds. These programs may have overlapping needs, yet divergent missions and mandates. In 1993, the Office of the Governor conducted an inventory of watershed projects by Water Resource Inventory Area and published the results in a draft report, "Significant Watershed Activity Survey" (Moody 1993). The summary tables of the report identify hundreds of watershed projects sponsored by local, state, and federal agencies, industries, environmental organizations, and private non-profit citizen watershed organizations. The report indicates that there is little or no coordination among watershed projects within the same hydrologic unit. It points to the need for a common information base to improve coordination between projects.

There are also a number of resource management and protection programs in Washington that are not being implemented through a watershed approach. For example, the Natural Resource Conservation Service farm pond (manure lagoon) program provides important benefits to watershed health, but the program is not administered as a watershed program. Although projects may be located within the same hydrological unit, or may be nested within the same regional basin, they do not have common jurisdictional boundaries, limiting their ability to collaborate. The large number of watershed projects and the Ecology Water Quality Program's statewide watershed framework provide both opportunities and incentives for non-watershed programs to become active partners.

Both watershed projects, and resource management and protection programs that do not currently use the watershed approach, are responding to the mandates of environmental legislation such as the Endangered Species Act, the Clean Water Act, and the Safe Drinking Water Act. Many of

their project and program goals aim to bring watershed activities and resource management into compliance with such acts. This report looks at how the activities of diverse watershed and non-watershed groups can be coordinated; it also examines how these groups can better meet the requirements of environmental legislation with one product and/or process. Section 2 focuses on the diversity of activities within the state that could be integrated into a broad-based watershed approach. For each program considered, this section presents:

- a brief program description that includes the sponsoring agency, legislative mandate, nature of activities, and purpose/product of the program; and
- the opportunities and barriers for using the watershed approach.

2.1 Department of Ecology - Water Quality Program

Program Description: In 1992, the Water Quality Program at Ecology established a watershed approach to geographically coordinate the activities of their permitting teams for National Pollution Discharge Elimination System (NPDES), the State Water Pollution Control Act (Chapter 90.48 RCW), and the State Waste Discharge Permitting Program (Chapter 173-216 WAC). The purpose of the watershed approach is to focus the resources of the Water Quality Program on specific activities within a watershed in each year of a five-year cycle, thereby integrating on-going activities within a basin and more efficiently utilizing resources.

Since that time, the activities of the nonpoint source planning team among others have been added to the effort. The approach now encompasses most of Ecology's Clean Water Act planning and implementation activities. The program divides the state into 23 water quality management areas (WQMA) and establishes a schedule for the focus of Water Quality Program activities in each of the WQMAs. A map of the WQMAs is included in Figure 2-1. Each WQMA is on a five-year cycle that is organized into four major areas of activity:

- Year 1: SCOPING: Identify and prioritize known and suspected water quality issues within the WQMA by assembling input from extensive community involvement and internal Ecology staff. Produce a Needs Assessment.
- Year 2/3: DATA COLLECTION/ANALYSIS: Conduct water quality Total Maximum Daily Loadings (TMDLs), monitoring, special studies, class II inspections, and general research to discern which of the issues identified in the scoping process are problems.
- Year 4: TECHNICAL REPORT: Develop a report in coordination with the community that addresses the above problems and other concerns. Outline strategies and management activities needed to: reissue NPDES and state waste discharge permits, form partnerships, and solidify nonpoint partnerships with grants and/or loans.

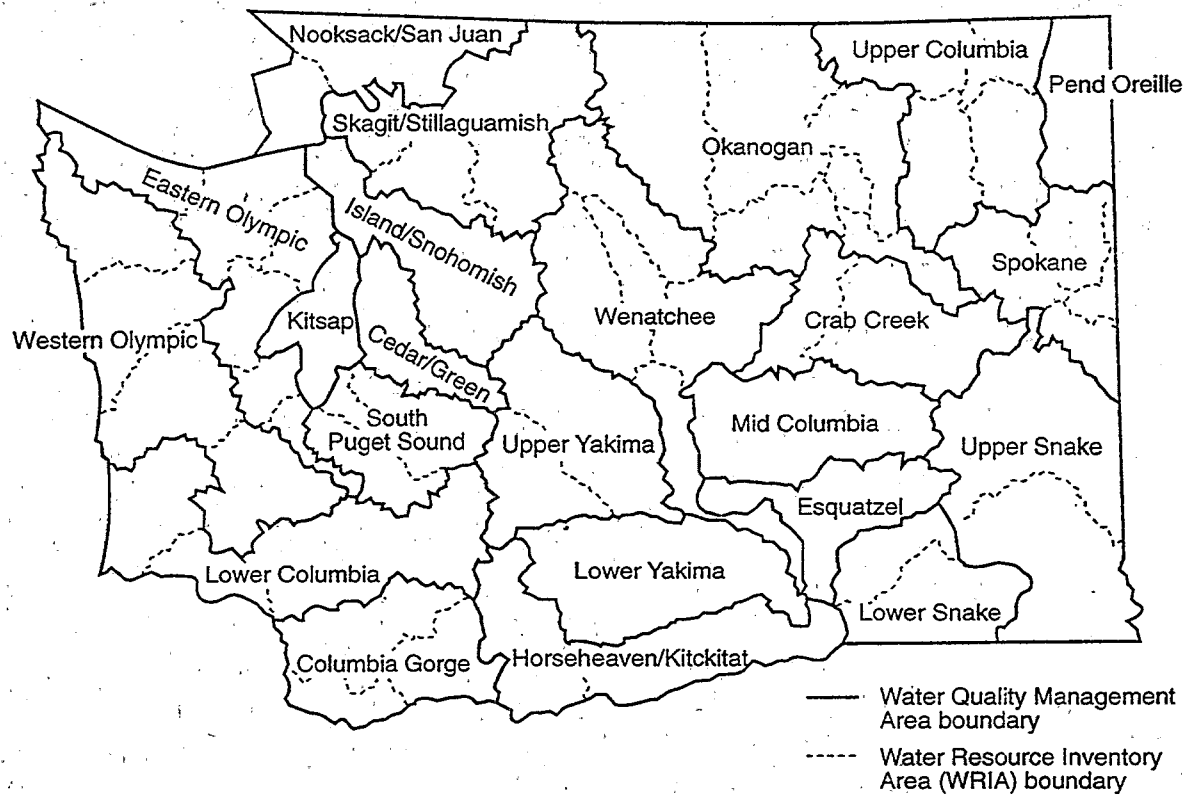


Fig. 2-1. Water Quality Management Areas (Department of Ecology 1994).

- Year 5: IMPLEMENTATION: Issue or reissue wastewater discharge permits and work with local programs and partners to implement nonpoint pollution prevention and control activities that respond to priority water quality problems.

The schedule for sequencing WQMAs into the watershed cycle is provided in Table 2-1.

Opportunities and Barriers Within the Watershed Approach:

- Ecology explicitly limited the scope of its statewide watershed approach to its Water Quality Program alone. Several factors contributed to this decision:
 - 1) The Water Quality Program was operating on a mandate that did not extend beyond their own program boundaries. The Water Quality Program was also aware of other watershed initiatives and projects, and was concerned about perceptions that the statewide approach was competing or seeking to supplant these efforts. Instead, the Water Quality Program was looking for a systematic way to complement ongoing efforts.
 - 2) The statewide watershed approach design process was truncated by a court-imposed deadline for implementation of the watershed approach. The deadline restricted the time period for conducting outreach and coordinating with other potential watershed partners.
 - 3) The Water Quality Program does not have the mandate or resources to maintain organizational support in all of the areas that have been targeted for water quality management support. Successful watershed initiatives must have some basis in the community. Ecology is prepared to serve as a catalyst for initiating watershed partnerships, especially during Year 1 (Scoping) of the process. However, local sponsorship and participation must emerge quickly to support and sustain watershed projects through the remaining years of the cycle.
 - 4) Ecology has sustained significant reductions in its budget in the past few years and is anticipating further budget reductions. Consequently, Ecology management is cautious about raising expectations that it can support the statewide watershed framework infrastructure for other partners in the face of declining resources. Promotion of a more inclusive watershed approach with enhanced communication and information management requirements cannot be supported by Ecology's current budget. Additional sources of funding will have to be identified to take the next step in improving the coordination of activities within watersheds.

Activities Schedule for Watersheds Under 5-year Cycle (lower case letters denote transition activities)										
Water Quality Management Areas	State Fiscal Year (July 1 through June 30)									
	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01		
Skagit/Stillaguamish, Columbia Gorge, Horseheaven/Klickitat, Upper Columbia, Pend Oreille	S	D	A	R	I	S	D	A		
Island/Snohomish, South Puget Sound, Okanogan, Crab Creek, Esquatzel		S	D	A	R	I	S	D		
Nooksack/San Juan, Western Olympic, Wenatchee, Upper Snake, Lower Snake			S	D	A	R	I	S		
Kitsap, Lower Columbia, Upper Yakima, Mid Columbia				S	D	A	R	I		
Cedar/Green, Eastern Olympic, Lower Yakima, Spokane					S	D	A	R		

I = Permits Issued; Other Actions Started
 S = Scoping
 D = Data Collection
 A = Data Analysis
 R = Technical Report

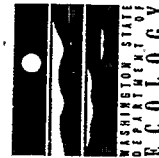


Table 2-1. Washington State Department of Ecology Watershed Approach to Water Quality Management.

- The 303(d) list of water quality limited waters and the associated Total Maximum Daily Load (TMDL) process have provided both great opportunities and significant barriers to the watershed approach. Court orders often limit the flexibility of the state in developing TMDLs on a schedule that may be inconsistent with the WQMA sequence. In addition, there has been no common understanding between EPA Region 10 and Ecology regarding the acceptability of alternative formats for TMDLs that are consistent with the watershed approach.
- Ecology is developing guidance for Nonpoint Source TMDLs as part of its efforts to incorporate the nonpoint program into the watershed approach. The draft guidance proposes that a nonpoint source TMDL would involve developing mutually agreeable (i.e., voluntary) solutions by local land managers and owners. This will increase the need for communication tools within the watershed that differ from a standard point source TMDL approach.

Despite the concerns and barriers listed above, the consensus-developed WQMA framework supports improved communication and information management. Ecology conducts monitoring and assessment activities statewide and maintains the largest water quality databases in the state. The Ecology watershed approach will provide the type of long-term involvement required to track baseline conditions in the WQMAs. Individual projects may shift around within the watershed mosaic, but Ecology will continue to use the WQMA as the base unit for organizing its activities.

2.2 Ecology's Shorelands and Water Resources Program: Water Resource Inventory Areas

Program Description: Ecology's Shorelands and Water Resources Program is responsible for surface and groundwater allocation. The surface water allocation program commenced in 1917 with the legislative enactment of Chapter 90.03 of the Revised Code of Washington (RCW). The groundwater allocation program was enacted in 1945 as Chapter 90.44 RCW. Legislation developed in 1971 (Chapter 90.54 RCW) mandated that the state be divided into 62 watersheds, termed Water Resource Inventory Areas (WRIAs). The 62 WRIAs identified in Chapter 173-500 of the Washington Administrative Code (WAC) are illustrated in Figure 2-2. The Water Quality Management Areas used by the Water Quality Program are composed of WRIAs that have been aggregated into larger basin units.

Recommended instream flows for many of Washington's rivers have been established by administrative rule; the first were established in 1976. When evaluating new applications for water rights, Ecology must consider the following four criteria:

- Is the proposed use of the water considered a beneficial use?
- Is water available?

Will any senior water rights be impaired by this use (including instream flows which are considered senior rights)?

Is the activity non-detrimental to the public interest?

Ecology seeks to balance the need to maintain senior water rights and instream flows that will support salmonid passage and fish spawning habitat with the need to accommodate new applicants. After reviewing each new water rights application, Ecology produces a "Report of Examination" which relates their findings and may or may not grant a water right.

In 1990, the Chelan Agreement was developed as a cooperative response to historic water resource conflicts in Washington. The agreement, which was developed by a diverse assemblage of water resource stakeholders, emphasizes cooperative water resource planning on a regional (WRIA) basis. Planning is intended to be a consensus process, circumventing the need for administrative, legislative, or judicial intervention.

Two watersheds which had been previously recommended by the legislature for regional water resources planning -- the Methow and the Dungeness-Quilcene -- were funded as pilot watersheds to develop plans using the Chelan Agreement process. In each area, an initial meeting of affected representatives was convened to identify stakeholders, identify the issues of concern, define watershed boundaries, establish a time frame for implementing the process, and designate a coordinating entity. The potential for coordination with other related planning activities such as water quality, land use planning, and permitting was also to be considered. Plans in the two pilot watersheds are being developed using the consensus process.

Opportunities and Barriers Within the Watershed Approach:

- Ecology has begun to evaluate new water rights applications within a watershed context by assessing such questions as, what are the other existing uses, the levels of use, and the potential impacts on water quality, does adequate data exist on which to base decisions, if not what specific data gaps exist. Therefore, this program has an increasing need for comprehensive watershed information.
- There are several ties to the Water Quality Program. For example:
 - ◆ the Jefferson County Public Utility District #1 versus the Washington State Department of Ecology (Elkhorn Case) decision establishes that flow is a component of water quality;
 - ◆ water rights data and associated information are stored electronically;
 - ◆ water reuse, reclamation, and conjunctive use information and decisions are closely aligned with nonpoint source program objectives; and
 - ◆ flow augmentation and water reuse have a direct relevance to Water Quality Program decisions.

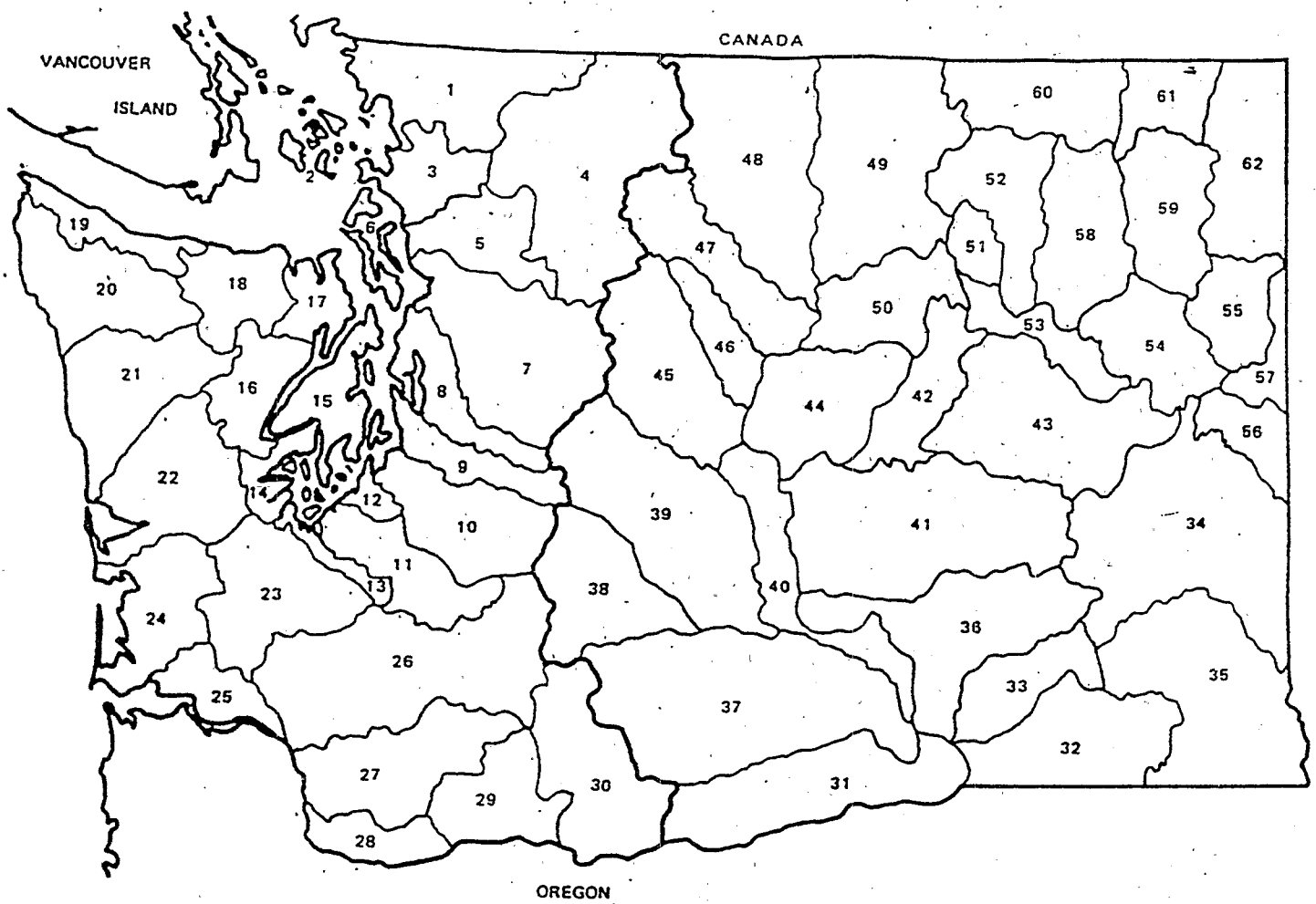


Fig. 2-2. Water Resource Inventory Areas.

- The watershed approach is useful for examining ground water/surface water interactions, especially in large basins where there is good correlation between aquifers and surface hydrological units.
- Ground water and surface water data acquired from other sources by Water Resources (and any associated analysis) is useful information to the Water Quality Program watershed approach teams (e.g., United States Geological Survey database - 80,000 wells, U.S. Bureau of Reclamation).
- The Chelan Agreement, which established a consensus-based process for planning water resources management within WRIs, is consistent with the watershed process. Thus there are areas where collaboration would make sense.
- Assessment of development trends within the WRIA provides valuable background information for evaluating water rights application.
- Water rights are viewed as property rights, which can make collaboration controversial and difficult in certain regions of the state.
- The statutory mandates which require Ecology to balance protection of the resource while permitting appropriate development create barriers to cooperation when using a watershed approach.

2.3 Washington Watershed Coordination Council

Program Description: The Washington Watershed Coordination Council (WWCC) was established to coordinate and integrate the watershed activities of ten participating state agencies. It provides a forum whereby state agencies can coordinate their activities in a watershed area including watershed planning. It is intended that the WWCC activities complement and support those of local governments. It is not intended to take over or lead local watershed activities. In this light, it supports locally-driven watershed planning and implementation efforts that protect and restore watershed health (WWCC 1996). Improving coordination and communication among state agencies will serve the stated purpose of enhancing the delivery of services to the watershed. The goal of the program is to improve inter-agency coordination, and external communication through the use of a state agency committee.

Four pilot watersheds have been identified to implement the principals of the WWCC. Lead agencies have been identified for each of these watershed as follows:

- Nooksack - Ecology
- Yakima - Ecology

- Snohomish - Puget Sound Water Quality Action Team
- Chehalis - Ecology.

For each watershed, the lead state agency represents a single point of contact for the watershed. The watershed lead helps direct questions from within the watershed to the appropriate individual within each agency, and ensures that follow-up occurs (WWCC 1996). Supporting state agencies designate a single reference person from among their staff who the watershed lead contacts when issues and questions arise in that watershed. One purpose of the WWCC is to create an environment where the planning or implementation efforts of individual agencies are coordinated and do not conflict within a watershed.

Opportunities and Barriers Within the Watershed Approach:

- The WWCC provides an opportunity to discuss priorities and coordinate activities among the participating agencies. It also serves as a central point for facilitating information exchange.
- The WWCC represents the constituencies of its agencies. Coordination and facilitation efforts must balance the needs of all interests in providing services to local communities within the watershed.
- The WWCC includes only two federal agency counterparts (EPA and the USFS) to the participating state agencies. These federal members are advisory and participatory members of the WWCC. Other federal program activities do not benefit from the coordinative efforts that enhance delivery of services to the local watersheds.

2.4 Ecology Local Action Teams

The Department of Ecology has initiated the formation of local action teams (LATs). These interdisciplinary (cross-programmatic) teams address environmental issues within a specific watershed. As with the WWCC, Ecology designates a single point of contact to help direct questions that arise within the local area. One of the LATs' primary goals is to involve the community in identification of environmental issues and their solutions. In accomplishing this purpose, the LAT leader encourages partnerships to be formed among local governments, tribes, citizen groups, and interested parties.

Four pilot LATs have been formed, three within the last year. The LATs do not necessarily share the same boundaries as WQMA; some, such as the Chehalis LAT, are nested within WQMA. The four existing LATs are:

- Nooksack
- Yakima

- Snohomish
- Chehalis.

Although the LATs coincide with the four watersheds designated at the state level to implement the WWCC process, the LAT leader may or may not be the WWCC lead agency contact. The focus of the LATs is to coordinate activities under Ecology's mandates within the basins.

LATs are proactive in planning and consolidating environmental actions within the watershed. The LATs coordinate Ecology's internal resources, as well as focus community resources, that will optimize resource utilization in implementing environmental solutions. For instance, the Yakima LAT serves an important role in building coalitions of stakeholders to implement water quality improvements with respect to the TMDL. The Yakima LAT also serves to educate a variety of local audiences about the TMDL.

While the LAT team leader is a new position within Ecology, the members of the LAT work for the various Ecology programs. As such, they are responsible for conducting the core business of Ecology in that area. Before a LAT is approved, a profile document is prepared. From this profile, Ecology management concurs with the activities for which the LAT will be responsible. It is important to note that both state and local priorities are addressed by the LAT.

Opportunities and Barriers Within the Watershed Approach:

- The Local Action Teams represent several constituencies within Ecology in addition to the Water Quality Program. Their coordination and facilitation efforts must balance the interests of all programs in providing services to local communities within the watershed. For example, a local community may not be interested in using the services of the LAT to address a TMDL, but could be in crisis mode regarding flood management assistance.
- LAT leaders provide a central point of contact for exchanging information and coordinating Ecology activities and priorities within the LAT.
- The function of the LATs is to coordinate existing leadership, not authority or resources. Therefore, they must rely on winning the commitment of others to be effective.
- LAT boundaries may not coincide with those of the WQMAs. Therefore, it could be difficult for LATs to respond to shifting priorities within the WQMA.
- A logical outgrowth of LATs could be the establishment of Field Offices to carry out selected business of Ecology in that area. The initiating premise is that Ecology needs to offer services as near as possible to the area obtaining the service. LATs are the first step in accomplishing that premise.

2.5 Watershed Plans under Chapter 400-12 of the Washington Administrative Code

Program Description: The 1987 Puget Sound Water Quality Management Plan created the Puget Sound local watershed action program (PSWQA 1987). The program is one of the primary means by which local communities manage and prevent nonpoint source pollution. Each of the 12 counties surrounding Puget Sound ranked their watersheds in 1988 according to a set of criteria based on scientific and institutional factors, resulting in a total of 119 ranked watersheds. Watersheds range in size from huge river systems, to clusters of smaller watersheds, to small tributaries. Currently, 30 plans are being implemented in ten of the Puget Sound counties, and 41 committees either have or are developing new watershed plans.

After obtaining funding (generally through the state Centennial Clean Water Fund [CCWF]), local officials appoint a community-based watershed management committee that includes representatives of county government, conservation districts, tribes, businesses, citizens, and special interest groups. For each watershed, the committee leads the planning effort through the following phases: 1) identification and characterization of goals, objectives, and problems; 2) development of solutions for each problem; 3) preparation for implementation, and public involvement; 4) agreement of implementing entities; 5) review of selected watershed priorities by involved agencies, the public, and Ecology; and 6) approval of the watershed plan by Ecology.

This program requires local ("grass roots") participation in developing watershed plans, including a strategy to involve and educate the public in all parts of the watershed. Opportunities for public participation exist through the watershed management committees, during and after the planning process, in the form of watershed tours, or through workshops, streamwalks, cleanups, volunteer monitoring, and other activities.

Opportunities and Barriers Within the Watershed Approach:

The WAC 400-12 watershed management committees provide an effective forum for negotiating consensus priorities within their watersheds. However, the WAC 400-12 process has some issues that must be addressed before it achieves its full potential.

- There is a perception that WAC 400-12 watershed management committee recommendations have not received adequate consideration from Ecology as funded project priorities. The interviews suggest several possible reasons for this perception:
 - ◆ The watershed management committees have identified far more priorities than there is available funding for.
 - ◆ The funding mechanisms available are not designed to provide consistent and on-going support to implement the recommendations of the watershed committees.

- ◆ The Legislature requires that 80% of the CCWF money be directed to facilities, and 20% to planning and nonpoint source activities. This creates an imbalance because the watershed management committee recommendations are exclusively nonpoint.
- ◆ An agency that is not part of the 400-12 watershed priority review process may undertake a project that was not on the WAC 400-12 list.
- ◆ There is a perception that WQMA sequence may cause Ecology implementation resources to be focused elsewhere in the state. This may not coincide with the timing of the WAC 400-12 watershed management committee recommendations. Ecology is aware of this perception and is working toward meeting local request for implementation funding regardless of the WQMA schedule.

2.6 Clean Lakes Program

Program Description: The Clean Lakes Program is enabled by Section 314 of the Clean Water Act and is administered by the Water Quality Program of Ecology. This grant-funded program provides for three types of projects, all of which are nested within larger WQMA. Each phase requires local government and citizen lake advisory committee support. This local involvement comes from citizens in the immediate watershed of the lake, and frequently lakefront property owners.

During Phase I, Diagnostic/Feasibility Assessments, funding is provided for in-lake and upland data collection. Physical, chemical, and biological parameters are collected; data are evaluated. With citizen input, a management plan is developed for implementation of Phase II. Phase II grants, Design and Implementation, fund a range of lake improvement activities and structural or mechanical solutions which will directly benefit lake water quality. Phase II Implementation projects may also be funded through the CCWF grants. Phase III, Post-Restoration Monitoring, provides funding for lake water quality monitoring for a minimum of five years following implementation of Phase II activities. The purpose of the Phase III projects is to determine whether long-term improvements have been realized.

Opportunities and Barriers Within the Watershed Approach:

- Clean Lakes Program grant requests often focus on mitigating a symptom within the lake, rather than on addressing the source of the problem within the watershed. Consequently, lake managers focus on solving problems that are located within the confines of the lake, instead of within the boundaries of its watershed.
- Lake associations are frequently not included in the larger watershed planning efforts at

the state level. Thus, the monitoring and lake restoration efforts are not recognized by other watershed partners.

- Prior to 1990, the Centennial Clean Water Fund supported five or six local projects each year. However, funding has diminished over the past six years.

2.7 Urban Bay Action Teams

Urban Bay Action Teams (UBATs) were created as an element of the Puget Sound Water Quality Management Plan (Plan) in 1987, and funded by EPA. The Plan recommended that Ecology use these teams to focus state resources for toxic pollutant source reduction, and contaminated sediment site remediation, in highly urbanized areas located at the mouths of major rivers on Puget Sound. Since 1987, UBATs have been established in Bellingham Bay, Elliott Bay, Commencement Bay, Sinclair Inlet, and Budd Bay. The team leaders have established working coalitions with representatives of cities, counties, tribes, industries, and citizen and interest groups to implement projects for source control, site remediation, and in some instances, habitat restoration.

Opportunities and Barriers Within the Watershed Approach:

- The Urban Bay Action Teams have had considerable success in cultivating partnerships within their geographic boundaries, collecting information, and advancing negotiations to implement source controls.
- The UBATs have had some difficulty coordinating with "upriver" partners, which has resulted in some disconnects between mitigation priorities.
- UBATs could use an information clearinghouse as a forum for negotiating more substantive watershed partnerships. The Nooksack was recommended as an ideal candidate for pilot demonstration of an information clearinghouse that would facilitate further progress with existing partnerships. These partners are ready to commit to a common process and product, but the information and communication support needs to be improved.

2.8 Department of Natural Resources Watershed Analysis

Program Description: Watershed analysis is the biological and physical assessment of a watershed to evaluate the cumulative effects of forestry practices on public resources (including fish and water). A process for watershed analysis was developed by forest landowners, tribes, environmental groups, and state natural resource agencies, and became required by law in 1992 (DNR 1995). A watershed analysis is performed on the basis of Watershed Administrative Units (WAUs) which are defined by hydrologic and geomorphologic characteristics. There are

approximately 800 WAUs in Washington state, which range in size from 10,000 to 50,000 acres (DNR 1995). The Department of Natural Resources (DNR) in consultation with cooperators from the Timber, Fish and Wildlife Process, has prioritized WAUs for analysis based on the following factors:

- Slope stability
- Hydrology
- Fisheries
- Likelihood of forest practices occurring in the near future.

DNR or landowners who own more than 10% of the land in a WAU may conduct a watershed analysis. Each analysis is conducted by a team of experts from the relevant scientific disciplines. Each team member is required to meet minimum qualifications, and must be trained in the watershed analysis process. The analysis includes an evaluation of watershed processes (mass wasting, surface erosion, hydrology, and riparian function) and an assessment of public resources (fish habitat, water quality and supply, and public capital improvements such as roads and reservoirs) (WFPB 1995). Once the analysis is complete, the experts develop "prescriptions" (mandatory and recommended forest practices) for the WAU. These prescriptions become requirements for forest practices applications approved by DNR.

Watershed analyses in approximately 70 WAUs have been completed by DNR and private teams since the inception of the program in 1992, at an approximate cost of \$100,000 each. Much of the data gathered has been digitized for use on the Geographic Information System (GIS); however, many of the reports are stored in hard copy only in the regional offices of DNR. DNR anticipates that all forest practices applications (including watershed analyses) will be posted on the Internet within the next six to eight months.

Barriers and Opportunities Within the Watershed Approach:

- Watershed analysis can provide essential information to a watershed team for assessment, priority setting, and developing management strategies. With sufficient coordination, watershed analyses can complement the strategic monitoring component of the statewide process.
- Watershed analysis often depends on land owners or land managers to supply information. If this information is to be used aggressively to list waters for the 303(d) process (water quality impaired), they may be reluctant to share data. This barrier could be addressed by using the information to raise the priority of a location for mitigation, without going to the formal 303(d) listing process.
- The watershed analysis is limited to forested lands in the state, and does not include other agricultural or heavily urbanized areas.

- Current staff and funding levels allow 6 to 8 WAUs (10,00 to 50,000 acre hydrological units) to be completed a year.
- DNR could use information from other watershed partners in the prescription phase to help understand the context of cumulative effects within adjacent or surrounding hydrological units.

2.9 Integrated Landscape Management (ILM) for Fish and Wildlife

Program Description: The Integrated Landscape Management (ILM) approach was initiated by the Washington Department of Wildlife (now called the Washington Department of Fish and Wildlife, WDFW) in late 1992. In June 1993, the Lewis-Kalama River watershed in southwest Washington was selected as a pilot project for testing this new approach. This area was selected because of the diversity in species, multitude of landowners, willingness of the agency staff and the need for plans to address future hydro-electric relicensing efforts, forest practices development, mining, and farming. This new planning process moves away from species-by-species to a broader landscape or ecosystem based approach. ILM is a voluntary, non-regulatory approach to managing fish and wildlife through partnerships between WDFW and landowners. The ILM planning process is currently the only statewide approach that addresses fish and wildlife management at the landscape or ecosystem level on the state's 43 million acres. The goals are to:

- Work with the public and landowners to prepare, implement and evaluate management plans for fish, wildlife and their habitats at the landscape level with clear ties to WDFW work plans, budgets, goals and objectives; and
- Implement this process as WDFW's standard method for managing fish and wildlife.

An integrated process is used to:

- Work cooperatively with the landowners, publics, and government agencies to identify goals and objectives for managing fish and wildlife habitats and species;
- Focus the expertise and contributions of individual employees across divisions and programs to achieve common objectives; and
- Bring together all fish and wildlife related data occurring on the same landscape.

Goals and objectives developed by the public, agencies, and the Citizens' Advisory Group (CAG) are used to identify the desired future conditions for fish and wildlife at the watershed level. GIS and remote sensing technology are used to illustrate the current condition of fish and wildlife habitat and what habitat conditions current land management will create in the future.

When planned land management practices will not meet common goals, voluntary agreements are developed with landowners that will. This is done by working with landowners cooperatively to develop incentives for them to implement positive activities for fish and wildlife. WDFW assists landowners in developing Habitat Conservation Plans (HCP), Forest Incentive Programs, Stewardship Programs, all of which foster a no surprises working environment.

The public is involved and includes landowners, users, interest groups, tribes, and local, state and federal agencies. The public participates in focus groups, public meetings, open houses, a citizens' advisory group, questionnaires, and implementation of the plan.

Watershed boundaries are set by the Washington Department of Ecology for 62 water resource inventory areas (WRIA). The 839,010 acre Lewis-Kalama River pilot area is WRIA #27. This unit is common to other plans for water, flora, and earth resources making it easy to coordinate with other landowners and agencies. Integrated Landscape Management will eventually apply to all 43 million acres in the state.

The final product is a watershed plan which will be used to protect and recover threatened and endangered species and provide wildlife viewing, fishing, and hunting opportunities. The 11 species plans, four habitat plans and one recreation plan are the building blocks of the overall watershed plan. For the Lewis-Kalama River watershed, the final plan will be one document with GIS-based maps illustrating areas, time schedules and options for making changes in the structure and composition of fish and wildlife habitat. It will describe the WDFW's priorities for allocating staff across programs and divisions to achieve fish and wildlife objectives.

Integrated Landscape Management is coordinated with all other natural resources planning activities in the state. Other projects are being conducted in the Lewis-Kalama watershed by the US Forest Service, Clark and Cowlitz County Conservation Districts, and Clark County Public Services. Major landowners include Gifford Pinchot National Forest, Weyerhaeuser, International Paper, Longview Fibre, Plum Creek Timber Company and Department of Natural Resources.

On September 14, 1995, the draft ILM plan, "An Integrated Plan for Managing Fish and Wildlife...Pilot Project in the Lewis-Kalama River Watershed, WRIA #27" was published and distributed. On June 17, 1996, a companion document, known as Volume II to the watershed plan was published which summarizes the process used to develop the pilot project to include what worked, what did not work and recommendations for improving the planning process.

Opportunities and Barriers Within the Watershed Approach:

- Direct and active support by WDFW's Director and Management Team are essential to getting the ILM approach accepted by all employees.

- The CAG is essential to gaining public support for ILM and getting landowners to cooperate in voluntarily changing some land use practices to achieve long range fish and wildlife objectives.
- ILM will be used to address watershed planning demands placed on the agency from the Governor's Office, the tribes, local governments, other agencies and citizen groups.
- ILM will be used to enhance the agency's GIS capabilities and coordination. This includes filling data gaps (such as digitized database for stream and riparian habitat), integrating known data for estuarine areas, and incorporating data as it becomes available through Habitat Conservation Plans and other watershed planning.
- ILM necessitates the development of statewide species and habitat goals and objectives. This subject is currently under discussion by the Timber/Fish/Wildlife policy committee. Such goals and objectives become the foundation for integrated landscape management planning in HCPs or watershed planning.
- WDFW will develop an ILM operations manual outlining specific guidelines and tactics to consider when a project manager leads an ILM process. Such leadership could result in a watershed identified as a priority by the Governor's Watershed Coordinating Council.

WDFW staff from Olympia and Vancouver are currently developing actions that will achieve multiple benefits for habitats and species objectives not met in the "hot spot" areas by the year 2014. The action plan will be used WDFW to start negotiations with willing landowners to discuss voluntary agreements for meeting the objectives.

Discussions are currently taking place with other state agencies to identify opportunities for joining efforts to maximize efficiencies, resource benefits, and cost savings in watershed planning.

2.10 Natural Resources Conservation Service Programs

Program Description: In recent years the Natural Resource Conservation Service (NRCS) (formerly the Soil Conservation Service) has developed national initiatives that focus on natural resource protection from an ecosystem perspective (SCS, 1992a). National Initiative Three, to "provide ecosystem-based assistance to our customers for the integrated management needed to sustain natural resources," includes the following supporting goals:

- Strengthen organizational attitudes, structures, and processes to support ecosystem-based assistance.

- Provide leadership for developing policies, regulations, and legislation that promote an ecosystem approach.
- Identify indicators that can be used to measure the results of conservation systems and programs in terms of ecosystem health.
- Develop and implement comprehensive education and marketing strategies for ecosystem-based assistance.

In Washington, NRCS provides assistance at two levels. First, NRCS technical staff work with individual landowners to ensure that their landuse practices do not adversely affect the environment, including water quality. This may take a number of forms, for example: education, assistance in designing manure lagoons to prevent surface water contamination, and fencing to prevent cattle from having direct access to streams. NRCS staff may work with Ecology staff to identify landowners who have the most severe water quality impacts. NRCS staff may also work with local watershed groups to assist them in developing management practices for reducing nonpoint pollution to be recommended in watershed plans.

Second, under the Watershed Protection and Flood Prevention Act (Public Law 566), state conservationists from the NRCS provide technical and financial aid to local organizations for planning and carrying out watershed projects (SCS, 1992b). These projects can include:

- Flood prevention
- Water quality improvement
- Agricultural water management
- Water-based recreation
- Municipal and industrial water supplies
- Fish and wildlife development.

Local organizations may make application for financial aid to develop a watershed plan-environmental impact statement for their project. Such plans are required to address:

- Problems
- How, when, and by whom the proposed measures will be installed
- Environmental effects
- Methods of financing.

After a thorough review by NRCS staff, the local organization and NRCS sign a watershed agreement. The project may then be funded through a cost-sharing agreement.

The watershed projects are locally focused in areas smaller than WQMAs and WRIAs. The projects are built upon long-term trust between NRCS staff, local landowners and organizations.

Opportunities and Barriers Within the Watershed Approach:

- NRCS currently uses Ecology assessment data on an incidental basis for locating and designing conservation projects [i.e., farm ponds (manure lagoons)]. A stronger watershed partnership would help NRCS focus their outreach efforts to landowners on priority water quality mitigation areas.
- In a broad-based watershed partnership, NRCS would provide substantial technical assistance, expertise in working with landowners, and cost share funding that would significantly enhance the resource protection options of water quality programs.
- NRCS cautioned that targeting must fall short of "red dotting" individual landowners as specific sources of significant nonpoint source pollution.

2.11 King County Surface Water Management Division

Program Description: The King County Surface Water Management Division provides technical and staff support to four watershed forums in the county. The programs are based on a 17-year history of cooperation among elected officials from four cities in King County who have jointly developed inter-jurisdictional solutions to flooding and drainage problems.

In 1995, the King County Council created and funded the Green/Duwamish Watershed Forum, a new alliance of elected officials from 12 local governments in the Green and Duwamish watersheds. The Forum's task is to address and resolve water resource problems that cross local boundaries, such as water pollution, flooding, and loss of stream habitat. The Forum allows local officials to establish common priorities and pool resources.

Three other Watershed Forums have been established in King County, most of which are nested in the Cedar/Green WQMA of the Ecology Water Quality Program. Each forum is staffed by the King County Surface Water Management Division, and has the following responsibilities:

- Convene elected officials and other decision-makers to identify concerns, establish priorities, and initiate solutions to watershed issues and problems.
- Support compatible actions undertaken by cities and other entities within the watershed.
- Conduct specific technical analyses to resolve watershed policy issues.
- Provide stewardship and public education activities.
- Improve access to information, expertise, and other resources for watershed citizens, organizations, and public officials.

- Guide the Surface Water Management Division and other county capital projects, programs, and other implementation actions within the watershed.

The METRO Water Pollution Control programs have also been consolidated with the King County Surface Water Management Division. This merger adds many NPDES functions for the Seattle metropolitan region wastewater treatment, and control of pollution from wet weather flows. As a result, a number of programs that address many of the significant stressors existing within one watershed have been brought together within one organization.

Opportunities and Barriers Within the Watershed Approach:

- The consolidation of water quality programs, and the use of hydrological units, will allow King County to use assessment data to prioritize their available water quality dollars in order to implement the optimal management strategy for watershed health. The county will have improved capability to rank water quality risks in an effort to target the most cost-effective project objectives. A comprehensive analysis of point source controls, wet weather BMPs, CSO infrastructure, landuse options, and physical habitat restoration can be considered within the watershed context.
- King County Surface Water Management will be able to more effectively represent water quality interests to elected officials and community leaders through established watershed forums.
- The involvement of elected officials early in the planning process provides agencies with a clearer assessment of potential implementation problems prior to committing a high level of resources to a particular solution. The difficulty of involving local elected officials is that they can be strongly risk averse to mitigation programs that require a commitment of local resources, or that adversely impact development plans.
- The consideration of zoning and landuse is a welcome component in evaluating the long-term effectiveness of a mitigation strategy relative to the potential impact of anticipated development.
- Using hydrological units that cross jurisdictional boundaries facilitates assessment and negotiations between upstream and downstream participants.

2.12 Citizen Watershed Initiatives: Save Lake Sammamish

Program Description: Citizen sponsored initiatives by definition and necessity have a diverse set of goals, structures, modes of operation, and products. It is not possible to choose one example that characterizes this set of watershed partners; however, it is important to represent them. Save Lake Sammamish is a citizen-initiated organization. Its charter mission is to serve as

representative for the lake and to protect the lake from further degradation. The citizens who founded Save Lake Sammamish were struck by the lack of coordination among agencies within the watershed, and the frequency with which they worked at cross purposes. The goal of the organization is to better coordinate and integrate the activities of various agencies working within the Lake Sammamish watershed. Board members are encouraged to serve on other resource management boards to provide further the cross-fertilization necessary for collaborative projects. Rather than focusing solely on mitigation objectives, the organization envisions an increased emphasis on pollution prevention and preservation of watershed resources.

It is important to briefly note two other citizen initiatives that have taken a form different from that of a resident watershed committee.

Citizens helped to sponsor an Open Space bond in King County that had a provision for establishing a Citizens Oversight Committee. This committee has legislative oversight for the expenditures made under the \$117 million bond. The oversight committee established a partnership with King County to form "Waterways 2000", which identifies open space objectives that will provide protection to King County waterways. These waterways will be preserved through purchase or easement. Waterways 2000 includes representatives from the Surface Water Management program and Parks and Recreation who work with citizen representatives. The passage of the bond gave citizens real authority in developing and directing agency partnerships.

The Mountains to Sound Greenway Trust (Trust) is a citizen-initiated public/private partnership which aims to establish a corridor that provides a green space connection from the Cascade Mountains to Puget Sound. To accomplish this objective the Trust has established a series of agreements between local agencies, the Washington State Department of Natural Resources, the U.S. Forest Service, and private corporations. The Trust maintains an inclusive board that has representatives from both the public and private sectors. The corridor currently includes 120 miles of greenway.

Opportunities and Barriers Within the Watershed Approach:

- Organizations that include private citizens and local agencies can build zoning and landuse into their mission more effectively. Landuse is the key to long-term protection of water resources in a watershed approach.
- Involvement of citizens can be an effective catalyst for agencies in overcoming "turf" issues, because there is an incentive not to block implementation.
- Citizen committees without funding authority do not have significant leverage in creating partnerships with state and federal agencies.

- Public agencies may be reluctant to accept and use monitoring data collected by volunteers. An information clearinghouse would provide the opportunity for agencies to compare volunteers' data with agency monitoring data from the same location, and evaluate their quality and consistency.
- A central collection point for watershed information -- including assessment data and information on existing and proposed agency activities -- would enhance the ability of citizen watershed initiatives to make informed recommendations. Agencies could use this information to improve their awareness of community-based priority setting and mitigation initiatives. For example, first-year Ecology scoping activities could be facilitated by quickly identifying possible local sponsors.

2.13 Source Water Protection for Drinking Water Supplies

Throughout Washington state there are many well established programs for protecting drinking water supplies for municipalities. The Safe Drinking Water Act Amendments of 1996 (P.L. 104-182) are the latest in a series of legislative mandates that states and local municipalities have responded to for development of policies and practices to protect public drinking water supplies. In addition, the Clean Water Act ensures protection of surface waters designated, in part, for use as drinking water. State environmental laws have also supported programs for protection of both surface and ground waters. These programs include the Wellhead Protection Program, Sole Source Aquifer Program, Underground Injection Control Program, among others. RCRA, CERCLA, and FIFRA have in conjunction with the CWA and SWDA provided authorities, financial support, and technical assistance to protect sources of drinking water, especially ground waters. Many municipalities established protection programs long before any state or federal legislation was on the books. Recently the protection of both ground and surface water supplies has come under the common heading of source water protection.

Washington state has a Source Water Protection Program within the Department of Health to provide local programs with guidance and assistance. Many municipalities maintain programs to manage watersheds and well-head areas that are located outside their municipal boundaries. Examples include:

- Seattle - Cedar River and south Fork Tolt River watersheds
- Spokane - Spokane/Rathdrum Prairie Aquifer (ground water)
- Everett - Spada Reservoir in the Sultan Basin, and
- Olympia - Allison Springs Area Wells (ground water).

The municipality acts as a catalyst for watershed protection in these areas that often include multiple landowners and managers. Building understanding and support for the policies and practices that are necessary to protect the drinking water supply poses significant information management and communication support challenges.

The Association of Metropolitan Water Agencies and U.S. EPA recently sponsored a stakeholder meeting for local water providers and state agency staff to consider guidance on Source Water Protection that is required by the 1996 SWDA Amendments. Many of the participating municipalities presented information on existing source water protection programs and commented favorably on the effectiveness of a watershed approach. However, participating municipalities also identified the need for an established framework to improve information management and communication support. In most cases the cities have the burden of providing these services for other affected watershed partners including many state and federal agencies.

2.14 Other Programs

Numerous other programs in Washington support activities that may influence water quality either within or across watersheds. Most of these do not correspond to the WQMA established by Ecology's Water Quality Program. However, they may be nested within the WQMAs. Although the scope of this project did not permit interviews with representatives from all of these groups, the programs are mentioned here to assist in future efforts to integrate and coordinate water quality management activities:

- Coordinated Tribal Water Quality Program
- Wild Stock Initiative
- Conservation Districts
- Agricultural Extension Service Programs
- Shellfish Protection Districts
- Integrated Landscape Management through the Department of Fish and Wildlife
- Local Volunteer Monitoring and/or Restoration Programs
- Wetland Integration Strategy
- Local Landuse Planning under the Growth Management Act
- Wellhead Protection Program
- Drinking Water Watershed Protection Program
- Comprehensive State Ground Water Protection Program Plan
- Ground Water Management Area Program
- River Council of Washington
- Tribal Watershed Initiatives

2.15 Considerations Based on Watershed Planning in Washington

The diversity of programs described in the preceding subsections is depicted schematically in Figure 2-3. These activities form a mosaic of watershed protection efforts across a hypothetical WQMA. The mosaic of watershed protection efforts being conducted simultaneously in any one basin may include preparation of plans such as habitat conservation plan, NRCS farm plans, DNR watershed analysis, and water quality activities. Currently, the efforts of the myriad of agency programs and local groups are not necessarily coordinated. The WQMA framework was

not developed to coordinate the mosaic of watershed planning efforts across agencies and local groups. Water Quality Program resource limitations would not support such coordination.

However, a coordinated process or format for sharing data, studies, plans, projects, and agreements within a watershed could reduce redundancy and increase efficiency of scarce public resources. The WQMA framework, as well as other resource management programs and activities could benefit from information sharing.

Many of the planning efforts are being performed at the local level by advisory committees which represent a wide variety of divergent interests. Local participants may include: landowners, business and industry, agriculture, tribes, local (city and county) governments, state and federal agencies, port authorities, environmental interest groups, and private citizens. While some of these local planning and implementation groups have developed, funded, and implemented plans that improve water quality, many more are in the early stages of working cooperatively and building trust. During these initial stages, the relationships are tenuous and would not withstand the commitment needed to develop a common product such as the Watershed Management Plan developed in other states. However, in interviews for this project, representatives from these groups expressed a willingness and enthusiasm to share information applicable across a WQMA as a mechanism to begin cooperation and trust-building. Section 3 describes a model that aims to fulfill this goal.

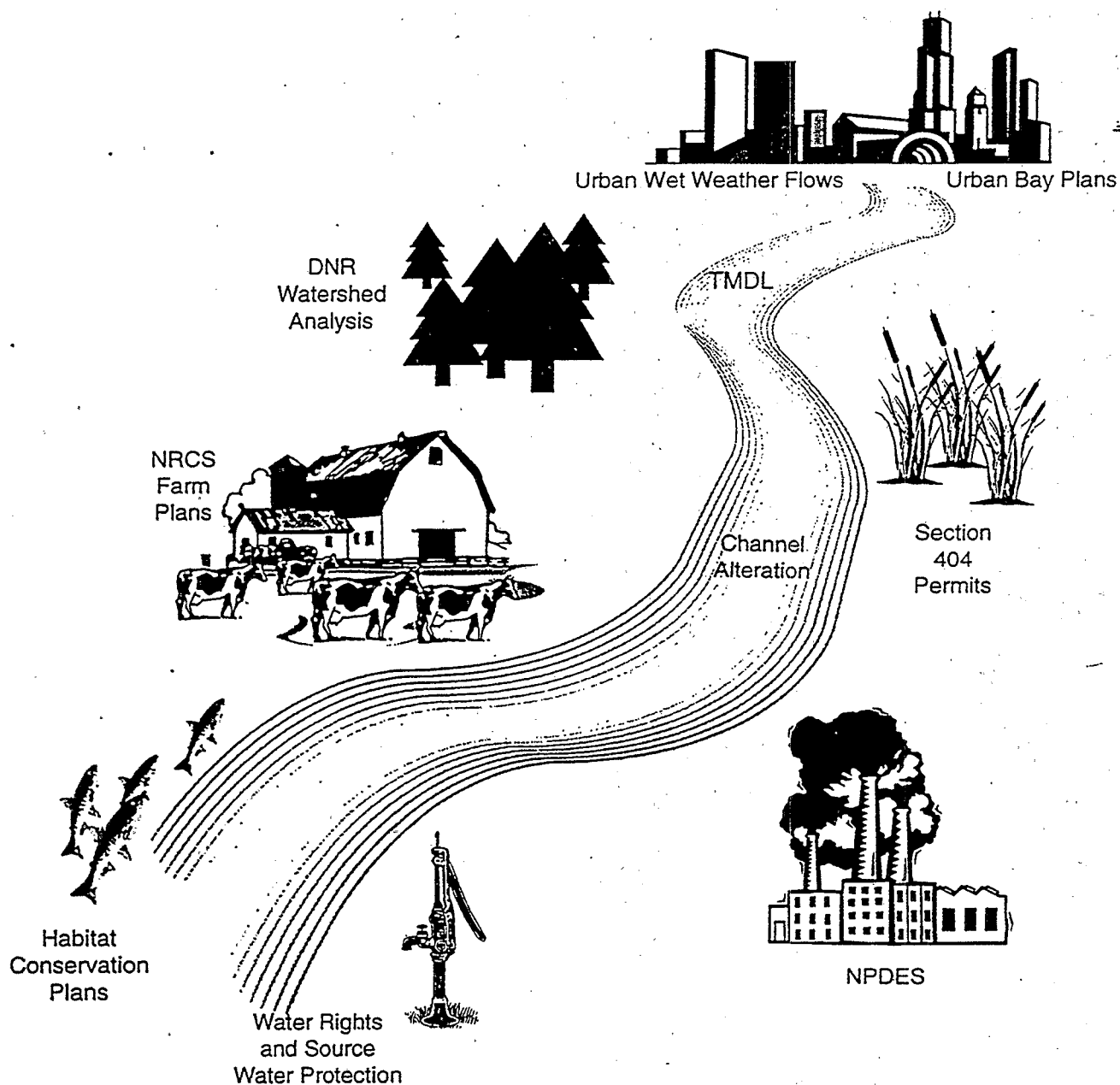


Fig. 2-3. Mosaic of Watershed Activities.

SECTION 3. THE WATERSHED INFORMATION CLEARINGHOUSE: A MODEL TO PROMOTE COMMUNICATION AND IMPLEMENTATION WITHIN WATERSHEDS

Initially, this project aimed to evaluate whether Watershed Management Plans such as those currently being used in Utah, Georgia, North Carolina, and other watershed states had potential for application in the Pacific Northwest. The project analysis would have identified the information and communication needs of various watershed partners and their associated programs, mandates, and/or regulations, to determine how a shared Watershed Management Plan might fulfill those needs or requirements. It also would have evaluated the content of each section of the proposed Watershed Management Plan to determine whether that content fulfilled the information and communication needs of each program, agency, and partner considered. Project recommendations would have been directed either to changes in Watershed Management Plan format, or to the attributes of information needed to fulfill these anticipated needs or requirements.

The first day's interviews were based on this initial project concept. However, the project team quickly concluded that the information and communication needs of Pacific Northwest watershed partners required a much more dynamic and flexible model than a single written document, such as a Watershed Management Plan could provide. The concept of a watershed information clearinghouse emerged, which would serve as a virtual watershed atlas. Participants responded favorably and enthusiastically when presented with this concept which responded to their information and communication needs. Due to the strength of support for a watershed information clearinghouse concept, the project focus shifted away from a written Watershed Management Plan to the watershed information clearinghouse model.

The information clearinghouse concept discussed in Section 3.2 is first described as the model under development in Yakima and secondly, as a synthesis of the ideas of interview participants in their enthusiasm to integrate all of the watershed programs and projects in Washington.

Watershed information clearinghouses would be organized and supported by partners within each of the established geographic areas. The information would be maintained in an electronic format with each watershed partner having equal access to it. The clearinghouse information data on which partners individually and jointly establish priorities; and in advanced cases, clearinghouses could facilitate the development of agreements where complementary objectives had been identified. The objectives of Section 3 are to:

- present a rationale for watershed information clearinghouses based on interview comments;
- describe the watershed information clearinghouse model that is under development in Yakima and as the concept evolved during project interviews; and

- list recommendations for further refinement of, potential applications of, and issues to be resolved in using, the watershed information clearinghouses.

3.1 Rationale for Watershed Information Clearinghouses

The rationale that emerged from project interviews for developing and using watershed information clearinghouses in place of individual written Watershed Management Plans had two components:

Watershed Partnerships Cannot Sustain a Common Product: Natural resource protection and management programs in Washington are increasingly recognizing the need for an integrated management approach. Two factors influence this condition. First, watershed-related activities in Washington are numerous and diverse. Second, the amount of environmental information available is staggering. If data do not have to be re-gathered by each entity, it can more easily be considered, ultimately resulting in better decision-making. However, the political climate is not necessarily conducive to forming partnerships between private groups and governmental agencies. Those partnerships that are tenuously formed, or are in their formative stages cannot sustain a commitment to a common product or agreement such as a Watershed Management Plan.

Nevertheless, many potential partners recognize the need for improved information management and communication to more effectively manage resources. Better information management and communication would provide substantial assistance to partners in all phases of watershed planning and implementation. There is sufficient willingness in many locations to invest resources and information in a shared watershed information clearinghouse. This willingness to invest in information sharing was encountered in Yakima, and several other watersheds represented in the interviews. Most interview participants envisioned a broad use of the watershed clearinghouse in providing a framework for negotiating partnership agreements, and implementing a variety of programs.

The Diversity of Information and Communication Needs is Better Served by a Clearinghouse: The watershed information clearinghouse provides watershed partners with the flexibility to address a wide range of information needs, and the capability to produce many different types of communication products (i.e., brochures, technical documents, agreements, accounting reports). The watershed information clearinghouse is viewed as a tool that will assist partners in developing the diverse communication products that are necessary to successfully implement resource protection programs using a watershed approach. Several interview participants noted that watershed partners will likely be working on an increased number of common products over time. The clearinghouse is the first step in that direction.

3.2 The Watershed Information Clearinghouse Model

This section describes two watershed information clearinghouses. Section 3.2.1 provides a description of the Yakima information clearinghouse and associated coordinator position - a locally initiated and implemented effort. Section 3.2.2 describes the clearinghouse model that could serve the needs of the myriad of Washington's potentially participating watershed and water resource-related programs, as well as the needs of local entities. This second model is a synthesis and evolution of the thoughts of interview participants from a variety of agencies when presented with the clearinghouse concept.

3.2.1 Yakima Watershed Clearinghouse

The need for a central source of water quality related information has been a topic of discussion by many public and private entities in the Yakima Basin for many years. The Yakima River Watershed Council (YRWC), a partnership of local, state, and federal agencies, private interests, and Yakima Indian Nation representatives, is working to improve water quality in the Yakima basin. As local watershed activities increased over the years, the need to share information became increasingly apparent and immediate.

In December 1995, more than a dozen of these entities met to discuss how they might collectively address information sharing needs in the watershed. The Yakima watershed information clearinghouse and coordinator concept was born at that meeting. The meeting participants decided to collectively apply for a Centennial Clean Water Fund (CCWF) grant to fund a position for a water quality (and related) information coordinator. An ad hoc grant proposal committee was formed to seek funding. A larger committee, the oversight committee composed of staff from state and federal agencies, the tribe, and private organizations, was also formed to oversee the operation of the clearinghouse and information coordinator role. Thus, the clearinghouse and coordinator position were created through a collaborative, community-based process.

The information coordinator position was funded by Ecology through a \$125,000 CCWF grant. A number of the watershed partners volunteered office space, a computer, library space, and in-kind services and materials. The oversight committee will continue its role to ensure that the coordinator continually meets watershed community needs and that the coordinator receives the necessary training and support. The coordinator's role is envisioned by the watershed partners as neutral - not responsible to any one agency or organization. The coordinator will not interpret or edit information, nor make decisions on which data to include. The coordinator may, upon oversight committee decision, prepare summaries, a monthly calendar of events, and listings of new materials.

The information clearinghouse in Yakima is intended to focus solely on the needs of the watershed partners it serves. It is currently not envisioned to serve in preparing data of information of decision-making agencies. The partners will jointly decide how information will be used.

3.2.2 Expansion of the Information Clearinghouse Concept

Interview participants enthusiastically embraced the concept of an expanded information clearinghouse for a number of reasons. First, participants viewed the concept as a mechanism to coordinate watershed (geographically-based) resource management activities, without the burden of generating a planning document. Second, participants recognized that information sharing can also serve to integrate management decisions across programs and agencies. Interview participants also realized the long-term savings such a clearinghouse could provide by reducing redundancy in information and environmental data gathering efforts across organizations.

Thus, the primary purpose of a clearinghouse designed to meet the needs of the diverse number of watershed-related programs is to develop, maintain, and provide access to an electronic database on all relevant aspects of the watershed. The clearinghouse would be designed to meet the data needs of the participating local, state, federal, tribal and private partners in a watershed. Watershed partners would provide environmental data, assessment reports, descriptions of their activities or projects, and other information of interest. Data developed by local interests (e.g., volunteer monitoring, best management practices and implementation projects, citizen participation opportunities) would also be included. The electronic files would be structured to facilitate use by the watershed partners. Figure 3-1 illustrates one concept of how this information could be indexed to create a virtual watershed atlas. The final report of the Intergovernmental Task Force On Monitoring Water Quality (1995) makes several recommendations for the categorization and characterization of environmental information that could be incorporated into the clearinghouse design.

Where possible, relevant information would be keyed to specific geographic locations within the watershed boundaries. The database could be structured to provide information both on a watershed-wide basis as well as on a smaller hydrologic unit ("nested" unit) basis. The end result would be that users could construct maps to identify areas of concern or interest, and of the activities of other partners, that might influence their decision-making process. Describing the content and location of the original data files. Metafiles could include information describing: 1) the collection of and analytical methodology for environmental samples, 2) data quality objectives for projects, 3) type of measuring units, 4) a summary of the information or project, and 5) any other attributes of the information a user would need to determine whether or not it is compatible with the user's intended purpose. The use of metafiles eliminates the problems of maintaining and updating data sets in multiple locations.

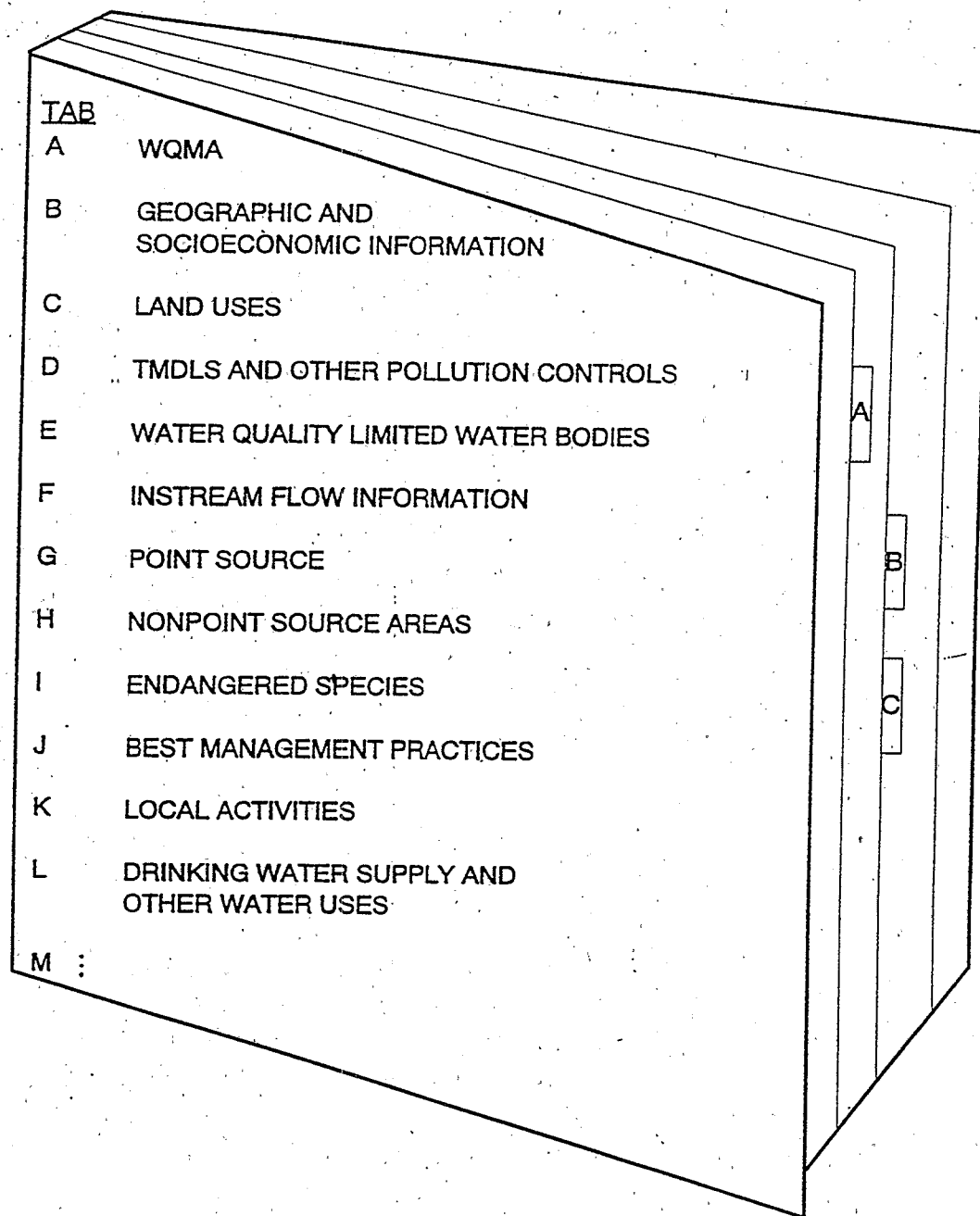


Fig. 3-1. Virtual Watershed Atlas.

The watershed information clearinghouse would not recreate or replace existing databases. Information already accessible in electronic format would be abstracted into a metafile. Information clearinghouses in each watershed would need to be accessible to all of the entities participating in the project in a watershed and to the public. Public access could be achieved through internet home pages. Local public access could also be enhanced through read-only computer access provided at libraries, county office buildings, and schools.

The concept of watershed information clearinghouses can be integrated into and consistent with the watershed planning and implementation process described in Section 1.2. A consistent relationship between information management activities and watershed planning and implementation activities has been developed in other states. Figure C-1 (Appendix C) illustrates how the information management procedures for a watershed information clearinghouse could be consistent with any step in the process. Information specialists could be involved in more than one of the steps or activities, depending on the needs of the watershed information clearinghouse partners.

Additional planning would be necessary to include all of the potential watershed partners reflected in Section 2.0 of this report to detail a full description of the model in each watershed. Figure C-2 (Appendix C) provides a series of steps for establishing an information clearinghouse that could be followed within each of the designated geographic units (e.g., Water Quality Management Areas) that would have a clearinghouse. These steps were used by a consortium of watershed partners in North Carolina Neuse River Basin to establish a watershed information clearinghouse. There are several milestones and guidelines identified in this figure and the process appears to be complex. However, watershed partners will determine which steps in the figure would need to be considered to develop a successful watershed information clearinghouse. The primary design goal is to facilitate the use of information by watershed partners. Section 3.3 presents recommendations made by various interview participants which should be considered during the planning of an information clearinghouse.

3.3 Recommendations for Application and Refinement of the Clearinghouse Model

Internet Home Page: The clearinghouse should be accessible through an internet home page site. The home page would serve as an electronic atlas that would be updated by the clearinghouse staff on a regular basis. The home page would offer a bulletin board for watershed partner and user input on upcoming events and meetings. The bulletin board feature could also be used to alert clearinghouse staff about additional data sources for acquisition.

Public Access Terminals: To provide adequate public access to the electronic watershed information clearinghouse, terminal connections could be maintained at several locations within the clearinghouse boundaries (e.g., the Water Quality Management Area). Accessible locations

that might be considered include: public libraries, schools, public buildings, or in space contributed by a watershed partner.

Metafiles and Linked Databases: The clearinghouse would not reproduce information contained within existing environmental databases. For extremely large or complex data sources the "home page" would include a pointer, or directions, for accessing additional data. The metafile indexes would describe the nature and purpose of the data, including any relevant quality assurance information, but would not contain the original data. The index would contain enough information -- including date of collection or posting -- to enable the reader to determine if the information met their use criteria.

Data Use Policies: The watershed information clearinghouse partners could select boards or committees to develop negotiated understandings on inclusion of data submitted to the clearinghouse. A clear understanding of the potential liabilities associated with submitting data for public review is critical for encouraging many information sources to contribute to the clearinghouse. For example, if a water quality violation is identified, should the information immediately be uploaded to the clearinghouse where an enforcement agency may have access to it, or will there be intermediate steps? Interim steps could include strategic monitoring to confirm the extent and magnitude of the problem, and if there is a problem, negotiations among involved partners to develop a suitable mitigation strategy. Data quality will also be an area for policy development. Data quality should be considered in determining its utility in priority setting and development of management strategies.

Information Input and Data Security for Linked Databases: Clearinghouses should have clearly established procedures for receiving and incorporating new watershed information from a diversity of sources. Recommended policy development areas include policies for: data inclusion, screening, and data security. The policies would be established by the watershed partners in each watershed and would be implemented by the clearinghouse information specialist. Interactive features of the internet home page may also raise questions of data security not only for the clearinghouse, but also for the electronically-linked databases.

Geographic Management Units Upon Which Watershed Clearinghouses Would be Based: Interview participants generally supported using the boundaries of the 23 Ecology Water Quality Program - Water Quality Management Areas for the clearinghouses. However, three important concerns were identified relating to the use of WQMA's:

- 1) The clearinghouses must be able to index on smaller (more local) hydrologic units within the WQMA indexing, for example, to a specific stream reach or project level.
- 2) Currently Puget Sound and the Columbia River are divided among several of the WQMA's. The clearinghouse system must have the capability to consolidate information from the WQMA's for these water bodies.

- 3) Fish and Game and USFWS have several information and communication needs that the clearinghouse can support (see Section 4.1 on the Endangered Species Act). However, many wildlife issues require the assessment of information on a geographic scale that is larger than the WQMAS, such as ecoregions.

This project does not propose a definitive statement regarding the appropriate geographic scale for establishing clearinghouses. Before this can be done, watershed partners must be consulted regarding their concerns over the use of WQMAS or other geographic boundaries, as the organizational unit for the watershed clearinghouses. Inter- and intra-agency, and inter-jurisdictional agreements may need to be developed, once the watershed boundaries have been established.

Fulfilling Technical Reporting Requirements: As the electronic watershed clearinghouses become more established, their role in fulfilling communication needs will grow. Some agencies are responsible for developing and implementing programs, while others have oversight responsibilities. Oversight agencies could use the clearinghouses to access reporting requirement information. For example, a local watershed could integrate and post the relevant information needed for 305(b) reports already in existence in the clearinghouse. The oversight agency, EPA in this example, could then retrieve and review this information to fulfill its oversight role. This feature places more responsibility on the oversight agency for acquiring information, but also allows the implementing agency to focus more of its attention and resources on local objectives.

Costs Associated With Establishing Watershed Clearinghouses: Based on information gathered during interviews, it is clear that Ecology cannot be the primary source of funding for establishing watershed clearinghouses. Although no formal commitment of funds could be made by the interview participants, they acknowledged that watershed clearinghouses would be of sufficient value to their agencies to merit funding for the creation and maintenance of the clearinghouse, and in some cases, the network. Interview participants indicated that the costs should be shared across all watershed partners, including private sector partners. No mechanism was identified for consolidating funding from several agencies on a regular and sustainable basis.

Public Access Restrictions to Selected Information: This issue is a subset of Data Use Policies established by the local board. There is information that should not or cannot be provided to all clearinghouse users. In particular, the specific location of Threatened and Endangered species cannot be included in the database that can be accessed by the general public. In addition, it would not be appropriate to highlight or pinpoint an individual landowner as a source of nonpoint pollutants. Location of information is an important factor for targeting and implementing Habitat Conservation Plans for Endangered Species and recommended BMPs for source areas. However, in cases where specific location information can bring harm to a species or have liability consequences for an individual the clearinghouse will have to ensure that the information is sufficiently generalized to protect the interests and identify of affected parties.

SECTION 4. SPECIFIC PROGRAM DESCRIPTIONS

Section 2 demonstrates that there are many local, state, and federal agencies, tribes, and citizen groups working as watershed partners and contributing to the mosaic of watershed activities. The brief overviews of partner activities included in Section 2 suggest some of the possible opportunities and barriers within the watershed approach. The purpose of these summaries was to highlight both the diversity of participants and programs, and the degree to which their missions and information management and communication support needs are complementary. Each of the interview participants is looking to better integrate their activities and fulfill their mandates through the watershed approach. In Section 3 the watershed information clearinghouse was proposed as a tool for helping coordinate the activities of the partners and programs, and for improving information management and the development of communication products. The watershed information clearinghouse is a key component of watershed approach capabilities for fulfilling the requirements and objectives of the Endangered Species Act and wet weather pollution control programs. The purpose of Section 4 is to evaluate if and how the watershed approach can effectively fulfill the requirements of the Endangered Species Act and wet weather pollution control programs. This section aims to briefly summarize the regulations that drive the watershed activities of those partners responsible for implementing these two program areas. It also aims to describe how the watershed approach, together with watershed information clearinghouses, can be used by watershed partners to more effectively fulfill the objectives of the two program areas.

4.1 Endangered Species Act

The Endangered Species Act (ESA) was first passed by Congress in 1973 (16 USC §§ 1531-1543 (1982)) for the purpose of preventing the extinction of "endangered" and "threatened" species by prohibiting both the "taking" of individuals and the destruction of critical habitat. The ESA is relevant to aquatic ecosystem protection where aquatic species, or non-aquatic species dependent on aquatic habitat, are listed as endangered or threatened. The ESA is jointly administered by the U.S. Fish and Wildlife Service (for terrestrial and native freshwater species) and the National Marine Fisheries Service (for marine and anadromous species).

The interviews with U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) (or together the Services) personnel focused on the use of the watershed approach to fulfill the requirements of the Endangered Species Act. The interviews spoke to practical issues such as existing operational procedures and products, and how these could be enhanced through the watershed approach.

All federal agencies including EPA, are responsible for complying with the ESA. In particular, Section 7(a)(2) requires consultation with the Services when any action funded, authorized, or carried out by a federal agency may affect Threatened and Endangered species listed or proposed for listing. Section 7(a)(1) requires agencies to use their authorities to help further the goals of the ESA.

The Services are moving in a direction that will allow them to implement the ESA in a manner that emphasizes proactive rather than reactive measures. The Services are working to more effectively coordinate with private land owners and public agencies to build endangered species considerations into their daily operations. Improved coordination will help to avoid the costly and time-consuming litigation that has figured prominently in the implementation of the ESA to date. The Services have made substantial progress in adopting policies that improve the timing and basis of negotiation with stakeholders in seeking compliance with the ESA. Table 4-1 lists the titles of guidance documents and informational pamphlets that describe procedures that the Services are following to promote proactive implementation of several Sections of the ESA. These documents were the primary reference materials used to evaluate the compatibility of the watershed approach with the ESA.

USFWS 1996. Biological Assessment Preparation and Review. A Workshop Sponsored by the U.S. Fish and Wildlife Service, Resources Northwest, Inc., and The Washington Chapter of the Wildlife Society. Held March 10, 1993 at The Inn at Semiahmoo, Washington.
The National Marine Fisheries Service 1995. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. Environmental & Technical Services Division, Habitat Conservation Branch.
USFWS/NMFS 1994. No Surprises: Assuring Certainty for Private Landowners in Endangered Species Act Habitat Conservation Planning. Joint FWS/NMFS "No Surprises" Policy.
USFWS n.d. What's all this stuff about "Habitat Conservation Planning" and "Incidental Take Permits" in Pacific Northwest Forests? U.S. Dept. of the Interior Fish & Wildlife Service Region 1.

Table 4-1. Procedures and Policies Used To Implement the Endangered Species Act.

The ESA provides a clear focus on habitat protection (but only for "listed" species). For example, Section 4 of the ESA allows agencies to determine "critical" habitat for the maintenance and recovery of endangered species, while Section 7 requires that the impacts of human activity on species and habitat be avoided. The pending listing of salmon species throughout the Pacific Northwest will dramatically expand the range over which ESA provisions apply. The geographic range of listed species in this region will become so large that the activities of virtually every natural resource and water quality management agency will need to comply with the requirements of the ESA. The salmon listing will thus require a closer linkage to the interests and activities of water quality programs. This increased geographic scale of application accentuates the need for a systematic method of improving coordination among affected stakeholders. Elements of a statewide watershed approach can provide the framework necessary for integrating the activities of local, state, and federal stakeholders in this process.

The first four subsections (4.1.1 through 4.1.4 below) briefly describe portions of four of the ESA sections that have the most relevance to watershed activities. The final subsection (4.1.5 below) places the activities and requirements of the ESA Sections described in the preceding subsections in the context of Ecology's Water Quality Program watershed cycle steps (described in Section 2.1 of this report).

4.1.1 ESA Section 4: Species Listings and Recovery Plans

Section 4 of the ESA addresses the listing process for threatened or endangered species, designation of critical habitat, creation of recovery plans, and monitoring of species. The listing process for new species is well defined in terms of criteria and scheduling. The geographic range of species being considered for listing may extend far beyond the largest hydrological unit. However, the accumulation of relevant information within hydrological units can improve access to the "best scientific and commercial data available" for a species. This information could be compiled from watershed information clearinghouses located within the geographic range of each species under consideration. The length of most statewide watershed cycles is five years, which is consistent with the status review required by Section 4.

The definition of "critical habitat", which has a regulatory effect on landuse within a watershed, has changed over the life of the ESA. In response to the original ESA and the Services promulgated regulations which were based on a broad interpretation of what qualified as critical habitat. These regulations also restricted actions that might reduce the distribution or population level of a species enough to adversely affect its survival. Congress amended the ESA in 1978 to narrow the definition of critical habitat, and to create a critical habitat designation process. These amendments introduced balancing criteria, stating that critical habitat should only be defined "after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat." USFWS implementation of these amendments directs that critical habitat definitions focus only on those "principal biological or physical constituent elements...that are essential to conservation of the species" (50 CFR §424.12(b) (1991)).

However, subsequent rule making efforts (The Critical Habitat Final Rule, Fed. Reg. Notice for Jan. 15, 1992 and USFWS Critical Habitat Guidance Document, Aug. 5 1992) allowed for an expanded definition of critical habitat through the designation of Critical Habitat Units (CHUs). CHUs are formally designated and mapped on federal lands, and encompass a larger geographic area than would otherwise be considered in a critical habitat designation (as per 50 CFR sec.424.12(b) (1991)). Furthermore, during the formal consultation process for proposed actions on federal lands, the USFWS must consider the action's affect on the CHU as a whole, the relationship to other CHU's, the sub-province, and the range of the species to determine whether the action is likely to result in "destruction or adverse modification" of critical habitat (Biological Assessment Preparation and Review, March 10, 1993, USFWS). The expanded definition of Critical Habitat Units, and the consideration of related factors, are more compatible with a watershed approach than the earlier strict definition of critical habitat was.

Section 4 also requires that a recovery plan for the survival and protection of listed species be developed after a species has been listed, and critical habitat for that species has been defined. The necessary components of a recovery plan are:

- 1) a description of site specific management plans necessary to achieve the goal of species conservation and survival;
- 2) objective, measurable criteria that when met would allow species to be removed from the list; and
- 3) estimates of the cost and time required for carrying out measures necessary to achieve the plan's goal, and to achieve intermediate steps towards that goal.

Recovery plans do not hold the force of law (i.e., they are not binding to any party). However, there is considerable flexibility in appointing the recovery teams that develop and implement a recovery plan. The recovery teams may be composed of "appropriate public and private agencies and institutions, and other qualified persons." Therefore, individual watershed teams could serve as recovery teams. Alternatively, existing watershed teams could be incorporated into a recovery consortium for a designated geographic area (e.g., WQMA). Watershed or basin plans within the defined geographic range of listed species could incorporate input from recovery teams.

Interview participants suggested that a watershed plan, or a series of mitigation activities that have been aggregated within a watershed information clearinghouse, could potentially contribute to a regional recovery plan. However, interview participants indicated that the activities and requirements of Section 4 present more obstacles for integration with the watershed approach than other Sections of the ESA.

During the interviews two features of the listing process were identified that would be difficult to address through a watershed approach:

- information collection for a listing must be conducted over the known range of the species (i.e., across watersheds, across state and international boundaries); and
- the listing process has specific criteria and scheduling that are likely to be inconsistent with the needs of other watershed partners.

The statewide process could provide watershed groups and teams a schedule for consulting with the Secretary of the Interior in establishing recovery teams and developing recovery plans once the Coho Salmon is listed.

Another component of the recovery process that may be satisfied with a watershed approach is monitoring for at least five years of these species which have recovered enough to be de-listed.

4.1.2 ESA Section 6: Cooperation with States

Section 6 authorizes the Secretary of the Interior to enter into agreements with states for the administration and management of any area established for the conservation of listed species. The requirements for an "active and adequate program" for the conservation of listed species are as follows:

- 1) authority resides in the state agency to conserve listed species;
- 2) the state establishes acceptable conservation programs for all listed species, and furnishes a copy of the plan and program to the Secretary;
- 3) the state agency is authorized to conduct investigations to determine requirements for the survival of listed species;
- 4) the state agency is authorized to establish programs and acquire land or aquatic habitat for the conservation of listed species; and
- 5) provision is made for public participation in the listing process.

As long as the requirements of the agreement are met, the actual form of the agreement may be some component of a watershed plan.

WQMA watershed teams are likely to include representatives from Ecology water quality programs, water resource programs, Department of Natural Resources, and Fish & Game, along with local agencies responsible for land use, among others. The combined resources and capabilities of these programs and agencies would best meet the five listed criteria. USFWS would need to determine whether there are viable WQMA teams for all CHUs, or for the range of listed species.

Section 6 also authorizes up to 75% cost share for states participating in these programs, and up to 90% cost share when two or more states cooperate in the conservation of the same species. The cost sharing feature of Section 6 could bring an added capability to the development of management strategies by the watershed team. The watershed planning process includes negotiated priority setting and targeting by the watershed team. The Services could benefit from watershed partners who combine data to develop an explicit list of habitat and mitigation priorities for listed species. It is likely that a greater number of these priorities will be funded if an effective cost share program is in place.

4.1.3 ESA Section 7: Consultations under ESA

In relation to federal agencies, the core of the ESA is its clear prohibition of any activity authorized, funded, or carried out by a federal agency which may "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse

modification of habitat of such species," (ESA sec.7 (2)). The process prescribed in the ESA for making the "jeopardy" or "no jeopardy" determination is uniform and prescriptive, thereby offering equal treatment to agencies requesting incidental take permits.

Briefly, the process involves the following steps. First, an initial biological assessment is conducted by the action agency (e.g., EPA) to determine whether the proposed action is likely to "adversely affect" the listed species in question. If not, the applicant submits the assessment and requests an informal consultation with the USFWS. The applicant will most likely receive a "no jeopardy" decision, and be allowed to proceed with the project. If the action is "likely to affect" the species, the initiator can request an informal consultation with the USFWS in order to revise the scope of the project to reduce or eliminate its impact, and continue with the project. If the scope of the project cannot be revised to reduce or eliminate its impact, the assessment will then go through a formal consultation with USFWS and most likely receive a "jeopardy" determination. The resulting Biological Opinion specifies reasonable and prudent alternatives allowing the project to proceed without jeopardizing species, and issues an incidental take permit protecting the agency from additional liability.

Two features of the watershed approach could enhance the Section 7 consultation process.

- The watershed approach and watershed information clearinghouses would compile all available information on watershed conditions. This information could provide an important baseline for evaluating an action in the context of other ongoing activities. In other words, the watershed approach would make more information more accessible. This is important because in the absence of information, the Services must use the most conservative assumptions for the protection of listed species. A clearinghouse could greatly simplify the collection of information needed in the consultation process by those responsible for contacting the Services.
- The watershed approach follows a series of activity steps that are consistent with the steps that have been established for Section 7 consultations (USFWS 1996). The advantage to "mainstreaming" Section 7 consultations is that issues can be identified, and project modifications or mitigation strategies recommended, prior to the completion of the planning process, and before the agreements and logistics for implementation have been prepared.

Although the jeopardy or no jeopardy determination process required by the ESA is prescriptive, there is an opportunity to streamline this process in the Biological Assessment/Evaluation (BA/BE) phase through the use of information contained in a watershed plan. Biological Assessments are required for "major construction activities", and are generally more detailed than Biological Evaluations, which are used in "other" activities. The contents of a BA include: a project description, site specific information including species present and habitat types, expected effects of the action -- including interdependent and interrelated effects, and cumulative effects within the project area, the likelihood of an "incidental take", suggested conservation measures, and determination of effect on listed species. In a well developed watershed plan,

much of the information required for a BA/BE will likely be available. If not, it will be the next time a similar information need arises, because the agency can identify the need for assessment information in the watershed strategic monitoring plan.

4.1.4 ESA Section 10: An Exception to the Rule

Clearly, "jeopardizing" the continued existence of any listed species or its habitat is not permitted by the ESA. However, some latitude exists for actions that may *incidentally* result in a "take" of some small number of a listed species or its habitat. Landowners, like federal agencies, who believe that their otherwise lawful activity may result in a "take" of listed species may apply to the USFWS for an "incidental take permit." An incidental take permit is not a "get out of jail free card" however, because in order to be considered for the permit the landowner must submit a detailed Habitat Conservation Plan (HCP). An HCP is an assessment of the impacts likely to result from the taking of the species, a list of measures the applicant will take to monitor, minimize, and mitigate those impacts, a consideration of alternatives to the take, and any additional measures the USFWS may require as necessary or appropriate.

Functionally, an HCP is a legally binding agreement made between the applicant and the USFWS. It exchanges some takes for a detailed, long-term commitment from the landowner to implement mitigation and/or conservation measures as part of the proposed action. As an additional incentive, the landowner is assured that even if the needs of the species change over time, no additional land or financial commitments will be required of the landowner for the full term of the HCP, which can be 50-100 years (USGS/NMFS, 1994. "No Surprises").

Thus there are strong incentives for both the landowner and the Services to enter into HCP's, and there is considerable flexibility in the design and scope of the Plan. The scope, content, and time frame of the HCP are determined through agreements made between the Services and the landowner; not by guidelines in the ESA. Thus each HCP can incorporate the specific needs of the species, the landowner, and the watershed(s) in which they reside. These factors combine to make HCPs a potentially important tool in watershed planning efforts.

4.1.5 ESA Activities Integrated Within the Watershed Approach

Ecology is only one of many watershed partners that will be coordinating with the USFWS and the NMFS through the watershed approach to address endangered species requirements. The cycle steps of the Ecology watershed approach are chosen for analysis in this subsection because it is a statewide process that has the capability to include the activities of most other watershed partners. The statewide sequence and schedule of activities is not prescriptive, and should never delay the development and implementation of local individual agreements. Rather, the advance notice and systematic support of watershed teams provided through the statewide framework serves as a catalyst and provides increased capabilities to locally sponsored initiatives.

The watershed approach cycle steps (Scoping, Data Collection and Analysis, Technical Report, and Implementation) are used by Ecology to organize its own activities within a geographic unit

(i.e., WQMA). The process provides predictability to other watershed partners. Because Ecology does not have sufficient resources to simultaneously implement all aspects of its watershed approach statewide, it needed a mechanism to manage its work load and resource demands. Sequencing through the WQMAs using the watershed steps provides this capability to Ecology. The watershed cycle could also be used as a tool by other watershed partners to coordinate their activities on watershed teams. It is well understood that the watershed cycle will not always match the timing needs of others. Where possible, Ecology could amend its schedule to match local circumstances. There will also be determinations that must be made outside of the cycle schedule. In general, however, the cycle could be a useful tool for coordinating activities within watersheds statewide. The discussion below examines how each of the four watershed approach cycle steps could incorporate ESA activities and requirements.

Scoping: The Scoping step includes: outreach activities such as stakeholder meetings and speaking to community groups, newsletters, making contact with established watershed groups, recruitment of a local sponsor, and formation of watershed teams. A key product of this step is the initiation of discussion regarding WQMA goals, objectives, and water quality concerns. In addition, the collection of information for the watershed information clearinghouse begins.

Section 4:

- The listing process requires information on many variables in order to make initial listing decisions, and to update the five-year listing status. During the scoping phase, information that is compiled into the watershed information clearinghouse can be used for the listing determination.

Section 6:

- The Services could provide outreach information on grant availability (approximate dollar amount), and procedures for applying for cost share grants.

Section 7:

- Agencies can contact the Services regarding the schedule and scope of their activities within the WQMA as part of the stakeholder outreach process. The Services can make the species list and designated critical habitat available to the watershed team(s).
- The Services could "piggyback" onto the outreach efforts of the watershed team(s). This might be a good opportunity for education aiming to diffuse misunderstandings regarding ESA regulations and requirements.
- If major projects or activities are ongoing or are already targeted, Scoping could provide a starting point for the informal consultation process.

- The watershed plan describes specific management actions that participating agencies will take to restore or protect the watershed. The commitments and agreements that are part of the watershed plan can be incorporated by reference into a program level consultation and or a pre-listing agreement. The Services could also participate on the watershed team to help develop the management strategies.

Section 10:

- The outreach and education component of the Scoping step provides a good opportunity to recruit interest among landowners and managers regarding the Habitat Conservation Program.

Data Collection and Analysis: Ecology and other watershed team members evaluate the goals, objectives, and concerns identified in the Scoping step to develop a strategic monitoring and information collection plan that addresses the information needs identified with each. Strategic monitoring collects information to support assessments for priority setting, and the development of management strategies. To the extent possible, the monitoring resources of watershed team members are coordinated to improve the temporal and spatial coverage of the watershed unit. The watershed analysis results compiled by the Department of Natural Resources provide one example of collaborative information. Many other opportunities for coordinated priority setting for the use of monitoring resources were discovered during project interviews. Those opportunities would be realized during this step. Assessment information is used to begin prioritizing the concerns identified in the previous step. Watershed teams can use either formal or informal priority setting procedures. The purpose is to target a subset of project objectives for the further development of a management strategy. Outreach and stakeholder meetings would follow a similar course for priority setting. Targeted project objectives would be carried forward to the next step for inclusion in the Technical Report.

Section 4:

- Listing information needs could be included in the development of the WQMA strategic monitoring plan.

Section 6:

- The monitoring and information collection plan would need to address the information needs associated with cost share grant requirements.
- Preliminary decisions for nominating project objectives for cost share grant support could be made.

Section 7:

- The strategic monitoring plan should incorporate the information needs associated with

the ecological goals that are identified in recovery plans, or the listing determination for species that occur within the WQMA. Example factors and indicators have been identified through a coarse screening process for potential application in ESA consultations (available through the Services). A few of these factors include: stream temperature, water quantity and timing, habitat condition, and sediment. These are parameters that will often be of interest to the watershed team regardless of ESA considerations.

- The Services could consult with the watershed team regarding the need for and design of Biological Assessment or Biological Evaluation for those projects that have already been targeted as WQMA objectives. This could be either an extension of the informal consultation process, or the beginning of the formal consultation.
- If the Services determines that the targeted project is likely to have an adverse affect, the project should be resubmitted to the watershed team for further priority setting and targeting consideration.
- If the reevaluated project is still considered a priority, the watershed team will need to enhance the monitoring and assessment plan for the project in order to support the information needs of the formal consultation process. In addition, the watershed team will need to refine the management strategy for the project for mitigation and alternative designs that may help avoid a jeopardy/adverse modification opinion.
- In priority setting and identifying measures of success, the watershed team should incorporate either those objectives identified in the recovery plan, or coarse screening objectives used for making Section 7 Determination of Effects.
- Interview participants supported the process used in the President's Forest Plan initiative. However, the information that was produced was often on too large of a scale to be useful in the consultation process. The nested watersheds that are a feature of the Ecology watershed approach should help to address this question of scale.
- Participation of the Services with other watershed partners on the watershed team will facilitate the early identification of project components (e.g., site specific standards, habitat restoration, grazing policies, water use allocations) that will require programmatic consultation. Early identification allows the regular watershed planning process to support the programmatic consultation process, instead of making this a separate process that requires additional project resources.

Section 10:

- The Services could begin working with those who have requested HCP support. The Services could target their assistance to high priority areas within the WQMA by using the comprehensive watershed assessment information.

Technical Report: The Ecology Technical Report is a short description of project objectives that have been selected for the watershed. The report is short because of the limited resources that are available for its production. The watershed information clearinghouse could address this issue by enabling Technical Reports to include more information in the future. The Technical Report serves an important function, because it notifies residents and other watershed partners who will be doing what, where, and when. In the past, it has typically covered only Ecology's activities. However, as watershed partnerships expand, the scope of the Technical Report may also have to expand. The Technical Report is a subset of the information that would be included in the watershed information clearinghouse. The Ecology Technical Report could include sufficient information to support the ESA programmatic consultation process if other watershed partners contributed to its production.

Section 4:

- The Technical Report could include information on the status of listed species found within the WQMA.

Section 6:

- The Technical Report can be used as a formal application for a cost sharing grant. The information compiled during the watershed planning process can provide supporting documentation and a rationale for the grant.

Section 7:

- The Technical Report can incorporate the modifications that are necessary for addressing the issues raised in the USFWS/NMFS Biological Opinion. It can also include any formal agreements that are made as part of the programmatic consultation process.
- For projects that are abandoned, the Technical Report can lay the groundwork for an alternative design to be investigated in the next watershed cycle.
- The Technical Report could include all of the information from any completed BAs or BEs, and any Biological Opinion submitted by USFWS or NMFS. The accumulated information may satisfy any Environmental Impact Statement requirements for approved projects.

Section 10:

- Project interview participants indicated that land owners and managers who have completed the HCP process are very proud of their agreements. Completed HCPs could be included in Technical Reports to advertise these successes, and to serve as examples to other HCP candidates.

Implementation: Implementation will be tracked through watershed newsletters and information that is available through the watershed information clearinghouse. The Technical Report will also provide a reference point for tracking progress.

Section 4:

- Project implementation plans could include provisions for monitoring to support the update of the species status in the next iteration of the watershed cycle.

Section 6:

- Grants could be allocated to targeted projects. The cycle would facilitate the coordination of collaborative funding. Grant tracking and project reporting could be made consistent with the information gathering activities included in the watershed cycle.

Section 7:

- Compliance checks throughout the WQMA could be better coordinated. The list of approved projects could be updated on a regular basis, consistent with the watershed cycle.
- Implementation agreements would be consistent with the findings of the consultation process. These agreements would be completed on the same schedule as other watershed partners. This would result in improved coordination among watershed partners that are collaborating on projects.
- Assist with assessing cumulative impacts ("inter-related projects").

Section 10:

- Individual HCP agreements are tailored to each land owner or land manager. However, the knowledge gained from other agreements could be transferred among agreements in the same watershed. This could facilitate the completion of more agreements in a shorter period of time, and could improve consistency among mitigation requirements for those components of the HCPs that support a common approach.

Conclusion: The watershed approach process can readily incorporate ESA considerations and the process that has been designated by the Services. The Watershed Approach planning and implementation steps can replace or be used in lieu of the procedures currently recommended for use by the Services. Several Pacific Northwest and other states use watershed approach steps for information collection, assessment, development, and implementation of management strategies that could fulfill the requirements of the ESA. The coordinated action promoted by the use of a watershed framework will significantly strengthen mitigation and recovery efforts undertaken through the ESA.

4.2 Wet Weather Programs

There are a number of different programs in Washington for controlling pollution from wet weather flows that can be considered for inclusion in a watershed approach. These programs are mandated at the federal, state, and local levels and are implemented within the context of NPDES permits, lending themselves to the five-year cycle established by the WQMA process. These programs are briefly described here and are described in further detail in the subsequent sections.

The combined sewer overflow (CSO) reduction program was initiated for all municipalities and counties by the state in 1985, although some activity was underway in Seattle Metro as early as 1975. The purpose of the legislation was to achieve the greatest possible reduction at the earliest possible date. In 1987, the Puget Sound Water Quality Management Plan (Plan) (PSWQA, 1994) directed major attention to storm water and combined sewer overflows in the Puget Sound region. The Plan contains elements that: recognize and encourage Ecology to complete the CSO guidelines and rule; direct Puget Sound municipalities to submit CSO reduction plans to Ecology; direct local jurisdictions to prepare comprehensive storm water plans; direct Ecology to provide technical assistance and guidelines for local jurisdictions; and encourages storm water pollution prevention planning in smaller watersheds under Chapter 400-12 WAC.

In response to the need for comprehensive NPDES requirements for discharges of storm water, the U.S. Congress amended the CWA in 1987 to require the EPA to establish phased NPDES requirements for storm water discharges. EPA published the initial permit application requirements for certain categories of storm water discharges associated with industrial activity, and discharges from municipal separate storm sewer systems located in municipalities with a population of 100,000 or more in November 1990. Storm water discharge permits provide a mechanism for establishing appropriate controls for discharge of pollutants to waters of the United States.

EPA has recently chartered the Urban Wet Weather Federal Advisory Committee and its Sanitary Sewer Overflow (SSO) and Storm Water Phase II Subcommittees under the Federal Advisory Committee Act. EPA formed these Committees to develop recommendations for coordinating the implementation of wet weather pollution control programs and cost-effective solutions for controlling the impacts of urban wet weather flows. The Committees provide a forum for identifying and addressing a wide range of issues associated with water quality impacts from urban wet weather flows.

The Federal Advisory Committee on Urban Wet Weather Flows is currently formulating a "Watershed Alternative" for including wet weather programs in the watershed framework. The focus of the discussion in Section 4.2.3 assumes that wet weather programs will be encompassed in the watershed framework. The subsequent subsections provide perspective on the wet weather programs in Washington and consider the utility of the more open model of the watershed approach described in Section 3.0.

4.2.1 Combined Sewer Overflows

In 1985, the Washington State Legislature enacted House Bill 815 (codified as Chapter 90.48.460-490) RCW) which required all municipalities with CSOs to submit CSO Reduction Plans to Ecology by January 1, 1988. The plans were to achieve the greatest possible reduction at the earliest possible date. They included locations, baseline annual frequency and volume and some water quality and sediment sampling data. By 1987, Ecology had defined the greatest possible reduction as one overflow per year at each CSO, and had negotiated interim goals of 75 percent and 79 percent reductions of CSO volumes system-wide by 1997. Reductions to one overflow per year negotiated by Washington were more stringent than the national policy.

Ecology developed CSO reduction rules (Chapter 173-245) and guidelines for implementation in 1987. EPA approved Ecology's CSO program in 1991. CSO Reduction Plans, must include:

- Field assessment and mathematical modeling to establish each CSO's location, baseline annual frequency, and annual volume
- Flow monitoring and sampling data sufficient to establish correlations between and among the group of CSO sites
- Analysis of control/treatment alternatives that considers best management practices (BMPs), pretreatment programs, and sewer use maintenance programs, as well as retention and separation technologies.
- An estimate of the water quality and sediment impacts from the proposed treatment alternatives.

All Washington municipalities with CSOs are continuing to control CSOs, typically utilizing separation and/or storage. Separation into separate storm sewers is generally less expensive and is consistent with the NPDES regulations (PSWQA, 1994).

At the federal level, EPA developed the National Combined Sewer Overflow Control Strategy in 1989. The strategy identified the following three objectives:

- Ensure that if CSOs occur, they are only as a result of wet weather
- Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements under the CWA
- Minimize the impacts of CSOs on water quality, aquatic biota, and human health from CSOs (EPA, 1995).

In addition, EPA required all States to develop state-wide permitting strategies designed to reduce, eliminate, or control CSOs.

Although the CSO Strategy was successful in focusing increased attention on CSOs, it fell short in resolving many fundamental issues. In mid-1991, EPA initiated a process to accelerate implementation of the Strategy. The process included negotiations with representatives of the regulated community, State regulatory agencies, and environmental groups. These negotiations were conducted through the Office of Water Management Advisory Group. The initiative resulted in the development of a CSO Control Policy, which was published in the *Federal Register* on April 19, 1994 (59 *Federal Register* 18688). The intent of the CSO Control Policy is to:

- Provide guidance to permittees with CSOs, NPDES permitting and enforcement authorities, and state water quality standards (WQS) authorities
- Ensure coordination among the appropriate parties in planning, selecting, designing, and implementing CSO management practices and controls to meet the requirements of the CWA
- Ensure public involvement during the decision-making process.

The CSO Control Policy contains provisions for developing appropriate, site-specific NPDES permit requirements for all CSOs that overflow due to wet weather events. It also announces an enforcement initiative that requires the immediate elimination of overflows that occur during dry weather and ensures that the remaining CWA requirements are complied with as soon as possible.

Key Elements of the CSO Control Policy

The CSO Control Policy contains four key principles to ensure that CSO controls are cost-effective and meet the requirements of the CWA:

- Provide clear levels of control that would be presumed to meet appropriate health and environmental objectives
- Provide sufficient flexibility to municipalities, especially those that are financially disadvantaged, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements
- Allow a phased approach for implementation of CSO controls considering a community's financial capability
- Review and revise, as appropriate, Water quality standards and their implementation procedures when developing long-term CSO control plans to reflect the site-specific wet weather impacts of CSOs.

In addition, the CSO Control Policy clearly defines expectations for permittees, State WQS authorities, and NPDES permitting and enforcement authorities. These expectations include the following:

- Permittees should immediately implement the nine minimum controls (NMC), which are technology-based actions or measures designed to reduce CSOs and their effects on receiving water quality, as soon as practicable but no later than January 1, 1997.
- Permittees should give priority to environmentally sensitive areas.
- Permittees should develop long-term control plans (LTCPs) for controlling CSOs. A permittee may use one of two approaches: 1) demonstrate that its plan is adequate to meet the water quality-based requirements of the CWA ("demonstration approach"), or 2) implement a minimum level of treatment (e.g., primary clarification of at least 85 percent of the collected combined sewage flows) that is presumed to meet the water quality-based requirements of the CWA, unless data indicate otherwise ("presumption approach").
- WQS authorities should review and revise, as appropriate, State WQS during the CSO long-term planning process.
- NPDES permitting authorities should consider the financial capability of permittees when reviewing CSO control plans.

In addition to these key elements and expectations, the CSO Control Policy also addresses important issues such as ongoing or completed CSO control projects, public participation, small communities, and watershed planning.

The CSO program in Washington is implemented through NPDES permits issued by Ecology to municipalities. Many of the municipal permits have not been re-issued to incorporate CSO control policy provisions, due to the backlog. The permits that have been re-issued include reporting requirements which entail an annual report summarizing the actions that the municipality has implemented within the preceding year, as well as any sampling results obtained. These reports could be produced from data stored on the virtual watershed atlas. The atlas could also serve to direct interested parties to the report, or a mechanism of distributing annual status information to interested watershed residents, as one forum for public outreach and education.

4.2.2 Separate Storm Sewers

A requirement for comprehensive storm water planning for all urbanized areas within the 12-county Puget Sound region was established in the 1987 Puget Sound Water Quality Management Plan (Plan) (PSWQA, 1994). The Plan also directed Ecology to develop technical manuals for

use by local jurisdictions in storm water planning. Ecology's response was a technical manual (Ecology, 1992) that provides engineered designs and best management practices for storm water pollutant control.

To meet the requirements of the CWA Amendments of 1987, EPA promulgated storm water regulations in 1990. These regulations provided for a phased approach to control of municipal storm water discharges, requiring large municipalities (>250,000 population) to submit a Part 1 NPDES applications by November 1991 and medium municipalities (populations between 100,000 and 250,000) by May 1992. Part 1 applications provided general information about the municipal storm sewer system such as: the municipality's legal authority to control discharges to the storm sewer, a topographic depiction of the entire drainage, landuse data and locations of outfalls, characterization of the discharge quantity and quality.

Part 2 of the large and medium municipal NPDES permit storm water application, which was required to be submitted to the permitting authority one year after Part 1, required comprehensive storm water management plans to be developed. The plans were to include: an inspection program, analytical results of any sampling performed, a program to identify illicit discharges, estimates of annual pollutant loads to the water bodies from the storm sewer discharges, a proposed monitoring program, and other components designed to address specific sources of pollutants.

EPA is currently developing Phase II storm water regulations which will apply to smaller municipalities. In developing the regulations, EPA is striving to encourage permitting authorities to address all storm water sources on a watershed basis.

By 1990, EPA had promulgated regulations requiring management of storm water discharges associated with industrial activity. Most of these industries were eligible for a General Permit for Storm Water Discharges Associated with Industrial Activities, others required individual NPDES permits. As part of the second phase, EPA may also extend current regulation of industrial dischargers to a wider variety of standard industrial classifications. The Phase II storm water regulations are anticipated to be proposed by September of 1997.

In Washington, the Water Quality Program of Ecology is issuing NPDES storm water permits on a watershed basis. All large and medium municipalities within a Water Quality Management Area (WQMA) are permitted under one permit. The Cedar/Green Water Quality Management Area permit (Ecology 1995) includes the following additional requirements:

- Assess the degree to which storm water discharges are impacting selected receiving waters and sediments.
- Evaluate the effectiveness of selected BMPs
- Develop a mechanism for gathering maintaining and using adequate information to conduct planning, priority setting, and program evaluation activities.

- Identification of watershed-wide coordination mechanisms and a schedule to complete the storm water management plans among permittees that share waterbodies; coordination of data management capabilities and modeling capabilities.

One of the permittees under this NPDES permit is the Washington Department of Transportation (WSDOT) (Ecology, 1995). Specific conditions apply to WSDOT activities in managing storm water from WSDOT roads and highways.

4.2.3 Sanitary Sewer Overflows

In late 1994, a number of municipalities approached EPA asking the Agency for greater national clarity and consistency in the NPDES requirements apply to sanitary sewer overflows (SSOs). EPA formed an internal work group which concluded that the regulation of SSOs varies from state to state and among EPA regions, and decided to convene a national "policy dialogue" among the stakeholders. The SSO Advisory Subcommittee was formed and began meeting in December 1994. The committee is examining the need for national consistency in permitting and enforcement, effective sewer operation and maintenance principals, public notification for SSOs with potential health or environmental dangers and other public policy issues. One of the issues the SSO Advisory Subcommittee is discussing is the storm size and frequency from which SSOs are likely to occur. EPA was asked to consider the Subcommittee's recommendations for regulatory and non-regulatory actions to reduce SSOs nationally.

In Washington, one of the EPA Region 10 states, SSOs are prohibited. SSO incidents are managed through sewage treatment plant NPDES permit compliance schedules, notices of correction, or available enforcement mechanisms. If SSOs are identified through self-reporting, citizen identification, inspections, or general sewer planning, the NPDES permit is modified to require corrective action. Corrective actions may include: identification and separation of cross connections between storm and sanitary sewers, increase pumping station capacity, and inflow and infiltration reduction program implementation. Management of SSOs in the other three EPA Region 10 states (Oregon, Idaho, and Alaska) may vary.

4.2.4 Integrating Wet Weather Flow Programs into the Watershed Approach

The discussion in Section 3.0 focused on the utility of an expanded information clearinghouse for a host of potential watershed partners. Clearinghouses would be used for assimilating data and providing a common storage platform for watershed information including water quality data, agreements among the various parties within a watershed, and indices with metafiles describing monitoring or project objectives, quality assurance programs, type of data, etc. for other sources of data.

The wet weather programs lend themselves to the WQMA watershed model because they are implemented as part of the NPDES program in Washington, for which the WQMA approach was designed. The wet weather programs can benefit from a shared information platform such as the clearinghouse. For the most part, wet weather programs do not require an extensive amount of

reporting to the oversight or permitting agencies. However, the information clearinghouse would serve well as an integrating tool. The open platform can serve as a mechanism for information sharing basin-wide and can be easily incorporated into the five-year cycle. From a basis of common information, partners within the watershed could develop management strategies with shared vision and priorities. The subsequent paragraphs describe how wet weather programs could utilize and benefit from a watershed information clearinghouse.

Scoping: The Scoping step includes: outreach activities such as meetings with potential watershed partners and community groups, newsletters, recruitment of a local sponsor, and formation of watershed teams. A key product of this step is the initiation of discussion regarding WQMA goals, objectives, and water quality concerns. In addition, the collection of information for the watershed information clearinghouse begins.

CSOs

- Outreach activities initiated by Ecology in the WQMA scoping process should target not only the sewer utilities with jurisdiction over CSOs, but also community groups with a demonstrated interest in CSO issues.
- Outreach activities targeting the public could be conducted, in part, through the clearinghouse once it has been established.
- Sewer utilities may have already identified the environmentally sensitive areas in the vicinities of CSOs required under the national CSO Policy. This information, any sampling data, and locations of CSOs that may be stored in GIS (e.g., Seattle has a GIS system with CSO locations) could be shared during the scoping process.
- Status on the utilities' implementation of the Nine Minimum Controls should also be shared, electronically, if possible, during this period.
- In a spirit of partnership and potential for shared priority setting, sewer utilities may have collected data concerning CSOs not specifically required under NPDES permit and not previously shared with the permitting authority.

STORM WATER

- Storm water utilities are not necessarily managed by the same jurisdictions that manage sanitary sewer utilities. It is critical to ensure that all the potentially regulated entities are brought into the partnership.
- Inclusion of established local watershed groups is critical for wet weather programs. These groups perform activities that either directly or indirectly (e.g., education) reduce nonpoint sources of pollution that can impact storm water quality.

- Inclusion of a wide variety of community groups can assist storm water permittees in meeting the public outreach component of the storm water management program required under their storm water permit. Community groups will be helpful in identifying contaminant sources such as illicit discharges to sewers, locations of storm water outfalls, or local projects that have been implemented that improve water quality.
- Representatives of industry should be included in the initial outreach meetings. Although these industries are not required to perform monitoring under the Ecology issued Storm Water General Permit for Industrial Activities, these industries are required to develop and implement storm water pollution prevention plans.
- A watershed clearinghouse could serve as watershed-wide coordination mechanism for sharing data, models, GIS maps, and sharing analysis of BMP effectiveness studies. Currently, data are housed in numerous locations with relatively limited access. For example, EPA and Ecology maintain separate databases with data gathered from municipal and industrial discharger reports that may include storm water monitoring data. EPA maintains location information on dischargers in GIS that could be relevant to the quality of storm water within a WQMA.

In King and Snohomish counties, the surface water utilities not only manage storm water but also gathers monitoring data on the quality of the smaller drainages within their boundaries. These utilities have invested in GIS systems that can depict the information graphically. In Snohomish county, for example, \$100,000 has been invested to create data layers for drainages, landuses, locations of water quality complaints received. They are intending to add stream gaging stations, locations of minor flooding, and areas in which erosion controls have been instituted. King County has data on land use, drainages, storm water discharge locations stored electronically. They also maintain stream habitat information, although this is not currently in electronic format. This information is valuable to the WQMA process for several reasons. First, display of information geographically can provide a useful tool for the public to understand the watershed issues. Graphical displays of information can also assist decision-makers in more readily establishing priorities. Second, surface water management agencies at the county level have already made investments in databases, although not all information is electronically stored. Continued investment in existing systems is more economically justified than re-creation of such systems. Third, these utilities may provide local sponsorship for the watershed information clearinghouses, although agreements with other partners would need to be developed and implemented describing financial support to the system and data access.

The Ecology issued WQMA storm water permits require utilities to gather and maintain information about the following items: location of storm water outfalls, drainage areas, land uses, zoning, precipitation, and storm water quality and quantity monitoring results. The 1995-issued permits also require a monitoring program be developed to estimate concentrations and loads from representative areas within the jurisdiction's portion of the

basin, identify pollutant sources, evaluate the impacts of storm water discharge on receiving waters and sediments, and evaluate the effectiveness of best management practices. Some of this information may be accessible electronically and either imported into the information clearinghouse or accessed through a linkage.

Industries may have access to information relevant to pollution control in the storm water. For industries that have individual storm water permits, discharge monitoring data may be maintained electronically by either Ecology or EPA. These data may be relevant.

Sharing information from all watershed partners during the scoping, and monitoring phases through a single watershed information clearinghouse will facilitate access to information and provide for better prioritization and decision-making of future monitoring needs.

SSOs

- Because sanitary sewer overflows are prohibited, municipal sewer utilities within the watershed will maintain information on the number and locations of storm sewer overflows. They may also be able to provide likely causes of recurrent overflows.
- Records of citizen identification of SSOs could also be included in the information clearinghouse.

Data Collection and Analysis: The watershed partners evaluate the goals, objectives, and concerns identified in the Scoping step to develop a strategic monitoring and information collection plan that addresses the information needs identified with each. Under the plan, partners collect information to support assessments for priority setting, and the development of management strategies. Monitoring resources of each of the watershed partners should be coordinated to improve the temporal and spatial coverage of the watershed unit. Coordinated priority setting for the use of monitoring resources can identify synergistic data collection opportunities that will enhance the amount of relevant data collected. Assessment information is used to begin prioritizing the concerns identified in the previous step. Prioritization of concerns can be either a formal or informal process. The purpose is to target a subset of objectives for the further development of a management strategy and inclusion in the Technical Report.

CSOs

- Shared evaluation of the WQMA objectives can provide perspective on the level of priority of CSOs for Ecology and the sewer utilities within the WQMA. Understanding these priorities can often clarify information gaps that would need to be required to address CSOs.
- Sharing of existing information may reduce the need for additional monitoring or may enable monitoring to be performed in tandem with other monitoring, thus creating

efficiencies.

STORM WATER

- In developing a monitoring strategy, partners can coordinate monitoring programs, reducing redundancy or establishing synergies for collecting, for instance a few samples for additional parameter analysis that will enhance the overall monitoring program.
- The ambient monitoring performed by the surface water utilities in King and Snohomish counties will greatly enhance the data collected by Ecology's ambient monitoring program.
- As data become available and are posted on the watershed information clearinghouse, prioritizing actions could be based on the severity of contaminant loading or on the impacts measured in the water body.

SSOs

- Citizen-sewer utility partnerships developed as a result of a watershed information clearinghouse could perform focused studies of past incidents of storm sewer overflows which may be able to provide likely causes of and potential corrective actions for recurrent overflows. Investigations of causes could include focus on potential cross-connections between storm and sanitary sewers, and identification of locations of high inflow and infiltration.
- Studies identified without a sufficiently high priority to merit funding, could be piggy-backed on other studies with minimal addition of funding. This is one mechanism to accomplish the objective.

The process of sharing in the gathering and analysis of information will assist the watershed partners to build consensus about the risk and priorities, and to understand the associated costs and benefits of addressing wet weather pollutant sources.

Technical Report: The WQMA Technical Report is a short description of priority objectives that have been selected for the watershed. The report development process should document the priorities developed jointly by the watershed partners. During the report preparation process, the watershed information clearinghouse would provide access to more information to include in the Technical Report. The report should also be expanded to include not only Ecology's activities, but also the activities of other watershed partners in controlling pollution from wet weather flows. The Technical Report should also be posted on the clearinghouse as notification to residents and other watershed partners who will be doing what, where, and when.

In some watersheds, the process of joint assessment of priorities may result in a demonstration that wet weather flows contribute one of the highest pollutant loads to the waterbody and, thus,

actions that reduce or eliminate the pollutant loads should be implemented first. In other watersheds, greater pollutant loading may be contributed by activities other than wet weather flows. In these areas, watershed planning bodies may develop strategies to manage those activities that impact the water bodies most severely first. As the clearinghouse information is re-visited in subsequent planning efforts, consensus will most likely direct efforts to address the highest remaining priority pollutant sources first.

CSOs

- The Technical Report can provide a forum for balancing the severity of environmental problems. For example, pollutant loading from a specific CSO may actually be rated as a lower priority than upgrading the sewage treatment plant, control of specific storm water discharges, or removal of a hot spot of contaminated sediment which adversely impacts the benthic biota. For example, King County is evaluating the relative impact of its CSOs on the Duwamish River to decide where to spend its limited resources. The study may identify a mechanism other than CSO reduction to improve water and sediment quality in the Duwamish. If this information were shared in the technical report, Ecology and King County could begin discussing alternatives for meeting the Clean Water Act objectives. Flexibility for such discussions is encouraged in the CSO Control Policy. Thus, the technical report provides the forum for balancing of environmental priorities with limited funding sources. Balancing environmental priorities across statutory or programmatic requirements suggests a pooling of funding resources across jurisdictional boundaries (state, cities, counties, wastewater utilities, storm water utilities). However, pooled funding is an issue that will require serious consideration by the watershed partners and changes to current practices and potentially to regulatory requirements.

STORM WATER

- The Technical Report could contain both an assessment of storm water quality in the WQMA and sources of contamination - industrial storm water, urban storm water and their relative contributions. Thus, the Technical Report could serve as an educational tool.
- The Technical Report could also provide focus for local volunteer groups (e.g., 400-12 watershed planning groups and other local citizen groups) in establishing new project ideas. If these groups are also watershed partners, they may commit to specific high priority projects in the report.
- Some watershed partners (e.g., the Washington Department of Transportation, [WADOT] one of the permittees under the WQMA storm water general permits) is enthusiastic about alignment between highest priority environmental issues and funding. For WADOT, however, their prioritization only includes issues for which they have responsibility.

Joint prioritization of concerns by the watershed partners from a shared information platform should result in a shared vision and commitment to necessary steps of implementation. However, prioritization among a number of watershed partners greater effort than are usually allotted to the technical report.

SSOs

- The Technical Report can assist local jurisdictions in focusing resources on the highest priority areas for corrective action because the most severe problems will be documented. They will be able to align resources with priorities.
- The report may serve as a public education tool, informing the public about the relative occurrence of SSOs and their environmental priority. The education and potential resulting activism may enhance the public will to fund corrective measures that would prevent future SSOs.

Implementation: Implementation can be tracked through watershed newsletters and information that is available through the watershed information clearinghouse. Draft permits issued for storm water and CSO control could be posted, and public comment could be received through the clearinghouse. The Technical Report and issued permit conditions will also provide reference points for tracking progress.

CSOs

- Draft municipal NPDES permits with CSO conditions could be posted on the information clearinghouse for public review and comment.
- Re-issued NPDES permits containing requirements for CSO reductions and implementation of the nine minimum controls may be more readily accepted by the regulated utility because they were included in the partnered prioritization process and will understand the priority.
- The information clearinghouse would be the format for status reports on CSO reductions, any permit-required monitoring results, and annual reports.

STORM WATER

- Permits, such as the Cedar/Green WQMA permit (Ecology 1995), issued on a WQMA basis offer a unique opportunity to demonstrate the utility of the information clearinghouse. Currently, this permit is issued to each of the jurisdictions independently and does not rely on interjurisdictional cooperation. An information clearinghouse could provide a forum for jurisdictions to develop agreements that would facilitate permit effectiveness. For example, under the current Cedar/Green WQMA permit, each of the five permittees is required to analyze its storm water management program needs.

independently from the other permittees in the watershed. A shared information clearinghouse may provide a forum for developing priorities across jurisdictional boundaries. King County is in the initial phases of developing a Regional Needs Assessment. The assessment is examining prioritization of utility issues across jurisdictions, and also examining models for pooling funding to address top priority issues.

- Draft WQMA storm water permits could be posted on the information clearinghouse for public review and comment.
- Ecology could post a list of all of the NPDES industrial storm water permits on the clearinghouse. Conditions could be structured to maximize the implementation of BMPs across permittees on a simultaneous schedule. Water quality monitoring before and following implementation could measure success.

SSOs

- Use of an information clearinghouse format for reporting instances of SSOs, information could provide real time data to Ecology and the public, simultaneously.

Conclusion: The Ecology WQMA process already incorporates wet weather programs because these programs are part of the NPDES program. The WQMA program does not currently serve as a forum for watershed partners to develop a joint vision and strategies to accomplish pollution control. Use of watershed clearinghouses can facilitate partnership development. As partnerships gain momentum, clearinghouses will be used even more effectively to enhance data sharing, synergize monitoring efforts, provide greater access for the public to information thereby enhancing involvement opportunities, and ultimately, focus resources more efficiently to accomplish broader pollution control.

SECTION 5. DEVELOPING WATERSHED INFORMATION CLEARINGHOUSES

Information management and communication support are key areas that could contribute to the growth of the watershed approach and improve the effectiveness of existing partnerships in the Pacific Northwest. The level of interest and support for the clearinghouse concept is impressive. The need for a universally accessible information source was identified in the interviews. The recognized need and support for the concept represent a service opportunity for agencies capable of extending support to watersheds to assist the partners in establishing clearinghouses. The following issues identified by project participants should be addressed in taking the next steps to establish individual watershed information clearinghouses, and to build a more comprehensive information management and communication support network for the watershed approach.

- 1) **Identifying Consensus Recommendations of Potential Clearinghouse Partners:** This project was not a survey and its geographic focus was limited to Washington state. Region 10 may want to consider a survey of states to determine if the recommendation identified in this report is applicable to other states. The survey could collect recommendations for alternative approaches to satisfy information management and communication support needs.
- 2) **Clearinghouse Boundaries: Scaling and Nesting to Achieve Integrated Geographic Coverage:** Boundaries that define the service areas of the watershed information clearinghouses need to be established. A consensus among watershed partners on boundaries would allow individual partners to begin forming the necessary agreements for the clearinghouse. Defining the hydrologic boundaries would also guide the process of indexing information to "nested" units ensuring integration of available information from individual projects. One suggestion was to conduct a survey or workshop for the purpose of building a consensus response to this question.
- 3) **Designing Information Clearinghouses:** Interview participants identified several areas in the state that are prepared to begin design work on the watershed information clearinghouse (e.g., Nooksack). Figure C-2 (in Appendix C) identifies a seven-step method for developing an information management and communication support system. Pilot projects could be sponsored in a few locations to determine if a consistent design is possible for the clearinghouse.
- 4) **Identifying Charter Issues:** It would be useful to prepare an information resource document describing solutions to forming organizational units (such as private non-profit organizations) for the clearinghouse. The document would address issues such as shared funding, information management policies, and board structure and function, to name just a few.

- 5) **Supporting and Tracking the Progress of Pilot Clearinghouses:** The Yakima watershed clearinghouse will begin to set up its operations over the next several months. Tracking its progress, EPA could identify critical needs and determine if there are mechanisms in place to provide the necessary support. With support, it would be possible to fund a periodic evaluation to determine how successful the clearinghouse is in meeting Yakima watershed partners' information management and communication needs.
- 6) **Extending the Clearinghouse in a Use Analysis:** It would be useful to develop a model for use in the designated service areas (e.g., WQMA) to determine the need, support, and critical functions of the proposed information clearinghouse. The WQMA watershed clearinghouse use analysis could address more topics and in greater detail than is possible in this project report. Example categories for the extended WQMA watershed clearinghouse use analysis are listed below:

- Identify the potential watershed clearinghouse constituency
- Collect recommendations for a clearinghouse mandate or charter
- Identify the monitoring and information collection activities of clearinghouse partners
- Describe the assessment objectives and methods of clearinghouse partners
- Describe the process used by individual partners to establish watershed priorities and describe the focus for priorities
- Evaluate the management strategy capabilities of watershed partners
- Define the products and services produced by watershed partners
- Assess the implementation capabilities of watershed partners

The use analysis report could be circulated among potential clearinghouse partners prior to convening a workshop to establish a clearinghouse. The report would provide background information on design questions to be addressed at the workshop.

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- Chapter 90.03 RCW. Water Code.
- Chapter 173-245 WAC. Submission of Plans and Reports for Construction and Operation of Combined Sewer Overflow Reduction Facilities.
- Chapter 173-500 WAC. Water Resources Management Program Established Pursuant to the Water Resources Act of 1971.
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Washington State Dept. of Ecology. 1992. Stormwater Management Manual for the Puget Sound Basin (The Technical Manual). Washington State Department of Ecology. February 1992. Publication No. 91-75.

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APPENDIX A

INTERVIEW INFORMATION PACKET

MEMORANDUM

TO: Project Participants

FROM: Clayton Creager and Nancy Winters

DATE: 29 August 1996

SUBJECT: Project Background Information for Watershed Approach Implementation: Using Watershed Plans In the Pacific Northwest

Introduction and Project Purpose:

Thank you for consenting to participate in this project. Your participation will contribute to an improved understanding of the use of watershed plans in the Pacific Northwest. There are many different types of watershed projects and approaches that are being implemented in Washington state. This project will look to the lessons learned from as many watershed experiences as possible to further promote the use of comprehensive solutions.

It is clear that there are many different purposes and uses for watershed plans. However, it is not necessary for participants in a watershed project to share all of the same objectives or goals for watershed plans to work. However, watershed plans must fulfill some purpose or requirement for all participants to sustain a commitment to a common coordinated watershed process. This project will identify many purposes for watershed plans and several requirements that they can fulfill. If all purposes and uses are recognized and given consideration among all participants in watershed initiatives, it is more likely that a watershed approach will be able to successfully focus collaborative efforts on common goals.

The project focus is on the use of watershed plans within the emerging statewide watershed approach being used by water quality agencies in Washington, Idaho, and in the near future Alaska. Oregon is also giving serious consideration to a statewide watershed approach. This project responds to the need for an improved understanding of how watershed plans can be used to fulfill a wide variety of communication and reporting requirements in one product. The purpose of the project is to collect information on the opportunities, barriers, and solutions for using watershed plans from a wide variety agency staff and watershed team participants. Because of time and budget constraints interviews will be conducted within Washington state.

Information collected through interviews will be consolidated into a project summary report. The summary report will focus on areas of consensus regarding the use of watershed plans by participating agencies, programs, tribes, and other groups. The report will also convey specific

recommendations for watershed plans to achieve the goal of serving as a common product (e.g., assessment report, cooperative management strategy, implementation guide, accounting report) for watershed planning and implementation initiatives. The project report will also identify the opportunities and barriers for the use of watershed plans in the Pacific Northwest. EPA Region 10 will use the information to identify what the Region can do to promote the opportunities and remove the barriers to more effectively use watershed plans within the region. The project report can be used as a resource / reference document for decision making relative to the watershed approach. The project report will be distributed to project participants and others interested in the watershed approach.

U.S. EPA is looking for opportunities to allow state and local agencies to meet Clean Water Act (CWA) requirements through the watershed approach. Examples of CWA requirements that can be addressed through the watershed approach include: 303(d) Total Maximum Daily Loads listing and mitigation strategy requirements; 305(b) water quality assessment reports; Triennial Standards Review and Update; NPDES permitting and wet weather programs; Comprehensive State Ground Water Protection Program - wellhead protection; and Nonpoint Source management plans. Other region-wide initiatives such as the Salmon Strategy and the Forest Plan, also involve a watershed approach. The project will also evaluate how the requirements of the Endangered Species Act can be addressed through the watershed approach:

Not all project participants will have an interest in the programs listed above. However, these participants may have other objectives or needs that can be fulfilled through the use of watershed plans. The project, by identifying mutual or overlapping objectives among potential watershed team members, can begin to establish a commitment among members to a common product and process. Therefore the project interviews will identify the opportunities and barriers of potential watershed team members with as many different backgrounds as possible.

The following sections and Attachments provide background information on the statewide watershed approach, example watershed plans, and the questions that will be used in interviews. The background information was included to help focus and extend the interviews. The information is not meant to limit any relevant experience that a participant can provide in the interview. Much of the information on the statewide watershed approach and watershed plans comes from the Statewide Watershed Management Course. However, results from any watershed project or associated approach is of interest to the project team.

Watershed Approach Background Information:

Washington, Idaho, Alaska, and Oregon are developing or implementing statewide watershed approaches. The goal of the watershed approach in each state is to provide a framework that will integrate the water resource management activities of local, state, and federal partners. The statewide framework developed by each state is tailored to their specific circumstances. Substantial differences exist between the descriptions of their approaches that are provided in draft or final

framework documents. However, each framework is based on several common elements, and comprehensive watershed plans are one of those shared elements.

The statewide approach establishes a voluntary schedule for sequencing geographic management units. The schedule for Washington state is included as Attachment A. Agency staff and citizens that choose to participate use the five steps described in Attachment B to identify priority issues and to target management strategies to specific geographic areas within the management units. The Washington Ecology Water Quality Program (WQP) watershed approach does not require the use of comprehensive watershed plans. Rather, the five steps included in Attachment B make reference to a technical report that is designed jointly by the participating agency staff and citizens. Attachment C represents one possible form of a watershed plan that has been compiled from examples from several states.

A watershed team, watershed advisory group, or a core set of watershed initiative partners can determine the audience, purpose, format, and requirements to address with a watershed plan. The example outline in Attachment C is simply a starting point for designing the appropriate document for a given watershed. The format adopted by a WQP Watershed Team is often a much shorter "watershed action strategy" that includes a brief description of the Ecology sponsored water quality management activities to be undertaken. The WAC 400-12 process is also a significant source of watershed plans in Washington state. The example provided in Attachment C is not intended as a model to replace WAC 400-12 plans. The outline is to be evaluated by project participants to determine the potential for a common watershed plan.

Watershed plans can serve as a reference document for planning and implementation cycle that has been adopted by participating watershed partners. In the example document, the status of watershed resources is reported, priority issues identified, and recommended management strategies described. Agreements between watershed partners that define collaborative activities can also be included. Watershed plans can serve as the basis and guide for implementation of water quality management activities. The plan can be issued once every five years. Alternatively, the plan can be developed section by section at the end of each management cycle step, and compiled into a notebook format at the end of each cycle. Many different approaches are being developed in states around the country. Experience from several other states indicates that watershed plans can fulfill a broad range of requirements for agency partners. A common product among watershed partners will make it less likely for anyone to "drift" away from the watershed process.

Examples Uses of Watershed Plans To be Considered / Issues To Be Considered

Several federal program areas and initiatives have been targeted to determine how watershed plans can be used to fulfill various requirements. The programs/requirements listed below are those that have been identified in statewide framework documents to be addressed and fulfilled by watershed plans. However, the scope will include consideration of other uses or issues identified by project participants.

- Endangered Species
- TMDLs
- Point Source Programs (e.g., Area-wide wastewater treatment plans; Pretreatment Program; Wet Weather - CSO, SSO; Pollution Prevention)
- NPS Management Plans
- State / EPA Performance Partnership Agreements (i.e., State/EPA Annual Work Plans)
- Comprehensive State Ground Water Protection Program
- 305(b), other Congressional reporting requirements
- Forest Plan
- Salmon Strategy

Summary descriptions of the programs listed above are available upon request. Each summary is 1 to 2 pages and includes the following categories: Description; Relationships among Federal, State, and Local Efforts; Opportunities for and Barriers to Watershed-Scale Aquatic Resource Protection; Opportunities for and Barriers to Risk-Based Approach; and Current EPA Initiatives. Interview participants are encouraged to identify other opportunities or requirements not included above.

Interview Questions

The interview questions were designed to take between 1 to 2 hours to complete. The purpose of the questions is to focus discussion to each participant's areas of interest and the potential use of watershed plans to satisfy those interests. The general questions listed below will be tailored to individual interviews. The interviewer will use the questions to explore the interview participant's area of interest or program area. The participant is encouraged to extend their response or comments beyond the issues covered in these questions.

- 1) Briefly describe the watershed planning/implementation process that you are involved in. What is your role in the process (e.g., a citizen volunteer; local official; local, state, or federal resource or service agency; local, state, or federal regulatory agency; other)? What is your and/or your organization's primary goal or objectives in the watershed?
- 2) What is the basis of your watershed initiative (e.g., local WAC 400-12 watershed plan; targeted watershed within Ecology's WQP watershed framework; independent; other)? What is the purpose or function of a watershed plan in meeting your goal(s) or objective(s)?
- 3) How can other local, state, or federal partners contribute to achieving your objective(s)?
- 4) Does the example watershed plan (Attachment C) address the information needs of those participating in your watershed initiative. If not, how could it be changed to do so?
- 5) How could a coordinated watershed process support your organizations' goals, objectives, information, or reporting needs?

- 6) What level of spatial or technical detail is required to address your organization's issues of concern related to water quality improvements?
- 7) What other opportunities do you envision for watershed planning and implementation that address water quality issues within a geographic area of any size?
- 8) Describe any barriers to developing your watershed planning/implementation process that have not been previously addressed in this interview.
- 9) What recommendations would you make to more effectively capture opportunities or overcome barriers that you have identified to successfully improve water quality in your geographic area of interest?
- 10) Can you identify any common ground among the many local, state, and federal watershed planning/implementation efforts? Likely areas of coordination or collaboration?
- 11) How can various watershed planning and implementation efforts be more effectively integrated?
- 12) How can the organizations involved in watershed planning/implementation work together to improve water quality?

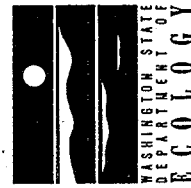
Watershed Approach to Water Quality Management

Attachment A

Activities Schedule for Watersheds Under 5-year Cycle (lower case letters denote transition activities)											
Water Quality Management Areas	State Fiscal Year (July 1 through June 30)										
	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01			
Skagit/Stillaguamish, Columbia Gorge, Horseheaven/Klickitat, Upper Columbia, Pend Oreille	S	D	A	R	I	S	D	A			
Island/Snohomish, South Puget Sound, Okanogan, Crab Creek, Esquatzel		S	D	A	R	I	S	D			
Nooksack/San Juan, Western Olympic, Wenatchee, Upper Snake, Lower Snake			S	D	A	R	I	S			
Kitsap, Lower Columbia, Upper Yakima, Mid Columbia				S	D	A	R	I			
Cedar/Green, Eastern Olympic, Lower Yakima, Spokane					S	D	A	R			

I = Permits Issued; Other Actions Started
 S = Scoping
 D = Data Collection
 A = Data Analysis
 R = Technical Report

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Washington State's Watershed Approach to Water Quality Management.

Washington's five-year transition to the Watershed Approach to Water Quality Management began in July 1993. This a comprehensive management approach including both point and nonpoint sources of pollution. It was formed as an organizational guide to improve coordination of water quality activities, service delivery, protection and prevention activities, and finally improved water quality statewide.

The cornerstones of Washington's approach are the division of the state into 23 water quality management areas (WQMA), the appointment of staff "leads" for each WQMA, and a five-year/five step process for systematically issuing permits, assessing water quality conditions, focusing staff effort, and developing an improved basis for decision making within each WQMA. This management model was necessitated by the need to increase protection using fewer resources. The objective is to develop more precise information so that managers can allocate scarce resources to where they are most needed and to better schedule workload over time. Since 1993 the watershed approach management model has provided a consistent and sequential internal structure for improving water quality. It is nationally recognized, and a prime example used in EPA's Statewide Watershed Management Course as a planning and priority setting system.

The watershed approach supports water protection activities on a geographic basis and synchronizes water quality monitoring, inspections and permitting. As a management tool, the watershed approach process focuses resources by matrixing staff through time into a variety of tasks in each of the 23 WQMAs. Other water quality technicians and research staff are also targeted to these areas. Each step of the process addresses specific evaluation, planning, and implementation needs. A strong public involvement element insures that the state continues to support and validate local watershed efforts and grant/loan funding priorities.

Five Step - Five Year Cycle: Each year, approximately four or five WQMAs are *scheduled* into a cycle. Within each cycle, there are five steps with each step consuming one year. The steps are:

- Year 1: SCOPING: Identify and prioritize known and suspected water quality issues within the WQMA by assembling input from extensive community involvement and internal agency staff. Produce a Needs Assessment.
- Year 2/3: DATA COLLECTION/ANALYSIS: Conduct water quality TMDL's, monitoring, special studies, compliance inspections and general research to discern which of the issues identified in scoping are in fact problems.
- Year 4: TECHNICAL REPORT: Develop an action plan that addresses the problems identified above and other areas of concern. Outlines strategies to resolve identified problems.
- Year 5: IMPLEMENTATION: Issue/reissue waste water discharge permits and work with local programs and partners to implement nonpoint strategies above.

After Scoping 19 WQMAs, the following number of technical activities are underway or completed: 36 TMDLs; 84 Monitoring/studies; 11 Compliance Inspections; and, 14 GIS Projects.

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ATTACHMENT C

Example Outline of A Water Quality Watershed Plan

Public Release Summary

1. **Introduction**
 - 1.1 History of Water Quality Management Efforts in the Watershed
 - 1.2 Purpose of and Guide to the Watershed Plan
 - 1.3 How the Watershed Plan Was Developed (citizen advisory committee, public meetings)
 - 1.4 Description of the Watershed Team and Mission Statement
2. **General Watershed Description**
 - 2.1 Physical, Geographical, Ecological, and Governmental Features
 - 2.2 Economic Base
 - 2.3 Land and Water Uses and References to Corresponding Standards
 - 2.4 Overview of Pollutant Sources
3. **Existing Water Quality**
 - 3.1 Sources of Water Quality Data
 - 3.2 Methods To Interpret Water Quality Data
 - 3.3 Results of Nested Watersheds Water Quality Data Analyses
4. **Existing Pollutant Sources and Loads**
 - 4.1 Point Sources - Major Categories and Types of Pollutants
 - 4.2 Nonpoint Sources - Major Categories and Types of Pollutants
 - 4.3 Data Sources and Assessment Methods
 - 4.4 Nested Watersheds Summaries
5. **Water Quality Concerns, Priority Issues, and Recommended Management Actions**
 - 5.1 Parameters and Issues of Concern
 - 5.2 Geographic Areas in Need of Targeting
 - 5.3 Recommended Water Quality Management Actions
6. **Problem Quantification**
 - 6.1 Establish Assimilative Capacity for Targeted Segments
 - 6.2 Pollutant Reduction Targets (sources and quantities)
 - 6.3 Evaluate Physical Habitat Quality (in channel, riparian, upland)
 - 6.4 Landscape characteristics
 - 6.5 Status of biological/living resources
7. **Long-Range Management Goals and Watershed Action Strategy**
 - 7.1 Projected Trends in Basin Development
 - 7.2 Long-Term Management Goals and Objectives
 - 7.3 General Management Strategy, Approach, Milestones, and Measures of Success
 - 7.4 Implementation Strategies for Restoration, Regulations, Enforcement, and Mitigation
 - 7.5 Monitoring
8. **Public and Affected Parties Outreach and Involvement**
 - 8.1 Summary of Public Review and Comments
 - 8.2 Summary of Discharger Workshops
 - 8.3 Schedule for Next Watershed Cycle - Future Considerations

APPENDIX B

LIST OF INTERVIEWEES

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
Lynn R. Singleton	Dept. of Ecology Information Integration Project	(360) 407-6610
Ron McBride	Dept. of Ecology Water Quality Program - Watershed Coordination	(360) 407-6469
David Roberts	Dept. of Ecology Water Quality Program - Nonpoint Pollution Control	(360) 407-6414
Dave Peeler	Dept. of Ecology Water Quality Program	(360) 407-6461
Mike Llewelyn	Dept. of Ecology Water Quality Program	(360) 407-6405
Steve Butkus	Dept. of Ecology Water Quality Program - TMDLs	(360) 407-6482
Kim McKee	Dept. of Ecology Water Quality Program - Clean Lakes	(360) 407-6566
Ray Hennekey	Dept. of Ecology Yakima River Local Action Team Leader	(509) 454-7832
Max Linden	Dept. of Ecology Water Quality Program	(509) 454-7207
Kahle Jennings	Dept. of Ecology Water Quality Program - Chehalis Water Quality Management Area	(360) 407-6269
Brian Walsh	Dept. of Ecology Chehalis Local Action Team	(360) 407-6646

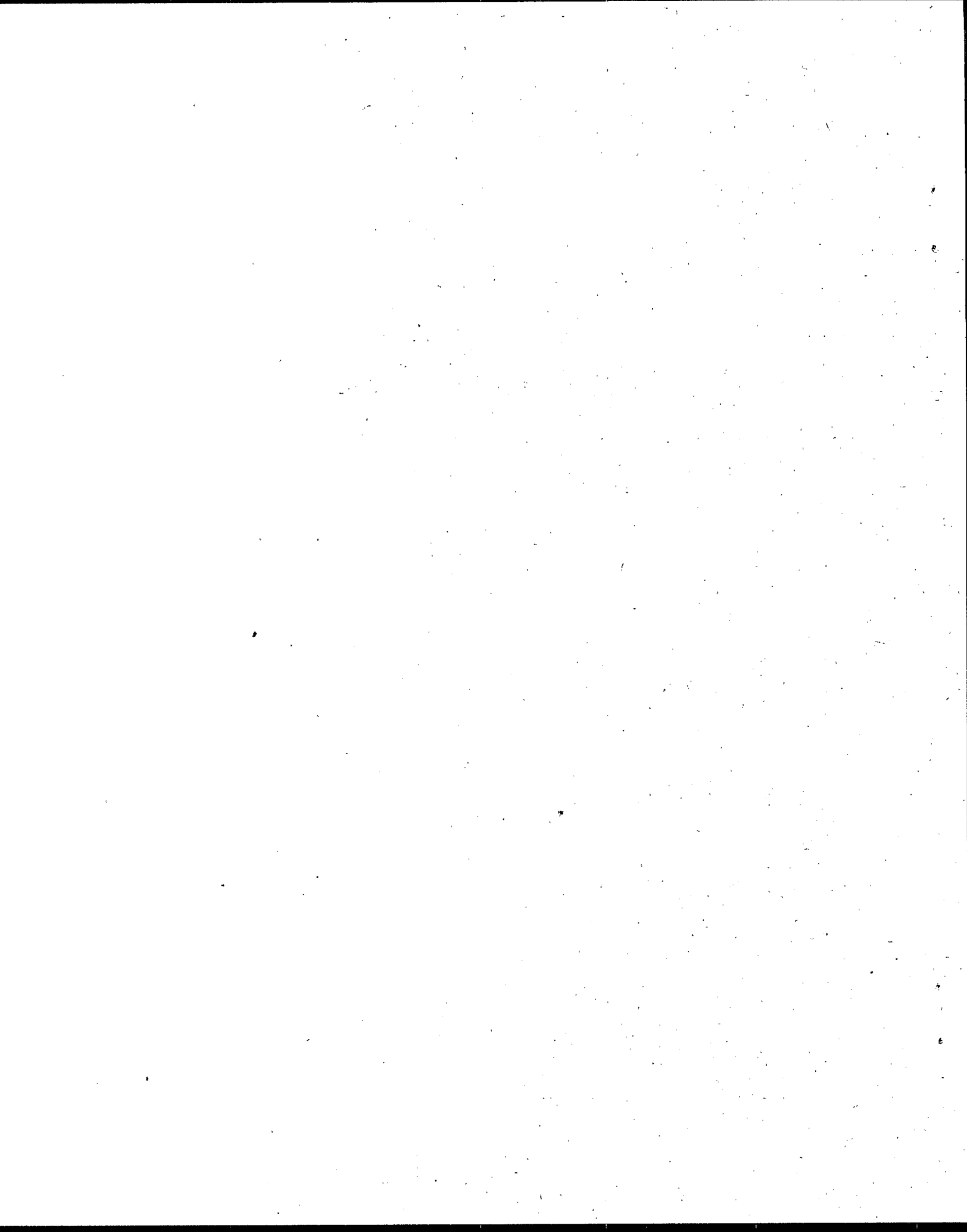
<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
Ann Wessel	Dept. of Ecology - Municipal Stormwater	(206) 407-6457
Ed O'Brien	Dept. of Ecology Water Quality Program	(360) 407-6438
Mike Harris	Dept. of Ecology Shorelands and Water Resources Program	(360) 407-7286
Doug McChesney	Dept. of Ecology Shorelands and Water Resources Program	(360) 407-6647
Lucy Pebles	Dept. of Ecology Bellingham Urban Bay Action Team	(206) 649-7272
Charles Carelli	Dept. of Ecology - Washington Watershed Council	(206) 407-6537
Duane Fagergren	Puget Sound Water Quality Action Team - Washington Watershed Council	(206) 407-7303
Kathy Minsch	Puget Sound Water Quality Action Team - Nonpoint and Watershed Programs	(360) 407-7320
Stephen Bernath	Dept. of Natural Resources Forest Practices and Watershed Analysis	(360) 902-1784
Raleigh Geppert	Dept. of Fish and Wildlife Habitat Management Program	(360) 902-2587
Jeff Swotek	Natural Resources Conservation Service - Thurston County	(360) 753-9448

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
Ruth N. Siguenza	EPA NEPA-Endangered Species Act	(206) 553-2143
Tina Reichgott	EPA Geographic Implem. - Nonpoint Pollution	(206) 553-1601
Alan Henning	EPA Water Quality - TMDLs and Watershed Analysis	(206) 553-8293
Curry Jones	EPA Water Quality - 305(b) and TMDLs	(206) 553-6912
Rick Parkin	EPA Geographic Implem. Unit	(206) 553-8574
Dru Keenan	EPA Office of Water - Groundwater Protection	(206) 553-1219
Paula vanHaagen	EPA Watershed Coordinator	(206) 553-6977
William Chamberlain	EPA Office of Water - Comb. Sewer Overflows	(206) 553-8515
Joe Wallace	EPA Storm Water	(206) 553-8399
Bruce Cleland	EPA Office of Water - TMDLs	(206) 553-2600

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
James L. Michaels	U.S. Fish and Wildlife Endangered Species Program Coordinator	(206) 753-9440
John Engbring	U.S. Fish and Wildlife Endangered Species Act - Consultations and Habitat Conservation Plans	(360) 753-5836
Viki Cambell	U.S. Fish and Wildlife Endangered Species Act - Section 7 Consultations	(360) 753-5827
Bill Vogel	U.S. Fish and Wildlife - Habitat Conservation Plans; Section 7 Consultations	(360) 753-4367
Greg Hueckel	National Marine Fisheries Service- Listing Decisions, Habitat Conservation Plans	(360) 753-6052
Bill Eckel	King County Surface Water Mgmt. Div.	(206) 296-8384
Bob Swartz	King County Water Pollution Control	(206) 684-1713
Randy Cowart	Snohomish County Surface Water Manag. Div.	(360) 388-3464 ext. 4556
Linda Hoffman	Thurston County Comm. & Environ. Programs	(360) 754-4111
Joanna Buehler	Save Lake Sammamish	(206) 641-3008
Terry Lavender	Bear Creek Waterways 2000; Citizens Oversight Committee for Open Space in King Co.	(206) 788-2304

APPENDIX C

INTEGRATING INFORMATION MANAGEMENT AND WATERSHED MANAGEMENT PROCESSES



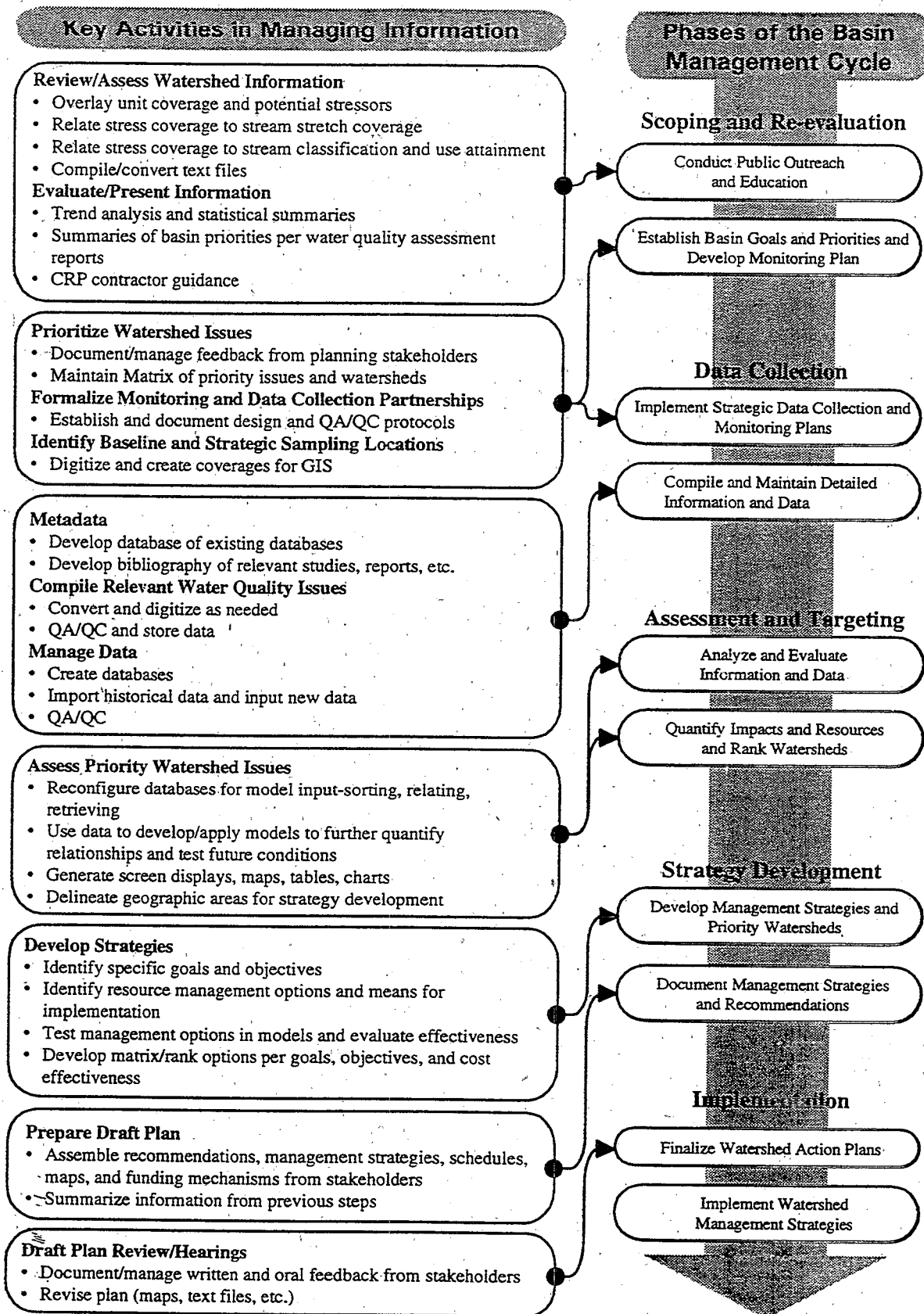


Figure C-1. How Information Management Relates to a Watershed Management Cycle

Step 1. Set Up an Information Management Design and Implementation Team

- Establish clear goals, tasks, and schedules as well as a mechanism for communicating with the watershed planning workgroup
- Inventory skills and knowledge of the team and bring in other expertise as needed
- Inventory existing information systems to be linked to watershed planning
- Identify potential users of the information system

Step 2. Survey Watershed Planning Partners

- For each group of users, identify primary responsibilities related to watershed planning/management
- Document relevant existing databases, maps, and geographic records and their formats
- Identify data gaps
- Distinguish GIS and non-GIS mapping, data management, and analytical functions
- Identify current obstacles to developing an information system and potential solutions
- Identify potential sources of funding and staff support
- Identify current or planned projects that could impact implementation of an information system

Step 3. Prioritize Data Needed

- Prioritize data need
- Create a schedule for developing or acquiring data

Step 4. Integrate/Relate Existing Data and Develop New Data

- Develop and formalize data transfer standards and QA/QC protocols
- Develop and formalize a plan for transferring, relating, integrating, and updating data
- Evaluate data sources (including quality and compatibility)
- Choose key database relational fields for geographic analysis
- Determine how database relational fields will be linked to GIS hydrology and land coverages
- Determine how frequently new GIS coverages will be created after core watershed planning coverages are completed
- Determine how frequently watershed planning databases will be updated
- Develop criteria for integrating and relating data (based on the above findings)
- Develop options that meet the criteria (adequate, good, very good) as well as the strengths, weaknesses, and cost of each option
- Get feedback on which option is preferred and fundable

**Fig. C-2. Steps and Milestones for Designing an Information Management System
(from USEPA 1997).**

Step 5. Evaluate Hardware and Software Configurations

- Identify existing plans for reconfiguring hardware and software that may impact information system design
- Determine the priority and sequence of basin planning hardware and software applications
- Identify existing hardware and software and how they can best be incorporated into the watershed planning information system
- Evaluate the compatibility of operating systems (for example, transferring data between the PC DOS and workstation UNIX environment)
- Determine need for exchanging and accessing data (including network speed)
- Develop criteria for configuring the hardware/software/network
- Develop options that meet the criteria (adequate, good, very good) as well as the strengths, weaknesses, and cost of each option
- Get appropriate feedback on which option is preferred and fundable

Step 6. Evaluate Organizational Design, Staffing, and Support Issues

- Based on preferred hardware/software and database management models, outline information management responsibilities
- Identify staffing needs (including hiring, reassigning, and training staff)
- Outline staffing options (adequate, good, very good), as well as the strengths, weaknesses, and cost of each option.
- Get appropriate feedback on which option is preferred and fundable

Step 7. Develop a Short- and Long-Range Implementation Plan

- Based on Steps 2-6, develop a multi-phased, 5-year plan, including
 - Staffing (including training)
 - Hardware
 - Software
 - Application development
 - Data development, conversion, and integration
 - Network/communication
- Include realistic funding for each component

Fig. C-2 Steps and Milestones for Designing an Information Management System (cont'd).

