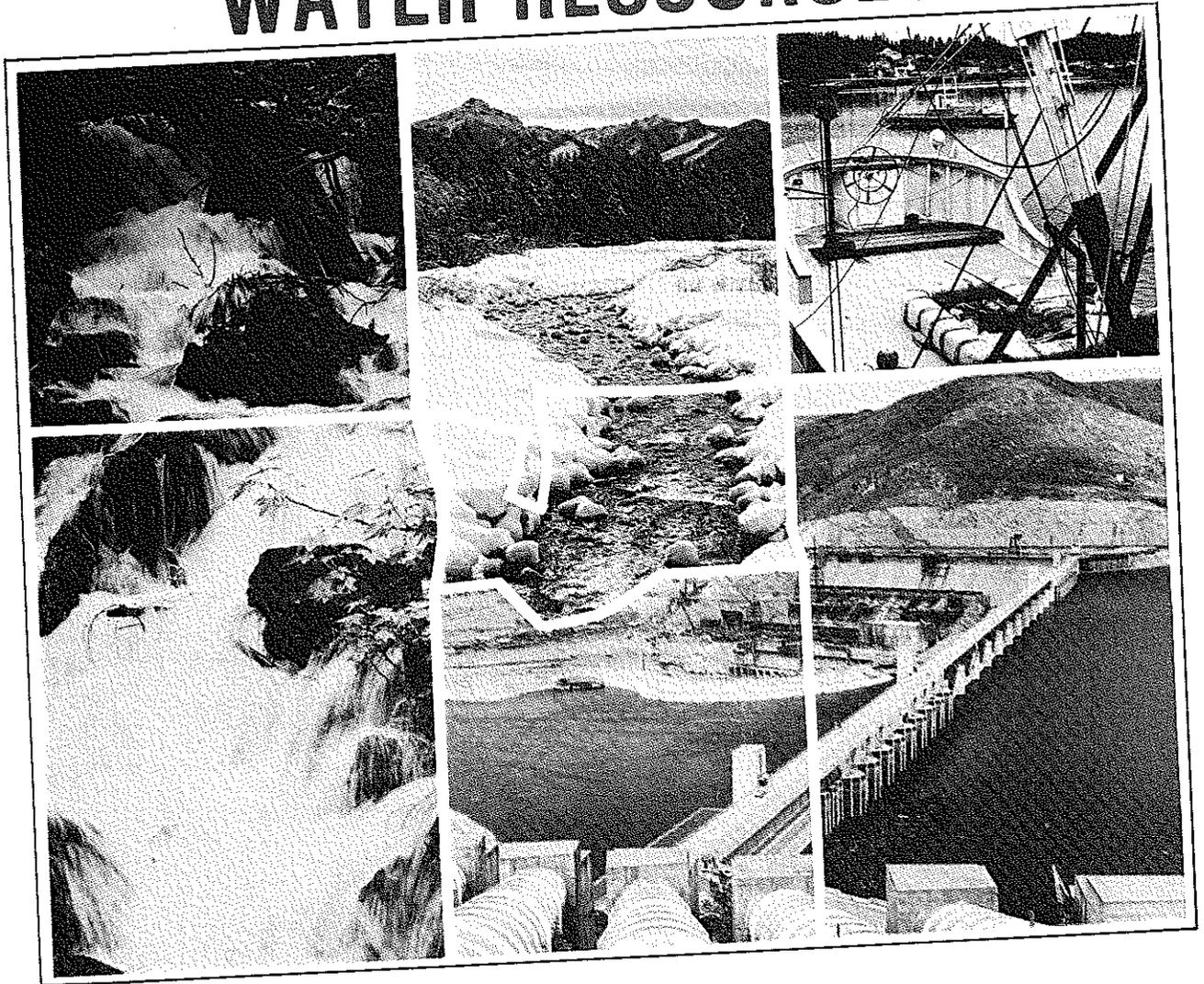


WASHINGTON'S WATER RESOURCES



Recommendations to the Legislature

January 1977

DEPARTMENT OF ECOLOGY
JOHN A. BIGGS
Director



STATE OF WASHINGTON
DANIEL J. EVANS
Governor

Ken Slattery

**WASHINGTON'S WATER RESOURCES:
RECOMMENDATIONS TO THE LEGISLATURE
Third Biennial Report — 1975-1977**

Washington State Department of Ecology
Olympia, Washington
January 1977



December 1, 1976

State of
Washington
Department
of Ecology



Dear Reader:

On July 1, 1970 the Washington State Department of Ecology was formed by an action of the State Legislature. At the same time the Legislature mandated the Department, as a matter of highest priority, to embark upon a close, careful and scientific appraisal of the state's water resources, consult with all elements of the public for the purpose of determining their interest in the water resources, and to develop a program for the immediate and long-range future usage of this publicly owned resource.

Recognizing the magnitude of the instruction and the need that the study be a careful and deliberate one, the Legislature established a time frame of six years to accomplish it. The six years have passed, and I am pleased to advise you that the Department of Ecology has completed fully the legislative instruction. I convey to you the results of it by the medium of this report.

The report describes the most far-reaching examination and appraisal of the publicly owned water resources the State of Washington has ever undertaken and completed. Its findings touch upon the lives of every person now living in the state and those who will live in the state in the foreseeable future. It clearly demonstrates that water is not a limitless resource but is, rather, a finite one; that the supply of it available to the people of this state and those who will follow them will never be larger and may well become smaller, and the needs of the people of the State of Washington for water will constantly grow and become more difficult to match against the available supply. Finally, the report illustrates that historically, for the present and the totally foreseeable future, this resource, the availability of it, and the right to use it will have a compelling influence on the lives of all people who live in the state.

Water, more than any other resource, provides us with the quality of living we have become accustomed to and, more than any other resource, will be the principal basic ingredient for the state's future economy.

A handwritten signature in cursive script, reading "John A. Biggs".

John A. Biggs, Director

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INTRODUCTION

Residents of Washington State are very fortunate. We share a relaxed life style and a physical setting of great beauty which attract new residents and which make those who live here reluctant to leave, and eager to return.

Our State's water is the envy of the nation in many ways. It excites envy through pictures in travel books and magazines, in movies, and on television. Our water also strikes a responsive chord in the minds of water managers in arid regions of the nation — particularly the thirsty southwest. There have been numerous schemes to pipe the Columbia River to the Arizona desert and other parched areas.

In 1971, the Legislature enacted one of the most progressive pieces of water resources legislation in the nation. This legislation, the Water Resources Act of 1971, sets forth the base upon which the Department of Ecology (DOE) undertook an extensive program to plan for and manage Washington's water resources.

The Legislature called for the orderly management of current water uses, an inventory and projection of the State's water supplies and needs, and establishment of priorities for water use in the future.

This Biennial Report to the Legislature describes DOE's efforts in these and other areas. It tells the Legislature and the people of the State what DOE has done, how much progress has been made, and how much still needs to be done.

Today, the Department's program of water management is no longer a concept or image of something to be. A water management decision-making process is in place, supported by an extensive inventory of the State's water supply and needs, and carried on by a competent staff of water resource professionals. The completion and adoption of several basin programs has proven a process capable of establishing realistic management programs for the State's river basins. Above all, the Department has dealt with the most fundamental question of water resources management — how to protect the rights of future generations to manage water for their benefit. The process of issuing term permits along with the basin planning program is described in this report.

Presented in this report is a summary of the condition of the State's water and issues surrounding the management of this vital resource. It will leave no doubt that water is Washington's most important natural resource and possibly an endangered one.

We will never have more water than is currently considered to be "ours." The jurisdictional boundaries within which the State manages its water resources are narrow. Federal and Indian claims to water rights are not a myth.

More than half of the total surface water supply in Washington enters the state from outside its borders. Over 87 percent of the storage capacity on the Columbia River exists outside the State of Washington. Most perennial streams and rivers which originate in the State have their headwaters on Federal lands. Our border with Oregon is the Columbia River, a river with waters shared by four other states and the Federal Government. Until an interstate compact for the Columbia River Basin is accomplished, the water users' interest in the Pacific Northwest remain unprotected. The Legislature must join the executive branch in a concerted effort to develop a management compact with other states utilizing the water of the Columbia River.

The Department shows in this report, that although blessed with a large supply of high quality water, there is no surplus for exportation outside the state. Washington's economic and social future is dependent upon no other resource to the extent it is on water. Our future depends on the retention of all the waters with which Washington is blessed.

The finiteness of our water resources is a stark reality that is exposed in this report. New uses of this resource will impact existing uses with costs and benefits to be weighed by the public. We are in an era of trade-offs.

This report shows that the Legislature has provided the basic legal tools to manage our water resources. DOE has implemented these laws and demonstrated their application. This report presents recommendations for improvements needed to better manage this valuable resource in the future.

Following this INTRODUCTION, the reader will find a brief SUMMARY AND RECOMMENDATIONS section, dealing with the major water management issues in Washington. These issues are discussed in the STATEWIDE ISSUES section.

The LOCAL ISSUES section, at the back of the report, provides a focus on water resources problems with individual legislative districts or groups of districts. The discussion of local issues for each area is keyed to those statewide issues which are particularly relevant to that area.

Water resources management has come a long way from the 1917 Surface Water Code and the 1945 Ground Water Code. This report discusses that progress and points out areas which still need attention from the Legislature and from the citizens of our State.

SUMMARY AND RECOMMENDATIONS



SUMMARY AND RECOMMENDATIONS

GOALS AND OBJECTIVES

Any statewide planning and management program must reflect the collective goals and objectives of the state's residents. Well defined goals and objectives guide decision-makers as they develop policies and carry out programs. Goals and objectives also help identify program alterations to meet developing changes in social preferences. The goal and objectives of the state water management program are:

To insure that the waters of the state are used and managed to promote public health, welfare, and safety, we must:

- * Allocate surface and ground water to secure maximum net benefits to Washington residents.
- * Restore and maintain the highest possible water quality within the state.
- * Reduce probable future flood damages.
- * Preserve adequate and safe supplies of water for human domestic use.
- * Preserve fish, scenic, and other environmental values, and navigational values of perennial streams and rivers, lakes and ponds.
- * Maintain or enhance Washington's share of national and international agricultural markets through irrigation development.
- * Provide adequate hydroelectric power supplies for the state.

A LEGISLATIVE IMPERATIVE

Water is a most valuable public resource. The Department is impressed by the imperative need not to irrevocably convey literally all of this and succeeding generations' interest in water resources to private interests, but rather, while providing for the most effective current use, to retain a public interest in significant portions of the resource and the right of future generations to make their own decisions.

DOE thus has advanced the controversial concept that new uses of large quantities of water be approved for a fifty-year term, renewable for another fifty years, and thereby retain the public's interest in these waters.

WAC 173-596 implements this concept for appropriations for agricultural irrigation. Discussion and comment about this regulation pointed up to the need

for additional legislative policy guidance in several areas:

- * preserving water use options for future generations while providing for full utilization.
- * encouraging family farming.
- * requiring large water developers to develop and use a conservation and management program.

WAC 173-596 is now the subject of litigation. DOE feels that such a regulation is consistent with the legislative mandate to allocate water in a manner which best serves the public interest and results in the achievement of the greatest possible public benefits.

DOE has attempted to bring these matters before the Legislature in three consecutive sessions and has not as yet received full legislative consideration. The regulation was adopted because it was felt essential in the face of major water right applications which had been submitted. DOE continues to consider these matters to be of highest legislative priority and interest, and does feel that a final policy should be legislatively determined.

WATER MANAGEMENT ISSUES AND RECOMMENDATIONS

This section briefly summarizes the statewide water resource management issues discussed in this report and lists Department of Ecology recommendations for dealing with each issue. These issues and recommendations are discussed in detail in the "Statewide Issues" section of this report.

Water management issues in Washington are divided into seven broad categories:

- * Water Allocation and Management
- * Public Safety
- * Public Involvement
- * Project Development and Financing
- * Clarification of Water Rights
- * State-Federal, Interstate, and Canadian Relationships
- * Management of the Columbia River

The scope of this report does not include water quality management and flood damage reduction.

Water Allocation and Management

Increasing demands on Washington's water supplies and conflicts between uses and users have raised a number of water management problems. It is essential that adequate and safe supplies of water be preserved for human and domestic needs. Stream flows must be maintained adequately to support fisheries and other beneficial uses. Ground water must be developed, protected, and allocated. Salt water intrusion into fresh water aquifers is a particular problem along the Pacific Coast and in the Puget Lowlands. DOE water allocation and management efforts include:

- * Developing and implementing basin management programs.
- * Designating ground water management areas and providing for the management for these areas.
- * Developing consistent statewide management policies.
- * Issuing or denying permits in accordance with management policies
- * Protecting existing rights and controlling illegal use through field enforcement.

Recommendations

1. See recommendation in "A Legislative Imperative."
2. The present water use priorities system should be continued so that basin management programs may be tailored to public needs and desires in individual basins, and on individual streams and rivers within each basin.
3. DOE's proposed FY 78-79 budget requests two additional Investigations Staff members to expand ground water investigation capability.

Public Safety

Increasing recreational use of Washington's lakes, rivers, and streams often finds the public enjoying recreation areas which were once remote. Dams and diversion structures built in these areas when they were remote and unused can present unanticipated and unnoticed safety problems. There have been eight minor dam failures, involving considerable property damage, in Washington in the past 20 years. Fortunately there was no loss of life attributed to these failures.

Dam operation is not presently controlled. The tragic deaths of two young girls on the Stuck River in July 1976 might have been prevented by adequate control over dam and diversion structure operation.

Recommendations

1. A strong dam safety law and a statewide public

safety program are required. The program should contain at least:

- * Minimum dam and reservoir operation standards and criteria and minimum construction design standards.
- * Plan review and approval to verify dam safety.
- * Authority to require correction of dam safety hazards.
- * Periodic review of dam and reservoir operating criteria to assure consistency with statewide standards.
- * Periodic dam safety inspection.
- * Continued dam inventory updating.
- * Accurate inspection records and listings of all failures or operational problems.
- * Adequate stream warning systems and warning signs in all public access areas.
- * Specific and clear authority for one state agency to implement and enforce the statewide program.

2. The administering agency must have enough manpower to carry out the program, which could probably be self-supporting through permit fees.

Public Involvement

It is essential that the citizens of Washington be informed of the existence, purpose, and status of water management and planning activities. Only when they understand the issues are they able to participate effectively in the management and planning functions. DOE strives to gain the greatest possible public involvement in water resource management. Public information efforts have involved many public and private organizations, and citizens groups communicating through newspapers, radio, television, public presentations and special publications. Public participation has been solicited through public meetings and workshops, with special emphasis on local citizens committees.

Recommendations

DOE's current budget proposal requests funds for a quarterly newsletter directed to both public and private sectors, beginning with DOE's existing 5,000 name mailing list. DOE recommends the Legislature approve funding to publish this newsletter regularly, and on a continuing basis.

Project Development and Financing

Most water resource development projects in Washington are for irrigation water. The federal government, which long dominated irrigation project funding has largely withdrawn development money. State and local governments and water users must now play a larger financial role.

DOE irrigation development and rehabilitation funding are limited to Referendum 27 loans and grants (\$25 million, of which \$20.7 million is allocated) and the Reclamation Revolving Account (about \$675,000 available for loans and bond purchases as of June 30, 1976).

Recommendations

1. Reclamation Revolving Account management is complicated by the irrigation districts' lack of capital need projections. Some of the account funds should be used to define the irrigation districts' capital needs, and to continuously monitor funded projects to assure loan integrity and continuing project benefits to the people of Washington.
2. The January 1, 1980 Referendum 27 bond issuance deadline should be extended, and the Legislature should consider at least \$17.1 million of additional bonds. These funds are needed to develop lands ready for irrigation at this time.

Clarification of Water Rights

In order to adequately manage Washington's water resources, it is essential that all legal claims to surface and ground waters in the state be established so that we know how much water remains for present and future uses. Many existing water rights do not specify the quantity of water involved. Specific problems in this area include:

- * Federal Reserved Water Rights
- * Indian Water Rights
- * Adjudications
- * Relinquishment

Federal Reserved Rights

The reserved rights principle provides that any federal reservation may develop water facilities within its boundaries for any use consistent with the reservation's purpose — regardless of state laws concerning those waters. There is presently no way other than by adjudication to know just how much water is involved in these federal rights, and since about 35 percent of Washington's land area is federally controlled, water management and allocation problems are seriously affected. Since individuals and state governments cannot sue the federal government without Congressional consent except in a general adjudication, such conflicts are heavily weighted in favor of the federal government.

Recommendations

1. Washington should continue to participate on interstate and regional task forces to provide recommendations mutually beneficial and satisfactory to federal and state government.
2. The Legislature should increase funding for general

adjudications in order that all water right claims including those of the United States can be quantified in state court proceedings.

Indian Water Rights

A number of U.S. Supreme Court decisions have concluded that when the U.S. government created Indian Reservations, those reservations carried implied rights to use as much water as needed to carry out the purposes — present and future — for which the reservations were created with a priority date of when the reservation was created. Waters in excess of those necessary to satisfy Indian reserved rights are subject to state laws and state jurisdiction. Three separate current federal court cases involving the State of Washington and the Lummi, Colville, and Spokane Indians may clarify these issues.

Recommendations

1. See recommendation No. 1 in Federal Reserved Rights section.
2. Indian water rights should be "quantified" to determine how much water is available for future appropriation under existing state laws.
3. DOE will continue to seek judicial resolution of Indian reserved right issues.
4. The state will remain receptive to future cooperative programs with the Indians to resolve quantification or jurisdictional issues.

Adjudications

Adjudication is a process to determine relative rights to water use in a particular area. The 1917 Water Code prescribes such a process for surface water; the 1945 Ground Water Code extended this process to ground water. Modern adjudications cover the waters of an entire drainage basin and establish those water rights claims that are substantiated by evidence as valid rights. The adjudication process closely follows formal trial procedures and is difficult and slow. In addition, eyewitness testimony, particularly for water uses prior to the 1917 Water Code, is becoming increasingly difficult to obtain as "old timers" die.

Recommendations

1. Existing adjudication statutes should be revised to make standards for admissibility of testimony and evidence less rigid.
2. Some of the provisions of House Bill 970 from the 1975 legislative session should be included in statutory changes, including:
 - * Requiring the state to share adjudication costs, reducing claimants cost for water right confirmation.
 - * Providing penalties for claimants who do not pay their share of adjudication costs after rights are confirmed.

3. The Legislature should provide additional personnel, including necessary legal support from the Attorney General's office.

Relinquishment

Relinquishment, the process whereby abandoned or forfeited water rights can be returned to the state for allocation, becomes increasingly important as more streams approach full appropriation, and will become critical as development and population increase and/or shift. Relinquishments to date have been voluntary, but it will become necessary to investigate existing water rights claims to find those not actually being used so that these waters can be allocated for other uses with great public benefits.

Recommendations

1. The subsection of RCW 90.14.140 relating to the exemption for future developments within fifteen years should be clarified or deleted. This portion of the statute makes involuntary relinquishments which are in the public interest impossible to accomplish.
2. RCW 90.14 should be amended to clearly state that relinquishment of rights should receive full attention in future adjudication proceedings as an alternative to the exclusive use of RCW 90.14 for relinquishment.

Federal-State, Interstate, and Canadian Relationships

DOE is responsible for representing the state's interests before the federal government, other states, and the Canadian Government. DOE represents the state on the Pacific Northwest River Basins Commission, the Columbia River Water Management Group, the Pacific Northwest Regional Commission's Water Resources Task Force, the Western States Water Council, and others.

Recommendations

DOE should continue to participate in interstate,

regional, federal and international organizations to insure that our citizens' interests are both represented and protected.

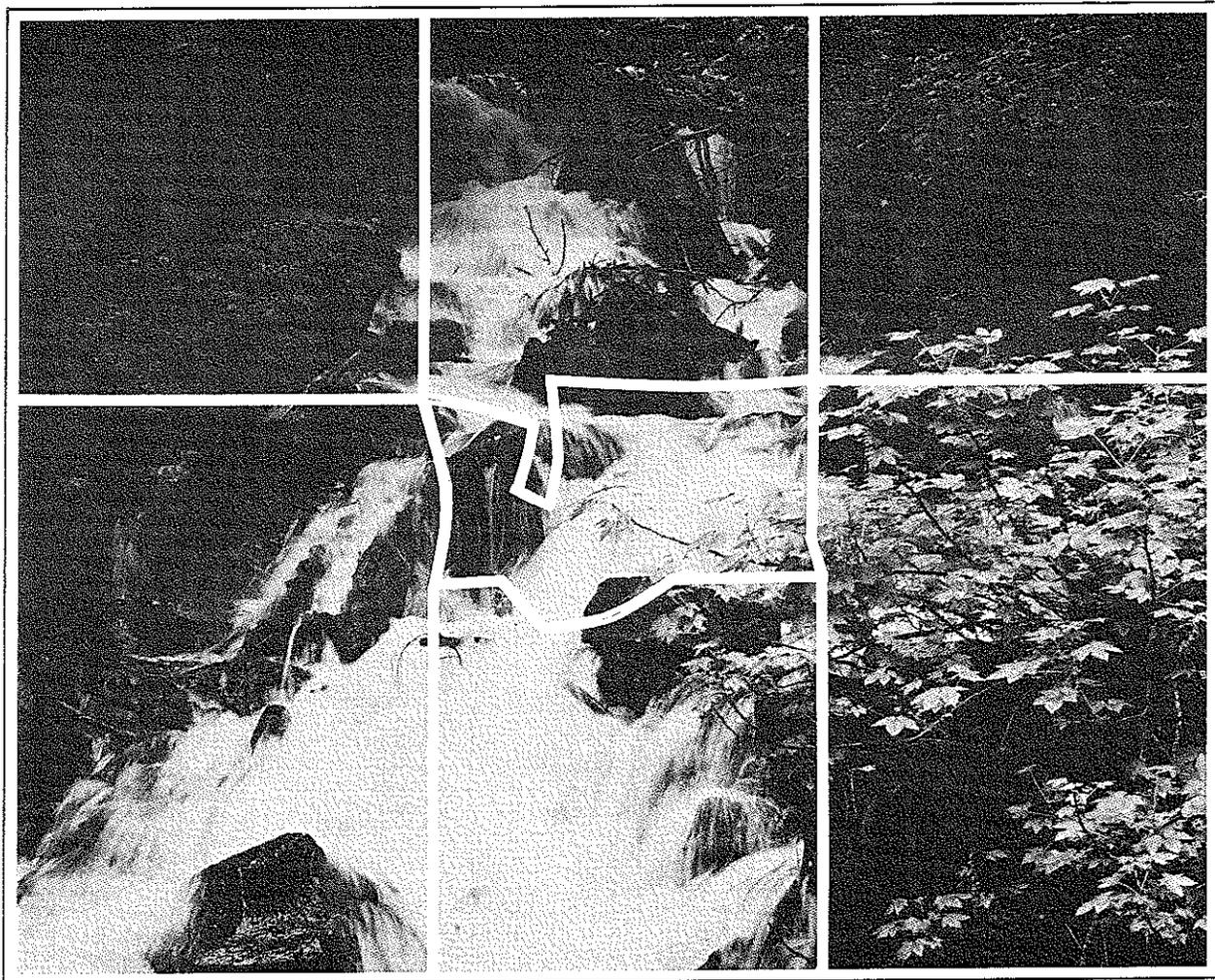
Columbia River Management

The Columbia River is one of the largest rivers in the nation, and is the largest producer and potential source of hydroelectric power on the continent. Managing the river is complicated by the fact that the Columbia River drainage basin includes parts of seven states, plus British Columbia. The Columbia provides water for hydroelectric power generation, irrigation, municipal, domestic, and industrial water supplies; supports major commercial and recreation fisheries; and provides passage for commercial vessels to navigate 300 miles from the Pacific Ocean, with another 150 navigable miles on its principal tributary, the Snake, reaching to the Idaho Border. Recreational and aesthetic values, while difficult to measure, are also extremely important. Renewed demands to divert Columbia River water to the arid southwest can be expected when the Congressional moratorium on studies for such transfers expires in 1978.

Recommendations

1. DOE should continue participation in federal, interstate, and international organizations involved in Columbia River management, in order to protect the state's interests and make our citizen's wishes known to these organizations.
2. Consideration should be given to resuming negotiations for a compact or other agreement for cooperative management of the interstate waters.
3. Development of basin management programs should continue in order to help document Washington's present and future water needs.
4. DOE will amplify upon and aggressively continue to document the limited availability of water within the state.
5. The Legislature should consider a resolution or other instrument reconfirming its opposition to exporting water from the state.

WATER IN WASHINGTON



WATER IN WASHINGTON

WATER QUANTITY

Water is regarded as one of Washington State's most plentiful and valuable assets. Washington generates more surface water runoff than most states in the union. Yet our climate and topography lead to extremely uneven geographical and seasonal distribution problems, often creating limits to the resource which are not evident in annual and statewide water supply averages. Effective water supply is determined by local, immediate conditions, instead of annual or statewide averages. Yearly rainfall variations further limit supplies producing serious conflicts between uses during low-flow years. Other potentially limiting factors include water quality, the cost of obtaining water, existing legal claims to water, and the need to maintain instream flows. Although Washington is not about to run out of water, increasing demands and competing uses sometimes approach the limits of the water supply at some places throughout the state.

Another key to understanding effective water supply is the distinction between the *stock* of water that exists in storage at any one time versus the *flow* of water over a period of time. The difference is especially important when we discuss ground water. The estimated stock of water stored in near surface underground aquifers in Washington is about 80 million acre-feet, but the estimated annual recharge (or flow) through this total reservoir is only 7.5 million acre-feet (See Figure 1). We cannot say that the 80 million acre-feet of ground water is "available" on an annual basis. Any withdrawal of ground water greater than the amount being recharged into the aquifer can only be temporary, and can often irreversibly damage the water-holding capacity of the aquifer.

Washington's major sources of water are shown in Figure 2.

An average of about 40 inches of precipitation fall on Washington's 66,572 square miles of land area every year, totalling about 142 million acre-feet of water. The 40% of the state west of the Cascades, with its temperate maritime climate, receives 67% of the precipitation. The arid to semi-arid 60% of the state east of the Cascade crest receives only 33%. Average annual precipitation ranges from five inches in the driest part of central Washington to over 200 inches in the Olympic Mountain rain forests (See Figure 3).

While most people know that eastern Washington is short of water, few realize that the western part of the state suffers seasonal deficiencies. The Puget Sound lowlands average under one inch of rain per month during July and August — less than one third the average crop requirement.

The state's 142 million acre-feet of precipitation generates about 96 million acre-feet of runoff in an average year. Drought conditions which would have a frequency of occurrence of once in 50 years could reduce this runoff to only 52 million acre-feet per year.

As shown in Figure 2, the combined flow of surface waters originating from outside the state amounts to nearly as much as the average precipitation. Other sources of water which are less significant are inflow of ground water from outside the state and stream flow runoff resulting from melting of glaciers.

WATER QUALITY

Washington's water quality is generally good and is improving as a result of a variety of water quality management programs. Continuing awareness of the State's water resources will help maintain a high level of water quality. While this report does not include an in-depth assessment of water quality in the state, an overview of the quality of the State's waters is provided by the 1975 *Water Quality Assessment*, published by DOE.

CURRENT AND PROJECTED USE

The Department has developed an extensive inventory of water supply information including current uses and projections. This is contained in basic data reports and special reports prepared through the state water program. An overview of the existing uses and projected demands is provided in this section.

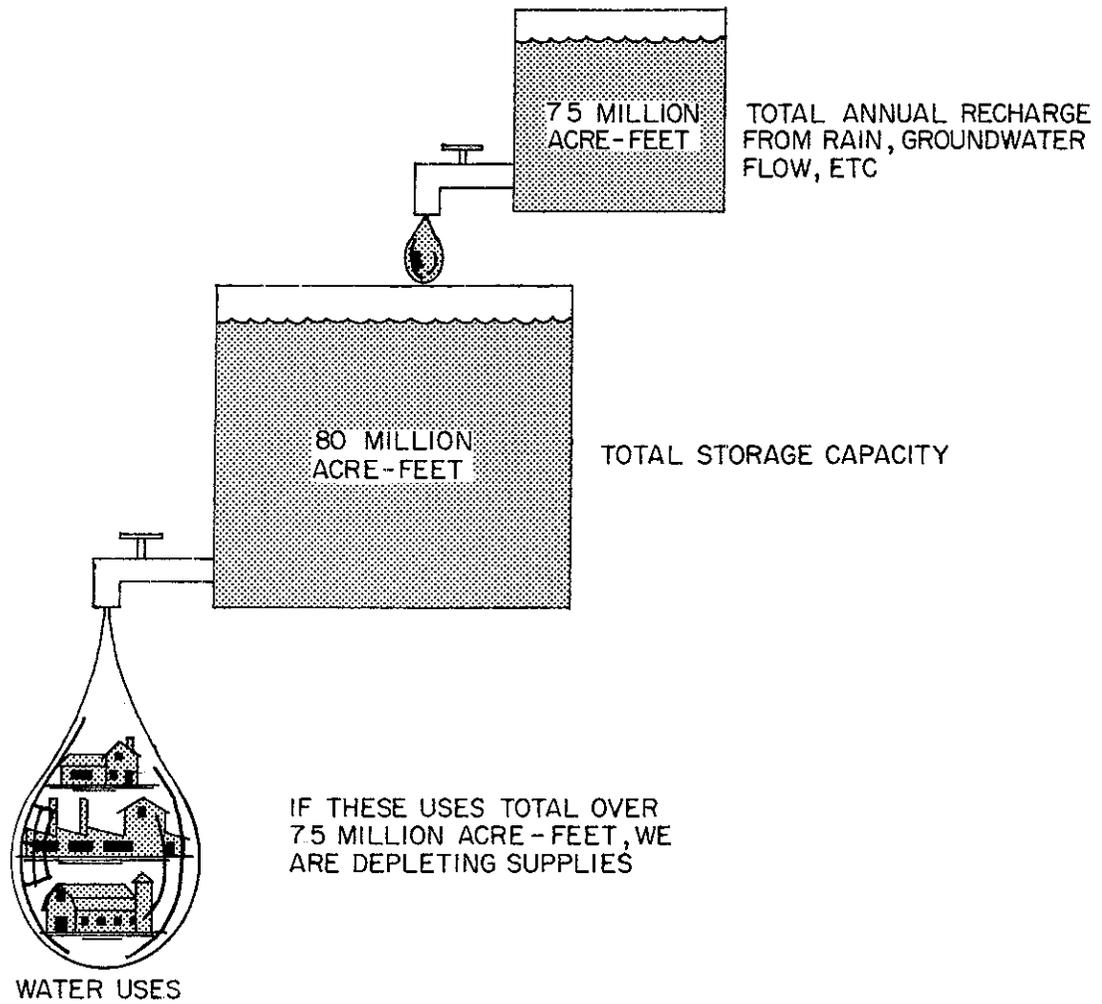


Figure 1
Ground Water Storage Capacity and Annual Recharge

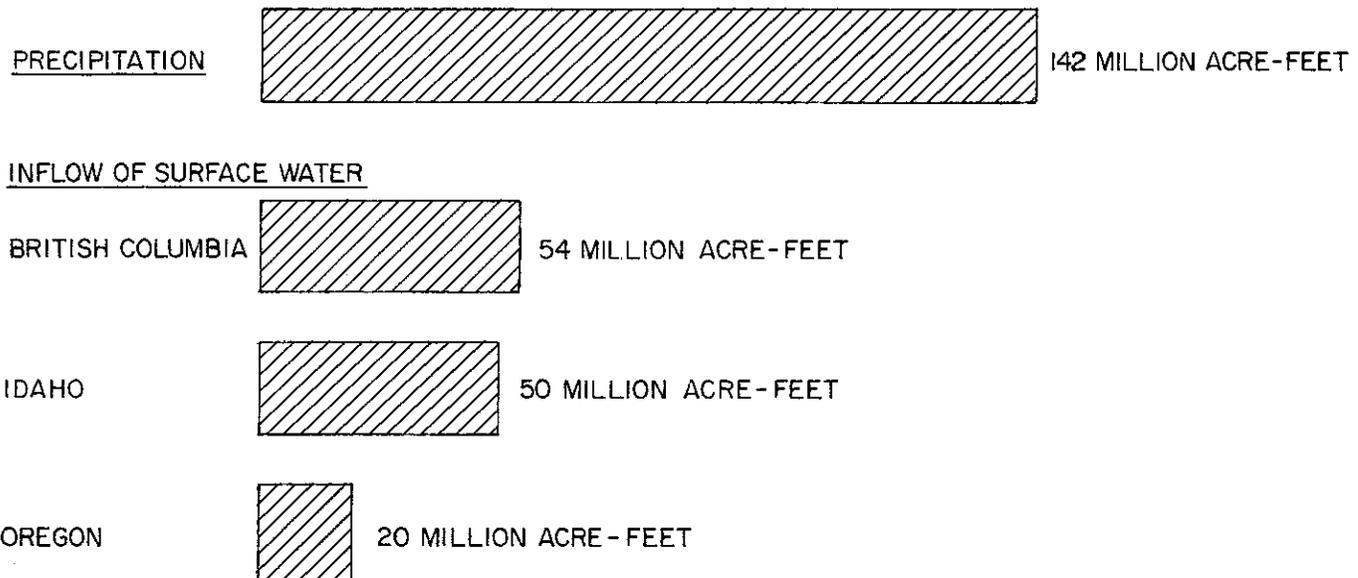
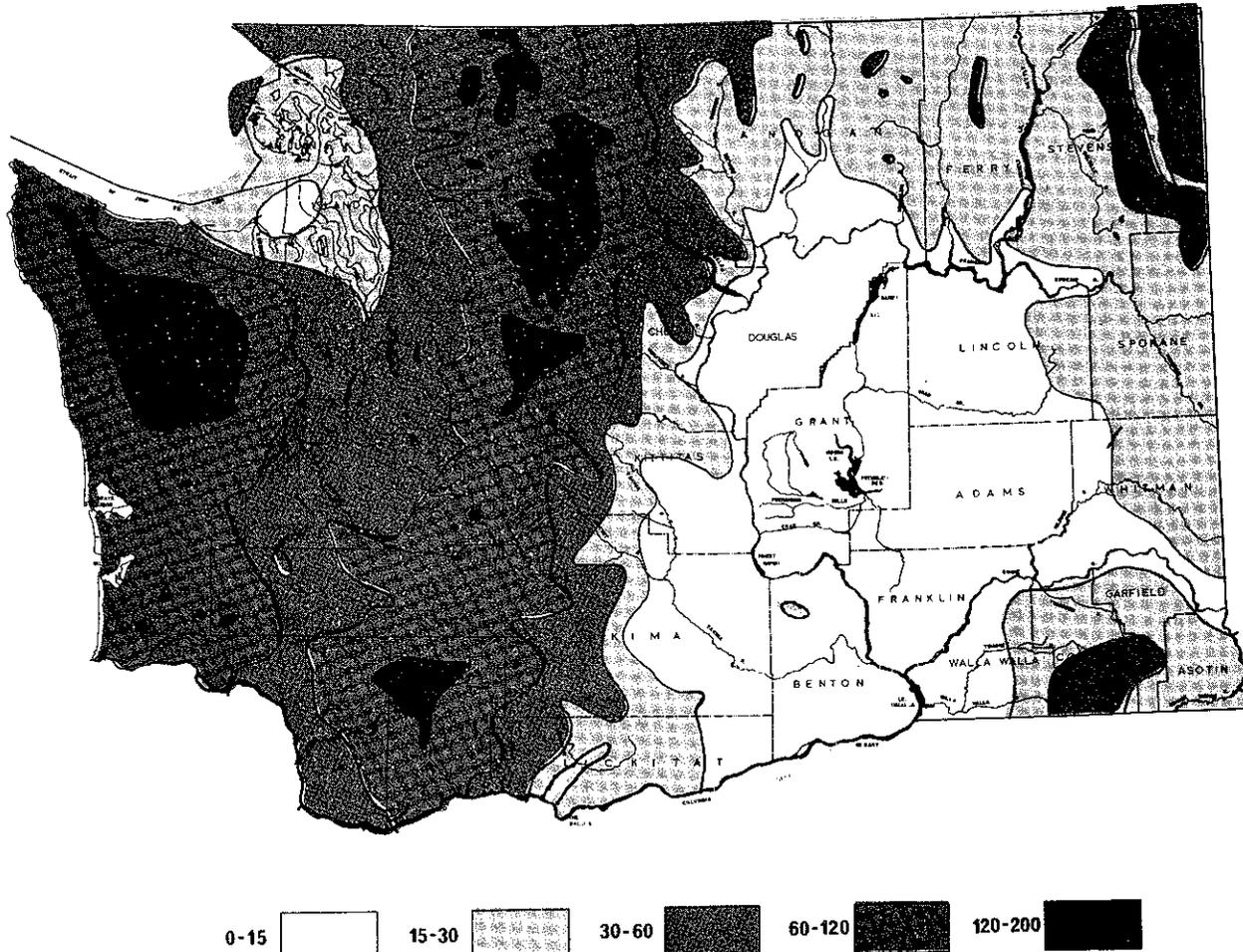


Figure 2
Major Sources of Washington's Water



Source: U.S. Department of the Interior, Geological Survey; *Mineral and Water Resources of Washington*; U.S. Government Printing Office; Washington, D.C.; 1966

Figure 3
Area Distribution of Average Annual Precipitation

Water uses are classified as being either instream or out-of-stream. Major instream uses include hydroelectric power production, navigation, fish and wildlife, and recreation and aesthetics. Major out-of-stream uses include irrigation, domestic, municipal, and industrial. The best available out-of-stream use summary by source and type of use was compiled in 1975 by the U.S. Geological Survey in cooperation with DOE (See Figure 4).

By 1985 annual municipal and industrial use is estimated to increase to nearly 950 billion gallons from 1975's approximately 442 billion gallons.

It is much more difficult to project future needs for irrigation, the State's largest out-of-stream water use, because of the many variables involved in determining future lands to be irrigated. Best available projections show annual irrigation water use increasing from

today's approximate 2,200 billion gallons (6,800,000 acre-feet) to 2,700 billion gallons (8,300,000 acre-feet) by 1985.

The instream water uses — navigation, hydroelectric power production, fish and wildlife maintenance, and recreation and aesthetic enjoyment — generally are not measured on an annual use basis since the water is not consumed. Instream water uses far exceed domestic, municipal, industrial, and irrigation uses even though they are measured in different ways.

Powerhouse flow capacity (hydraulic capacity) is the maximum flow which a generating facility can use for hydroelectric power production. Table 1 lists the powerhouse flow capacities for the projects on the Columbia and Snake rivers in Washington. These are indicators of the use of water for power production.

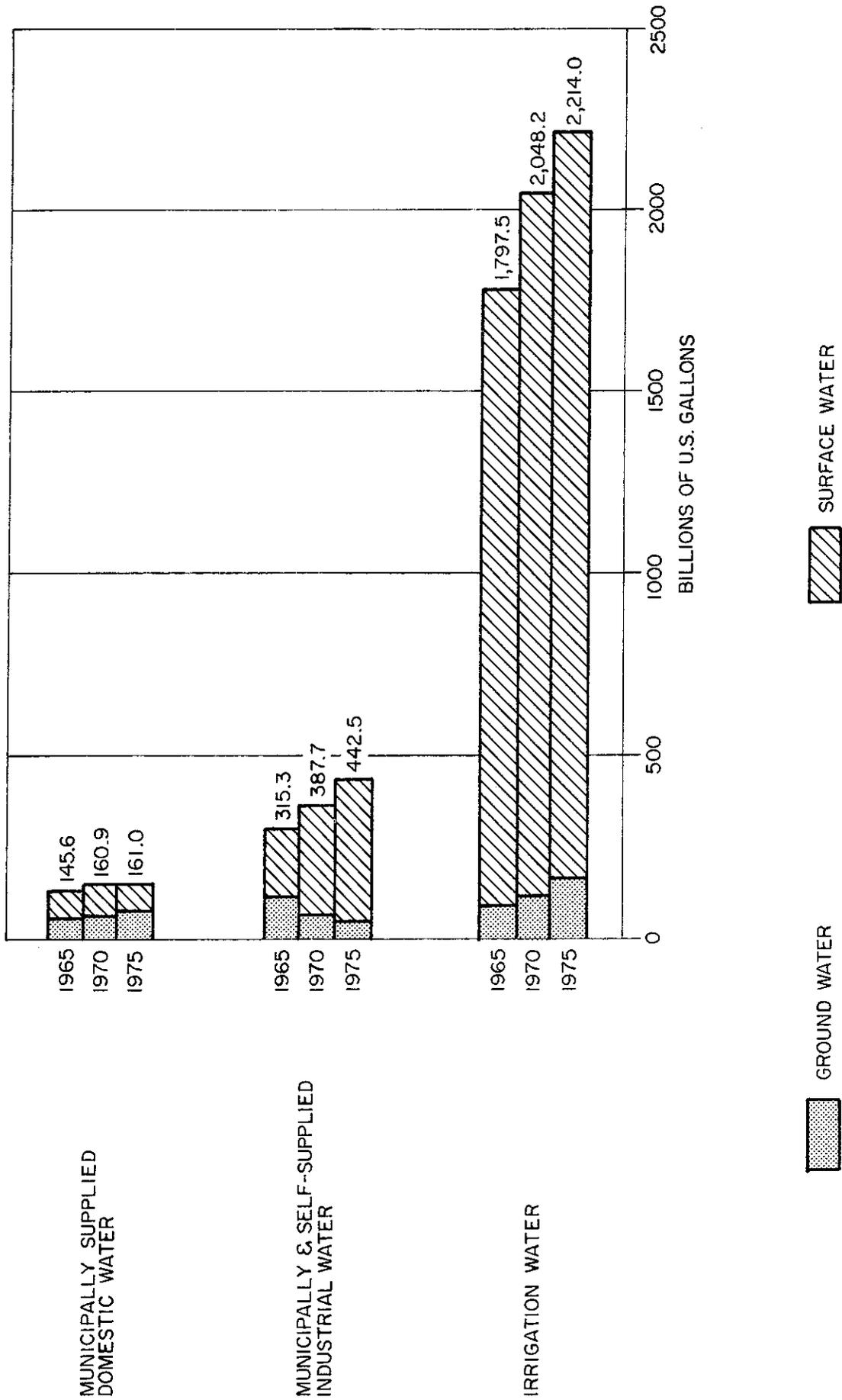


Figure 4
Statewide Water Use, Ground Water and Surface Water

Table 1. Powerhouse Flow Capacities

Project	Owner	Mid-1970's Powerhouse Flow Capacity (cfs)	Mid-1980's Powerhouse Flow Capacity (cfs)
Grand Coulee	U. S. Bureau of Reclamation	92,000	280,000
Chief Joseph Wells	U. S. Corps of Engineers	111,000	210,000
Rocky Reach	Douglas Co.	220,000	220,000
Rock Island	Chelan Co.	200,000	210,000
Wanapum	Chelan Co.	84,000	220,000
Priest Rapids	Grant Co.	183,000	220,000
Lower Granite	Grant Co.	175,000	220,000
Little Goose	U. S. Corps of Engineers	66,000	136,000
Lower Monumental	U. S. Corps of Engineers	66,000	135,000
Ice Harbor	U. S. Corps of Engineers	66,000	100,000
McNary	U. S. Corps of Engineers	220,000	370,000
John Day	U. S. Corps of Engineers	354,000	354,000
The Dalles	U. S. Corps of Engineers	376,000	376,000
Bonneville	U. S. Corps of Engineers	136,000	313,000

Capacities are current as of February 1976.

Irrigation

Existing Use

Irrigation in Washington requires more water than all other out-of-stream uses combined, accounting for about 65 percent of total surface and ground water withdrawals and a similar proportion of total depletions. (See Figure 4)

Before 1900, most irrigated Washington land was near Yakima, Wenatchee, and Walla Walla. By 1930, 400,000 acres were irrigated. Development slowed during the Depression and the 1940's. In the 1950's, the Columbia Basin Project provided another surge, and by 1960 more than one million Washington acres were irrigated. Growth was more moderate in the early 1960's.

More recently nearly 300,000 acres of new irrigation has been developed through private-corporate or group

efforts pumping directly from the Columbia and Snake rivers and from ground water sources. Most small-scale developments have been made by individuals using ground water, although considerable expansion has occurred by more efficient use of existing surface supplies.

Major new irrigation development (10,000 acre increase or more) from 1966 through 1974 is listed in Table 2.

About 15 million acres are currently irrigated in Washington — 17 percent of the total farmland in the state — diverting about 6.3 million acre-feet from surface and ground water sources each year.

Virtually all new developments since 1966 are sprinkler irrigated, with conversion of older systems to sprinklers running about 0.5 percent a year.

Table 2. Major Irrigation Development 1966-1974

	New Irrigation (acres)	Source of water supply	
		Surface Water (acres)	Ground Water (acres)
Big Bend	166,900	70,500	96,400
Yakima	27,000	11,000	16,000
Lower Snake	35,100	31,400	3,700
Middle Columbia	49,400	49,400	0

Projected Demands

In addition to the current 1.5 million irrigated acres in the state, up to 7.6 million acres have favorable soil, topography, and drainage characteristics for irrigation. Further development will depend largely on market prices and availability of financing, energy, and water.

Irrigation development projections by the U.S.

Department of Agriculture consider food and fiber requirements for two alternative national population projections and projected foreign exports (See Table 3).

These figures show that the total irrigated acreage projected to the year 2000 will increase by approximately 50 percent from the present.

Table 3. Projected Irrigation Development

Low Population Projection			High Population Projection		
	Total Irrigated Area (acres)	Increase From 1969 (acres)	Total Irrigated Area (acres)	Increase From 1969 (acres)	
1969	1,440,000	—	1,440,000	—	
1980	1,746,000	306,000	1,758,000	318,000	
2000	2,219,000	779,000	2,288,000	848,000	
2020	2,503,000	1,063,000	2,615,000	1,175,000	

Domestic, Municipal and Industrial Supply

Existing Use

Public water supplies (those supplying two or more services) serve 3.1 million of Washington's 3.5 million people. Many of these public supplies include industrial water supply along with domestic and other municipal uses. Calculating the total use of water for these three uses results in an average usage of about 130 gallons of water per day per person.

Public systems supply about 45 percent of the total industrial water requirements, with industries themselves supplying the rest of their needs. Municipal and industrial use constitutes about 20 percent of total water uses.

Fifty-two percent of the state's population are supplied

by public water systems using wells. While chlorination is important to good quality water, 95 percent of the well water systems (serving 490,000 people) are not chlorinated. Surface water, including springs, supply the remainder of the municipal and domestic users. While thirty percent (970,000) of all public water supply users receive unfiltered water, many of these systems have rigid quality control and plan to add filtration. Many surface water sources are also unchlorinated and potential health problems exist.

Projected Demands

In 1975, Washington's estimated population was 3,494,100. Various projections of future state population are listed in Table 4.

Based on current per capita use, annual municipal, domestic, and municipally supplied industrial water needs will increase from about 165 billion gallons today to approximately 200 billion gallons in 1990.

Table 4. Washington Population Projections

	U. S. Bureau of the Census —Low—	State OPP&FM	U. S. Bureau of the Census —High—
1980	3,549,000	3,745,300	3,909,000
1990	3,805,000	4,300,700	4,518,000
2000	3,992,000	4,835,400	5,129,000

Electric Power Production

Existing Use

1970 electric energy use in the Pacific Northwest by class of customer is listed in Table 5.

Industry comprises the largest single user group with approximately 50 percent of all consumption. Within the industrial class, the aluminum reduction industry accounts for 50 percent of the industrial use; followed by the pulp and paper industry with an estimated 15 percent.

Table 5. 1970 Electrical Energy Use

Class of Customer	1970 Energy Consumption (billions of KWH)	% of Energy Sales
Industrial	44.1	50.3
Domestic	27.5	31.4
Commercial	12.1	13.8
Irrigation	2.6	2.9
Other	1.4	1.6
TOTAL USE	87.1	100.0

Historically, power for the Pacific Northwest has been supplied largely by hydroelectric generation. In early 1974, hydroelectric facilities provided 86 percent of the area's generating capacity and thermal facilities provided only 14 percent. While hydroelectric power is an instream or non-consumptive use of water, thermal facilities consume water as part of their cooling process and so must be considered as an out-of-stream or consumptive use.

Projected Demands

The Bonneville Power Administration predicts a tripling of demand for electric energy in the Pacific Northwest in the next 20 years. Base loads are projected to increase from 14,033 MW in 1974-75 to 34,844 MW in 1994-95, with peak load increases from 21,483 MW to 56,627 MW during the same period.

It is evident that the region's hydro resources will probably be inadequate to supply all energy needs of the region. In response to this a group of public and private utilities and the Bonneville Power Administration developed in 1966 a long-range, cooperative program, "The Hydro-Thermal Power Program," for the Pacific Northwest. This program is a blueprint for an orderly shift from reliance on hydro generation to a system of thermal generation to supply the base load with hydro generation to supply peak loads.

The coal-fired Centralia plant, was the first thermal component in the Hydro-Thermal Program, followed by the Trojan Nuclear Project located on the Oregon side of the Columbia River across from Kalama, Washington. Additional projects under construction or planned in Washington include three units at Hanford and two each at Satsop and Sedro Woolley. These facilities all consume water for cooling. Water availability therefore should be a major consideration when determining sites for future thermal plants.

Other power production potential includes pumped-storage hydroelectric and geothermal power.

A 1976 Corps of Engineers study identified 258 potential pumped-storage projects in Washington. A number of sites including several in eastern Washington are currently being investigated by various agencies.

Pumped-storage hydroelectric power production involves cycling water between two reservoirs at different elevations. In peak load periods water released from the upper reservoir drives turbines to generate power. In off-peak periods the upper reservoir is refilled by pumping from the lower reservoir. A pumped-storage project now operating at Grand Coulee uses Franklin D. Roosevelt Lake and Banks Lake.

Geothermal power production uses steam produced by heat occurring naturally below the earth's surface to drive steam turbines. Preliminary studies indicate that Washington may have significant geothermal potential.

Navigation

Existing Use

The Pacific Ocean, coastal estuaries, the Puget Sound waterways and rivers, including the Columbia and its major tributaries, constitute a network of waterways serving the state's waterborne transportation needs.

Recreational boating, fostered by the abundance of navigable waterways in the region, is among the highest in the country.

Puget Sound and the adjacent inland waters form a huge natural harbor deep enough to accommodate the world's largest super carriers. Most Puget Sound harbor entrances permit unrestricted access and are protected from ocean waves and storms. Depths at berths and docks vary from 25 to 70 feet. Seven major deep draft ports (Bellingham, Anacortes, Everett, Seattle, Tacoma, Olympia, and Port Angeles) handle general cargo, grain, lumber products, crude oil (inbound) and petroleum

products (inbound and outbound). Bremerton is the home base of the U.S. Navy's Pacific Fleet.

About 100 minor Puget Sound harbors and waterways are used for rafting logs, barging sand and gravel, ferry traffic, and for fishing and recreational boats.

Small boat facilities at the mouth of the Columbia River and along the coast support large fleets of commercial fishing vessels, with a tremendous concentration of charter and privately operated recreation craft at Ilwaco and Chinook during the summer fishing season.

The Columbia River provides a major inland waterway and barge channel with a minimum depth of 40 feet extending 106 miles from the ocean to Vancouver. Improvement of the channel has been authorized to provide a minimum channel depth of 27 feet from Vancouver to the Dalles, Oregon and 14 feet for the remaining river reach which extends to the Pasco-Kennewick area on the Columbia and to Lewiston on the Snake River.

Projected Demands

Future shipping needs will be governed by established economic production patterns. Agricultural and forest products production will continue to be important while the state's expanding manufacturing base becomes more diversified with increasing needs to import raw materials and export finished products. Population increases will dictate more imported consumer goods. Crude petroleum from Alaska will supplement crude imports from present foreign sources. International alternative energy requirements could result in coal exports and imports for thermal power plant construction.

Foreign and domestic commerce is projected to increase from a level of 45 million tons in 1968 to nearly 120 million tons by 2000. Internal commerce projections increase from about 52 million tons in 1968 to over 110 million tons by 2000. About half of the current and projected tonnages pass through Puget Sound, with less than 5 percent in coastal harbors and the remainder in the Columbia-Snake River system.

1973 data for Puget Sound show 30.3 million tons of internal commerce and 26.0 million tons of foreign and coastwise commerce, which are well within projected levels.

Future Columbia-Snake waterborne commerce will include: grain, petroleum, sand and gravel, fertilizer, wood chips, paper and wood products, logs, miscellaneous liquid and dry bulk cargo, and possibly coal and alumina. The major structural change necessary in the near future in the Columbia-Snake waterway system is replacement of the Bonneville Lock. Bonneville Lock carried an average of 4.5 million tons of barge and log raft traffic during 1972-1974. Projected Bonneville tonnage for 2000 is 14.3 millions tons, reaching the existing lock's capacity by 1990. An authorization report

now being completed will recommend construction of a new lock which will increase the size of the lock to the same dimensions as the seven upstream locks.

Additional small-boat harbors and related facilities are badly needed on Puget Sound. The growing number of recreational boats is causing increasing congestion at existing facilities, and a large latent demand for boats is curtailed by the lack of facilities. The current 20,000-space moorage shortage is growing each year. New facilities are needed soon to even partially meet boating needs.

Fish and Wildlife

Sport fishing should nearly double over the next 25 years, assuming the resources are available. Sports fishing for salmon, steelhead, trout, and spiny ray species depends on population, and people's income and mobility. Fishing success becomes a limiting factor; as success falls off, so does fishing activity. In the future, even with a combination of native and hatchery fish, production is not likely to exceed demand for the resource.

Washington has significant wildlife resources. The large populations of many species are defined primarily by habitat. Frequently, the limiting factor is not water supply but availability of food and shelter.

Wetlands and vegetation along rivers, canals, and ditches provide habitat for many waterfowl species. Washington is on a major migratory bird flyway extending northeast-southwest across the state above the Columbia Basin. The flyway shifted to the Columbia Basin due to availability of food, shelter, and water.

Public interest in wildlife is fairly heavy for both hunting and observation. Trapping is limited to a few individuals who traditionally run trap lines near their mountain valley homes. Demand for hunting and wildlife observation will probably exceed the wildlife supply in the foreseeable future.

Recreation and Aesthetics

The State of Washington has immense resources for water-oriented recreation including 8,000 lakes, 50,000 miles of streams and nearly 3,000 miles of salt water shoreline. Residents and out-of-state visitors find the state an exceptional playground. The Puget Sound area is one of the great boat ownership areas in the United States — about twice the national average. While state population projections show an increase of as much as nearly 50 percent by the year 2000, recreation demand will increase even more rapidly. Water-oriented recreation represents nearly 38 percent of total recreation demand.

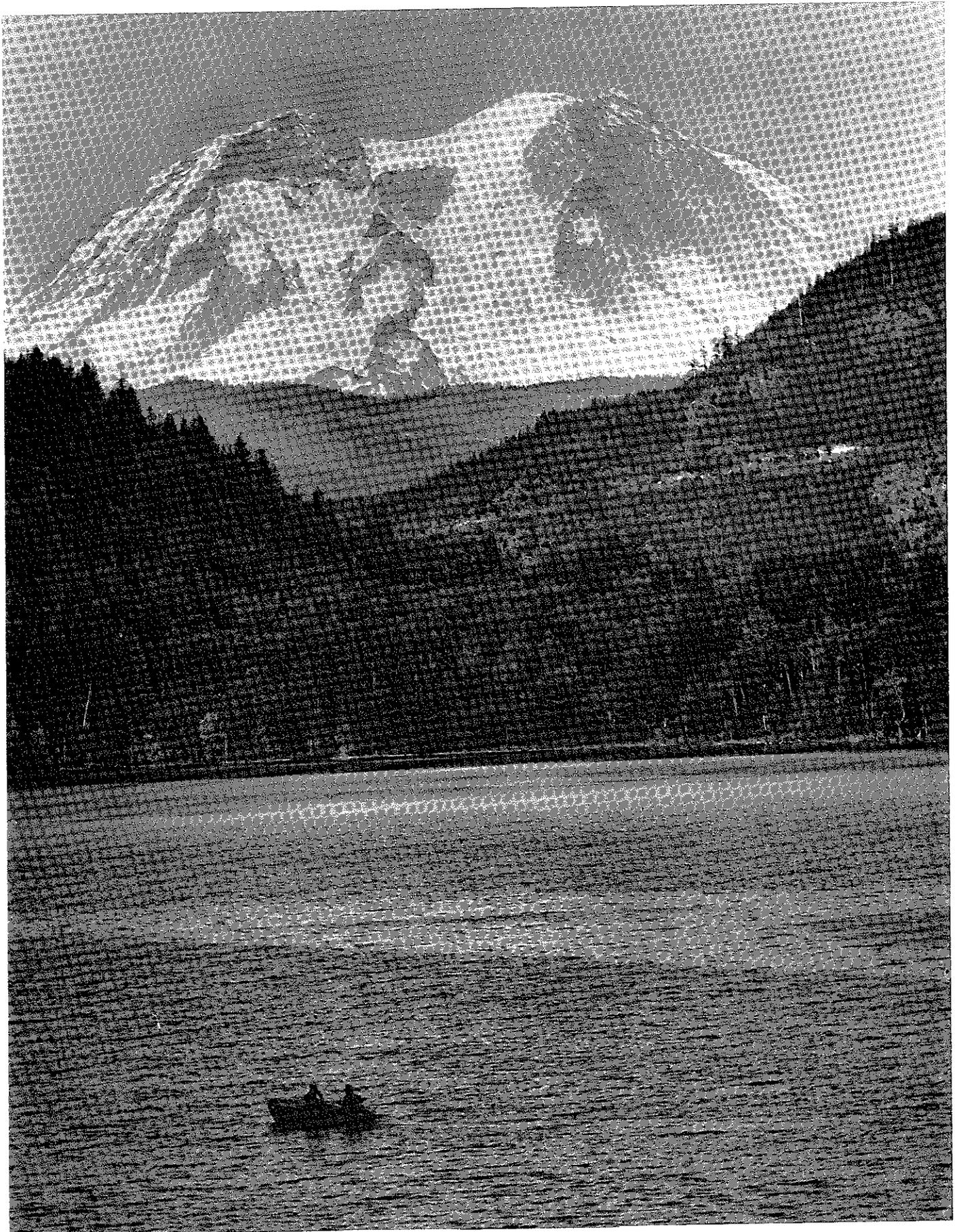


Figure 5
Recreational Fishing

STATEWIDE ISSUES



STATEWIDE ISSUES

Washington State has entered an era of increased awareness of water as a valuable resource and an awareness of the variety of water management issues.

This section discusses the State's major water management issues, the Department of Ecology's accomplishments and continuing response to these issues, and recommendations for legislative action.

Water management issues have been organized into seven broad categories:

- * Water Allocation and Management
- * Public Safety
- * Public Involvement
- * Project Development and Financing
- * Clarification of Water Rights
- * State-Federal, Interstate, and Canadian Relationships
- * Management of the Columbia River

WATER ALLOCATION AND MANAGEMENT

Rapidly increasing water use has revealed that there are limits to what state residents once considered inexhaustible supplies. Already, further diversions frequently require a tradeoff against other water uses. Complex, interrelated issues are involved: full resource utilization, regional development, family farming, preserving future options, protecting instream flows, maintaining safe sustaining ground water yields, joint surface/ground water management and much more.

PUBLIC SAFETY

Recent tragedies demonstrate the need for greater consideration of public safety, including river management, reservoir operation, and structural safety of dams. Public safety becomes increasingly important with the rapid growth of recreational use for streams and reservoirs

PUBLIC INVOLVEMENT

Greater public awareness has made the task of public

involvement both easier and more difficult. The high degree of public awareness of water's value and water issues make the job easier. On the other hand, it is more difficult to inform and involve a much larger group of people with varied and sometimes conflicting interests.

PROJECT DEVELOPMENT AND FINANCING

Continually increasing demands require that more water be made available for use where and when it is desired, usually through large projects. Development cost is high and the federal government is increasingly reluctant to participate. State-local-private financial partnerships are needed.

CLARIFICATION OF WATER RIGHTS

To adequately manage water, we must first know how much is truly available, and how much is already committed for use under existing water rights. The four major issues are:

- * Federal reserved water rights
- * Indian water rights
- * Relinquishment
- * Adjudications

The expanded efforts needed to determine the quantities of water involved in these issues should be facilitated by legislative changes.

STATE-FEDERAL, INTERSTATE, AND CANADIAN RELATIONSHIPS

About 56 percent of surface water flow through Washington originates in neighboring states or Canada. The lower 300 miles of the Columbia River form our border with Oregon. Continued major federal water management and development is evidenced by the Columbia River system. The Southwest stands ready with renewed attempts to obtain Pacific Northwest water after the federal moratorium expires in September 1978. DOE must maintain its strong position representing Washington's water resource interests — a position founded better than ever upon facts, reason, and logic.

COLUMBIA RIVER MANAGEMENT

This is a crucial period in development and management of the Columbia River. The U.S. Corps of Engineers has underway a major study of the system for power generation and a number of other factors. Protecting instream values, including providing base flows, insuring adequate fish passage, and controlling

nitrogen supersaturation is of increasing concern. Irrigation developments in Washington and in Oregon use the Columbia River, and Idaho uses the Snake River as an irrigation water source before the river reaches Washington. These factors require coordinated efforts with federal agencies and the states of Oregon and Idaho. Interstate compact discussions have been renewed.

WATER ALLOCATION AND MANAGEMENT

THE ISSUES

As the various demands for water resources have increased, conflicts between uses and users have developed, thereby increasing the need for effective water management. DOE currently faces a number of water allocation and management issues.

Reservation of Water for Future Use

A fundamental of the Water Resources Act of 1971 is that adequate and safe supplies of water shall be preserved and protected for human domestic needs. Under the present water appropriation system, the permittee is given specific time limits to complete his project and to put the water to full beneficial use. As a result, public water supply utilities have either been unable to insure adequate future water supplies or have filed application for permits with no intent to develop immediately.

Streamflow Maintenance

For many years after the adoption of the Surface Water Code in 1917, surface water right permits were issued on a "first-come, first-served" basis with no limits other than the availability of the water and potential interference with existing rights. This resulted in some streams being dried up during certain times of the year.

In 1949, legislation was passed enabling denials of water right applications when further appropriations "... might result in lowering the flow of water below the flow necessary to adequately support fish populations." The Minimum Water Flows and Levels Act of 1969 and the Water Resources Act of 1971 further provided for maintaining flows in streams for fisheries and other values.

Ground Water Management

Proper development, use, and regulation of our ground waters is perhaps the most important key to further economic growth and retention of a high quality life for residents of many areas in Washington

Ground water development and use has occurred slowly because surface water was more accessible and less expensive to develop. As a result, the Ground Water Code was not enacted until 1945, nearly thirty years after the enactment of the Surface Water Code.

The Ground Water Code provides a means for regulating, controlling, and managing ground water through the issuance of water right permits. Ground water management will be a major issue in the next decade as surface waters approach full appropriation. Already, in many areas of our State, the only source of water for increased irrigation is ground water. Specific examples are the Walla Walla area, the Upper Yakima area, and the Eastern Columbia Basin.

The primary practical problem in ground water management is the lack of preciseness in the methods used to determine the physical characteristics of the aquifer systems. This, coupled with the fact that all wells have different efficiencies and depths of aquifer penetration, makes it difficult to determine the cause and effect relationships between two or more wells and the long-term effect of withdrawal from one or more wells on a particular aquifer system.

Another ground water management problem is the intrusion of salt water into fresh water aquifers. Considered a form of ground water pollution, such salt water intrusion is nearly always caused by man's activities, and is either irreversible or requires an extended period of time to correct by recharging the aquifer. Generally, the problem is caused when one or more wells withdraw fresh water from a coastal aquifer faster than the natural recharge rate, allowing sea water to rise into and contaminate the wells. The problem can be prevented by requiring all pump intakes drawing from the aquifer to be above sea level. Withdrawal limits or artificial recharging might prevent salt water intrusion, but the great sensitivity of the salt water level to the level of the fresh water table (as explained below), makes this type of management difficult.

Under natural circumstances, the fresh water and salt water within an aquifer remain separate because fresh

water is slightly less dense than—and literally floats on—salt water. Since the density difference is about one-fortieth, only one-fortieth of the fresh water floats above sea level. As an example, if the (fresh) water table were two feet above sea level, then the fresh-salt water boundary would be about 80 feet below sea level (See Figure 6) If more fresh water is removed from the aquifer than is recharged and the water table is lowered to one foot above sea level, this will allow the boundary to rise to only 40 feet below sea level.

With more than 1,000 miles of marine coastline in Washington State, potential saltwater intrusion into fresh water aquifers is a matter of special concern. With the rapid development along the shorelines of the State, growing demands are being placed on ground water supplies. The Puget Sound lowlands have more areas of saltwater intrusion than the Pacific Coast because of the narrow peninsulas and islands surrounded by salt water and more intense development of the aquifers.

Complete ground water management of an aquifer system would require defined underground boundaries, and development and management by a single entity such that all users have a common and equal interest.

Since this is not the case, DOE attempts to provide for maximum beneficial use of the resource, without exceeding safe sustaining yields, or adversely affecting existing rights. This requires the management of the ground water resource to be coordinated with surface water management.

ACCOMPLISHMENTS, CURRENT DIRECTION, AND RECOMMENDATIONS

DOE's water allocation and management activities include:

- * Developing and implementing basin management programs.
- * Designating ground water management subareas and developing and implementing management regulations for such subareas.
- * Developing statewide policies for purposes of consistent resources management.
- * Issuing or denying various permits consistent with surface and ground water management policy.
- * Protecting existing rights and controlling illegal use through field enforcement.

Basin Management Programs

For planning and management purposes, the State has been divided into 62 Water Resource Inventory Areas (WRIA's) (see Figure 7). WAC 173-500, adopted by DOE in January 1976, provides for the formulation of a water resources management program for each WRIA or group of WRIA's. These management programs, as appropriate:

- * Provide for the management of surface and ground waters.
- * Identify and foster development of water resource projects.

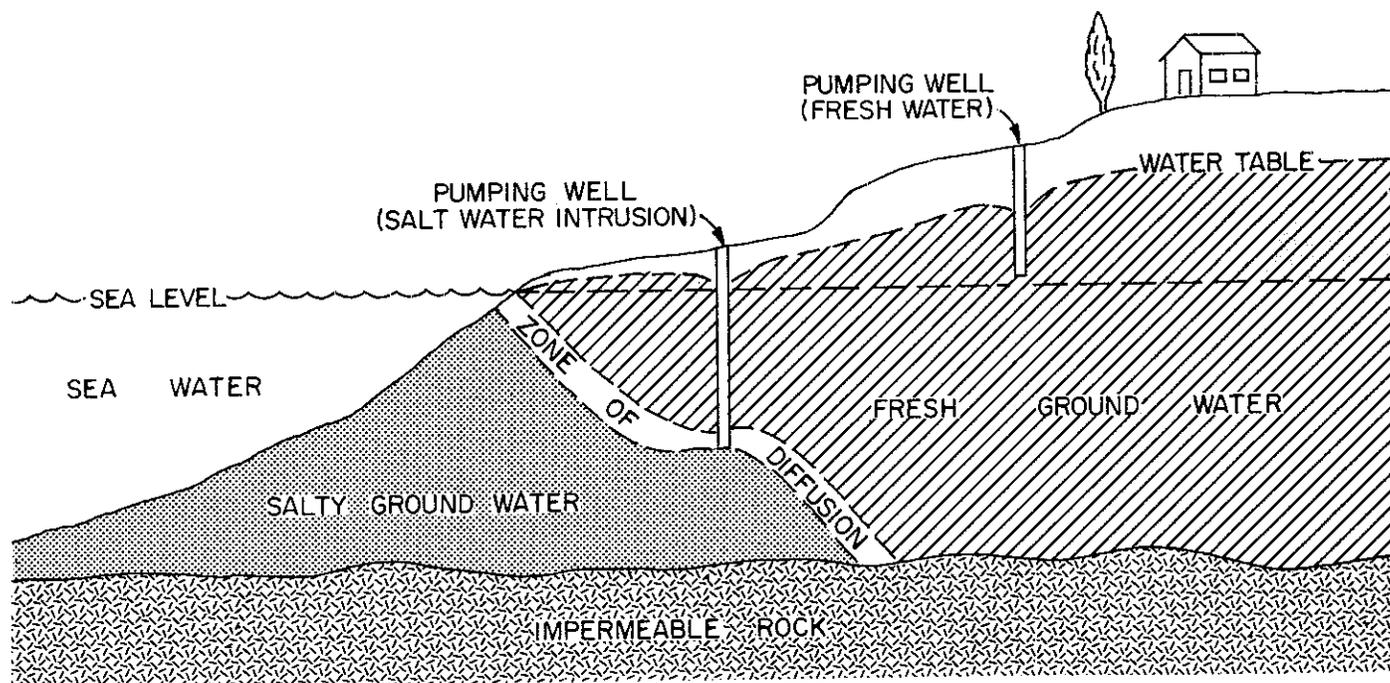


Figure 6
Salt Water Intrusion

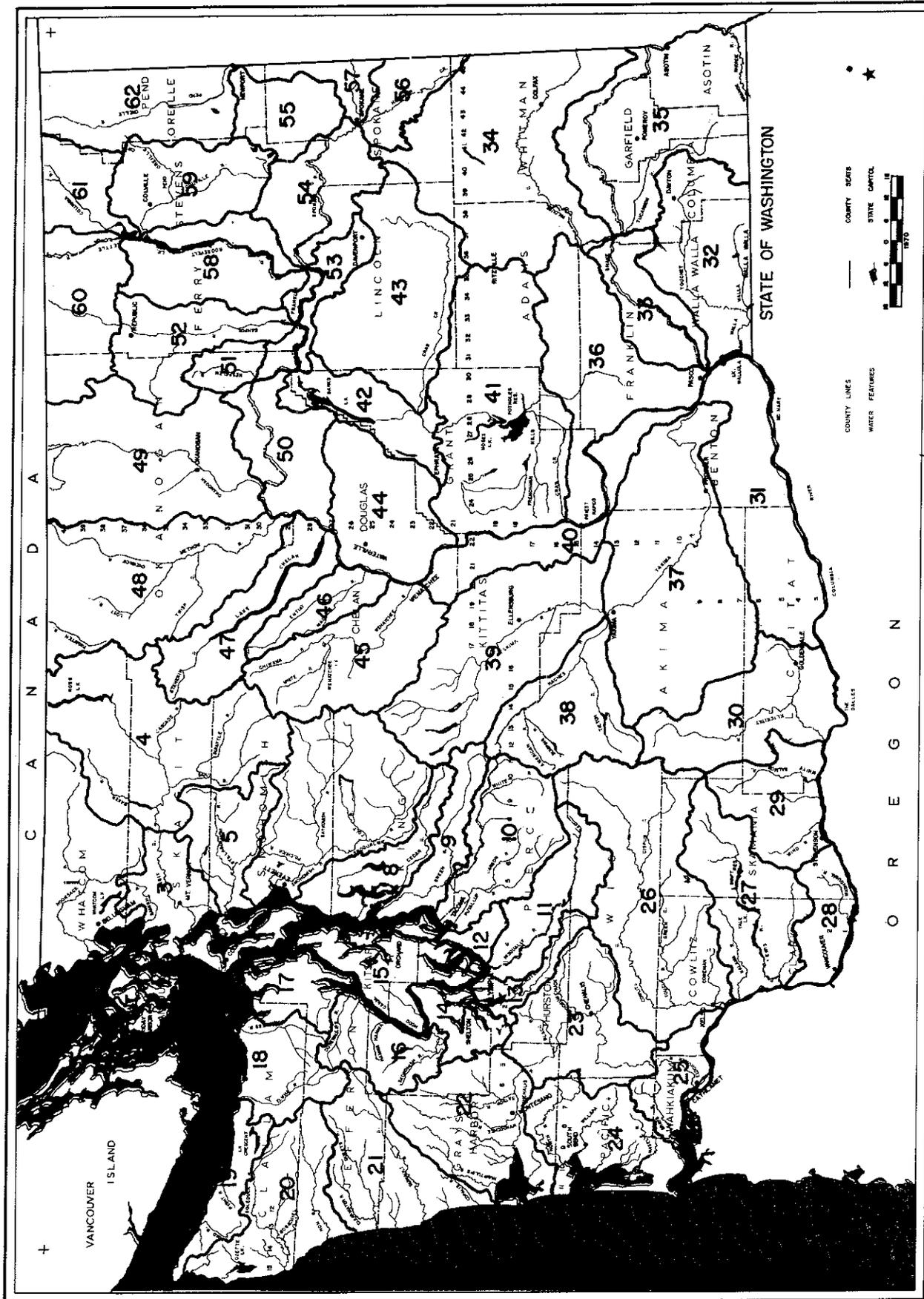


Figure 7
Water Resource Inventory Areas

- * Allocate quantities for beneficial uses including the establishment of base flows for instream uses.
- * Declare preferences or priorities of use with existing water rights at the time of the adoption of a basin management program being highest priority.
- * Reserve water for future beneficial use
- * Withdraw waters from additional appropriation when information and data are insufficient for sound decision making.
- * Establish criteria for appropriation limits.

Public involvement is important to the development of each program. Informational meetings are held to explain the water management proposal and receive

public comments and ideas. These comments and ideas are studied and evaluated and appropriate revisions of the draft basin management program are made.

An Environmental Impact Statement is prepared on the proposed basin management program to explain environmental implications.

Formal public hearings are held to explain the final proposal and solicit recommendations for changes from the public prior to program implementation.

Figure 8 shows the areas of the State where basin management programs have been or are being developed. Table 6 presents the current status of program development for each basin; basins are listed in descending order of priority.

Table 6. Status of Basin Management Program Development
December 31, 1976

BASIN	WRIA NO.	PERCENTAGE OF TOTAL AREA*		Basin Bibliography	Preliminary Analysis	Definition of Program Scope	Initiation of Public Involvement	Detailed Analysis	Program Document Developed	Draft Policy or Management Regulation	Policy or Regulation Formally Adopted
		%	Cumulative %								
Little Spokane	59	1.0	1.0	X	X	X	X	X	(X)	(X)	(X)
Chehalis	22, 23	4.1	5.1	X	X	X	X	X	(X)	(X)	(X)
Okanogan	49	3.5	8.6	X	X	X	X	(X)	(X)	(X)	(X)
Methow	48	3.3	11.9	X	X	X	X	(X)	(X)	(X)	(X)
Snake	33, 35	7.9	19.8	X	X	X	X	X	X	X	
Columbia (John Day and McNary Pools)	31	2.3	22.1	X	X	X	(X)	(X)	(X)	(X)	
Cedar	8	2.8	24.9	X	X	(X)	X	X	(X)	(X)	
Walla Walla	32	2.0	26.9	X	X	(X)	X	(X)	(X)	(X)	
Yakima	37-39	9.1	36.0	X	X	(X)	X				
Klickitat	30	1.9	37.9	X	(X)						
Nooksack	1	2.4	40.3	(X)	X	(X)					
Colville	59	1.5	41.8	X	X	(X)	(X)				
Kitsap Peninsula	15	3.9	45.7	X							
San Poil	52	1.3	47.0	X	(X)	(X)					
North Olympic Peninsula	17-20	4.2	51.2	X	X	(X)					
Wenatchee	45	1.9	53.1	X	(X)						
Green	9	7.2	60.3	X							
Palouse	34	4.1	64.4	X							
Puyallup	10	1.8	66.2	X	(X)						

X Completed

(X) Completed in FY '76

* As compared to the total area of the State (66,572 square miles; 42,650,000 acres)

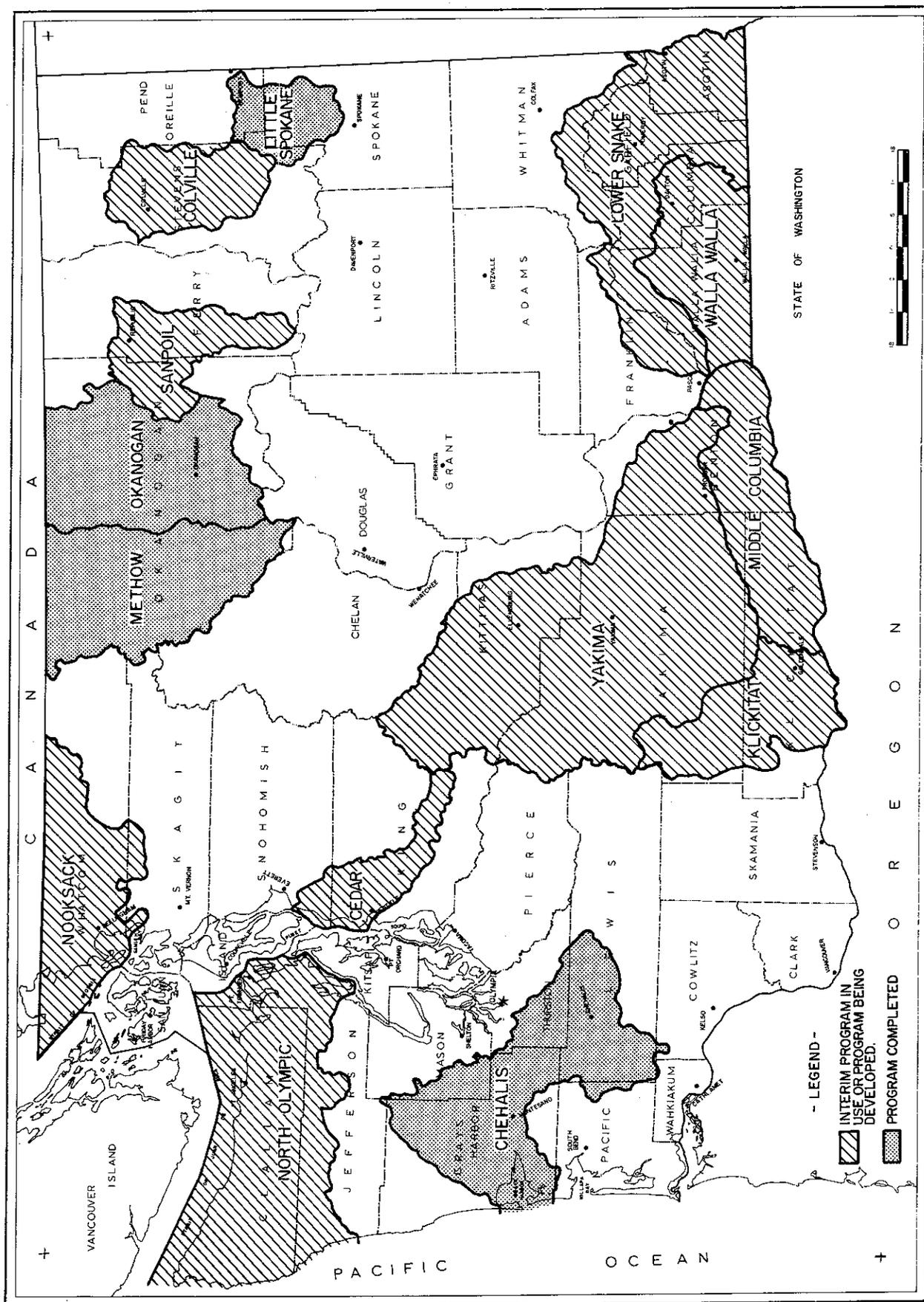


Figure 8
BASIN MANAGEMENT PROGRAMS

Four basin management programs have been completed. The Little Spokane River Basin Program (WAC 173-555) was adopted on December 23, 1975; the Chehalis River Basin Program (WAC 173-522) was adopted on March 10, 1976; the Okanogan River Basin Program (WAC 173-549) was adopted on July 14, 1976; and the Methow River Basin Program (WAC 173-548) was adopted on December 28, 1976. Each program is discussed in the "Local Issues" section of this report.

The basin management programs treat surface water and ground water as appropriate to the situation in each basin. The programs developed to date have been oriented but not limited to surface waters. In contrast, the program being developed for the Walla Walla Basin emphasizes ground water management.

Ground Water Management

Predecessor agencies of the DOE were involved in ground water resources before the 1945 Ground Water Code was adopted. The earliest work on ground water consisted of investigations of the availability of ground water, the demands on the resource, and potential problems. Investigations under a continuing cooperative program with the U.S. Geological Survey (U.S.G.S.) result in Water Supply Bulletins or other technical reports published by the U.S.G.S. A work program is developed each year based on the need for the investigations and the money available. Figure 9 shows where further geology and ground water studies are needed.

Another ongoing, cooperative activity with the U.S.G.S. is the observation well program. A network of observation wells monitor changes in ground water levels in many of the principal aquifers. These wells are publicly or privately owned, and the measurements are collected with the cooperation of the well owners. The number of wells in the network has varied over the years since the beginning of the program in 1938. Currently there are 200 wells in the network as compared to a total of 378 wells that have been used as observation wells at some time in the past. Table 7 lists the number of observation wells by county.

Recent additions to the network of observation wells are tabulated below:

Year	Number of New Wells
1970	9
1971	12
1972	5
1973	8
1974	4
1975	5
Total	43

These investigations and observation well readings provide the data which show changes in water levels.

Steadily declining ground water levels indicate a need for more detailed management of the resource. The Ground Water Code provides that DOE may designate ground water areas and depth zones within these areas and regulate withdrawals to maintain a safe sustaining yield.

DOE has designated three such ground water areas by regulation: the Quincy Subarea (WAC 173-124), the Odessa Subarea (WAC 173-128) and the Duck Lake Subarea (WAC 173-132). Ground water management regulations have been adopted for the Odessa Subarea (WAC 173-130) and the Quincy Subarea (WAC 173-134). The Quincy regulation includes provisions for management of artificially stored ground water, which occurs from seepage and percolation of Columbia Basin Project irrigation waters. The Odessa and Quincy subareas are discussed in the "Local Issues" section of this report.

A ground water management program is a major element of the basin management program being developed for the Walla Walla Basin. This will be the first basin management program to treat ground water management in detail.

The concept to be utilized in this management program is conjunctive use of surface water and ground water—the integrated use of surface water and ground water to maximize the benefits of the use of all the waters of a basin. In the development of the Walla Walla Basin management program, methods will be considered to control uses of ground and surface water so that ground water uses will be increased and surface water uses will be decreased during low streamflow periods.

Heavy demands on surface waters make it necessary to fully explore water use benefits available through conjunctive management of all State waters. Utilizing available ground waters in conjunction with surface waters can greatly increase development possibilities.

Salt water intrusion problems have not yet required a complex management scheme. To prepare for anticipated problems, DOE has recently adopted a Standard Office Procedure on coastal water wells. It states that: "Where a proposed well site is within one mile of a salt water body (bay, sound, strait, or ocean seacoast area), the ground water appropriation permit should provide that the pump intake be installed above mean sea level." It also urges prospective users "to locate their wells as far inland as reasonable because of the uncertainty of the amount of saltwater intrusion to be experienced in the future." To obtain an exemption from the Standard Office Procedure, "An applicant must provide technical data that accurately locates the fresh-salt water interface and shows evidence of a definite seaward gradient of the ground water."

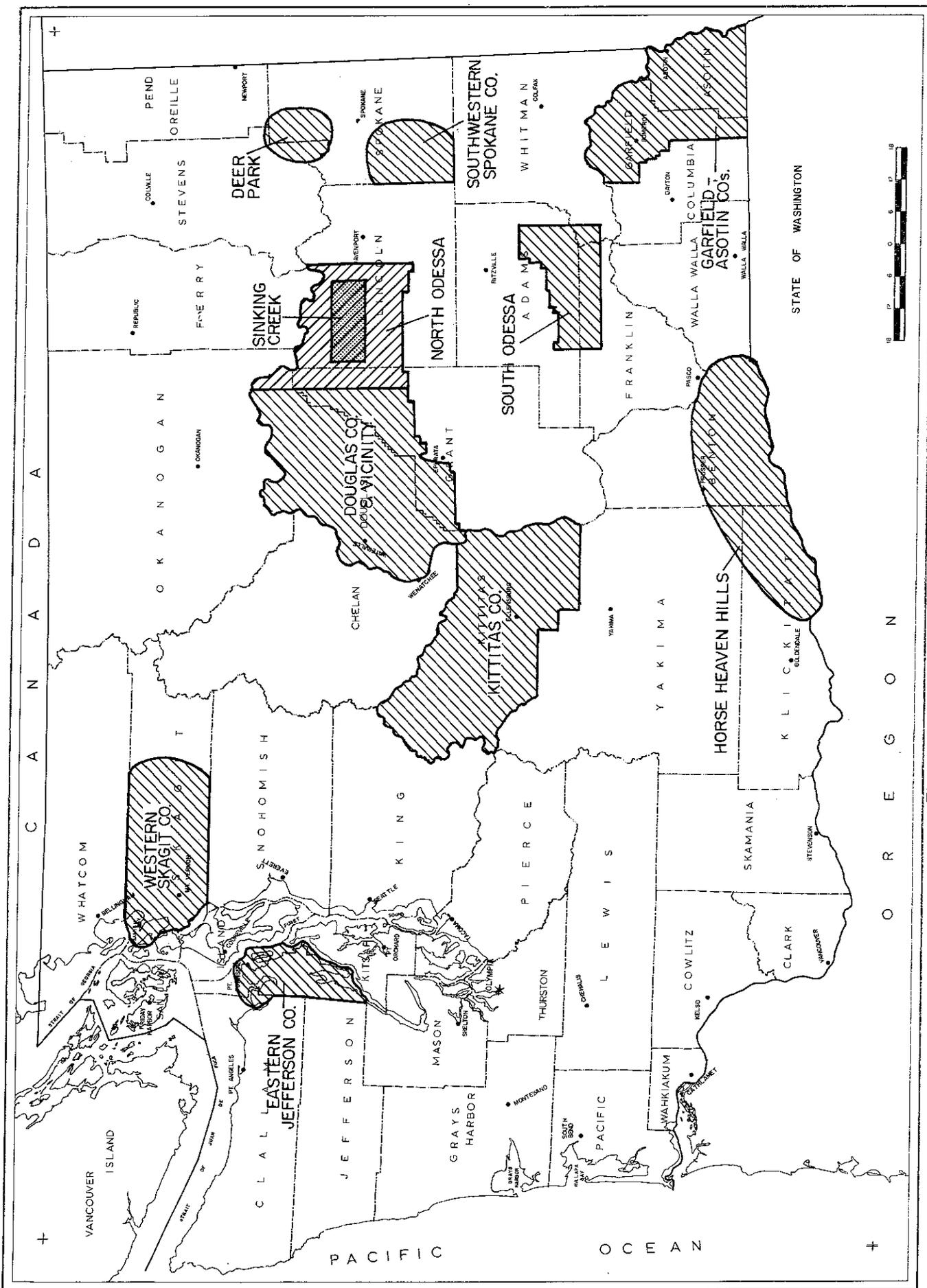


Figure 9
 AREAS REQUIRING GROUNDWATER INVESTIGATIONS

Table 7. Observation Wells

	Number of wells used for observation		First measurement on active wells
	Total	Currently	Earliest date/ Latest date
ADAMS	50	31	1942/1975
ASOTIN	2	—	
BENTON	7	5	1968/1972
CHELAN	1	1	1945
CLALLAM	1	—	
CLARK	2	—	
COLUMBIA	—	—	
COWLITZ	—	—	
DOUGLAS	11	5	1943/1974
FERRY	5	—	
FRANKLIN	14	14	1940/1966
GARFIELD	2	—	
GRANT	58	36	1940/1975
GRAYS HARBOR	5	4	1970
ISLAND	2	—	
JEFFERSON	2	—	
KING	11	2	1960/1970
KITSAP	1	—	
KITTITAS	4	1	1968
KLICKITAT	12	7	1957/1973
LEWIS	10	4	1953/1957
LINCOLN	32	26	1953/1971
MASON	—	—	
OKANOGAN	10	2	1964/1968
PACIFIC	—	—	
PEND OREILLE	—	—	
PIERCE	9	4	1953/1969
SAN JUAN	—	—	
SKAGIT	2	—	
SKAMANIA	—	—	
SNOHOMISH	2	1	1940
SPOKANE	21	11	1938/1967
STEVENS	3	1	1954
THURSTON	5	1	1958
WAHIAKUM	—	—	
WALLA WALLA	44	20	1942/1973
WHATCOM	4	1	1948
WHITMAN	22	12	1938/1968
YAKIMA	24	11	1944/1968
TOTALS	378	200	1938/1975

The Water Well Construction Act of 1971 (RCW 18.104) requires the licensing of well drillers and submittal of a report on each well constructed. WAC 173-160 establishes minimum standards for construction and maintenance of water wells. Under present law, DOE does *not* have clear statutory authority to stop all well construction in an area where the water quality is being threatened by saltwater intrusion.

Current Direction

DOE continues to develop basin management programs considering both surface and ground water and the potential for conjunctive use management, and to adopt appropriate regulations for total resource management. No additional ground water subareas are proposed at

this time, but modification of the Duck Lake Subarea is under consideration. Further subareas will need regulation as the demand for ground water increases. Such regulations will be integral parts of basin management programs developed under the provisions of the Water Resources Act of 1971.

Recommendations

Major ground water management needs are more investigations of the resource available for future uses and monitoring of existing uses. Previous experiences have clearly shown that problems develop in those areas of the State where ground water permits have continued to be issued without a thorough knowledge of the resource available.

DOE's proposed FY 78-79 budget includes a request for two additional staff members for the Investigations Section to provide greater ground water investigation capability to minimize the development of new ground water problem areas. Investigations are proposed in areas such as the Horse Heaven Hills and Eastern Jefferson County, which are now developing and have little ground water information available. DOE recommends that the Legislature act favorably on this budget request. With sufficient staff to perform the necessary investigations, DOE can expand present concepts of ground water management, basin management programs, ground water subarea designation, conjunctive use of surface and ground water, and control of saltwater intrusion.

Statewide Policies

Accomplishments

Statewide policies are developed for critical problem and issue areas where necessary or desirable for consistent management of the resource throughout the State. Statewide policies have been developed for streamflow maintenance, reservation of water, withdrawal of water for study purposes, and significant appropriations.

Streamflow Maintenance

In 1949, the Legislature declared it to be the policy of the State "... that a flow of water sufficient to support game fish and food fish populations be maintained at all times in the streams of this state." This legislation, RCW 75.20.050, provided that the water rights administrator, upon the advice of the directors of the departments of Game and Fisheries, may refuse to issue a permit which might result in lowering the flow of water below that necessary to adequately support fish populations

Under the provisions of this legislation, approximately 250 streams (nearly all very small) have been closed to further appropriation, and *low flow provisions* have been applied to individual permits on approximately 250 other streams.

The Minimum Water Flows and Levels Act (RCW 90.22) was enacted in 1969 to provide a formal process to protect instream flows. Under this Act, DOE may establish *minimum stream flows and lake levels* to protect fish, game, birds, or other wildlife resources, or recreational or aesthetic values. The Act also directed that adequate waters be provided for the watering of livestock on riparian grazing lands. The Act set forth hearing procedures for the establishment of minimum stream flows and lake levels, but did not define criteria for the determination of such flows or levels.

A number of investigations were undertaken in an attempt to develop methodology for the identification of instream flow requirements. Due to the complexity of the subject and a lack of basic data, no single acceptable, definitive methodology has been identified. As a result, only one minimum flow regulation has been

adopted; that regulation was adopted for the Cedar River in 1971 (WAC 173-30).

The Water Resources Act of 1971 (RCW 90.54) further provides that perennial streams and rivers shall be retained with *base flows* necessary to provide for the preservation of wildlife, fish, scenic, aesthetic, and other environmental values, and navigational values. The Act further provided that lakes and ponds shall be retained substantially in their natural condition.

DOE initially proposed a statewide regulation providing a criterion and procedures for the establishment of base flows, but opposition to this criterion by various individuals and groups prevented its adoption.

Subsequently, a more acceptable stream flow preservation program was developed which currently is being implemented as an integral part of the more comprehensive basin management programs being developed for various basins in the State. The current program represents an effort to implement the base flow concept described in RCW 90.54, while retaining the ability to use the minimum flow concept of RCW 90.22 as a supplement.

As of October 1976, base flow analyses had been undertaken for 20 of the 62 Water Resource Inventory Areas (WRIA's) in the State. These analyses had been completed for 12 WRIA's

Reservation of Future Public Water Supplies

In March 1976, DOE, in cooperation with the Department of Social and Health Services (DSHS), adopted procedures which provide that any person may petition DOE to reserve water for future public water supply (WAC 173-590). WAC 173-590 assists municipal water utilities in their planning, and assures the petitioner that a water supply will be available for the area

A "Memorandum of Agreement" has been signed by DOE and DSHS relating to processing of petitions. Reservation Petition Forms have been prepared and distributed to regional DOE and DSHS offices. Two requests have been received by DOE for petition forms, but no completed petitions have been submitted.

Withdrawal of Unappropriated Waters

When sufficient data and information are not available to make sound management decisions in a given area, all or a portion of the unappropriated waters may be withdrawn from further appropriation until the necessary information is available. Thus, the adoption of a withdrawal regulation is not a permanent solution, but rather provides a specified period of time for the Department to develop adequate information with which to make future decisions.

Two withdrawal regulations have been adopted. The withdrawal regulation for the Little Spokane River Basin expired with the adoption of a basin management program. The other regulation, adopted in April 1976, withdrew waters of the Little Klickitat River Basin

from further appropriation until November 1, 1978 or until a management program is developed, whichever is sooner.

Significant Appropriations (Term Permits)

The water resources of the state are clearly the most valuable publicly owned resource. The problem has been how to conserve basic amounts of water for fish, wildlife, aesthetics, recreation, and the natural environment while still putting to work in the most effective way, all available surpluses of water to add to the state's economic base. History has shown that the economic uses of water represent a constantly changing pattern.

DOE has felt the need not to irrevocably convey literally all of this and succeeding generations' interest and ownership in these water resources, but rather, while still using the water in the most effective manner, to retain title to significant portions and the right to make decisions concerning this water to future generations.

DOE thus has advanced the controversial concept that large applications for water be made available to the applicant on a fifty-year term basis, renewable for another fifty years, while still keeping the title to the water in the people of the state.

WAC 173-596, adopted by DOE in June 1976, outlines procedures and policies governing appropriations of significant amounts of water for agricultural irrigation. This regulation significantly changes the administration of the permit system established in 1917. The controversy created by the regulation, when first proposed, brought about an increased awareness of the State's water resources and their management.

WAC 173-596 applies to any proposed use of surface water for agricultural irrigation in the amount of 40 cubic feet per second or greater, or on 2,000 acres or more. It also applies to a proposed withdrawal for a portion of a total project exceeding either or both of these criteria.

DOE will favor applications for significant withdrawals involving regional and/or multipurpose projects, operation by public entities, and family farming.

In processing an application for a significant withdrawal, if it is determined that public waters are available and that existing water rights will not be impaired, then DOE considers whether the proposed water use will be upon lands which might be better served through a regional water supply system or multipurpose water project. If a regional water project appears desirable and feasible, and if a public entity which is or will be in existence has the interest, authority, and capability to construct and operate such a project within the reasonably foreseeable future, DOE will encourage the development of the regional project.

Permits issued to a public entity for a regional water project shall provide that a substantial portion of the irrigation waters be used for family farm units.

If a regional water project is not desirable or feasible, or if no public entity is available to construct and operate such a project, DOE will then conduct hearings to obtain public comments on the application. The hearings will be conducted to obtain views, not only as to whether the application should be approved, but whether the permit (if approved), should limit the initial period of authorization for withdrawal to 50 years. Such a permit shall terminate, in whole or in part, at the end of 50 years, if at any time before the end of the 45th year, DOE finds that all or a portion of the public waters of the State authorized for withdrawal by the permit are required for a higher beneficial use, and that the termination does not appear to create conditions detrimental to the public interest and welfare which exceed the public benefits to be derived from the termination.

A water right pertaining to a significant withdrawal shall normally include a condition relating to a conservation and management program designed to promote public interest values on the lands to which the public waters are to be applied as well as on the lands adjacent thereto.

Current Direction and Recommendations

The Water Resources Act of 1971 was a major step forward in the definition of water resources management policy, and DOE has made significant strides in implementing this policy. The most controversial action was adoption of the regulation relating to significant surface water appropriations. Discussion and comment about this regulation pointed up the need for additional legislative policy guidance in several areas:

- * preserving water use options for future generations while providing for full utilization.
- * encouraging family farming.
- * requiring large water developers to develop and use a conservation and management program.

There also has been considerable discussion and comment about statewide water use priorities. DOE water right permits and certificates are issued according to the following priorities (and subject to existing rights):

- A. In basins where basin management programs have been adopted,
 1. Base flows to protect instream values (except where overriding considerations of the public interest exist).
 2. All other uses are prioritized on a stream reach basis.

- B. In basins where basin management programs have not been adopted, priorities are based only on the date of acceptance of the application under which the right was granted.

DOE recommends that this approach be continued so that basin management programs may be tailored to the specific needs and public desires in individual basins and on individual streams and rivers within each basin.

Permits

Surface and ground water management policies are being implemented through the issuance or denial of various permits

The water management program and policies may seem abstract, but anyone who applies for a water-related permit finds the program and its policies very real. Permits provide a direct link between the water management policies and people's activities.

Water Appropriation Permits

The 1917 Surface Water Code (RCW 90.03) requires anyone desiring to appropriate and use surface water obtain a permit from the Department of Ecology. No diversion or appropriation of water may take place before the permit is issued.

The 1945 Ground Water Code (RCW 90.44) requires anyone desiring to appropriate and use more than 5,000 gallons of ground water per day to obtain a permit from the Department of Ecology. The appropriation of water for stock watering and watering of a lawn or noncommercial garden not exceeding one half acre are exempted. Construction of any well or other works for withdrawal of ground water may not occur before the permit is issued.

During Fiscal Year 1976, the Department received 2,000 appropriation permit applications, and issued 3,200 permits and 2,870 certificates (surface and ground water sources combined). As of December 1976, the Department had 2,157 permit applications on hand for processing.

Figure 10 shows the trends in numbers of applications, permits, and certificates over the years. The number of applications peaked during June 1974, the expiration date for the Water Rights Claims Registration Act. The Registration Act's impact is still being felt as shown in the increased numbers of permits and certificates now being issued.

Reservoir Permits

A reservoir permit is required prior to construction of any structure which can impound water to a depth of 10 feet or more at any point and/or will impound a volume of 10 acre-feet or more. Plans and specifications are required for structures impounding 10 acre-feet or more. A reservoir permit normally provides for the filling of the reservoir once a year. A secondary permit is required for the use of water stored in the reservoir.

Well Driller Licenses

The Water Well Construction Act (1971) provides for licensing well drillers. These licenses must be renewed annually. In Fiscal Year 1976, 75 new licenses were issued by the Department and 559 licenses were renewed.

The Act also requires a report on each well constructed in the State. These reports are submitted to the Department by the well drillers or well owners.

Monitoring and Enforcement

DOE's ability to regulate surface water use depends on whether the stream is adjudicated, the attitude of the local county prosecutor's office, and the number of DOE personnel to initiate and follow through on regulatory action. On unadjudicated systems, if a user claims a vested right, DOE is virtually powerless to protect holders of State appropriation permits and certificates without an adjudication. DOE's ability to regulate also depends on whether the local prosecutor considers the burden of proof of the right to use water to be on the individual whose right is in question or whether DOE must prove that no right exists.

The Surface Water Code permits DOE to appoint a stream patrolman (to be paid by the water users) on an adjudicated stream.

To facilitate an effective enforcement program, the Department will pursue a regular program for the issuance of orders for the installation of measuring devices where needed, and will pursue the development of adequate procedures to be used in the event such orders are violated.

This program will be established in accordance with the recommendations from field offices and will be implemented at a rate consistent with the capability of each concerned regional office to provide the necessary assistance to the involved water users regarding their installation of measuring devices and to enforce such orders.

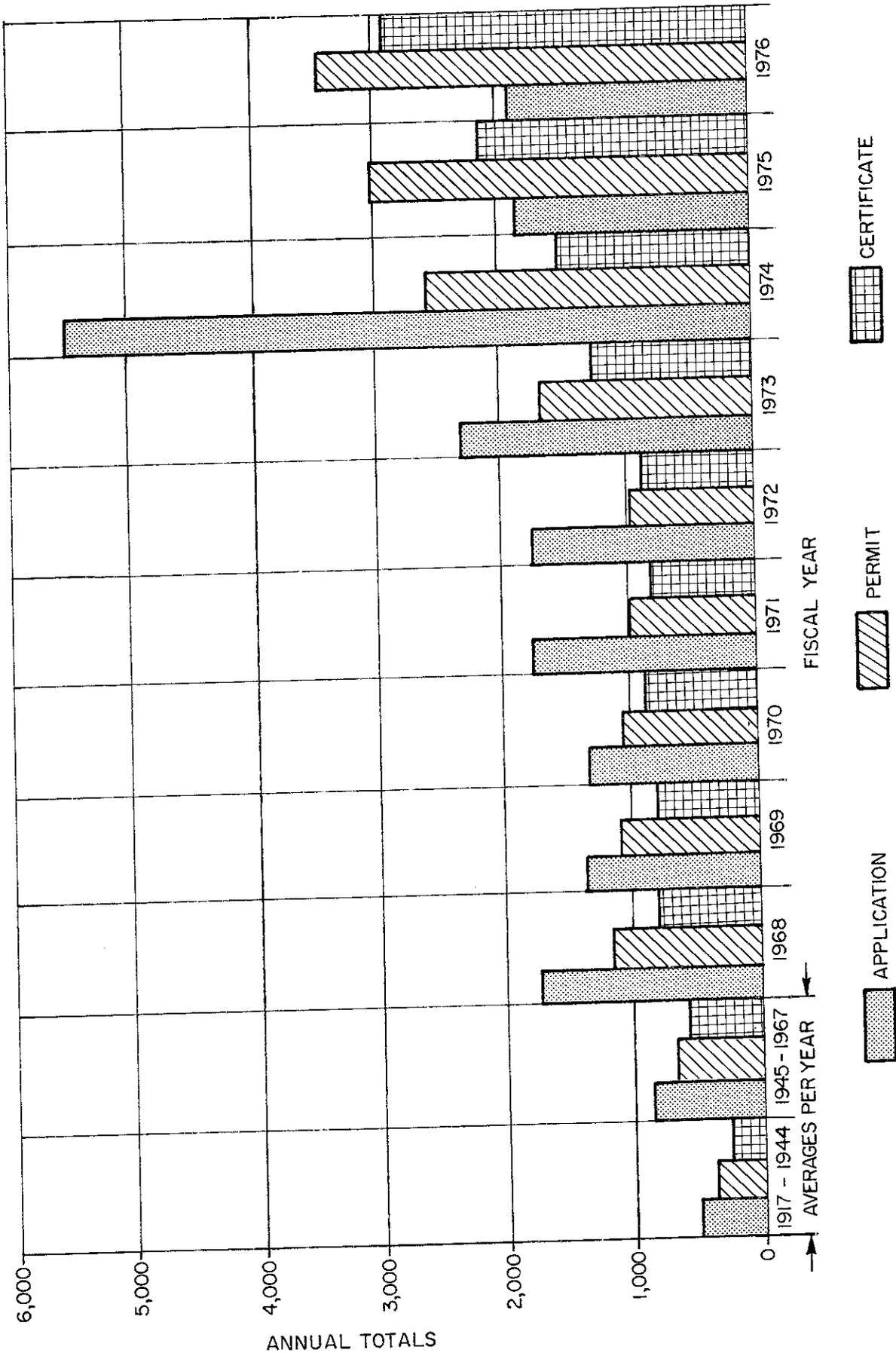


Figure 10
 WATER RIGHTS FILINGS, SURFACE AND GROUND WATER, 1917-1976

PUBLIC SAFETY RELATED TO DAMS, RESERVOIRS, AND RIVER OPERATION

Increasing recreational use of Washington's lakes, rivers, and streams raises potential conflict with other, earlier uses of these waters. Many dams, diversion structures and canals were built years ago in remote locations. Many of these remote settings have now become choice recreation areas. Greater usage exposes unanticipated or unnoticed public safety problems.

In mid-July 1976 at a recreation area on the Stuck River near Pacific, two young girls were swept downstream by sudden high water and drowned. A report was prepared by DOE on this incident documenting the events leading up to the dangerous, high flows. A brief summary of the incident is included in the Local Issues section of this report under Puget Sound Metropolitan Area.

In 1965, there were approximately 9,000 large dams in the world with 3,200 in the United States. Worldwide, major damage (failure or rupture) had occurred to 202 dams of which 117 were in the United States. With 35 percent of the world's dams, the U.S. had 58 percent of the failures.

Eight minor dams have failed in Washington during the past 20 years causing damages to roads, highways, railroads, a cannery, 6 homes, and a water main. Fortunately, there was no loss of life attributed to these failures. A June, 1971 dam failure in Okanogan County caused a second dam to fail, washing out major roads. Just one day earlier, several children had been cleaning up this area.

A dam used in a sand and gravel operation near Everett failed, damaging adjacent property and a city water main, and washing-out a mainline railroad fill so that a train derailed into Puget Sound. Luckily, only minor injuries resulted. Although warned against reconstruction without safety approval, the owners hastily rebuilt the dam — it failed again within 2 months, derailing a second train. Other similar failures have occurred, nearly all involving projects which were not approved—there was no official record the dams existed.

With more than 670 dams on rivers and streams in Washington and with development and recreational pressures increasing, it is critically important to develop a comprehensive statewide public safety program for the operation and structural safety of new and existing dams and reservoirs.

THE ISSUE

The Water Code (RCW 90.03), enacted in 1917, provides DOE very limited authority for public safety related to dams, reservoirs, and river operation. RCW 90.03.350 provides for plan review and approval for new dams but lacks other elements needed for a comprehensive public safety program.

The need for a comprehensive program is demonstrated by national emphasis to avert disasters of the type experienced in Rapid City, South Dakota; Buffalo Creek, West Virginia; and Teton, Idaho; and the need to prevent tragedies like the one which occurred on the Stuck River in July, 1976.

ACCOMPLISHMENTS

RCW 90.03.350 provides limited authority in dam safety and operation. It provides for plan review and approval for dam construction or modification, but does not consider indirectly related public safety hazards — reservoir discharge control or inadequate warning systems. DOE presently devotes only one-half manyear per year to this task.

RCW 90.03.350 requires plan approval for projects storing over 10 acre-feet of water. Small earthfill dams are approved if they comply with minimum design criteria. Few, if any, inspections are held during or after construction. About 300 dam plans have been approved under this law, but 375 other dams lack plan review and approval. Without a state dam inspection program, most of these dams are immune to surveillance, inspection, or action to protect life and property.

The National Dam Inspection Act of 1972 authorized the Corps of Engineers to inventory all dams and initiate national dam safety inspection. This inventory has been completed and "Recommended Guidelines for Safety Inspection of Dams" were issued. The Corps has told Congress that inspection of nonfederally owned dams should be a state responsibility. An ongoing federal program in Washington State monitors 35 federally-owned dams and 12 power dams licensed by the Federal Power Commission (FPC).

Since many Washington dams were built 40 to 70 or more years ago (see Figure 11), dam failure with loss of life and property is quite possible. Inspection of both new and old dams shown in the existing dam inventory is imperative. Dams should be classified according to size and hazard potential, with a Phase I inspection — a review of available engineering data and visual examination of the dam abutments, spillways, and other critical structures, followed by a Phase II detailed engineering analysis, if warranted.

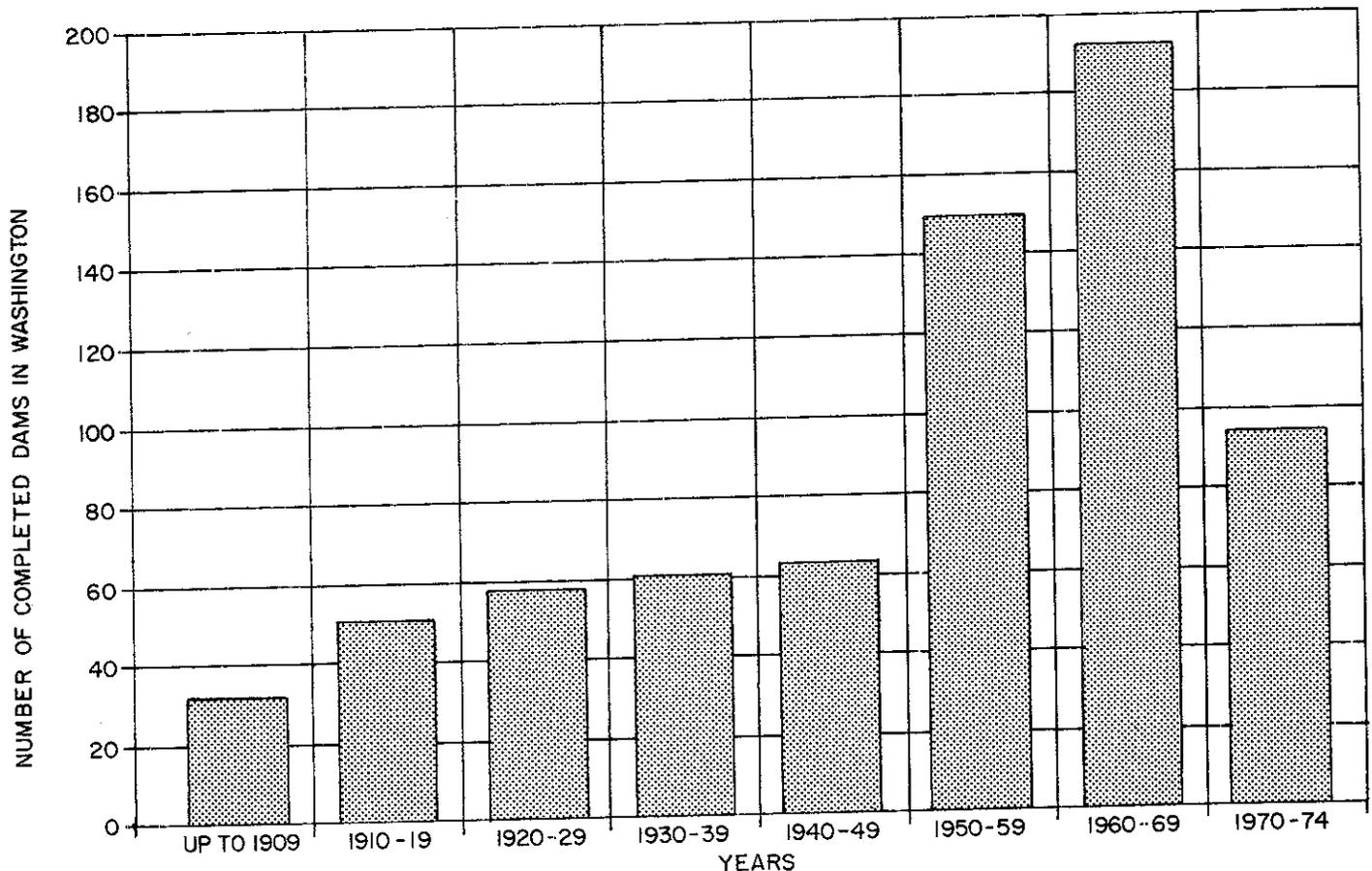


Figure 11
CONSTRUCTION OF DAMS IN WASHINGTON

RECOMMENDATIONS

A comprehensive, statewide public safety program involving dam safety, reservoir operation, and river discharge control is needed. Legislation authorizing such a program should be adopted and properly funded. Such a program should contain at least:

- * Minimum dam and reservoir operation standards and criteria, including river discharge controls, and minimum construction design standards.
- * Plan review and approval to verify dam safety.
- * Authority to require elimination of dam safety hazards.
- * Periodic review of dam and reservoir operating criteria to assure consistency with statewide standards.
- * Periodic dam safety inspection.
- * Continued dam inventory updating.
- * Accurate inspection records and listings of all dam failures or operational problems.

- * Adequate stream warning systems to warn of operation and maintenance activity or impending dam failure. Adequate warning signs in all public access areas.
- * Specific and clear authority for one state agency to implement and enforce the statewide program.

Many of these elements appear in the U.S. Committee on Large Dams' 1970 "model" dam safety law—the model for DOE's 1972 comprehensive dam safety bill. DOE urges the legislature to consider this legislation as the start of a comprehensive dam safety program.

A stronger law and comprehensive program could greatly reduce the risk of life and property losses due to dam failures or unsafe operation. The administering agency must be able to provide the manpower to carry out the entire program. A complete program could probably be self-supporting through permit fees.

PUBLIC INVOLVEMENT IN THE WATER RESOURCES PROGRAM

The Water Resources Act of 1971 (RCW 90.54) specifically required that the public be informed about state water resource management and be afforded meaningful participation.

There are no handy formulas or exact guidelines to develop a program which achieves maximum net benefits including all the benefits and costs of water development and management. A strong citizen participation program is used by DOE as part of its water management decision-making process to insure that the true values of water development are considered rather than only those which can be quantified.

Participation by a well-informed public helps to develop water management programs which meet public needs and desires, and gain public support. There are two efforts, informing the public and involving them. The first should foster public knowledge of the existence, purpose, and status of on-going water management and planning activities. The second effort must fully involve the public in water resource management and planning.

The public information effort has involved many public and private organizations, including the Public Affairs Office of the DOE, the Cooperative Extension Service, and various citizen groups. Various approaches including radio, television, newspapers, public presentation, and special publications can be used alone or in combination for widest communication.

Public participation involves public meetings, workshops, and local citizen committees, particularly the local citizens committees (see Figure 12). Committee members must represent the various water interests in the study area.

In October 1972, DOE began a series of Public Information Bulletins to inform the people of Washington about the Water Resources Act of 1971, as well as the planning efforts to achieve effective water resource management and allocation. Citizen involvement through active participation at public meetings and on citizens committees was strongly emphasized. Bulletins were issued during 1972 and 1973 to favorable public response.

An agreement with Washington State University Cooperative Extension Service in the fall of 1972 established an ongoing "State Water Program" public involvement plan. The Extension Service was to help local citizens groups develop and evaluate alternative approaches to water planning, to clarify community

findings and intentions, and hold meetings to explain these findings and intentions. The Extension Service reported progress to DOE and advised on water management policy.

DOE, through the Extension Service, provided technical and nontechnical information to help establish priority rankings of river basin objectives and develop alternatives. DOE also integrated citizen group recommendations into state water planning activities.

The Extension Service helped establish public involvement programs and form citizen water resource committees specifically to assist in the development of basin management programs and in related activities in the Big Bend, Okanogan, Methow, Yakima, Little Spokane, and Southwest Washington river basins (see Figure 13).

Big Bend Basin

The Big Bend Basin covers five counties extending over a large geographical area, which complicated public involvement organizing efforts. Four Extension Service agents helped form local committees in their own areas, with an overall committee representing the entire basin.

Initial committee work focused on what DOE was trying to do and why. There were numerous handouts, and two questionnaires were circulated to solicit opinions. In July 1973, goals and objectives for the basin were adopted by the committee.

Since then, committee members have met on call and provided comments and suggestions on preliminary Drafts of the Big Bend Level B Study. The committee work has no specific termination date, and members of the original group or individuals who assisted can be called on later to review and comment on developing state water policies.

Methow River Basin

For the past four years, a group of Methow Valley residents have met periodically to discuss problems and concerns about the basin's water and related resources and future water uses.

The Methow Valley citizens committee water resource use and planning effort produced a series of basin policy statements. A water allocation and planning questionnaire was distributed in 1974 to all mailing addresses in the basin.



Figure 12
PUBLIC INVOLVEMENT MEETING IN YAKIMA

The citizens steering committee policy statements and basin-wide questionnaire results formed the basis of the DOE Water Resources Management Program for the Methow Basin. The Committee's review of the proposed Methow Level B Study report has provided important contributions.

Okanogan River Basin

An April 3, 1973 public meeting was held in Okanogan to discuss the purpose and objectives of a water resources management program, and form a standing citizens advisory committee. Over the past three years, residents were invited to public meetings to discuss future uses and development of Okanogan Basin water resources. A water allocation and planning questionnaire was distributed to all mailing addresses in the basin.

As the citizens advisory committee gathered momentum, water resource use and planning issues became more clearly defined. The committee generated basin policy statements that were printed as a full-page supplement in the basin's newspapers.

The citizens advisory committee policy statements were used in preparing the DOE Okanogan River Basin Water Resources Management Program. Public comments were instrumental to adoption of the final regulation on July 14, 1976. The committee also provided important review of the proposed Okanogan Level B Study report. The citizens advisory committee still meets on an on-call basis.

Yakima River Basin

In October, 1972, DOE and Agricultural Extension Service personnel and local citizens met to discuss a Yakima Basin citizens committee and agreed to hold a seminar in early December, 1972. The purposes of the seminar were to describe basin problems, obtain input about citizen concerns, and form a citizens committee. The committee which was formed included six representatives each from Benton, Yakima, and Kittitas Counties who represent a broad cross-section of basin residents.

Early in 1974, the committee prepared policy recommendations for the Yakima Basin which were

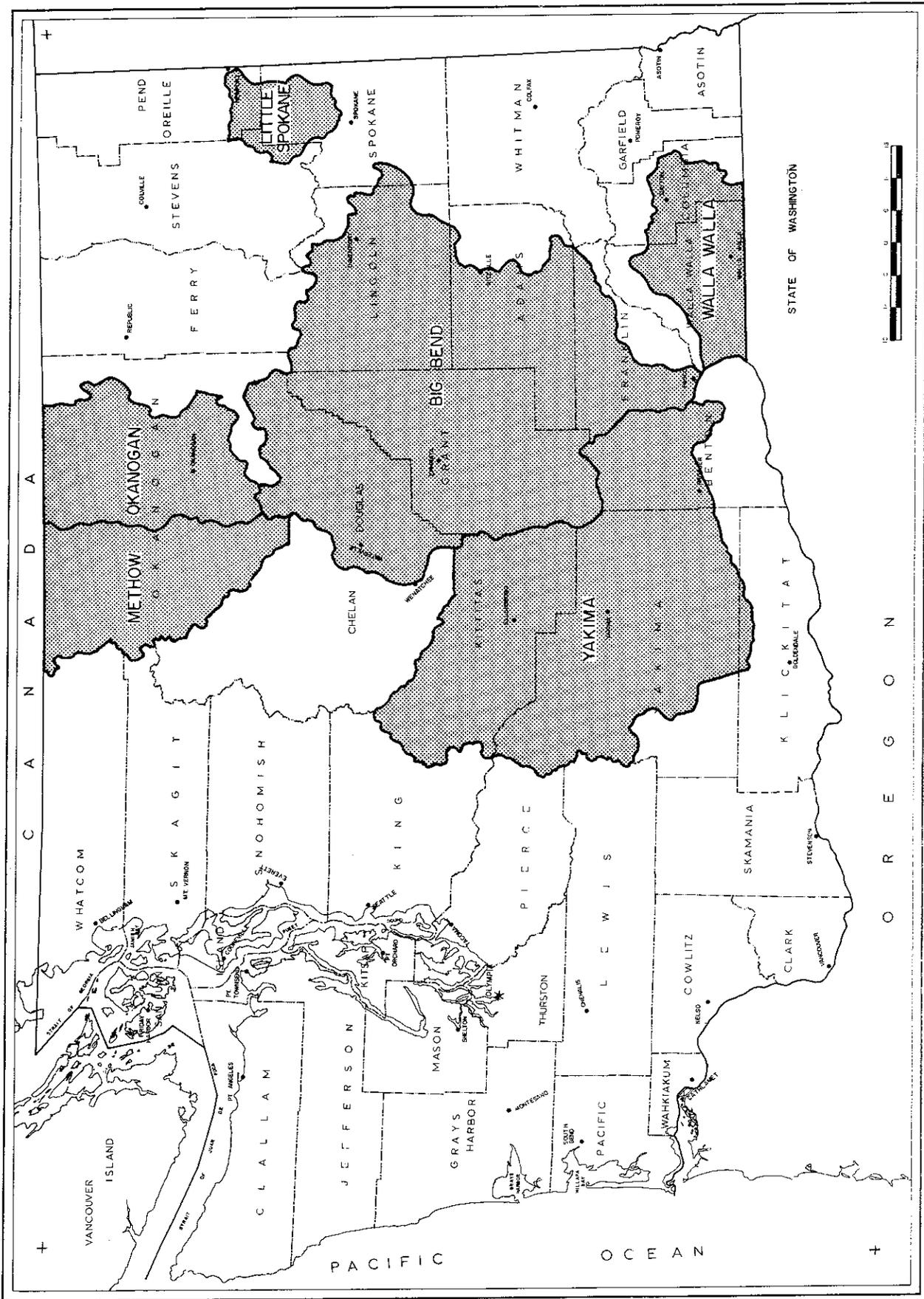


Figure 13
 WATER RESOURCES CITIZEN ADVISORY COMMITTEES

presented to the general public at a meeting in May, 1974.

After the initial public presentation, the committee reviewed and revised their policy statements, which were adopted by the Yakima River Basin Citizens' Committee on October 15, 1975, and later published. These policies guided the Washington State Study Team (led by DOE) in preparing the Yakima Level B Plan.

In July, 1976, DOE released preliminary Yakima Level B Plan results in a newspaper supplement to three major basin newspapers. Sixty-six thousand copies were distributed with a postage paid return questionnaire. There was a 1½ percent return of the questionnaire — considered good for this type of distribution. Questionnaire results were released in October, 1976.

Little Spokane River Basin

In 1974, a citizens water resource advisory group representing a cross-section of basin interests was established. The group was to advise DOE on obtaining public participation, and to help develop the management program itself. Public participation activities were led by a basin resident.

On October 29, 1974, a well-publicized workshop, based on a questionnaire mailed to residents, was held to explain the need for a management program in the Little Spokane watershed and to identify public interest and major water resource issues.

In December 1974, a second questionnaire sought residents' opinions on specific stream stretches and use priorities. A fact sheet was provided for each of the problem areas discussed at the first workshop, including fishing, flood control, access, and water quality. The information obtained was used to develop a draft management program.

A second public workshop in Spokane and Pend Oreille counties was held on June 11 and 12, 1975 to discuss the draft management program. Public and agency comments were incorporated into a revised draft and management regulations.

The management program and implementing regulation were again reviewed by citizens and interested agencies. Their comments were considered in the final regulation which was adopted on December 23, 1975.

DOE will seek continued public involvement through a standing citizens advisory committee.

Chehalis River Basin

DOE conducted a basin management study of water resources in the Chehalis Basin where a number of streams were fully or over-appropriated.

In July, 1975, public information meetings were held in Centralia and Satsop. DOE explained its water management proposals, circulated copies of the draft program document, and heard public comment.

A draft environmental impact statement prepared in November and December, 1975 explained the environmental implications of the proposed management program. The draft statement was distributed to over 200 citizens, groups, and governmental agencies.

Formal public hearings were held in January 1976 to explain the final proposal, receive comments about the plan and impact statement, and solicit public recommendations for change before the program was implemented. Comments from the formal public hearings were considered, and the basin management program regulation was adopted on March 10, 1976.

Walla Walla River Basin

A water resources citizens' committee representing various local interests was formed in 1973 to obtain input to a proposed Walla Walla River Basin management program.

Citizens raised basic questions about important local interests. A draft basin management program attempting to answer these and other relevant questions was presented at a November 1976 public meeting.

John Day/McNary Pools Reach of the Columbia River

Current water allocation and utilization studies in this reach will evaluate benefits and impacts among various instream and out-of-bank uses. Public discussion and separate consultation will seek the views of the public and interested agencies throughout the planning process.

A public workshop on April 15, 1976, in Pasco, Washington, seeking public participation in developing state policy for the John Day/McNary Pools area on the Columbia River was attended by nearly 100 persons representing both public and private interests. Individual concerns; local, state and federal governmental agencies; state legislators; and special interest groups were represented. Additional public meetings will be held as the development of a state water use and allocation policy for this area continues. DOE intends to more actively seek direct input from local residents since government agencies have provided the greatest input to date.

The Pacific Northwest Region

The Comprehensive Coordinated Joint Plan (CCJP) for the Pacific Northwest, a regional water and related land resources plan, is scheduled for completion in 1977 by the Pacific Northwest River Basins Commission (PNWRBC). This plan will reflect a strong state-local position on water management in the Pacific Northwest. PNWRBC, cooperating with states in the region, including Washington, is making a major effort to inform the public about the CCJP. The plan's potentially great impact on future use and development of regional water resources makes it of interest and concern to the public. The PNWRBC public information effort will use a multi-media approach to

reach the broadest cross-section of the population. A major educational television series will present regional and statewide water resource problems and issues, and the plan's proposals to deal with them. DOE is providing technical assistance and advice on Washington's water resource problems and issues. DOE has also provided financial assistance in obtaining film footage for the television series.

CURRENT DIRECTION

DOE encourages public participation through two distinct efforts: informing the public and then involving them. Informing the public of the existence, purpose, and status of state water planning and management activities is a desirable and necessary DOE function. Public involvement is actively solicited in developing state water management programs and plans.

Gaining public involvement requires finding out who the "public's" are for particular programs so the administrator can decide how to reach them. Each geographic area has its own economic and social structure. To involve the public in a state water management program, DOE must decide what approach or technique best fits the area's objectives and goals and would attract the most area residents.

The public can be informed through news releases and interviews with newspapers, radio, and television stations, through distribution of brochures and pamphlets, or other means.

Once the public is informed about issues, problems, and proposed solutions, DOE can solicit public involvement through citizens advisory committees, public or special interest groups, workshops, public information meetings, formal hearings, forums, questionnaires, or through news media or films. These approaches can be used individually, or combined as needed.

RECOMMENDATIONS

In the future, DOE intends to reach out to better involve residents of areas that are directly affected by management policies. This continues to be a weakness in the citizen involvement program because it is the most difficult to accomplish.

One specific way to keep the "interested" public informed about managing the State's water and related resources is through a newsletter directed to both public and private sectors, including: agencies, corporations, groups, and individuals identified as being interested in planning, management, and use of the State's water resources. To further its charge to inform the public, DOE proposes that such a water resource management newsletter be published quarterly. A mailing list containing over 5,000 addresses has already been prepared.

DOE's current budget proposal requests funds for such a newsletter, which is a much needed and important vehicle to carry out the spirit and intent of the Water Resources Act of 1971.

PROJECT DEVELOPMENT AND FINANCING

"The Department of Ecology shall as a matter of high priority evaluate the needs for water resource development projects and the alternative methods of financing of the same by public and private agencies, including financing by federal, state, and local governments and combinations thereof" — Water Resources Act of 1971, RCW 90 54 100.

Washington State currently has about 1.5 million acres of irrigated farm land. Of the estimated 7.6 million acres which are potentially irrigable, irrigation of another 1 to 2 million acres within the next 50 years may be economically feasible (see Table 8). Recent world-wide food shortages and sharply higher food prices forecast future need for development of these areas. Citizens participating in the Alternatives for Washington program preferred an overall moderate economic growth rate, with agriculture most frequently designated as one industry which should be encouraged to grow and expand.

Washington must lead in development, planning, and financing of water resource projects to insure that our waters are used and preserved for the people of the State. The federal government long dominated irrigation project financing in Washington through the Bureau of Reclamation and the Soil Conservation

Service, but federal support of water development has diminished. Continued steady development requires a larger financial role for state and local governments and water users.

Modern irrigation development is costly. Lands that can be most economically developed are served first, and future developments become more expensive, even without price inflation. Future developments in Washington will probably cost at least \$2,000 per acre for water delivery, application, and drainage systems.

Such large capital requirements pose problems for private financing. Since few farmers can arrange such large loans, private developments tend to be owned or financed by large corporations using risk capital, or developed slowly in stages by farmer-developers. Public financing could help overcome these problems, permitting larger, more efficient irrigation projects. Marginal areas bypassed by private developers might be developed. Disproportionate gains by a few large developers might be prevented and the family farm concept promoted. These benefits could be enhanced by state-local-private partnerships to finance project development.

Table 8. Potential Irrigation Development

Area & Location	Acres	Approx. First Cost to Develop (1975 \$)	Current Status	Water Availability
Columbia Basin (Grant, Lincoln, Adams & Franklin Counties)	600,000	\$950 Million	Active	Available
Horse Heaven Hills (Benton & Klickitat Counties)	400,000	\$410 Million	Active	Available
Lower Snake River (Eureka Flat and Franklin County)	275,000	\$310 Million	Private	Available
Yakima Valley (Yakima & Benton Counties)	260,000	\$300 Million	Infeasible due to inadequate water supply	Insufficient water available to develop
East Banks-West Banks, and East East Area (Grant, Lincoln, Douglas & Adams Counties)	1,300,000	\$3,500 Million	Economically Infeasible Due to Required Water Lift	Available
TOTAL POTENTIALS: 2,835,000 Acres—\$5,470,000,000 First Cost				

Additional irrigation development is feasible and desirable (while protecting already-productive farmlands). Declining federal financing and large capital costs make state-local-private partnerships appropriate and necessary for rational, efficient development. Specific details of such financial partnerships should be determined.

Present DOE irrigation development and rehabilitation funding is limited to Referendum 27 loans and grants (\$25 million) and Reclamation Revolving Account loans and bond purchases (current balance available: approx. \$675,000). DOE manpower and funding for project planning or development are also limited to Referendum 27 and Reclamation Revolving Account funds.

RECLAMATION REVOLVING ACCOUNT (Agricultural Water Supply)

The Reclamation Revolving Account created in the 1919 State Reclamation Act (RCW 89.16) provides long-term, low-cost financing for irrigation/reclamation districts through loans and purchase of district bonds to promote reclamation and development of agricultural lands. The account also finances rehabilitation of existing projects and development of new lands.

The amount of money available varies as the account is used and repaid and money is appropriated to or from

it. Out of approximately \$900,000 in the account June 30, 1976, \$675,000 was available for loans and bond purchases. Twenty-four of the State's 92 irrigation districts presently benefit from the account, affecting approximately 76,000 acres (see Tables 9 and 10).

RCW 89.16.050 authorizes DOE to use Reclamation Revolving Account funds to purchase bonds of any approved, financially sound irrigation/reclamation district project. The Department may also advance money to districts in anticipation of bond purchases. Bond investments are limited only by the balance in the account. The largest bond purchase was \$480,000 to the Naches-Selah Irrigation District in 1957. The maximum bond repayment period is 40 years.

When developing loan repayment or bond retirement schedules, the Department considers the districts' ability to pay based on expected annual revenues and annual costs. For example, payments during the first 10 years of a 40-year bond issue might be quite low, reflecting the district's limited ability to pay during the early development years.

Under RCW 89.16.045, the Department can loan an irrigation/reclamation district up to \$50,000 at a maximum 8 percent interest over 10 years for construction or improvement of agricultural water supply facilities. Most Reclamation Revolving Account use recently has been for purchases or advances in anticipation of bond purchases rather than loans.

Table 9. Status of Reclamation Revolving Account Bond Investments

District	Original Amount	Issue Date	Maturity	Interest Rate (%)	Current Balance
Aeneas Lake Irrigation District	\$220,500.00	1/1/71	1/1/76 - 1/1/10	5	\$ 213,500.00
Cascade Irrigation District	185,000.00	1/1/71	1/1/73 - 1/1/11	5	177,000.00
Columbia Irrigation District, Benton Co.	125,000.00	1/1/69	1/1/70 - 1/1/09	4	86,000.00
Entiat Irrigation District	210,000.00	1/1/73	1/1/74 - 1/1/13	5	204,000.00
Gardena Farms Irrigation District No. 13	200,000.00	7/1/56	7/1/57 - 7/1/96	3	132,500.00
Methow-Okanogan Reclamation District	45,000.00	7/1/66	1/1/70 - 1/1/87	3	14,000.00
Methow Valley Irrigation District	58,000.00	7/1/48	1/1/53 - 1/1/87	1	22,000.00
Moab Irrigation District	160,000.00	1/1/69	7/1/72 - 1/1/09	4	154,500.00
Moab Irrigation District	21,000.00	1/1/71	7/1/80 - 7/1/10	4	21,000.00
Model Irrigation District No. 18	140,000.00	7/1/72	7/1/73 - 1/1/82	4	115,000.00
Naches-Selah Irrigation District	480,000.00	1/1/57	1/1/62 - 1/1/90	3	282,000.00
North Dalles Irrigation District	50,000.00	1/1/62	1/1/62 - 1/1/02	3	36,000.00
Palisades Irrigation District	60,000.00	1/1/54	1/1/58 - 1/1/84	3	16,000.00
Pateros Irrigation District	15,000.00	1/1/54	1/1/55 - 1/1/85	3	5,750.00
Skagit County Diking District No. 1	130,000.00	7/1/66	7/1/67 - 7/1/76	3	15,000.00
Spokane Valley Irrigation District No. 10	212,000.00	7/1/48	7/1/49 - 7/1/78	2	27,000.00
Spokane Valley Irrigation District No. 15	238,000.00	7/1/48	7/1/49 - 7/1/78	2	30,500.00
Stemilt Irrigation District	75,000.00	7/1/41	1/1/42 - 1/1/81	1¼	15,100.00
Stemilt Irrigation District	40,000.00	7/1/62	1/1/64 - 1/1/77	3	3,000.00
White Salmon Irrigation District	50,000.00	1/1/62	1/1/63 - 1/1/02	3	36,000.00
Whitestone Reclamation District	25,000.00	1/1/49	1/1/54 - 1/1/88	2	10,250.00
Whitestone Reclamation District	40,000.00	1/1/48	1/1/53 - 1/1/87	2	13,750.00
Wolf Creek Reclamation District	60,000.00	1/1/48	1/1/49 - 1/1/88	1	18,000.00
Wolf Creek Reclamation District	30,000.00	1/1/54	1/1/55 - 1/1/84	3	8,000.00
Wolf Creek Reclamation District	21,500.00	7/1/66	7/1/67 - 7/1/81	3	9,000.00
TOTAL	\$2,891,000.00				\$1,664,850.00

Note: Available for loans and bond purchases June 30, 1976: \$675,000.00
 Total balance in account (approx.): \$900,000.00

Table 10. Active Reclamation Revolving Account Advances to Districts
 (June 30, 1976)

District	Original Amount	Contract Date	Interest Rate (%)	Current Balance
Chelan River Irrigation District Repayable by Bonds	\$ 60,000.00	02/20/70	4	\$ 53,533.80
Chelan River Irrigation District Annual Payments (1/10 of principal per year)	23,000.00	12/03/73	5	18,400.00
Greater Wenatchee Irrigation District LID No. 7 Repayable by Bonds	135,000.00	06/06/69	5	77,760.09
Lower Squillchuck Irrigation District Repayable by Bonds	70,000.00	03/31/69	4	72,800.00
Drainage District No. 6 of Snohomish County	25,000.00	07/22/64	3	32,633.59
Stemilt Irrigation District (1/10 of principal annually)	50,000.00	10/19/72	4	35,000.00
TOTAL	\$363,000.00			\$290,127.48

Recommendations

Managing the Reclamation Revolving Account is complicated by the lack of good projections on irrigation districts' future capital needs. Many districts do not know their rate of water diversion or total annual water use. Most districts will need to rehabilitate or replace existing irrigation facilities in the future, but few estimate funding requirements beyond the current year. To maximize the use of the Reclamation Revolving Account, some of the account should be used to: (1) define the irrigation districts' capital needs, and (2) continuously monitor funded projects to assure loan integrity and continuing project benefits to the people of Washington.

REFERENDUM 27 (Agricultural Water Supply)

Referendum 27 was part of the Washington Future bond package approved by the voters in 1972. RCW 43.83B, authorized the issuance of \$75 million in general obligation bonds for planning, acquisition, construction, and improvement of water supply facilities in Washington. DOE was designated to administer the bond proceeds. The Governor's office, legislators and concerned state agencies agreed to provide two-thirds of the bond proceeds for municipal and industrial water supply development and one-third (\$25 million) for agricultural water supplies.

The legislature must appropriate the referendum bond proceeds. For the fiscal 1975-1977 biennium, \$20,769,529 was appropriated for grants and loans from the \$25 million allotted to Referendum 27 agricultural supply, along with \$164,202 for administration and planning of agricultural water supply projects. Of the \$20.7 million in grants and loans, up to \$15 million is for the Second Bacon Siphon and Tunnel Project. DOE can make loans or loan and grant combinations up to 50% of eligible costs for any single project. Grant funding may not exceed 15% of a project's eligible costs (35% for DOE project commitments made with the Bureau of Reclamation between August 1, 1974 and June 30, 1975). Approximately \$8.9 million of Referendum 27 bond proceeds were unobligated as of August, 1976.

The huge costs of large-scale irrigation development projects, the limited funding provided by Referendum 27 bond proceeds, and the widespread needs for agricultural water supply compel the Department to give highest priority to those projects bringing the greatest benefit to Washington's people. Most important among project requirements and eligibility criteria under the agricultural water supply loan and grant program are:

- * Applicant must be a public body.
- * Applicant's financial ability including repayment ability.
- * Need for the project—based on benefit-cost analysis of public and private economic benefits.

- * Applicant's need for *state* funding assistance.
- * Necessary water rights, secured under State law, to operate project, plus demonstration of reasonable water use efficiency.
- * Project's ability to enhance and/or maintain the agricultural economy of the region, including promotion of the family-type farm.
- * Applicant's readiness to proceed with planning, engineering, and construction pending loan and/or grant award.
- * Environmental acceptability of project.

Projects Financed

Table 11 lists the projects financed through Referendum 27. The most significant project to be partially financed with Referendum 27 bond proceeds is the Second Bacon Siphon and Tunnel, located between Banks Lake and Billy Clapp Lake which will ultimately serve the remaining 568,000 undeveloped acres of the 1,095,000 acres authorized for the federal Columbia Basin Project. Existing Columbia Basin Project carriage facilities (including the First Bacon Siphon and Tunnel) are already used to full capacity. Any significant new land development must depend on the Second Bacon Siphon and Tunnel for water.

Completion of the Second Bacon Siphon and Tunnel and enlargement of existing main water carriage facilities will permit development of 136,000 to 200,000 acres in the next few years. Recent bid openings for the siphon and tunnel alone were just over \$32 million. Estimated completion costs are about \$42 million. The estimated total project cost including enlargement of main conveyance facilities is approximately \$117 million, with completion planned for 1981. The state will supply a grant up to \$15 million from Referendum 27 bond proceeds for the project. The remaining \$102 million will be repaid to the federal government through water service contracts and the original repayment contract between the Bureau of Reclamation and the participating irrigation districts.

Much of the land remaining to be developed in the Columbia Basin Project beyond the initial 136,000 to 200,000 acres will require public support. The concept of state-federal-local financing established in funding the Siphon and Tunnel could be used for this development, if the state expands its financing capability beyond the present bond issues.

In August 1976, the Governor's Horse Heaven Hills Select Committee completed a reconnaissance level study of potential irrigation development in the Horse Heaven Hills area. The study indicates that significant new irrigation development of land not near or adjacent to the Columbia River is **not economically feasible** for public financing under present conditions. Although the area has between 200,000 and 300,000 potentially irrigable acres, public financing will probably be unavailable, particularly for the higher elevations, until economic conditions become more favorable or unless

Table 11 Agricultural Water Supply Projects Financed with Referendum 27 Bond Proceeds

Name of Responsible Agency and Purpose of Project	Total Project Cost (approx.)	State Assistance		Status as of Dec. 31, 1976	Acres Affected
		Grant	Loan		
Second Basin Siphon and Tunnel with main Conveyance Facilities. Quincy Irrigation District, East Columbia Irrigation District (see text for discussion)	\$117 million	up to \$15 million		Contracts Signed August 1976; Construction Started October 1976	136,000-200,000
Snipes Mountain Irrigation District. To replace 870 ft. of 60-inch diameter pumping plant penstock, 3,400 feet of 30 inch diameter pumping plant discharge line.	\$550,000	\$192,500 (35%)		Construction Started October 1976	1,915
South Columbia Basin Irrigation District, Local Improvement District No. 2. To construct a pumping plant and approximately 17,000 feet of lateral pressure distribution pipe.	\$686,428	\$102,965 (15%)	\$240,250 (35%)	Complete	2,000
Wenatchee Heights Reclamation District. To rehabilitate the district's irrigation system.	\$1,437,000	\$493,500 (34%)		Contracts Signed October 1976	739
Agnew Irrigation District (Clallam County). To construct 1,860 feet of 60-inch-diameter concrete pipe to replace an old wooden flume.	\$168,434	\$55,677 (33%)		Complete	7,198
Benton County PUD For the Horse Heaven Hills Reconnaissance Study (see text for discussion)	\$30,000	\$15,000 (50%)		Complete	
SUB-TOTAL		\$15,859,641	\$240,250		
TOTAL		\$16,099,891			
AUTHORIZED from Ref. 27		\$25,000,000			
AMOUNT REMAINING (August 1976)		\$ 8,900,109			

the state decides to subsidize a project. A state grant to the Benton County PUD financed 50% (\$15,000) of the reconnaissance study, and the remaining \$15,000 was contributed by major water right applicants and landowners in the Horse Heaven Hills.

Future Needs

Projects proposed for financing will certainly exceed the remaining Referendum 27 bond money. The Department will use the published guidelines to prioritize funding requests to best use the remaining funds. However, a number of potential projects will need additional financing in order to continue significant development.

Completion of the Second Bacon Siphon and Tunnel will initiate development of 136,000 to 200,000 acres in the Columbia Basin Project. The irrigation districts will probably have to finance some construction of the final water distribution facilities, and may apply for state financial assistance. About \$6 million in state funds could be used in this area, under Referendum 27 formulas.

Nearly 7,000 acres in the Kennewick Irrigation District Extension have a high development potential and the District will probably ask for state financial aid. State support of the estimated \$13-\$20 million project could cost \$8 million.

Two additional areas have irrigation development potential and may require state assistance. About 4,000 acres in Okanogan County's Crazy Rapids Project would be irrigated, including: state-owned lands administered by the State Department of Natural Resources; private lands; and some Colville Indian land. The state share could be \$500,000 to \$1.5 million of the \$3 to \$4 million total cost. Nearly 17,000 acres within the Yakima Indian Reservation likely to be developed in the near future would cost about \$40 million; the state's share would be \$6 to \$10 million. There is a remote possibility that certain areas within the Horse Heaven Hills region will ask for state financing. No dollar estimate of such requests is available.

Several other areas need rehabilitation of existing projects. Six irrigation districts would like Referendum 27 funds to help finance rehabilitation of irrigation works affecting 28,000 acres at a cost of about \$36 million — the state's share would be \$5.3 to \$6 million.

RECOMMENDATIONS

More funds are needed to develop and rehabilitate irrigation works within the state. Under Referendum 27 loan and grant formulas at least \$26 million of state funds are needed over the next 6-8 years just to develop lands ready for irrigation at this time (see Table 12).

As of August 1976, only about \$89 million of Referendum 27 funds were unobligated. The Department recommends that the January 1, 1980 bond issuance deadline be extended and that the Legislature consider at least \$17.1 million of additional bonds.

Referendum 27 (Municipal and Industrial Water Supply)

Fifty million Referendum 27 bond dollars were earmarked to improve existing municipal and industrial water supply distribution systems and to build new ones.

The Referendum made DOE responsible for fund disbursement. The Department of Social and Health Services (DSHS), as the agency responsible for municipal and industrial water supply activities, administers the program under agreement with DOE.

The Legislature has appropriated \$34.1 million for municipal water supplies. 256 grants and 83 loans providing up to 60 percent of project cost had been made to local communities by August 1976. While the major objective is to improve water supplies, other efforts are helping local governments to develop adequate reserve accounts for maintenance and improvement.

Table 12. State Share of Potential Irrigation Project Funding Requirements

Projects	Estimated State Share of Funding Requirements
Final water facilities for districts using water from Second Bacon Siphon and Tunnel	\$ 6.0 Million
Kennewick Irrigation District Extention	\$ 8.0 Million
Crazy Rapids Project	\$ 1.5 Million
Yakima Reservation Development	\$ 6.0-10.0 Million
Other Areas	\$ 5.3-6.0 Million
	<hr/> \$26.8-31.5 Million
Referendum 27 Funds Available	\$ 8.9 Million

CLARIFICATION OF WATER RIGHTS

Managing water resources and providing beneficial public use of unallocated water supplies depends on clear establishment of all legal charges against the resource, so that we can determine how much water is still available. The four major issues in this area are:

- Federal Reserved Water Rights
- Indian Water Rights
- Adjudications
- Relinquishment

This section discusses these issues and includes specific recommendations.

FEDERAL RESERVED RIGHTS

The reserved rights principle provides that any federal reservation may develop water facilities within its boundaries, for any use consistent with the reservation's purpose — regardless of state laws concerning those waters. The large amount of federal land in Washington (15,097,000 acres or about 35 percent of the state's total land area) and the possibility of multiple jurisdiction over much of the state's public water creates serious water allocation and management difficulties (see Figure 14).

Over nearly 100 years, Washington state water law has enabled substantial public and private development in Washington by establishing water rights. Past federal water rights were considered to be obtained through state law. Most federal agencies obtained water rights through the same procedures as other water users in the state. Since 1917, state administrative and judicial procedures provided an effective, if complex, way to determine water rights.

Recent U.S. Supreme Court cases have changed the government's approach to water use on federally reserved land. The reservation principle, based on the 1908 *Winters* case, stated that creation of an Indian reservation carried the implied right to use as much of the waters located in the reservation as was needed to carry out the reservation's purposes, with priority from the date the reservation was created. The 1955 Pelton Dam decision by the U.S. Supreme Court indicated that the federal withdrawal or reservation of lands also included reservation of the water on those lands.

The 1963 *Arizona v. California* U.S. Supreme Court decision dispelled any lingering doubts that the land reservation included water rights. Federal lands

reserved for national forests, national recreation areas, and wildlife refuges, carried "implied" reservations of water to satisfy requirements of the reserved lands regardless of provisions of state law.

The Issue

Implementation of this reservation principle on the large amount of federal land in Washington creates serious uncertainties about water allocation. Some people fear that the reservation principle will upset established water right priority systems and eliminate the value of water rights granted under state law. If the federal government fully used the water reservation principle on their lands, public and private uses for that water might be cut off without compensation. The state would have little, if any, control over much of the water within its borders.

Uncertainty about the quantity of water affected by the reservation doctrine impedes effective, coordinated state water resource planning and management. The state cannot prepare long term plans without knowing when or if the federal government will preempt water resources on federally reserved lands.

The federal government presently contends it can claim any amount of water on federally reserved lands whenever a need arises. This situation has already caused conflicts and, as water resources become more fully appropriated, will cause increasing future problems.

Accomplishments

There is no effective judicial machinery to resolve the issues raised by the reservation principle except in case-by-case individual situations. While the United States is free to initiate water rights proceedings, the doctrine of sovereign immunity bars suits by water users or state administrative agencies without congressional consent. In this difficult and weighted water rights battle, the non-federal user often loses long-established water rights granted under state law. There is need for a more realistic approach to the reserved rights problem and legislation to provide a workable solution for both federal and state governments.

All bills submitted to resolve the federally reserved rights issue have failed. Many early state proposals tried to eliminate the reservation principle. A 1976 U.S. Supreme Court decision (the Akin case) held that federally reserved water rights, including rights reserved for the Indians by the United States, may be

determined in state courts as well as federal courts. Under this ruling, the federal government would be a party in any suit for the adjudication of owners' rights to use the water of a river system or other source on federally reserved lands. This ruling confirmed past federal reserved rights rulings through adjudications in Washington State courts.

Recommendations

Washington should continue to participate in the Interstate Conference on Water Problems, the Association of Western State Engineers, and the Western States Water Council in an effort to resolve the problem. Task force participation permits Washington's concerns to be expressed in proposed recommendations. An interstate or regional approach is more comprehensive and will achieve more satisfactory results than the states working independently.

Continued participation on the interstate and regional committees is extremely important. Committee studies can provide recommendations mutually beneficial and satisfactory to federal and state government.

The state should continue to seek "quantification" of federally reserved claims to clear up the uncertainty of the implied reservation and to provide the basis for cooperative water planning between the federal and state governments. Quantification should identify the reserved waters and water rights, quantity reserved, and proposed water use. Identifying location, purpose, priority, place of use, and, most important, quantity, will eliminate many possible impacts on private rights, and allow assessment of the impact on affected water rights and users. Such an inventory would eliminate fears and uncertainties about federally reserved water rights, promote more effective water resources planning, and provide more equitable treatment to holders of water rights granted under state law.

Quantification of waters reserved by the federal government is essential to effective, coordinated state planning and management of future water resource development. Water reserved for federal reservations within Washington must be quantified to eliminate water allocation uncertainties.

The adjudication process, discussed in the following section is the only mechanism under existing state laws by which this quantification can be accomplished. An adjudication results in a quantification of all rights in a basin, including federal reserved rights.

It is recommended that the Legislature increase funding for general adjudications to expedite quantification of all claims to water rights, including those of the United States.

INDIAN WATER RIGHTS

Washington State's 22 Indian reservations have an approximate population of 19,000, (see Figure 15). In a predominantly rural economy, traditional Indian

economic activity has been tied to natural resources — timber, range, agricultural land, fisheries, and minerals on or related to the reservations.

The increasing sophistication and development of reservation areas will probably cause much higher per capita water use in the future, placing substantial demand on the water supply on most reservations. In some areas, this demand may exceed the supply.

Indian water development needs and plans must be considered in water resource planning and management, particularly in the area of Indian water rights.

Legal principles governing Indian reserved water rights were established by the U.S. Supreme Court *Winters v. United States* decision. The United States sued in behalf of the Fort Belknap Reservation Indians in Montana to enjoin upstream diversions that interfered with the flow of 120 cubic feet per second of water necessary to irrigate pasture and farmland on the reservation. The Court concluded that the United States reserved water rights for the Indians were effective from the time the Indian Reservation was created, with implied reserved rights to use as much water as needed to carry out the purposes — present and future — for which the reservation was created.

The Issue

In the 1963 *Arizona v. California* case, the Supreme Court reaffirmed the Winters Doctrine and held that the quantity of Indian water rights should be determined by the amount of potentially irrigable acreage. Even with these federal court decisions, and the fact that the State of Washington recognizes the existence of Indian water rights, the rights to water within or bordering state Indian reservations have not been quantified. Water planning officials therefore are unable to determine exactly how much unappropriated water is available in streams bordering on or flowing through Indian reservations. This creates particularly difficult jurisdictional problems. Many non-Indian land owners on waters within or adjacent to reservations want to develop their acreages. They have, as required by state law, submitted water right applications to DOE, raising the question of whether the state has jurisdiction to issue a water right to a private landowner within an Indian reservation.

Current DOE Policy and Direction

DOE recognizes the Indians' rights to reserved waters. Any rights issued to these waters are subject to prior rights. DOE does not agree that *all available waters* are necessary to satisfy Indian rights in cases where needs or quantities of water have not been determined. The State recognizes that the Indians have the right to regulate reservation waters for their own purposes, but water in excess of their needs is subject to state laws and state jurisdiction.

DOE policy on this issue is to prevent diminishment of the State's control over public waters available for

allocation to competing uses and to seek legal resolution of the problem.

Three separate cases now in federal court involving the State of Washington and the Lummi, Colville, and Spokane Indians may clarify Indian water rights problems.

In view of this ongoing litigation, DOE advises all applicants for water rights within reservation boundaries that applications will be held pending resolution of litigation.

DOE is also participating in several interstate efforts which are examining the Indian water rights issue.

Recommendations

DOE recognizes the Indians' rights to reserved waters. The Department also recognizes that it is desirable to quantify Indian water rights to determine how much water is available for future appropriation under existing Washington State law.

Washington should continue to participate in interstate efforts which are examining the Indian water rights issue.

DOE will continue to seek judicial resolution of the quantification of Indian water rights and the extent of state jurisdiction.

DOE will remain receptive to future cooperative programs with the Indians to resolve specific quantification or jurisdictional issues.

ADJUDICATIONS

The Issue

The 1917 Water Code (RCW 90.03) prescribes an "adjudication" process to determine relative rights to use surface waters in particular areas. The 1945 Ground Water Code (RCW 90.44) extended adjudication to include ground water.

Rights are adjudicated in order to determine all existing rights to the use of water. This is accomplished by judicial evaluation of each right and each claim of right, judicial confirmation as rights those claims which were substantiated by evidence, and issuance of certificates of adjudicated water rights by the department.

The first adjudications in the state occurred before the enactment of the Water Code. Prior to 1917, adjudications consisted of a determination by the local courts of the relative rights between disputing parties and included only the disputants instead of all the water users in the basin. The 1917 Water Code provided that any decrees of this nature be accepted as evidence in future adjudications for the involved parties only.

The present adjudication process closely follows formal trial procedures, and is difficult and slow.

Since 1972 DOE and the Legislature have considered statutory revisions to streamline adjudication. In 1975 the House passed substitute House Bill No. 970, but it was not voted on by the Senate. This bill:

- * Reduced court involvement by making DOE rather than the court responsible for notifying each landowner involved.
- * Required the state to share adjudication costs, reducing claimants cost for water rights confirmation.
- * Provided penalties for claimants failing to pay their share of adjudication costs after rights were confirmed.

This bill would have corrected existing statutory deficiencies and made possible a relatively rapid process to establish title to water. Existing statutes require claimants to prove dates of commencement and development, water use, amounts used, uses made, places used, and source points. Following normal court procedures, claims verification requires testimony based on personal knowledge or admissible documentary evidence. Most significant rights confirmed through adjudication claims predating 1917 were proven by eye witnesses who personally substantiated such early water uses. Hearsay testimony relating to water uses before the effective date of the Water Code in 1917 is normally inadmissible, and the number of eyewitnesses is diminishing.

Accomplishments and Current Direction

Adjudications have proceeded very slowly in Washington (see Figure 16). 56 adjudications were completed between 1917 and 1940, and only 10 since 1940. Figure 17 shows that adjudicated areas, including incomplete adjudications, cover only about 10 percent of the state. Completed adjudications, decree dates and location by county are listed in Table 13.

From 1917 until 1940 emphasis on adjudications was high in areas with severe water right controversies. Most of the critical areas were adjudicated by 1940, and the program slowed from 1940 to 1967. The Department of Water Resources, Division of Adjudications sparked a short-lived reemphasis, beginning some 20 adjudications between 1967 and 1970. Ten are complete and the others delayed or not completed for various reasons.

The Water Rights Claims Registration Act of 1967 (1969) provided for filing claims to rights which had not been established by appropriation permits or certificates. The expiration date for filing these claims was June 30, 1974. The nearly 180,000 claims registered from 1969 to 1974 represent a claims inventory useful for future adjudications and an approximation of the claims against the resource. While such a claim is not a determination or adjudication of the right, it may be considered prima facie evidence in an adjudication (RCW 90.14.081).

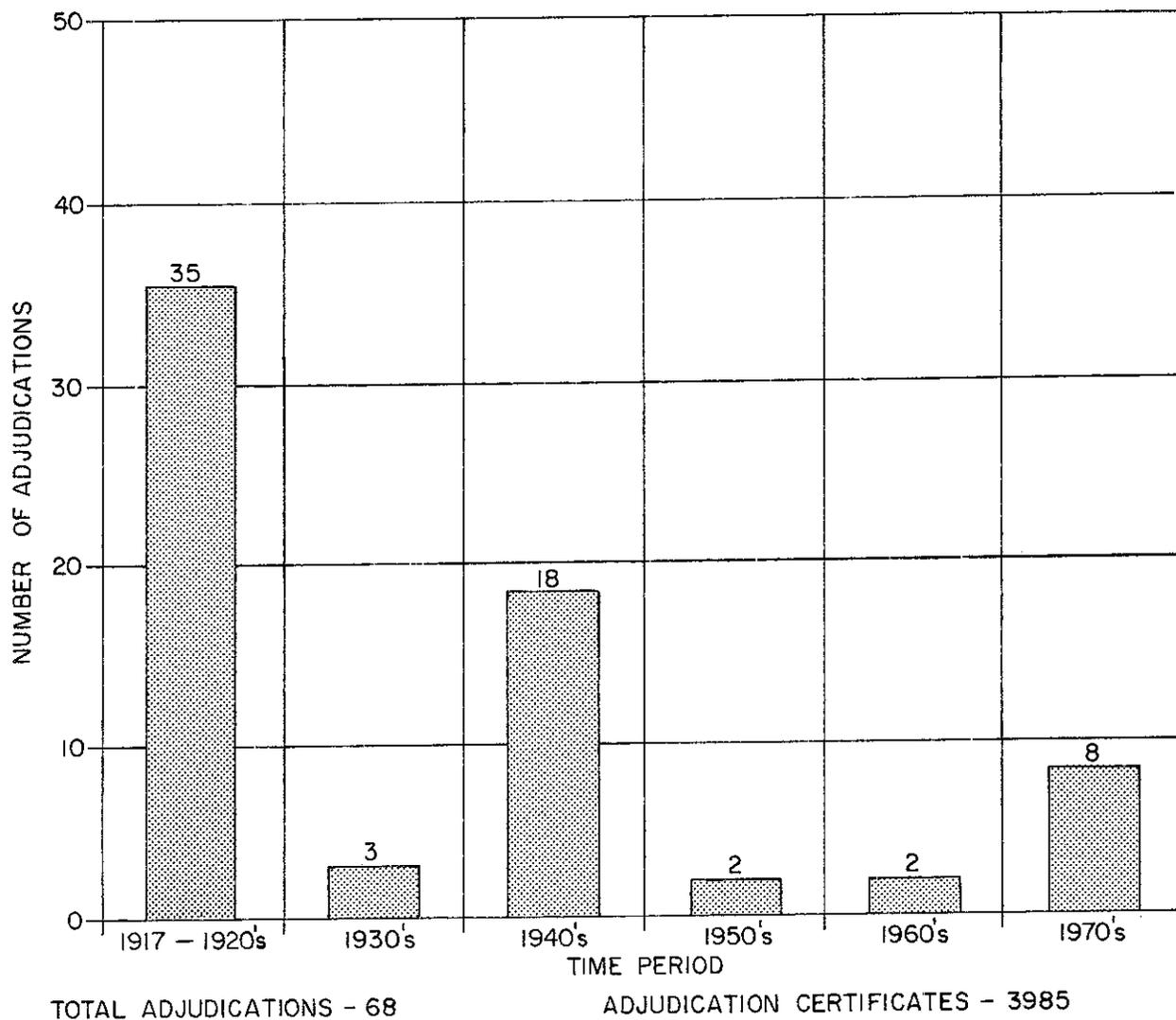


Figure 16
Adjudication Decrees 1917-1976

DOE has embarked on a program to develop basin management programs for all drainage basins in the state. These programs establish the quantity of water available for appropriation. In areas where there are many "vested claims" for water use, the actual total quantities of water available for further appropriation will not be known before adjudication of the total sources. Water-dependent developments in unadjudicated basins are tenuous until/unless the amounts of water available are established by due process.

Although the adjudicated portion of the state is small, many critical areas have been adjudicated. Adjudication is not needed in all basins but many more basins still require it.

DOE will use a team concept to raise adjudication program priority. The FY 78-79 DOE budget proposes that the adjudication program use personnel from

headquarters and the regions as project teams. The proposal reassigns existing staff for 5 FTE/year and adds one new position for a total of 6 FTE/year. The team would consist of a 1 to 3 person core group from Headquarters to coordinate efforts with the Attorney General's office and the local Superior Courts, and 2 to 4 regional office field personnel for field work and mapping.

Recommendations

To implement and maintain a meaningful adjudication program, DOE recommends that the legislature:

- * Revise the adjudication statutes.
- * Provide additional personnel, including the necessary legal support from the Attorney General's office.

Table 13. Adjudications

Name of Watercourse	Date of Decree	County	Code
Similkameen River	11-26-18	Okanogan	01
Roaring Creek	10-24-19	Chelan	02
Wenas Creek	2-23-21	Yakima	03
Bird & Frazier Creeks	3-14-21	Klickitat	04
Teanaway River	6-16-21	Kittitas	05
Cook Creek	8-13-21	Kittitas	06
Beaver Creek	9-20-21	Okanogan	07
Libby Creek	11-18-21	Okanogan	08
Cowiche Creek	5-18-22	Yakima	09
Meadow Gulch Creek	6-12-22	Garfield	10
McFarland Creek	11-16-22	Okanogan	11
Alpowa Creek	3-26-23	Asotin	12
Upper Stone Creek	7-10-23	Walla Walla	13
Doan Creek	11- 1-23	Walla Walla	14
Alder Creek	2-19-24	Stevens	15
Chewaka Creek	2-19-24	Stevens	16
Dungeness River	3- 7-24	Clallam	17
Big Creek	3-27-24	Kittitas	18
Crab Creek & Moses Lake	5- 5-24	Adams & Grant	19
Ahtanum Creek	5- 7-25	Yakima	20
Safety Harbor Creek	6-20-25	Chelan	21
Stemilt Creek	1-22-26	Chelan	22
Salmon Creek, North Fork	4- 6-26	Okanogan	23
Johnson Creek	5-20-26	Okanogan	24
Squillchuck Creek	6-14-28	Chelan	25
Lower Antoine Creek	7- 9-28	Okanogan	26
Bigelow Gulch Creek	8-31-28	Spokane	27
Walla Walla River	9-12-28	Walla Walla	28
Corus Creek	10- 3-28	Stevens	29
Deadman Creek	1- 4-29	Garfield	30
Quilsascut Creek	1-19-29	Stevens	31
Gold Creek	5- 7-29	Okanogan	32
Black Canyon Creek	6-20-29	Okanogan	33
Touchet River	9-19-29	Columbia	34
Icicle Creek	10-28-29	Chelan	35
Bacon Creek	2-20-30	Klickitat & Yakima	36
Bear Creek & Davis Lake	5-14-30	Okanogan	37
Sinlahekin Creek	5-20-30	Okanogan	38
Wawawai Creek	3- 3-31	Whitman	39
Crystal Springs	3- 5-31	Spokane	40
Johnson Creek	5-23-31	Chelan	41
Sherwood Creek	6-13-31	Stevens	42
Oropahan Creek	10-13-31	Stevens	43
Deer Creek	1-16-32	Stevens	44
Chewelah Creek	10-15-32	Stevens	45
Joe Creek	11-26-32	Chelan	46
Myers Creek	11-26-32	Okanogan	47
Jennings Creek	6-26-33	Stevens	48
Hoffman Creek	8-18-34	Stevens	49
Little Calispel Creek	6-12-35	Pend Oreille	50
Twin Creek	5-29-36	Ferry	51
Pingston Creek	7- 1-36	Stevens	52
Bull Dog Creek	3- 9-38	Stevens	53
Thomason Creek	5-11-38	Stevens	54
Crab Creek, South Fork	6-21-39	Lincoln	55
Crab Creek, between Sylvan Lake & Odessa	7- 6-39	Lincoln	56
Dry Creek	5-20-52	Walla Walla	57
Whitestone Lake	5-21-56	Okanogan	58
Chiliwist Creek	5-16-67	Okanogan	59
Cummings Canyon	9-21-67	Chelan	60

Table 13. Adjudications (Cont'd.)

Name of Watercourse	Date of Decree	County	Code
Spring Creek	10-22-70	Skamania	61
Mountain Lake	12- 8-70	San Juan	62
Narcisse Creek	2-28-72	Stevens	63
Blockhouse Creek	6- 1-72	Klickitat	64
Black Lake Tariatt Slough	11- 9-73	Pacific	65
Harvey Creek	1- 4-74	Stevens	66
Magee Creek	1- 4-74	Stevens	67
Grouse Creek, Jumpoff Joe Lake, Jumpoff Joe Creek	7-25-75	Stevens	68

Incomplete Adjudications

Bonaparte Creek	Okanogan	A
Bowman Creek	Klickitat	B
Cascade Lake	San Juan	C
Clugston Creek	Stevens	D
Cow Creek	Adams	E
Crab Creek (Wilson Cr.)	Grant/Lincoln	F
Eagle Creek	Jefferson	G
Hunter Creek	Stevens	H
Mill Creek	Klickitat	I
Naneum Creek	Kittitas	J
Stranger Creek	Stevens	K
Tenmile Creek	Whatcom	L
Thompson Falls	Okanogan	M
Wilson Creek	Kittitas	N
Wolf Creek	Okanogan	O

Initial recommended statutory changes include some of the provisions of House Bill 970 from the 1975 Legislative Session. Standards for admissibility of testimony and evidence should be less rigid. The basic Western water law concept "first in time is first in right" has usually been established by eyewitness testimony. Referees have tried to draw a sharp line between pre-1917 (1945) appropriation rights and "new" developments or enlargements that fall under the 1917 (1945) requirements. In cases where eyewitness testimony is no longer available the court appointed referee should have, under the law, the discretion and responsibility to use his expertise and experience in water resource matters and water law to make deductions, findings, and recommendations based on actual existing development and uses of the water.

RELINQUISHMENT

The Issue

Relinquishment is a process whereby abandoned water rights or rights which have been granted but are no longer used can be returned to the state for reappropriation. Relinquishment of unused water rights has become increasingly important as more streams approach full appropriation, and will become critical as

development and population increase and/or shift. RCW 90.14 provided procedures to formally record such relinquishments so the waters can become available for reallocation.

Before enactment of RCW 90.14, the only way a water right could be relinquished was through the owner's voluntary consent or through court action. RCW 90.14 defines how and when rights revert to the state.

In summary, the relinquishment portion of the statute provides that if any person entitled to divert or withdraw waters voluntarily fails, without sufficient cause, to divert or withdraw water during any 5 or more successive years, he relinquishes all or part of his right, which reverts to the state, making those waters available for appropriation in accordance with RCW 90.03 250. The law allows several "sufficient causes" for nonuse. By legislative intent an unused right is dead even before it is formally reverted to the state.

DOE is concerned over a section of the statute which states that a right claimed for future development within 15 years after July 1, 1967 or the most recent beneficial water right use (whichever is later) is not subject to relinquishment.

Accomplishments and Current Direction

DOE has not been very active in relinquishment. The only rights relinquished have been voluntarily submitted. DOE does not have enough field personnel to find out which rights are subject to relinquishment.

Recent inquiries to 5 states about relinquishment programs revealed that their programs are no more comprehensive or better developed than Washington's.

A recent DOE paper discussing ways to actively implement RCW 90.14 presented four alternatives, each developed to stimulate discussion of future program direction. After reviewing the alternatives, DOE decided to take action on water rights that appear subject to relinquishment. These first few test cases should show whether existing legislation is strong enough to accomplish involuntary relinquishment.

Findings in the test cases could guide program development.

DOE must have a comprehensive relinquishment program within the next few years. Basin management programs seek to develop priorities for future water use allocations in various categories. The amount of water not already allocated or in use is determined by the quantities of issued water rights (including adjudicated rights) and current water use estimates. Many issued water rights far exceed actual present use. Effective water management is impossible without significant reduction of this difference between water rights and water use.

Recommendations

DOE recommends legislation to delete the 15-year exemption-for-future-development from RCW 90.14.140. The Department also recommends amending existing legislation to apply relinquishment under RCW 90.14 to adjudication so that reversion of rights receives full attention in future adjudication proceedings.

FEDERAL-STATE, INTERSTATE, AND CANADIAN RELATIONSHIPS

The 1967 legislation which created the Department of Water Resources set forth the following powers and duties of the Department:

1. To represent the State at, and fully participate in the activities of any basin or regional commission, interagency committee, or any other joint interstate or Federal-State agency, committee or commission, or publicly financed entity engaged in the planning, development, administration, management, conservation, or preservation of the water resources of the state.
2. To prepare the views and recommendations of the State of Washington on any project, plan, or program relating to the planning, development, administration, management, conservation, and preservation of any waters located in or affecting the State of Washington, including any Federal permit or license proposal and appear on behalf of, and present views and recommendations of the State at any proceeding, negotiation, or hearing conducted by the Federal Government, interstate agency, State, or other agency.
3. To cooperate with, assist, advise, and coordinate plans with the Federal Government and its officers and agencies, and serve as a State liaison agency with the Federal Government in matters relating to the use, conservation, preservation, quality, disposal, or control of water and activities related thereto.

4. To cooperate with appropriate agencies of the Federal Government and/or agencies of other states, to enter into contracts, and to make appropriate contributions to Federal or interstate projects and programs and governmental bodies to carry out the provisions of this chapter.

These powers and duties subsequently were transferred to the Department of Ecology upon its establishment in 1970.

The Water Resources Act of 1971 further provided that:

The state shall vigorously represent its interest before water resource regulation, management, development, and use agencies of the United States, including among others the federal power commission, environmental protection agency, army corps of engineers, department of the interior, department of agriculture and the atomic energy commission, and of interstate agencies with regard to planning, licensing, relicensing, permit proposals, and proposed construction, development and utilization plans. Where federal or interstate agency plans, activities, or procedures conflict with state water policies, all reasonable steps available shall be taken by the state to preserve the integrity of this state's policies.

REPRESENTATION ON REGIONAL AND INTERSTATE COMMISSIONS

A number of commissions and other organizations provide communication and coordination between federal and state government and among states in water resources matters. DOE actively participates in the activities of several of these groups including the Pacific Northwest River Basins Commission, the Western States Water Council, the Interstate Conference on Water Problems, the Association of Western State Engineers, the Columbia River Water Management Group, and the Pacific Northwest Regional Commission's Water Resources Task Force.

The Pacific Northwest River Basins Commission (PNWRBC) is a Federal-State commission made up of representatives from the five northwest states and nine federal departments, with a chairman appointed by the President. This commission was organized to coordinate water and related resources planning in the Pacific Northwest. Cooperative Federal-State planning is discussed in the next section of this report.

The Western States Water Council, an organization of the 11 western states, was created in 1965 to provide coordination and cooperation among the states in water resources matters. The Council meets once a year to discuss matters of the States' mutual interest.

The Association of Western State Engineers consists of individuals who are responsible for the water rights programs in the 20 western states. Representatives of various federal agencies involved in water resources management are associate members.

The primary purposes of the organization are to provide cooperation among the states in solving mutual problems, sharing information, and improving existing water resources legislation. Current areas of involvement are the federal reserved water rights and Indian water rights issues.

The Columbia River Water Management Group was established in the late 1960's as an informal organization to continue operation and management functions of the Columbia Basin Inter-agency Committee which was terminated when PNWRBC was created in 1967. The Group is made up of representatives of state and federal agencies involved in operating and managing water control facilities and stream-flow forecasting within the Columbia River basin and contiguous coastal areas of Washington and Oregon. The group meets monthly to discuss weather and stream-flow conditions, water held in reservoir storage, the water supply and power generation outlook, reservoir operation for navigation and flood control, water quality conditions, and fisheries operations. Other activities concerning Washington include development of the Columbia River hydro-meteorological data network, development of structures and operational procedures to reduce nitrogen supersaturation, installation of sonic stream gaging stations at critical Columbia and Snake River locations, and analysis and projection of streamflow depletions.

The Pacific Northwest Regional Commission is a joint Federal-State effort to assist overall regional economic development through planning, research, technical assistance, and grants. The commission consists of the Governors of the states of Washington, Oregon, and Idaho and a federal co-chairman appointed by the President. The commission was set up in 1972, and was the eighth such commission established.

The commission has undertaken several water resources studies, including a study related to the proposed Columbia River Compact, a study on irrigation water use efficiencies and institutional incentives for their improvement, and an analysis of the potential for warm water irrigation in the Hanford area.

The commission's expenditures for water resources studies were \$100,000 in FY 1976; the FY 1977 budget was undetermined as of November 1976.

COOPERATIVE FEDERAL-STATE PLANNING

A major responsibility of the Pacific Northwest River Basins Commission under the Federal Water Resources Planning Act of 1965 is the preparation of a comprehensive, coordinated joint plan for the Pacific Northwest. Pursuant to this responsibility, "Level B" studies have been completed in the State of Washington during the past three years for the Big Bend, Okanogan, Methow, and Yakima basins. A Level B Study is a reconnaissance study of complex problems with a 15-25 year time horizon. These studies were conducted by a state study team composed of representatives of state and federal agencies with water and related resources management responsibilities, under the leadership of the Department of Ecology. Citizen advisory committees in each area provided valuable assistance and input throughout these studies. (See section on Public Involvement.)

Participating in these studies benefits the state two ways. First, it permits the state to influence federal funding priorities in water resources development, and it also provides the state with information and data needed to manage water and related resources.

DOE developed recommendations and priorities for:

- * Legislative and Administrative Modifications
- * Projects and Programs
- * Implementation Studies
- * Planning-Related Research
- * Special Studies
- * Basic Data Collection Programs

Local goals and objectives developed by the local citizens committees form an important element of each study report.

Table 14.
Federal Water Resources Planning in Washington State
Estimated Fiscal Year 1976 Expenditures

U.S. ARMY CORPS OF ENGINEERS		\$600,000	
Columbia River and Tributaries			
Level C Studies			
	Puget Sound and Adjacent Waters	\$140,000	
	Chehalis River and Tributaries	100,000	
	Metro Spokane	146,000	
	Okanogan	100,000	
	Yakima	100,000	
	Grays Harbor	100,000	
	Snohomish River and Tributaries	50,000	
	Subtotal		736,000
	Level B Studies		24,000
	Subtotal		\$1,360,000
 U.S. DEPARTMENT OF INTERIOR			
All Interior Agencies - BPA, BOR, FWS, GS, BR, NPS, BLM, BM			
	Comprehensive Coordinated Joint Plan		190,000
 Bureau of Reclamation			
	Appraisal Studies (Level B)		
	Western Energy Expansion	}	146,000
	Colville Indian Reservation		
	Yakima Indian Reservation		
	Feasibility Studies (Level C)		
	Grand Coulee 3rd Power Plant Extension	}	275,000
	Bumping Lake Enlargement		
	Walla Walla Project		
	Special Studies		
	Yakima Valley Water Management Study	150,000	
	Subtotal		571,000
 Fish and Wildlife Service			
	Estuarine Studies	}	180,000
	Land and Water Resource Planning Assistance		
	State Water Plan		
 Bureau of Land Management			
	Resource Management Conservation and Protection	15,000	
	Subtotal		956,000
 U.S. DEPARTMENT OF AGRICULTURE			
	Type IV Studies	105,000	
	Level B Studies	34,000	
	Level C (P.L. 566) — Four Projects	130,000	
	Subtotal		269,000
	TOTAL		\$2,585,000

A Level B Study proposed for the Snohomish Basin was approved by the U.S. Water Resources Council in August 1976. The study, scheduled to begin in 1977 and to be completed within two years, will dovetail with areawide waste management planning recently initiated for the Snohomish County METRO area and the Mediated Agreement for the Snohomish Basin developed over the past two years.

The draft Comprehensive Coordinated Joint Plan (CCJP) for the Pacific Northwest will enter formal review early in 1977. As part of its responsibility to conduct the CCJP public review program in Washington, DOE contracted with Washington State University to prepare several public television programs on state water resources management issues.

MONITORING OF FEDERAL WATER RESOURCES PLANNING AND MANAGEMENT

DOE is monitoring federal water resources planning to insure the preservation of the integrity of the state's policies. As appropriate, State position statements are developed on Federal project and program proposals. Estimated Fiscal Year 1976 expenditures by the Army Corps of Engineers, Department of Interior, and Department of Agriculture are listed in Table 14. These expenditures totaled \$2,585,000. For the same period, federal water resources planning assistance to the state totaled \$102,000; state funding totaled approximately

\$200,000 for all water resources planning activities. This vividly illustrates the situation confronting the state in its attempts to achieve and maintain a leadership position in water resources planning and management in Washington

RELATIONSHIPS WITH CANADA

The fact that nearly 25 percent of the surface water available in Washington originates in Canada provides some measure of the significance of our relationships with our northern neighbor. The foundation for these relationships is provided by the Boundary Waters Treaty of 1909. Among other features, this treaty established the International Joint Commission (IJC) with jurisdiction over certain questions involving uses, obstructions, and diversions of boundary waters.

In 1961, the United States and Canada signed a treaty relating to the development and management of the Columbia River system. Under the provisions of this treaty, dams have been constructed in Canada at Arrow Lake, Duncan Lake, and Mica Creek and in Montana at Libby.

Current water management issues involving Canada include water supply for Point Roberts, the proposed raising of Ross Dam, and management of the Okanogan and Similkameen rivers.

These issues are discussed in the Local Issues section of this report (see Northwest and Northeast areas).

MANAGEMENT OF THE COLUMBIA RIVER

Few Washington residents need to be reminded of the importance of the Columbia River in North America. Although its 180,000,000 acre feet per year average water discharge is exceeded by the Mississippi, Mackenzie and St. Lawrence rivers, the Columbia is the largest producer and greatest potential source of hyroelectric power on the continent (see Table 15 and Figure 18). Flowing through fertile (but moisture-

deficient) lands, waters from the Columbia irrigate an area second only to that supplied by the Missouri River. It has over 300 miles of commercially navigable waters; its principal tributary, the Snake, is navigable for another 150 miles to the Idaho border. The Columbia also has been called the primary salmon-producing stream in the United States.

Table 15. Columbia River Flow
(1,000's Acre-Feet per Year)

	Inflow From Washington	Inflow From Other States & Canada	From Upstream	Total
Upper Columbia Snake	7,500 100	82,200 28,200	— —	89,700 28,300
Middle Columbia Lower Columbia	3,600 36,300	18,000 31,100	118,000 139,600	139,600 207,000
TOTAL	47,500	159,500	—	207,000
PERCENT OF TOTAL	23%	77%	—	100%

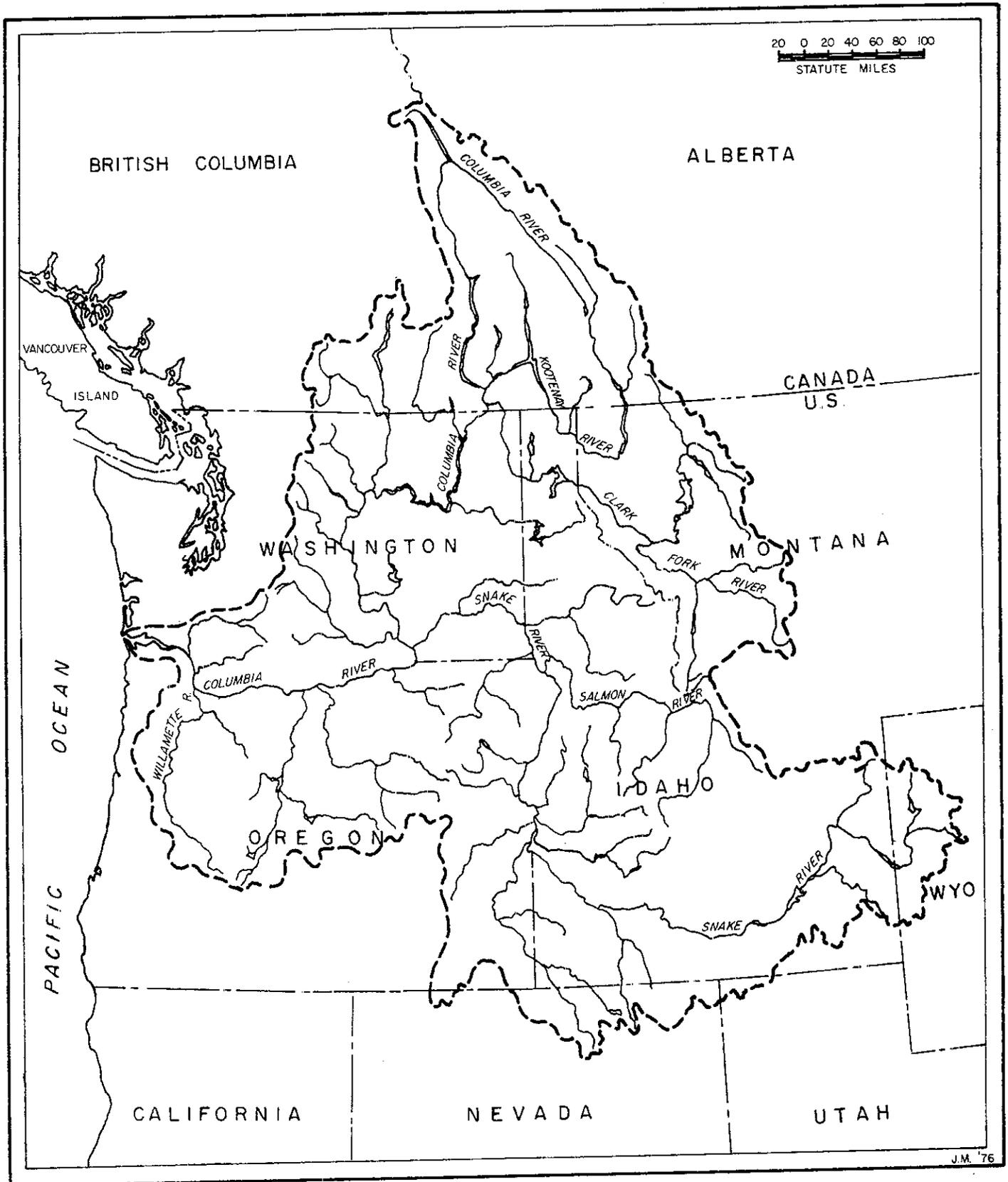


Figure 18
Columbia River Drainage Basin

Yet the tremendous abundance of the Columbia River is *limited*. Demands on it have grown so much that allocating water among competing uses now involves difficult trade-offs.

Columbia River management also involves coordination among a variety of interests and institutions. DOE has primary water resource responsibility within Washington. DOE has two fundamental management objectives — to seek the *maximum net benefits* from the use of water resources and to achieve full utilization of water resources, subject to natural environmental constraints.

Despite DOE's responsibility to issue out-of-stream water rights, Washington State has only limited authority over the Columbia. The Columbia basin includes parts of seven states, plus British Columbia; some tributaries cross the international border three times before entering the Pacific. Management authority is fragmented among international, federal, regional, state and local agencies. Management of the Columbia and Lower Snake River dams is shared by the Corps of Engineers; the Bureau of Reclamation; Chelan, Douglas and Grant County Public Utility Districts, and officials of British Columbia. Bonneville Power Administration is responsible for transmitting and marketing power generated by the federal projects. Columbia flood control and navigation management is principally the responsibility of the Corps of Engineers. Entities responsible for tributary project management include the Idaho Power Company, Montana Power Company, Washington Water Power Company, and others.

Each state allocates water within its boundaries, subject to Indian and federal reserved water rights; Congress has final authority to allocate interstate water, although an interstate compact for water allocation could strengthen the states' posture in regard to area of origin protection. Dozens of interest groups and local, regional or national committees are also involved in Columbia Basin water policy. Table 16 shows some of the important entities involved in Columbia River Management.

Major treaties, compacts, laws and issues pertinent to the Columbia River Basin include:

- * *Treaties with Pacific Northwest Indian Tribes* (see section on Indian Water Rights)
- * *1909 Boundary Waters Treaty with the United Kingdom* International Joint Commission formed.
- * *1915 Columbia River Fish Compact* (Oregon — Washington)
- * *1947 Pacific Marine Fisheries Commission Compact* (Alaska, California, Idaho, Oregon, Washington)
- * *Washington State Columbia River Fish Sanctuary Acts of 1949 and 1969* (RCW 75.20)

- * *1961 Treaty with Canada Relating to Cooperative Development of the Water Resources of the Columbia River Basin*

- * *Northwest Energy Policy Project* — PNWRBC

- * *Comprehensive Coordinated Joint Plan* — PNWRBC

- * *Columbia River and Tributaries Study* — U.S. Corps of Engineers

Only piecemeal written policies currently define Washington's interests in Columbia River management or suggest a state posture on future development of power, fisheries, recreation and other resources. In 1976 DOE began to prepare management policies for a key section of the Columbia.

Present and potential uses of the Columbia River include:

- * Hydroelectric power (base and peak load; pumped-storage)
- * Irrigation
- * Municipal and rural domestic water supply (including stock watering)
- * Industrial water supply
- * Waste Assimilation (chemical and biological wastes; heat)
- * Navigation
- * Fish (Indian, sport, and commercial fishing; resident and anadromous species)
- * Exportation of water to out-of-basin areas
- * Recreation
- * Preservation of environmental, scenic, aesthetic, historical (archaeological) values and wildlife

Hydroelectric power

High runoff and relatively silt-free water make the Columbia River Basin especially well suited to hydroelectric power generation. There are 38 hydro-power projects within the Columbia Basin — 11 on the main stem of the Columbia (see Figure 19). Total annual energy production equals 195,000,000 barrels of oil (19,500 megawatts). Expanding the existing 43,565,000 acre-feet of active storage capacity, and adding generating capacity at existing dams could raise capacity beyond the 27,300 MW now planned for the mid-1980s. Grand Coulee Dam alone has an ultimate generating capacity of nearly 10,000 MW.

Predicted future power demand exceeds even this generating capacity. In the future, large-scale thermal generating plants will supply the base load, while hydroelectric plants, highly efficient under variable-load conditions, supply varying peak demands. Changing hydroplant operation from baseload to peak-load power generation is a far-reaching man-

Table 16. Major Entities Interested In Management Of Columbia River Basin Water And Related Resources

International Joint Commission
U.S. Department of State
U.S. Department of the Interior
 Bureau of Reclamation
 Bureau of Land Management
 Bonneville Power Administration
 Geological Survey
 Fish and Wildlife Service
 Bureau of Outdoor Recreation
 Bureau of Indian Affairs
U.S. Department of Agriculture
 Soil Conservation Service
U.S. Environmental Protection Agency
Federal Power Commission
Energy Research and Development Administration
U.S. Department of Transportation
 U.S. Coast Guard
U.S. Department of the Army
 Corps of Engineers
U.S. Department of Commerce
 National Marine Fisheries Service
U.S. Water Resources Council
Pacific Northwest River Basins Commission
Pacific Northwest Regional Commission
Western States Water Council
Pacific Marine Fisheries Commission (CA, OR, WA, ID, AK)
Columbia River Interstate Compact Commission

Washington State—Departments of Ecology; Fisheries; Game; Parks and Recreation
Idaho—Departments of Water Resources, Fish and Game; and Health and Welfare
Oregon—Water Resources Department
Montana—Department Natural Resources and Conservation
Wyoming
Nevada
Utah
Dominion of Canada
Environment Canada
Province of British Columbia

Committee for the Completion of the Columbia River Hydropower System
Columbia River Water Management Group
Public Utility Districts (esp Chelan, Douglas, Grant counties)
Irrigation/Reclamation Districts
Columbia Basin Fisheries Technical Committee
Public and Private Power—Marketing Companies
Conservation/Environmental Groups
Columbia River Estuary Study Task Force

NOTE:

FIGURES IN PARENTHESES REPRESENT ACTIVE STORAGE CAPACITY OF RESERVOIRS (IN THOUSANDS OF ACRE-FEET) AS CALCULATED BY THE CORPS OF ENGINEERS. WHERE FIGURES ARE ABSENT, THERE IS ESSENTIALLY NO STORAGE CAPACITY

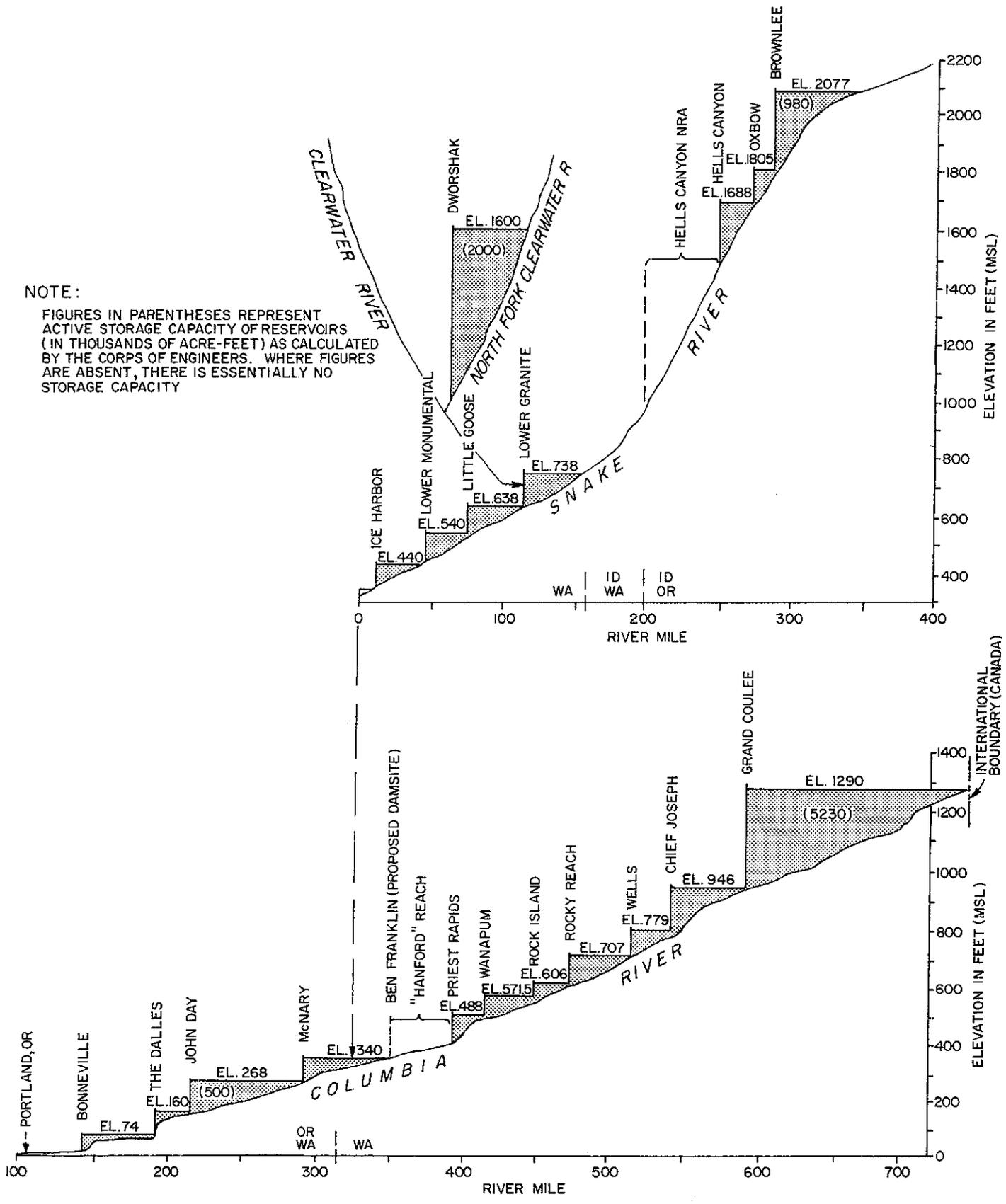
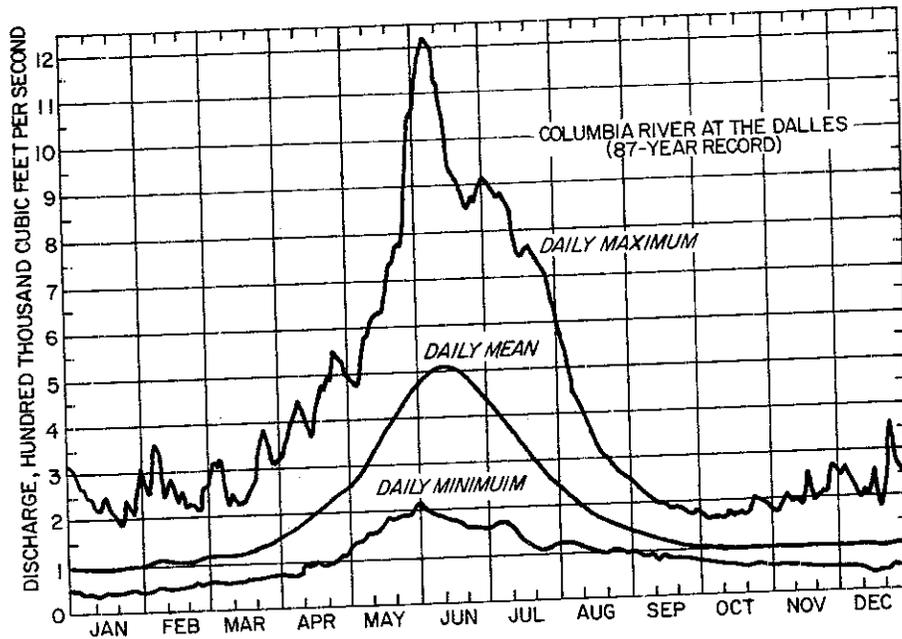


Figure 19
Columbia and Lower Snake River Projects



- NOTES:
1. ALL STREAMFLOWS ARE OBSERVED VALUES PUBLISHED IN U.S. GEOLOGICAL SURVEY WATER SUPPLY PAPERS. THE AVERAGE FLOW FOR THE 87-YEAR PERIOD FOR COLUMBIA RIVER AT THE DALLES IS 194,000 CFS. THE AVERAGE OF MODIFIED FLOWS FOR THE 30-YEAR-BASE PERIOD, 1928-58, IS 171,300 CFS
 2. THE 87-YEAR RECORD PERIOD FOR COLUMBIA RIVER AT THE DALLES IS JUNE, 1878 THROUGH SEPTEMBER, 1965

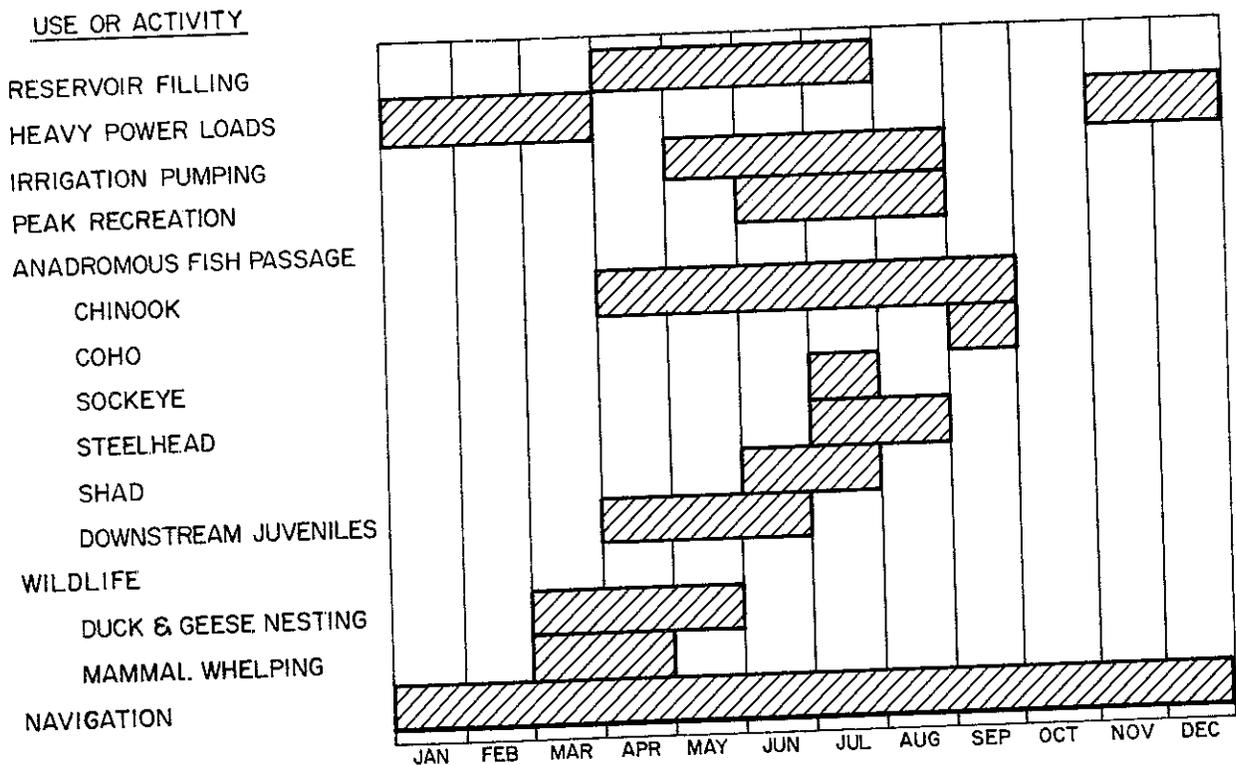


Figure 20
Seasonality of River Uses and Flows

agement problem. Hydroplant peaking operation requires more extreme flow fluctuations than present operations. Reservoir levels could change even more greatly within any 24-hour period and instream flows could range from near zero to the plant's maximum hydraulic capacity in just a short time, with potentially serious effects on fish, wildlife, recreation, navigation, environmental and waste assimilative values.

Base-flow or minimum-flow requirements limit the peaking operation of hydroplants and may require additional nuclear or gas turbine power plants. Nearly all Columbia water above Bonneville Dam is now used for power generation, except during the June-July peak runoff period. Using the Columbia for energy and peaking capacity will require trade-offs between other instream water uses requiring a steady flow and, possibly, out-of-stream consumptive uses, such as irrigation.

Another potential hydroelectric power development which may aggravate flow fluctuation problems is pumped storage. Pumped storage requires two reservoirs at different elevations. During off-peak hours, energy from thermal power plants pumps water from the lower to the upper reservoir. For peak-loads, the stored water is released to flow through generating turbines to the lower reservoir. Although pumped storage can also provide water supply, irrigation, and flood control for the area around the upper site, the overall system consumes 1½ units of energy for every unit produced, and further intensifies flow fluctuations. Washington's only existing pumped storage facility is at Grand Coulee-Banks Lake. The Corps of Engineers has identified over 250 potential pumped storage sites in Washington, but no development is expected in the next several years.

Irrigation

The Columbia River system still has tremendous potential for future irrigation development. There are approximately seven million acres of land under irrigation in the Columbia River drainage basin. An increase in irrigation of over four million acres has been projected by the year 2020. As part of the Columbia River and Tributaries Study, the Corps of Engineers is leading a cooperative interagency Irrigation Depletions/Instream Flow Study to evaluate alternative irrigation depletion levels and minimum instream flow levels on the operation of the Columbia River system. DOE is one of over 40 agencies assisting in the study.

This expanded irrigation development will provide a substantial increase in farm commodity output and will increase tax revenues to the state. Adverse effects include loss of downstream power generation and power requirements for irrigation pumping.

The effect of irrigation development on normal flows is relatively minor. The projected regional increase in irrigation would reduce the annual run-off of the Columbia River drainage basin by about 10.8 million acre-feet or about six percent in an average year. However, in a year similar to the 1973 water year, this amounts to over 10 percent of flow. Monthly impacts would be more significant.

Although irrigation development does have some effect on low flows, the conflicts are not as great as those between the maintenance of minimum flows and power production. However, fish, wildlife, recreation, navigation, and waste assimilation will be affected by irrigation to some extent as flows are reduced.

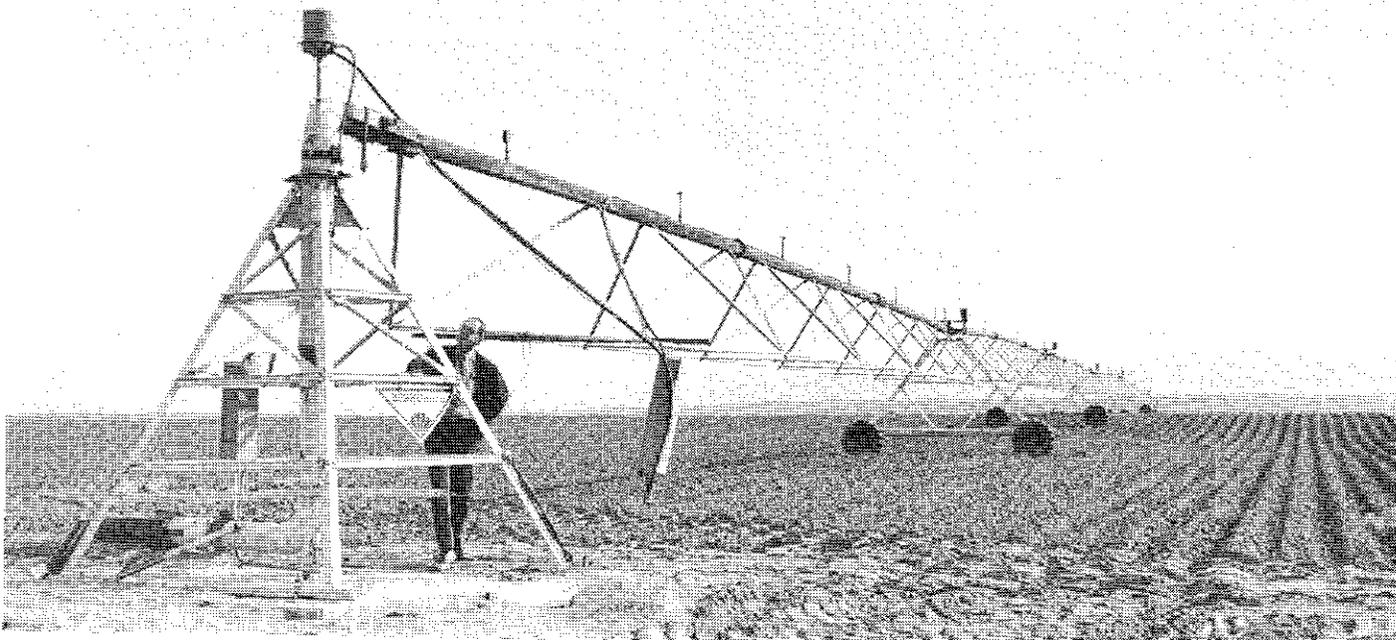


Figure 21
Sprinkler Irrigation

Rural Domestic, Municipal, and Industrial Water Supply

While water withdrawals for rural domestic, municipal and industrial uses involve relatively minor quantities, some industrial uses, especially for cooling thermal power plants, may increase soon. Thermal power plants consume approximately 17,000 AF/yr. per 1,000 MW of generating capacity with the use of cooling towers. Pollution abatement equipment now being installed should reduce other industrial water quality problems. Municipal water supply takes priority over most uses, and demands very high water quality even though relatively small quantities are needed.

Waste Assimilation

This function of Columbia River water is neither glamorous nor well known, but it is very important. The river must accept municipal, industrial and agricultural wastes; it must be able to assimilate these chemical, biological and thermal wastes without impairing other river uses and values (fish, wildlife, domestic water supply, recreation, aesthetic). Any major withdrawal from the river places additional demand on the remaining water, and usually reduces its quality.

Navigation

An inland water transportation system consisting of eight locks (four each on the lower Columbia and lower Snake) allows commercial vessels passage to Clarkston, Washington and Lewiston, Idaho on the Snake, and to the Tri-Cities area on the Columbia. There has been some interest in extending navigation upstream to Wenatchee on the Columbia by building locks in three additional dam projects (provisions were made for locks when these dams were built), plus dredging and modifying portions of the Hanford reach. This would conflict with preservation of the last remaining unimpounded reach of the Columbia in the U.S.

There are potential conflicts between navigation and other river uses. In low flow periods, the water required to operate the locks has reduced power generating capabilities. On the other hand, peak load power generation can cause flow fluctuations endangering navigation. Future port facilities must accommodate these greater water level fluctuations, and may also have to compete with future irrigation pump stations for preferred locations.

Fish

Before human development on the Columbia River, the system yielded an estimated 50,000,000 pounds of salmon and steelhead per year. Recently, despite \$250,000,000 spent on fish hatcheries, ladders and spawning channels, the total salmon and steelhead yield is estimated at 30,000,000 pounds. While it might seem easier to manage the river without the fish and their requirements, the economic value of Columbia River-produced salmon and steelhead (between \$75 and \$85 million annually) should be preserved and enhanced in every way possible.

High dams on the Columbia and its tributaries posed the first migration barrier to anadromous fish species. Grand Coulee Dam entirely cut off migration to the upper 600 miles of the Columbia and its tributaries. Later, Chief Joseph Dam cutoff another segment of the Columbia. The Hells Canyon Dam made the upper two-thirds of the Snake River inaccessible to salmon. Besides habitat loss, numerous other problems beset fish. As young fish begin downstream migration, reduced flows may increase their travel time to the sea, seriously decreasing survival chances; physiological changes place steelhead and young salmon on a limited time schedule. When migration is delayed, some fish fail to reach the ocean or may be unable to survive the adjustment to salt water and are lost from either fisheries or spawning stocks.

Passage at dams is another serious problem. Five to 15 percent of downstream migrants are killed passing through the turbines of each dam. Adult fish returning to spawn may be physically damaged as they leap against the concrete or are caught in high velocity flows. Fish delayed by dams may not reach the spawning area in time for successful spawning.

Reducing downstream migration turbine losses requires turbine screens and fish by-pass channels, or transporting fish around the dams. Improved fish ladder design for upstream migrants and/or capture and transportation above the dam may help reduce losses.

Nitrogen supersaturation, now recognized as a major cause of fish mortality, occurs when water flows over dam spillways and plunges into the stilling basin so deeply that entrained air is driven into solution. Water with more than 115% of its normal maximum dissolved gas may cause a fish disease similar to "the bends" in man. When the fish rise to shallow depths, the supersaturated nitrogen in their blood streams forms bubbles. Fish not killed directly are often blinded and vulnerable to intense predation or secondary infections.

Dangerous dissolved gas levels are found during high flow from Chief Joseph Dam and from Little Goose Dam (on the Snake) to the mouth of the Columbia. Because high flow periods and water spilling roughly coincide with major salmon and steelhead migrations, mortality rates can be significant. The Washington State Department of Fisheries estimated that in 1967 about 60% of the chinook salmon reaching Chief Joseph Dam died from nitrogen supersaturation before spawning. Reducing the Columbia and lower Snake to a series of pools behind the numerous dams has aggravated the situation. Water in these pools does not dissipate the supersaturated gas before it reaches the next dam. Waste heat injected in the water worsens the problem by increasing supersaturation.

The most effective solution may be to stop spilling water over dams—by increasing storage capacity upstream to even out flow; by increasing hydraulic

capacity of generating units; or by passing water through unused turbine bays. The Corps of Engineers estimates the need to spill will be drastically reduced by 1990. In the meantime, research has shown that spillway deflectors, or "flip-lips," reduce supersaturation in spilled water. These devices kick the spilling water out horizontally rather than allowing it to plunge deeply and become supersaturated. The Corps expects to complete spillway deflectors on the lower Snake dams and on federal dams on the Columbia by 1980. DOE has recommended deflectors at the five dams owned and operated by Chelan County PUD (Rocky Reach and Rock Island), Douglas County PUD (Wells) and Grant County PUD (Wanapum and Priest Rapids).

Migrating anadromous fish encounter habitat loss, difficult passage at dams (in both directions), flow and reservoir level fluctuations, and water quality problems such as nitrogen supersaturation and heat pollution. Careful management, in conjunction with other uses of the Columbia, is essential to protect our valuable fish resource. DOE supports plans for facilities and programs to enhance fish and wildlife resources.

Recreation

The Columbia and lower Snake rivers are major water-related recreation areas in Washington. Nearly 900 river miles provide over 200 water-related outdoor recreation sites. Recreation on the Columbia and lower Snake should increase substantially during the next 25 years. Much of this increase will probably be accommodated by expanding existing facilities.

Increased use of hydroelectric plants for peak power generation and resulting reservoir level fluctuations may conflict with recreational uses of reservoirs. Recreational impact of dam operation must enter into management strategy.

DOE has supported and cooperated with the "Stewards of the River" program presently being studied by the Pacific Northwest River Basins Commission. This proposed program would provide coordinated and integrated recreational opportunities along the river. DOE recommends that this program be implemented.

The only undeveloped segment of the U.S. portion of the Columbia is the 57-mile section between Priest Rapids Dam and the McNary Pool (Lake Wallula), also known as the "Hanford" or "Ben Franklin" reach. Twenty six miles of the reach is within the Hanford Reservation, where public access has been restricted since 1943. The area has significant wildlife, archaeological, scenic and potential recreation values. There is controversy over future use of the Hanford reach. One possibility is construction of a dam at the Ben Franklin damsite, the last U.S. site on the Columbia River. DOE opposes this and general public opposition will probably prevent a dam in the near future. Assuming that no dam is built, the range of potential uses includes designating all or part of the

reach as a National Recreation Area, National Wild and Scenic River or National Environmental Research Park; opening the entire reach to recreation (including motorized boats) and navigation; or keeping the reach in its current state.

Careful study is needed to determine the impact of opening the fragile desert-riparian environment along the shores of the reach to recreational use. In 1970 the reach was designated a "study river" under section 5(d) of the Federal Wild and Scenic Rivers Act (PL 90-542). The federal Bureau of Outdoor Recreation (BOR) would be the lead agency in such a study. DOE recommends a complete study be initiated by the BOR and all concerned agencies and citizens to determine future uses for the Hanford reach.

Preserving environmental/scenic/aesthetic/historical values and wildlife

The Columbia and lower Snake Rivers are used by migratory waterfowl and small mammals. River flow and reservoir level fluctuations threaten wildlife due to potential habitat disruption. The Washington State Game Department is studying the wildlife impacts of river fluctuations; DOE recommends that dam operators consider all necessary steps to reduce such impacts.

Conflicts between environmental values and river uses generally center around flow fluctuation and reservoir fluctuation. Minimum flow regulations should help minimize many river fluctuation problems. Preserving the Ben Franklin reach of the Columbia in its present semi-natural state deserves thoughtful consideration. DOE supports additional studies oriented to preserving environmental values of this reach.

ACCOMPLISHMENTS AND CURRENT DIRECTION

DOE has five basic management tools to implement adopted policies. These tools include establishing flows available for out-of-stream uses; establishing priorities of use; establishing minimum or base flows, reserving water for future beneficial uses, and presenting state position statements on federal project proposals.

In the Columbia River Basin, DOE has adopted basin management programs for the Little Spokane, Okanogan and Methow River Basins. The Snake River and the John Day-McNary reach of the Columbia River have highest priority of other basins under study; several more basins tributary to the Columbia are also being studied.

As a result of a need to act on numerous applications to divert large quantities of water from the Snake River for irrigation, DOE drafted a management policy for the Snake in 1974. After agency and public review of the draft policy, final action was postponed until the Corps of Engineers completed the Irrigation Depletions/In-

stream Flows Study. Results of this study, expected by early 1977, will be used to prepare a revised Snake River management plan. Idaho has drafted a State Water Plan for the Snake River which is being considered for adoption. There are portions of the Plan to which Washington has taken exception because of conflict with our downstream interests.

DOE began work on a water management program for the John Day-McNary reach in early 1976. In April 1976, DOE and the Pacific Northwest River Basins Commission (PNWRBC) co-sponsored a public workshop in Pasco, Washington. An alternatives discussion paper was prepared, public and agency comments were solicited, and another public meeting was held in September 1976. DOE has drafted management policies for the John Day-McNary reach and has provided them to the public and interested agencies for review.

Columbia River Interstate Compact

The Columbia Interstate Compact Commission was formed in 1950 after Congressional defeat of a proposed Columbia Valley Authority (patterned after the Tennessee Valley Authority), intended to promote massive public power development in the Columbia Basin. The Compact Commission requested federal authority to become a bona fide interstate organization, under the United States Constitution. The federal enabling act for the Compact Commission became law (PL 82-572) on July 16, 1952. A 1954 amendment added Utah and Nevada to the original five member states.

The Compact Commission is composed of representatives from the seven Columbia Basin states: Washington, Oregon, Idaho, Montana, Wyoming, Utah and Nevada. For 18 years the commission met to draft and redraft a Columbia Interstate Compact for ratification by the seven state legislatures. In December 1954 the first compact approved by the Commissioners was submitted to the seven state legislatures. Oregon and Washington legislatures failed to ratify the compact during their 1955 sessions, beginning a 10-year struggle to secure approval in all seven legislatures. Complex political issues developed, involving public vs. private power production and marketing, state's vs. federal rights, upstream vs. downstream state rights and the question of advisory vs. enforcement power for the Commission itself. Ratification attempts were made in 1955, 1957, 1961, 1963 and finally in 1965. The original 1954 compact was used until revised in 1960 and 1962. The Oregon and Washington legislatures never ratified the compact; the other five states did. In 1968, the Commission, lacking financial support from the member states, held its last official meeting, and the compact became (for the time being) a dead issue.

Review of Interstate Compacts

Article I, Section 10, of the United States Constitution requires a state to receive Congressional consent before entering into any compact with another state. A compact authorized and ratified by the member states

must be approved by Congress before it becomes United States Law. Any subsequent state law which conflicts with terms of the approved compact is invalid and unenforceable. A state may not unilaterally withdraw from the compact; consent from Congress and presumably from the other states is required. The United States Supreme Court decision in the 1963 *Arizona vs. California* case indicates that an interstate compact cannot prevent Congress from legislating out-of-state water diversion even if such a diversion is contrary to the terms of the compact approved by Congress.

A summary of the activities required to form an interstate compact are:

- (1) States petition Congress for compact enabling act
- (2) Congress passes enabling act (66 Stat. 737, PL 82-572)
- (3) State legislatures authorize commissioners to draft compact (RCW 43 57)
- (4) Commissioners meet, draft and approve compact
- (5) State Legislatures and governors ratify compact
- (6) Congress ratifies compact

At least three alternatives to an interstate compact should be considered in any conflict over Columbia River water or power. First, the states might do nothing, waiting for federal intervention to solve the problem. Second, the states might enter into litigation. Third, the states might approach problems on an *ad hoc* basis as they arise. At first glance, the compact alternative appears superior to all of these, since it provides for more comprehensive and well-planned regional problem solutions, but political complexities, time delays and inflexibility of the compact method cannot be ignored. All possible solutions to interstate problems of Columbia River allocation should be examined.

Recent Developments

Runoff in the Columbia Basin in the fall and winter of 1973 was extraordinarily low, giving early warning that Columbia Basin water resources are limited and that all competing water demands cannot always be satisfied. This realization, the impending end of the moratorium on major interbasin water diversion studies, and DOE's proposed management policies for the Lower Snake River prompted a meeting of technical representatives of the seven Columbia Basin states in May 1974 to investigate reopening interstate compact negotiations. The Pacific Northwest Regional Commission funded a study of possible renewed compact negotiations, and public meetings held by state agencies in several Columbia Basin cities examined public interest in the subject.

DOE supports negotiations between the Columbia Basin states to develop a compact or other agreement

for cooperative management of interstate waters. Discussions on the Columbia River and Walla Walla Basin (with Oregon) and the Snake River (with Idaho and Oregon) are needed. Joel Haggard, Seattle attorney, was appointed by President Ford in 1975 to act as the federal representative to the Columbia Interstate Compact Commission.

In the fall of 1976, the states of Idaho, Oregon, and Washington began serious discussions to develop agreements to establish coordinated and comparable water resource information systems. These discussions are taking place under the sponsorship of the Pacific Northwest Regional Commission. Efforts to establish a common information base may be the most meaningful activities for coordinated management which can be undertaken at this time.

Exporting Water From the State

In September 1968, Congress passed the Colorado River Basin Project Act (PL 90-537) and temporarily put to rest calls for major interbasin water transfers by legislating a 10-year moratorium on such transfer studies. Before the 1968 moratorium, dozens of proposals were presented to divert water hundreds or thousands of miles to water-deficient areas (see Figure 22). The largest such proposal (NAWAPA) involved transferring up to 250 million AF/yr. from Alaska, Canada and the northwest United States to the water-deficient areas of Canada, the United States and Mexico; construction costs of at least \$100 billion (1964 dollars) were cited.

Most calls for major interbasin water transfers have come from the arid southwest states, where anxious water managers have long dreamed of gaining large quantities of Columbia River Water they feel are lost each year to the Pacific Ocean. At least two events suggest renewed and stronger calls for diversions to the southwest when the moratorium expires in September 1978.

First, the world food shortage has ended federal policies to discourage "excess" farm production — maximum farm production is now encouraged. Second, the energy shortage has led to proposals for large fossil fuel power-generating plants near the coal and shale-oil fuel resources of the Colorado River Basin. Such plants need large quantities of cooling water. Furthermore, some southwest agriculture is based on mining "fossil" ground water, a resource being depleted, perhaps even irreversibly. The southwest wants out-of-basin water to rescue its failing agricultural water supply and to expand its agricultural and power-generating capabilities. Calls for water transfer for municipal supply in the southwest are questionable, since a small decrease in agricultural water use would greatly increase the water available for municipal uses.

One purpose of the Congressional moratorium was to allow states involved to assess and document present and future water needs. It was suggested in Congress that in view of the northwestern states' "amply

generous" water supply, the states' opposition to interbasin transfers was because they had so much excess water that they had never carefully studied their present and future needs. In 1971 the Washington State Legislature passed the Water Resources Act noting that "the availability of waters of the state is being evaluated by interests who desire to remove portions thereof from the state in a manner inconsistent with the public interest of the people of the state" and directing DOE to carry out a water resource management program to provide "a process for making decisions on future water resource allocation and use." DOE's activities to address this concern have been discussed throughout this report.

A second purpose of the moratorium was to allow the National Water Commission to study the water policies of the entire nation. The NWC study, finished in June 1973, took no explicit stand on interbasin water transfers, but the commission recommended that the beneficiaries of any project should pay the full cost of getting the water to them, plus compensation to the area of origin for opportunities foregone by such water export. Adopting these recommendations would greatly reduce calls to divert water from Washington.

DOE's position that there is no excess water available for exportation from Washington is based on present and near-future water use within the state. Expanding irrigation in the Columbia Basin Project and the Horse Heaven Hills area, as well as water needs for power generation and other instream uses (fish, wildlife, recreation), leave no excess available for export. If all environmental costs and benefits are fully accounted for, if benefactors of a transfer are required to pay full costs (plus compensation to the area of origin), and if the other National Water Commission economic criteria are used, large scale water transfers appear economically infeasible.

There is considerable debate whether any legal mechanism protects an area-of-origin from water transfers which it does not support. The riparian system of water law, common in the eastern United States, inherently protects area-of-origin water because riparian water rights can be used only on the riparian land. The appropriation doctrine of water rights, dominant in Washington and most western states, provides no such protection. Colorado, Nebraska, Texas and Oklahoma have included area-of-origin protection in their water legislation. Congress, after much debate, included in the 1968 Colorado River Basin Project Act, language as follows:

"All requirements, present or future, for water . . . (in the area of origin) shall have a priority of right in perpetuity to the use of the waters of that river basin, for all purposes . . ."

However, as a matter of law, Congress cannot bind itself to any particular course of action, and could repeal this "perpetual" water right at any time. The 1963 U.S. Supreme Court decision in *Arizona vs. California* established that Congress can allocate the waters of an

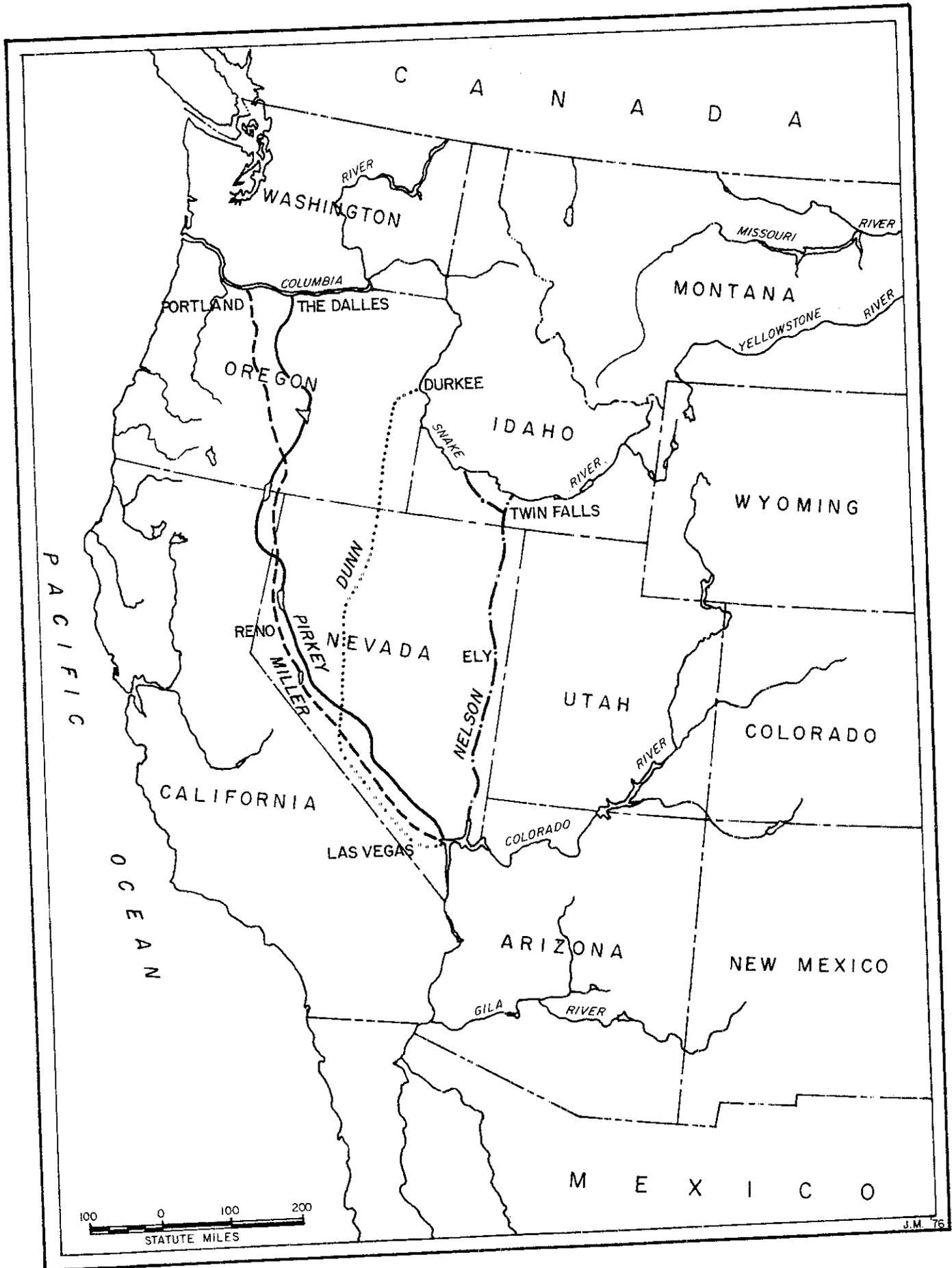


Figure 22
 Selected Columbia River Basin Water Diversion Schemes

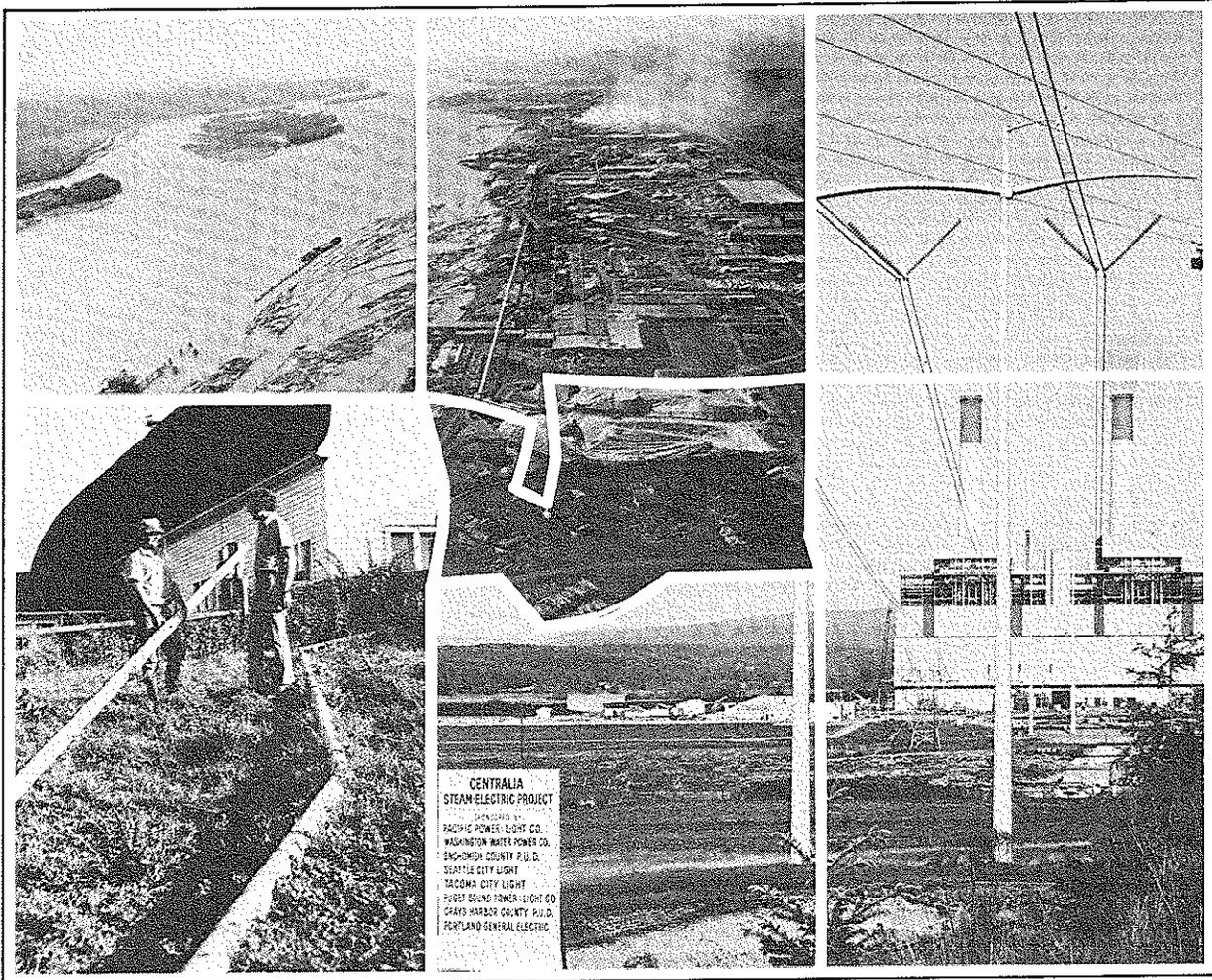
interstate river among the states. A state or a group of states cannot veto a Congressionally-mandated interstate water transfer, even if Congress had previously ratified an interstate compact prohibiting such transfers

Therefore, it appears that there are only a limited number of ways to protect the state's vulnerable water resources. DOE repeatedly has stated that Washington has no excess water for export. Most recently (October 1976), the director made this point in a speech to the International Commission on Irrigation and Drainage, meeting in Spokane. The Water Rights Claim Registration Act of 1967 and 1969 (RCW 90.14, in part) allowed DOE to document the amounts of vested water rights which pre-date the water codes, eliminating some

of the uncertainty surrounding the amount of water available in Washington. Continuing development of basin management programs will help document the state's present and future water needs.

Washington should produce a document before the 1978 moratorium expiration, carefully substantiating the limited availability of water within the state. Notwithstanding Congress' overriding power, the state supports renewed negotiations for the Columbia River Interstate Compact to clarify water management issues and to present a unified coalition of northwest political power to defeat proposed transfer schemes. The Legislature should consider a resolution or other instrument documenting their opposition to exporting water from the state

LOCAL ISSUES



LOCAL ISSUES

Every area of the state has different hydrologic conditions, resource characteristics, citizen concerns and political realities.

This section discusses water resource matters which have high local interest and which often relate directly to statewide issues. Local issues are grouped by geographic areas of interest to members of the legislature (see Figure 23).

Discussion topics are primarily problem-related issues pertinent to a defined locality within the geographical area. The background and cause of particular problems are presented along with discussions of solutions or proposed solutions.

For many issues solutions have not been found. In these cases, current DOE policy and recommended solutions are presented.

Many of the Local Issues discussed here relate to the Statewide Issues section of the report, and the reader is referred to the statewide issue(s) involved.

DOE recommendations for revision or clarification of existing statutes to overcome specific problems, are included in this assessment of local issues.

NORTH OLYMPIC LEGISLATIVE DISTRICT 24

This area includes Clallam, Jefferson, and Mason counties and the northwest portion of Thurston County. Local water resources issues include:

Water management in the eastern portions of Clallam, Jefferson, and Mason counties.

Elwha Indian water rights

Dungeness River.

Statewide issues which address these local issues include: Indian Water Rights discussed on page 44 Adjudications discussed on page 46 and Water Allocation and Management discussed on page 18.

Eastern Portions of Clallam, Jefferson, and Mason Counties

The anticipated increase in water usage resulting from development pressure related to construction of the Navy Trident Submarine base and probable Alaskan oil importation has created a need for accelerated ground and surface water studies in this area.

Water supply in this area generally is limited because of the "rain shadow" effect of the Olympic Mountains. To supply the water needs of this expected increase in

population, new sources of water need to be developed.

There have been very few investigations made of the ground and surface water resources of this area primarily because of the limited population.

Federal funding has been requested to expand the study area beyond the primary impact area, which is an area with a 25 mile radius of the Trident site within Kitsap County. \$100,000 has been requested for Fiscal Year 1977, and \$103,350 for Fiscal Year 1978. The water availability for the primary impact area is discussed on Page 72.

The Department is currently preparing plans and specifications for an observation well to be located on the Miller Peninsula. This well will be drilled to determine if there is a deep aquifer capable of producing high yields of ground water. The Weyerhaeuser Co. has recently drilled a deep well near Sequim which is capable of producing approximately 1000 gallons per minute. If the aquifer intercepted by the Weyerhaeuser well extends to the Miller Peninsula, a major source of ground water will be available for use in this area. Verification of this will be determined from the observation well to be drilled by DOE.

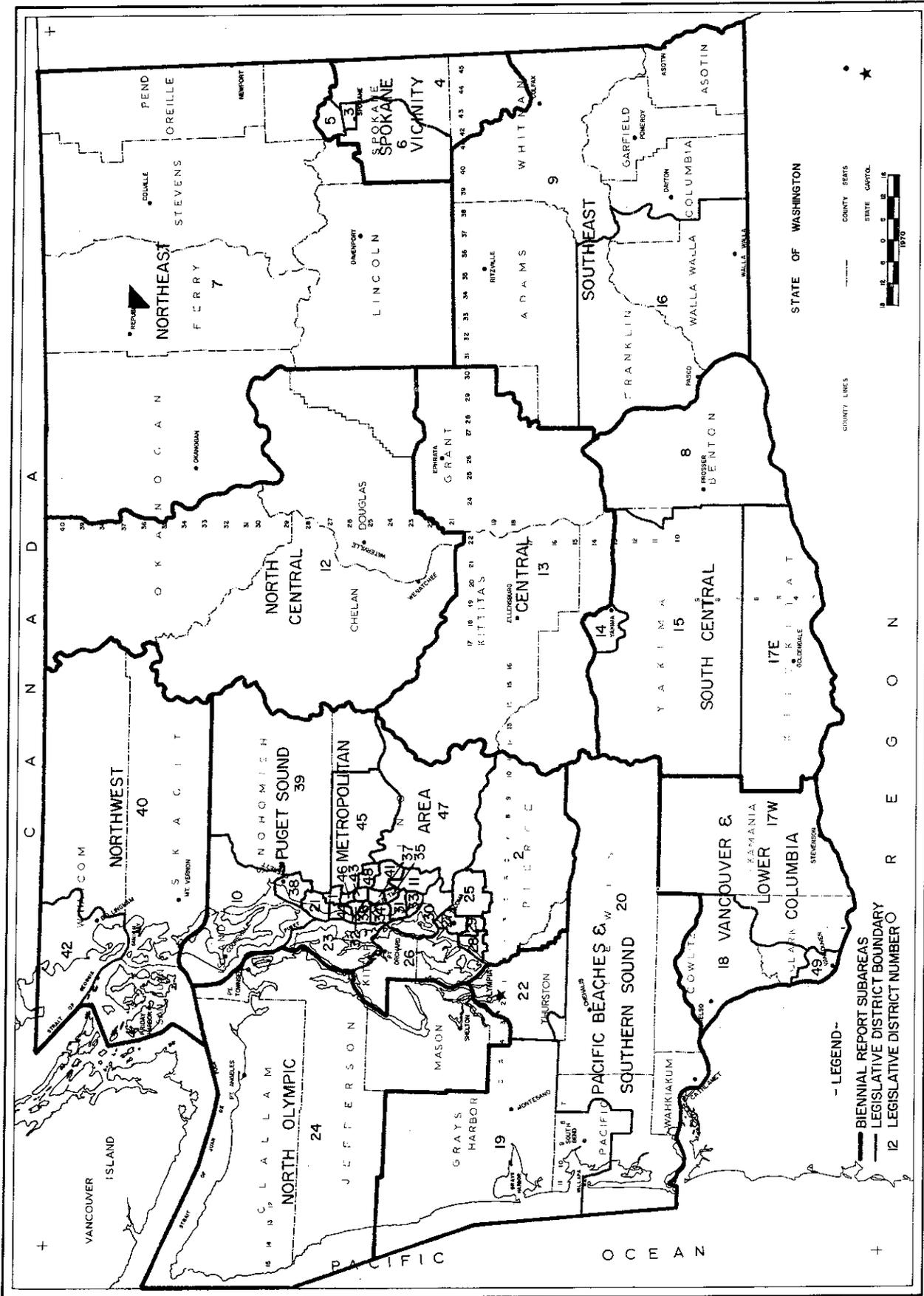


Figure 23
 Discussion Areas—Legislative Districts

Elwha Indian Water Rights

The statewide issue of Indian Water Rights, as discussed earlier in this report, primarily relates to the Indians' reserved rights to water as part of their original treaty rights. Indian tribes throughout the state are claiming that neither the tribes nor any non-Indian landowners within a reservation are required to file for water rights with the State.

In this particular case, the situation is different. The Elwha Indian Tribe has submitted three water right applications for a total of 40 cubic feet per second from the Elwha River basin for fish propagation.

Because of this unique situation and the complex nature of the total Indian water rights issue, these applications have been referred to the Attorney General's staff for legal review prior to action by the Department. The action that will be taken on these applications may be very significant in resolution of the statewide issue.

A recent court case in Port Angeles resulted in the court upholding an order by the Department of Social and Health Services to the City of Port Angeles to improve the quality of the city's water supply from Morse Creek. As a result of this court case the City of Port Angeles is investigating an option of using the Elwha River as a source of water for municipal supply.

A major problem for the City is the unknown amount of water that would be available for city use because of the uncertainty of the Elwha Indians' water rights.

Dungeness River

A Superior Court Order of March 7, 1924, adjudicated

the waters of the Dungeness River. Certificates of water rights were subsequently issued.

The referee's Report and Final Order granted one cubic foot of irrigation water per second for each fifty acres of land irrigated with an annual irrigation season from April 15 to September 15, and with sufficient water in the ditches at all times for livestock and domestic use.

Since the original adjudication, the valley's water use patterns have changed dramatically. Agricultural lands are being subdivided and the area is converting to single family dwellings, many of which are retirement homes. As a result, the irrigation distribution systems are so run-down that significant amounts of water are wasted.

The City of Sequim has filed an application for 2,100 gallons per minute of additional water from gravels below and in hydraulic continuity with the Dungeness River to meet the water needs of its growth pattern. Because the Dungeness is closed for future appropriations, their application will likely be denied.

The 1924 adjudication did not consider fishery base-flows, recreation, aesthetics or other environmental aspects, now considered beneficial.

The Department will be initiating a review of the old adjudication by surveying existing water uses as one step towards developing a basin management plan which reflects the changing water uses and provides for current and future needs.

This situation is an example of changes that can occur over a period of time which require flexibility in managing water as a resource.

PACIFIC BEACHES AND SOUTHERN SOUND LEGISLATIVE DISTRICTS 19, 20 AND 22

This area includes Grays Harbor, Pacific, Wahkiakum, Lewis and Thurston counties and the northern portion of Cowlitz County. Local water resources issues discussed on the following pages are:

Water management in the Chehalis River Basin.

Groundwater management in the coastal areas.

Relinquishment of unused water rights.

These issues are related to two state-wide issues of particular relevance to this area. These are Relinquishment, discussed on page 50, and Water Allocation and Management, beginning on page 18.

Chehalis River Basin

On March 10, 1976 a basin management program and regulation were adopted for the Chehalis River, its tributaries, and all other streams which flow into Grays Harbor.

The majority of the Chehalis Basin is located in Grays Harbor, Thurston and Lewis counties. This basin drains an area of 2,680 square miles and has an average annual discharge of 8,120,000 acre-feet.

Study of the Chehalis River Basin began in early 1973 when the Departments of Fisheries, Game and Ecology voiced serious concerns over the environmental effects

of low in-stream flows during dry seasons. In July of 1973, DOE began a comprehensive hydrologic study of the basin. Local government and other state agencies were invited to cooperate and participate in the endeavor. The purpose of the study was to develop a water allocation plan for the drainage system that would result in the most beneficial use of the water, along with protection and enhancement of associated environmental amenities.

Commencing in August 1973, all surface water applications received by the DOE were held and no permits issued pending completion of the study and the development of a management program. Approximately 100 surface water applications were received during this interim period.

The preliminary draft of the proposed water program was released to the public in July of 1975. The public and other agencies were very helpful in providing constructive suggestions and recommendations, which were incorporated into the proposed management program.

In January of 1976, six public hearings were conducted — one in each county of the basin.

With adoption of the management program on March 10, 1976, processing of all pending surface water applications began. This was completed by April 30, 1976.

This management program will provide the basis for making day-to-day decisions for good management of this vital resource.

It was learned from this effort that 19 tributary streams previously closed to further consumptive appropriation, at the request of the Department of Fisheries & Game, as well as four other streams, were fully appropriated during the summer low flow months. It was also learned that if the state was going to protect any kind of instream flow for the future, base flows had to be established for all streams in the basin.

As more consumptive water rights are issued, additional streams will have to be closed to further appropriation.

during the low flow months to protect existing water rights and uses.

In order to assure the maximum and best use of this resource, an adjudication or a program to relinquish unused water rights will have to be undertaken. Discussions have begun with the Lewis County Office of the Soil Conservation Service to initiate a program to investigate the amount of water being used for irrigation. It is anticipated that if the SCS can provide these data, the Department can use the information as a basis for relinquishing unused water rights.

Coastal Ground Water Management

Along the ocean beaches from Moclips to the mouth of the Columbia River, the shallow aquifer (10 to 25 feet deep), which many residential owners are using for domestic supply, is subject to contamination from septic tanks and/or other surface pollution. The problem is greater on the two peninsulas, in the vicinity of Long Beach and Ocean Shores. The Department has been working with local groups and studying this problem to identify possible solutions.

Under the Federal Water Pollution Control Act, the Department is funded to examine the statewide problems of ground disposal of waste. This study is underway and should provide more information on the control of aquifer contamination problems.

One alternative solution would be to drill domestic wells nearer the center of the peninsulas. Other alternatives include installation of sewer systems, deepening and spacing of wells, or controls on building permits. All these will require further consultation with local officials to solve.

Another concern is salt water intrusion which is described in the statewide issues. There have been no significant problems with salt water intrusion to date but the potential is there because of increasing development. The communities of Ilwaco and Long Beach are both looking for additional municipal water sources at this time. Controls on well spacing, depth and pumping rates may become necessary to prevent salt water intrusion in existing & future wells.

VANCOUVER—LOWER COLUMBIA

LEGISLATIVE DISTRICTS 17 (Skamania and Clark Co. portion), 18 and 49

This area includes Skamania and Clark counties and southern Cowlitz County. The most significant local water resource issue is ground water management.

This issue relates directly to the statewide issue, Water Allocation and Management, discussed on page 18.

Ground Water Management

The rural area northeast of Vancouver is one of the most rapidly growing areas of the state. Associated with the population increase is an increase in the demand on the water resource. In this particular area, the majority of the water used is from ground water so there is concern as to whether there is enough ground water available to meet projected needs.

A predecessor agency to the DOE, the Department of Conservation, did a ground water study of this area and published a report in 1964; there has been little ground water investigation in this area since then. Another factor to be considered in water management for this area is the number of different water service companies which supply water to this area, as well as individual water supplies.

Because of these situations, Clark County is conducting a ground water study which is nearly completed. The consultant who is doing the study is developing a

computer model to predict the effect of ground water withdrawals on the aquifer. The DOE has provided some technical and staff support for this study.

The completed study will show both the present and future ground water situation based on existing and predicted populations and water usage. With this information, the Department and the local water suppliers will be able to develop a water management plan to ensure the most efficient use of the resource.

PUGET SOUND METROPOLITAN AREA LEGISLATIVE DISTRICTS 1, 2, 10, 11, 21, 23, 25-39, 41 and 43-48

This area comprises all of Island, Snohomish, King, Pierce and Kitsap counties, and a small portion of eastern Thurston County. These counties were grouped together for this discussion because of the common urban nature of the major water resources issues. These include:

Ground water management in Island County

Water management in the Snohomish River Basin, Cedar River Basin and Kitsap Peninsula

River flow management and public safety

These issues relate directly to Water Allocation and Management discussed on page 18, and to Public Safety discussed on page 30.

Ground Water Management in Island County

In 1968, the Department of Water Resources published Water-Supply Bulletin No. 25, "Ground Water Resources of Island County." The Department of Ecology is updating this report with data on current water levels and chloride concentrations and comparing these with original data. A slight drop in the water table in the rapidly-growing Oak Harbor area is the only trend detected thus far. Continuing investigations will define the limits of the Oak Harbor problem area and define and quantify small, local areas of known or suspected salt water intrusion.

Snohomish River Basin

The Snohomish River Basin has high environmental values, but its location subjects it to the demands of rapidly-developing urbanization. Water quantity and quality are two important parameters enticing developmental projects, but which are also impacted in numerous ways.

Competition between major basin users is keen, with agriculture, forestry, water supply, recreation, rural development and others competing for a share of this resource. Flooding is an annual problem, with damage occurring in the mid-lower basin. A "Level B" study

to focus on the institutional aspects of these problems and issues was requested by Governor Evans on October 3, 1974, and approved by the Pacific Northwest River Basin Commission on December 11, 1974. Federal approval and funding is expected; initiation of the study is scheduled for October, 1977.

Future water demands in this basin can be met if agreements and priorities are established now. This includes regional coordination of municipal water, industrial water and other needs, and the prioritization with adjoining basins, such as the Cedar and Green, which supply municipal and industrial supplies to Seattle and Tacoma.

A brief analysis of Seattle's water supply from the Cedar-Tolt system and its effect on the Snoqualmie system provide an example of the necessary coordination.

The Corps of Engineers is studying the feasibility of structural and operational modifications to use the Masonry Dam on the upper Cedar River as a multi-purpose facility for flood storage potential, increased municipal and industrial water supply, and fisheries enhancement. Additional water from the Cedar-Tolt system may be needed to supply the rapidly growing east side (Bellevue) area of King County. The multi-purpose concept, which increases the municipal and industrial supply capabilities and incorporates flood damage reduction, along with the ancillary effects of fish production, appears to be feasible.

Bellevue and other east side water districts now purchasing water from the City of Seattle are seeking the best source of water for their citizens. They have filed applications with DOE for 250 cfs from the Snoqualmie River system diverted from one of three alternative sites. One concept is to obtain water from a multi-purpose dam on the North Fork of the Snoqualmie River, a project under study by the U.S. Army Corps of Engineers.

If Bellevue and the other water districts participate in development of this multi-purpose dam for their water

supply, or if they develop diversion works of their own on the main stem, there may be no need for the multi-purpose Masonry Dam Revision Study on the Cedar River or for an additional pipeline to serve the east side area.

Conversely, if Bellevue and Seattle enter into an agreement making the Cedar River—Masonry Dam project viable, the North Fork Multi-Purpose Dam may not be feasible.

Continued cooperative planning between all involved agencies is vitally important to ensure optimum utilization and protection of the water resources of this and adjacent basins.

Cedar River Basin

The Cedar River—Lake Washington Basin is located almost entirely in King County. Water resource planning is a continuous process in this basin. The Cedar River is the major source of water supply for the Seattle metropolitan area and it supports one of the largest runs of sockeye salmon in the state. Cedar River water is also required to maintain lake levels in Lake Washington and to operate the ship canal locks. Because of this diversified use of the Cedar River and the absence of a quantified water right for the City of Seattle, managing the water resource for the public's interest has become very difficult and complicated. A basin management plan now being developed will address these issues.

Recently, DOE established an agreement among the City of Seattle, State Departments of Game and Fisheries, and the Corps of Engineers to negotiate a long-lasting operating procedure and minimum flow for the Cedar River. Negotiations are expected to require approximately six to nine months and result in agreed-upon flows to protect fish runs, lake level, and ship canal lock operation, while not eliminating the benefits to municipal supply and flood control which can be derived from Masonry Dam improvements.

A flood damage reduction study on the Cedar River by the Corps of Engineers is scheduled for completion in late 1977. The recommended plan calls for a multi-purpose project which, if implemented, should provide better distribution of the limited supply of water.

This plan calls for pumping during low flow periods to provide additional flood water storage behind the Masonry Dam and to utilize existing dead storage for municipal and industrial supply enhancement. It also includes flood plain management measures.

The Seattle Water Department is conducting a Metropolitan Water System Study which will provide a comprehensive water supply plan for the entire service area.

Kitsap County

A recent concern of Kitsap County residents has been construction of the Navy's Trident submarine base at Bangor. A 1975 USGS study to determine how much water is available to support this activity and the increased county needs indicates the anticipated 18 to 21 million gallons per day needed in the Trident impact area could be provided by local surface and ground water sources.

The Trident impact area consists of about 220 square miles and extends from Port Gamble on the north to the valley of Blackjack Creek south of Port Orchard, and from Puget Sound on the east (including Bainbridge Island) to Hood Canal on the west.

The estimated 1970 water use in this area was about 13 million gallons per day, about nine million gallons of which came from surface water sources and about four million gallons from ground water. The additional five to eight million gallons per day needed to support the Trident activities must come from ground water sources and preliminary aquifer evaluation indicates adequate supplies to satisfy these requirements.

The report suggests monitoring chloride concentrations to determine if saltwater intrusion occurs when large-scale ground water withdrawals from the lower or main aquifer are attempted in areas adjacent to saltwater. Preventative measures such as proper location and spacing of wells, adequate casing and pumping restrictions may be necessary to reduce and/or prevent saltwater intrusion.

River Flow Management and Public Safety

In late July 1976 a tragic event occurred on the Stuck River near the town of Pacific, close to the line between Pierce and King counties. Two young girls were drowned when swept downstream by sudden high water.

This high water was caused by the almost simultaneous release of water from the federally-operated Mud Mountain Dam (about 20 miles upstream) and the rapid closure of Puget Sound Power and Light's diversion for Lake Tapps.

The release from Mud Mountain Dam was part of an annual maintenance procedure for flushing out sediment. The Lake Tapps diversion was shut off rapidly to avoid the anticipated heavy silt load into Lake Tapps. This combined action raised the flow in the Stuck River from approximately 100 cfs to about 2,500 cfs in only a few minutes.

DOE conducted an investigation of these events to determine the factual situation and the final report was published in August, 1976. The report included an examination of the possibility of such events occurring in other areas of the state.

Some of the major findings of the report were:

- * The state must have clear-cut authority to control the rate of change of flow on any stream or river resulting from man-made structures or their operation.
- * There is a need for a flood warning and communications system on river systems with controlled flow releases.

- * A study must be made on each river system with controlled flow releases to determine accurate flood profiles and flood crest travel time.

As discussed in the Statewide Issues section on public safety, the Department is introducing legislation to correct these deficiencies to the 1977 Legislature.

NORTHWEST LEGISLATIVE DISTRICTS 40 AND 42

San Juan, Skagit and Whatcom counties include legislative districts 40 and 42. Local water resources issues discussed on the following pages include:

- Water management in the Nooksack River Basin
- Point Roberts water supply
- Salt water intrusion on the Lummi Peninsula
- Cascade Lake adjudication
- The raising of Ross Dam

These issues relate directly to Adjudications, discussed on page 46, and to Water Allocation and Management, discussed on page 18.

Nooksack River Basin

The Nooksack River Basin occupies most of western Whatcom County. The Nooksack is the largest river in this area and drains 826 square miles. The Sumas River drains 52 square miles and the Upper Chilliwack River drains 186 square miles into the Fraser River system in British Columbia. Coastal streams, such as California, Dakota and Terrell creeks, drain 259 square miles into the Strait of Georgia. Most of the basin's streams have either been administratively closed to further appropriation or permits issued are subject to low flow provisions, as a result of recommendations from the Departments of Fisheries and Game.

A water resource management study has been undertaken for the Nooksack Basin to deal with water management issues in a comprehensive fashion. Discussions with local officials resulted in the following water management issues being identified for consideration in the basin study:

- * How will future water rights be handled regarding water availability and base flow protection? (This is particularly critical since the area is experiencing rapid urban & recreational home development).
- * How do the Indian water rights affect this Basin? (The Lummis have a hatchery within the basin and an extensive aquaculture program.)

- * Is the hydraulic continuity between surface water and ground water supplies critical for future water needs and what is the status of ground-water availability?
- * What should DOE do about the fact that British Columbia is considering use of Sumas River water to irrigate 3,000 acres along the river, while Washington has already closed the river to further diversion in order to provide adequate water for fisheries interest? (This discontinuity in water management is to be dealt with immediately.)

In addition to addressing these problems and issues, this study will review existing stream closures, multi-purpose schemes for flood damage reduction and municipal and industrial water supply, the need for additional stream closures, and the need for base flows to protect in-stream uses.

The current schedule calls for the study to be completed and a program adopted by the fall of 1977.

Point Roberts

A critical water shortage occurred in 1973 at Point Roberts, when the British Columbia government refused to sell this isolated point any water because of a policy of "Canadian resources for Canadians." Water District No. 4 trucked water from Blaine to provide the minimum needs for Point Roberts. Water District No. 4 plans to build a five-million-gallon storage reservoir which will serve 2,000 dwellings with 25 percent more water than Point Roberts residences presently are supplied.

Limited ground water storage prevents extensive ground water development on the Point; therefore, further development will require an external water supply. There have been many schemes, mostly dropped shortly after their inception. The most recent would pump water from Blaine to Canada, with Canada furnishing water to the Point. This problem is being considered in a comprehensive water supply plan required for Referendum 27 funding through DSHS.

Lummi Peninsula (Lummi Indian Reservation)

The Lummi Indian Reservation covers this entire peninsula, so water rights are being handled according to DOE Indian reservations policy, as discussed earlier in this report under Statewide Issues. Some saltwater intrusion problems have also been identified and DOE's regional office is collecting samples and measuring water levels to monitor the situation. Although chloride concentrations in some wells are above normal, there has been no serious contamination. Increased use of groundwater in this area could increase intrusion problems. A comprehensive groundwater management program may be necessary.

Cascade Lake

Mountain Lake and Cascade Creek on Orcas Island were adjudicated in December 1970. Rosario, Inc., was granted Class I priority to divert 0.5 to 3.0 cfs from Cascade Creek into Cascade Lake. The previous owner of Rosario dammed Cascade Lake, raising it about 10 feet. This was done before the Moran State Park land grant to the state. About two years ago the present owner of Rosario established an additional diversion from Cascade Lake to furnish water to a newly-developed part of the estate. The State Parks and Recreation Commission objected to this diversion, not recognizing Rosario's claim to the top 10 feet of Cascade Lake.

To quantify the vested rights claimed by Rosario, Inc., and to resolve the differences between State Parks and Rosario, Inc., and adjudication of waters in the Cascade Lake basin has been started. Summons have been served on all property owners in Cascade Lake drainage as a first step.

NORTH CENTRAL LEGISLATIVE DISTRICT 12

This area comprises all of Chelan and Douglas counties and portions of Grant and Okanogan counties. Local water resources issues include:

Adjudications

Duck Lake and Sagebrush Flats — ground water problems

Water management in the Methow River Basin.

These situations directly relate to Project Development and Financing, discussed on page 36; Adjudications, discussed on page 46, and Water Allocation and Management, discussed on page 18, all of which are statewide issues.

Ross Dam

In 1920, the City of Seattle submitted an application for the appropriation of 3,500 cfs of Skagit River waters for power generation. A permit issued in 1921 set forth a schedule requiring construction to begin in 1924, with completion and full water utilization to begin by 1930. The City of Seattle gave due notice that construction had been started, but thereafter, several requests for extension to complete construction were submitted; all were approved by predecessor agencies of the Department of Ecology.

A companion application for a reservoir permit was filed in 1926. A permit was issued in 1943 for construction of a dam 665 feet high storing 3,800,000 acre-feet of Skagit River and Ruby Creek water. This permit included a schedule indicating construction had begun and was to be completed by 1949. Construction to a height of 540 feet was completed in 1949, creating a 1,405,000 acre-foot reservoir; according to the City of Seattle, this is 79½ percent complete in terms of water use. Extensions of this construction schedule were requested and granted.

In January 1971, DOE, after consulting the Ecological Commission, determined that it would be in the state's best interest to hold the current request for extension of the construction schedules. The City of Seattle's interests would remain in good standing in DOE files, pending a completion of the application to the Federal Power Commission (FPC) to raise Ross Dam to its ultimate elevation.

At public hearings, DOE actively opposed Seattle's request for a license amendment. The Administrative Law Judge hearing the application recommended to the FPC that the license amendment be granted despite the state's objection. As of September 1976, the FPC had not reached a decision.

Adjudications

A major problem in this area is the lack of completed adjudications. No major stream has been adjudicated here, although the Methow, Twisp, Chewack and other rivers should be. Eighteen tributary streams have been adjudicated.

A large percentage of the lands were irrigated prior to the enactment of the Surface Water Code in 1917 and therefore the validity or extent of the water rights have not been confirmed. The uncertainty of the rights is difficult for the land owners involved. It also makes it very difficult for the Department to assess water availability and its effect upon existing rights in current water right applications cases. Two area streams, Wolf Creek, a tributary of the Methow River, and Chumstick Creek, a tributary of the Wenatchee River, have had adjudications started but not completed. Completion of

these two adjudications would enable DOE to resume processing on 39 water right applications, some of which have been inactive for several years. Completion would also quiet title to several dozen other water rights on the streams. During a public meeting in October, 1976, residents of the Chumstick Creek basin unanimously agreed that a petition for adjudication should be submitted to DOE.

Duck Lake Subarea

This 3,500-acre area, approximately one and one-half miles northwest of Omak, has potential for agricultural development and has been subdivided into many five-to-forty-acre parcels of land. Ground water, from the shallow and unconfined aquifer system in continuity with Duck Lake, is the proposed water supply. Another problem besides the limited water availability is that some of the ground water in the subarea comes from waters artificially stored in Duck Lake by the Okanogan Irrigation District.

Some 14 ground water permit applications are being held, pending adoption of management regulations for the area. To draft the regulations, the proportion of public waters and artificially-stored water must be determined. Such a study was scheduled for completion in the fall of 1976, and regulations will be drafted before mid-1977.

Current indications suggest that the present level of development can overdraft the ground water supply in the subarea if water is not artificially introduced to supplement that occurring naturally.

Sagebrush Flats

This potentially irrigable 30,000-acre area is approximately 10 miles northwest of Ephrata, bounded on the west by Moses Coulee, on the east by Lake Lenore, on the north by State Highway No. 2 and on the south by the Beezley Hills. All irrigation would be from ground water.

Since early 1975, DOE has received about 50 applications for ground water permits in this area including 30 from the Department of Natural Resources (totaling 48 wells) to irrigate up to 21,160 acres. Two private-property owners have applied for six ground water permits for a total of nine wells to irrigate 2,200 acres. Existing water rights cover about 1,000 acres, with the largest single right affecting 300 acres.

Holders of prior water rights in the area expressed concern when the public notice of these applications appeared in the local newspapers. Responding to strong public sentiment, DOE held a public meeting in Ephrata in October 1975, to explain and discuss the area development, emphasizing a "go slow" approach for new permits in Sagebrush Flats.

A proposed permit was appealed to the Pollution Control Hearings Board, which remanded the case to DOE for additional study. During the 1976 irrigation

season, DOE installed a continuous-reading recorder in an observation well adjacent to the newly-authorized production well; it also made manual measurements of water levels in numerous other wells through the 1976 season. The collected data were reviewed and submitted to the Hearings Board by DOE as the Hearings Board required. Further action will be based on the Hearings Board review of the data submitted by DOE.

Methow River Basin Program

The Methow River Basin occupies the western portion of Okanogan County. From its headwaters in the northeastern portion of the Cascade Mountains, the Methow River flows southeasterly for about 60 miles to the Columbia River at Pateros. The principal tributary streams are the Chewack and Twisp rivers. The Methow River has an average annual flow of 1.2 million acre-feet.

As a result of the seasonal distribution of precipitation and runoff, there is often a shortage of surface water during the irrigation season, especially in the tributary streams. This late summer water shortage results in conflicting demands for water for different activities in the basin. In addition, a major ski resort complex and increased mining activity are being considered in the Upper Methow Basin. Such activities are major concerns to many of the residents of the basin.

In response to the increasing pressure on the Methow Basin's high quality land and water resources, the Department of Ecology has developed a water resources basin management program for the Methow River and its tributaries. The program (a) protects existing rights, (b) sets forth "base flows" necessary for the preservation of instream values, (c) establishes priorities of beneficial use, (d) closes certain streams and natural lakes in the basin to further consumptive appropriation (with certain exceptions for single-domestic and stock water uses), (e) establishes quantities of public water available for future appropriation by stream management unit, subject to the beneficial use priorities, and (f) sets forth water resource administrative procedures.

The policies set forth in this program relate to the Methow Basin's hydrologic conditions with the current level of development and provide for future development with appropriate protection of instream needs. The program consists of the program document, the water resources management regulation (Chapter 173-548 WAC), and the Environmental Impact Statement.

The Methow River Basin Management Program is the result of three years of work by the citizens of the basin and DOE. The citizen advisory committee policy statements and the results of their basin-wide questionnaire were utilized by the department in the formulation of the management program. The residents of the Methow Basin were very active throughout the planning process and provided valuable input to DOE.

After the adoption of the water resource management regulation in late 1976, the Department will begin to process the water rights applications that were retained during the plan formulation period.

The Methow River Basin Water Resources Management Program establishes flexible yet responsible policies for the management of the water resources of the Methow River and its tributaries, and includes provisions for periodic review to assess the need for program revision as conditions in the basin change.

The Methow Level B Study has also been completed. The Level B Study deals broadly with water and related land resources and makes a number of specific recommendations. The development and adoption of the Methow River Basin Water Resources Management Program is one of the Level B recommendations (see Page 52, for further information on the Level B Study program).

CENTRAL LEGISLATIVE DISTRICT 13

This legislative district comprises all of Kittitas County and portions of Grant and Yakima counties. Local water resources issues include:

Ground water management in the Quincy Subarea

Adjudications in the Kittitas Valley

Water management in Wenas Valley

These problems relate to Adjudications, discussed on page 46; Water Allocation and Management, discussed on page 18, and Public safety, discussed on page 30, all statewide issues.

Quincy Ground Water Subarea

The Quincy Ground Water Subarea shown on Figure 24 includes approximately 1,000 square miles mostly in Grant County, with minor areas in Adams and Douglas counties. It has been identified as a ground-water problem area because:

- * Ground water rights already issued appropriate amounts believed to be nearly equal to natural recharge.
- * Naturally-occurring ground water is supplemented by artificially-stored ground water, resulting from percolation of surface water used for irrigation within the Columbia Basin Project. Ground water management is complicated by commingling of the artificially-stored and naturally-occurring ground water.

Background-Accomplishments

On January 5, 1967, the Washington State Department of Conservation reported by memorandum to the Columbia Basin Project Office of the U S. Bureau of

Reclamation Project that the state-authorized volume of ground water rights in the Quincy Basin area amounted to 59,341 acre-feet per year (AF/yr). The memorandum further pointed out that applications had been filed for an additional 10,405 AF/year of ground-water withdrawals from the Quincy Basin and concluded that ground water appropriated in the Quincy Basin area was probably at or near the natural recharge capacity.

Because of this finding, the state, in cooperation with USGS, undertook a five-year study of ground water in the project area. Washington agreed with the Department of Interior, Bureau of Reclamation not to authorize additional ground-water withdrawals within the Quincy Basin during the study period. It was also agreed that all state-granted permits for ground water withdrawals within a specified surrounding area (subject to artificial recharge) would not be processed to become certificates of water right. These agreements were entered as orders of the former Washington State Department of Water Resources (DWR Dockets 67-3 and 67-4, combined in 1967 into Chapter 508-14 WAC).

Upon completion of the five-year study in late 1972, the Department established the present Quincy Ground Water Subarea by adopting Chapter 173-124 WAC. Subarea establishment was justified by the study which showed total Quincy Subarea natural recharge to be 105,000 AF/yr, (61,000 acre-feet as surface water in Moses Lake, Rocky Ford Springs, Soap Lake and spring flow). The Department had, however, authorized ground-water withdrawals totaling 155,417 AF/yr against this resource in the subarea.

Some ground-water withdrawals were authorized by special Bureau licenses during the five-year study according to the agreement between the Bureau and DOE. This is described in more detail in WAC 508-14. The ground-water withdrawal licensee filed both an

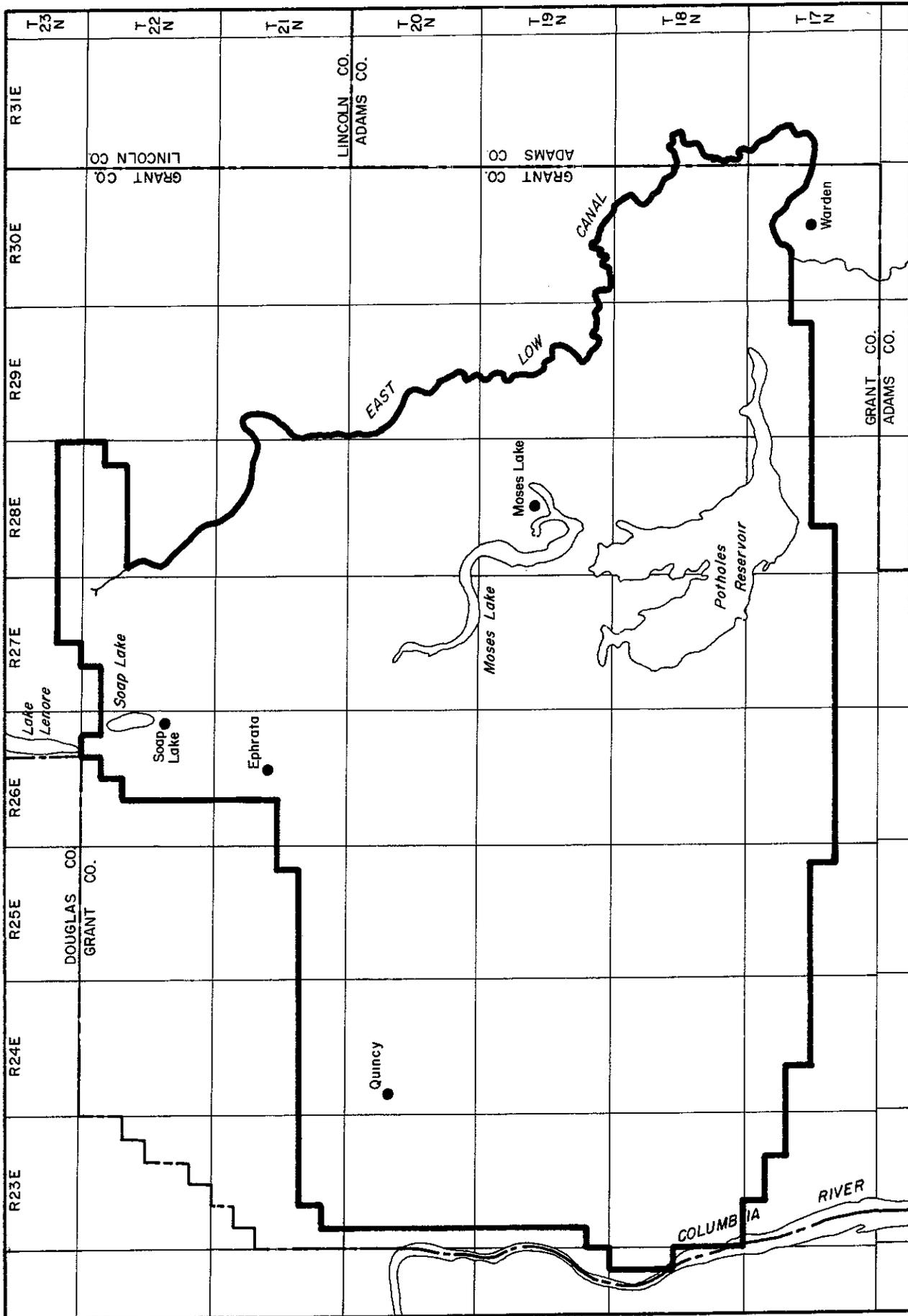


Figure 24
Quincy Ground Water Sub-Area

application for a license from the Bureau and an application to appropriate the public ground waters of the State of Washington. The dual application provided that the licensee could continue to withdraw ground water after study completion if the study revealed that public ground water was in fact available for appropriation.

DOE received a total of 143 notices of intention to use this ground water, 123 of which were granted a Bureau license. Ground-water withdrawals under this system in 1974 amounted to approximately 72,000 AF/yr, to irrigate about 18,000 acres of land. This withdrawal is in addition to the 155,417 acre-feet authorized under state rights mentioned above.

Acting in accordance with State Law (RCW 90.44.130), in May 1973 the Bureau filed a declaration of ownership of artificially-stored ground water with the Department. The Bureau's claim was for 3,498,000 acre-feet of ground water artificially-stored in the Quincy Subarea, 614,142 acre-feet of which were withdrawn and used each year by the Bureau; this water was replaced in the Project by deep surface water percolation imported by the Bureau. After investigation, DOE ruled in favor of the Bureau's claim to storage and use of the artificially-stored ground water, entering its findings as an Order, Department of Ecology Docket No. 74-772, dated January 8, 1975. The Department investigation showed that according to the Model Study, 3,493,142 acre-feet of ground water were artificially stored in the Quincy Subarea by spring 1973, 614,142 AF/yr of which were withdrawn annually for Bureau use. Therefore, DOE accepted the Bureau's claim for the amounts of artificially-stored and used ground water; acceptance was conditional on DOE's right to manage the withdrawal and use the artificially-stored ground water. DOE found that the ground water artificially stored by the Bureau was between land surface and the top of the public ground waters, as measured in October 1949. The Department also tentatively concluded that the depth of commingling between public ground water and artificially-stored ground water was limited to the top 200 feet of basaltic rocks that underlie the Quincy Subarea

Recent Accomplishments

To clarify procedures to be followed in authorizing the use of artificially-stored ground water under a declaration accepted by the Department, DOE adopted WAC 173-136 on January 8, 1975. This general regulation includes separate provisions for managing artificially-stored ground water within specific ground water areas, subareas, or zones. The regulation for management of The Quincy Subarea management regulation was adopted on January 8, 1975, as Chapter 173-134 WAC.

The management regulation sets forth the following:

- * Procedure to be followed in allocating water rights to artificially-stored ground water

- * Quantities of water available per year for allocation
- * Provisions for compliance with water-use right
- * Regulation and enforcement procedures
- * Implementation of the Technical Committee
- * Procedures to review departmental action before the Pollution Control Hearings Board.

Current Direction

Permits are not presently issued in the Quincy area for naturally-occurring ground waters or for artificially-stored ground waters. New applications accepted are being held for priority date only.

Applications for artificially-stored ground water will be held until the end of the 1978 irrigation season, and subsequent evaluation of permits for artificially-stored ground water from 328 applications processed during February and March 1975. As of September 1, 1976, 213 applications for artificially-stored ground water were pending.

Applications for naturally-occurring ground water are also being held, pending further investigation of the deep aquifer (results should be available during 1977). Action on the pending applications for natural ground waters will be decided at that time.

Recommendations

Because of the complex nature of the water rights in this area, continued updating of data and monitoring of the water rights is needed.

Adjudications — Kittitas Valley

The Kittitas Valley was settled early in the development of Central Washington. Prior to 1900, water availability problems developed in the streams tributary to the Yakima River. As a result of this, the courts attempted to determine water rights. Some pre-1917 decrees are either incomplete or unclear regarding lands to which the waters are appurtenant.

Manastash Creek has two of these early mutually-conflicting determinations. Substantial changes in irrigation practices over the years necessitate a general adjudication to resolve the conflicts and changes. Rights to the use of waters from Taneum, Reecer, Coleman, Caribou, Parke-Bushey-Warm Springs, Little and First creeks are similarly clouded.

Numerous court actions over many years have so complicated and clouded the water rights of the Wilson-Naneum Creek watershed that every year serious conflicts arise among the water users. A partial adjudication of the upper valley (i.e. above the High Line Canal) was conducted by the Department of Ecology in 1973. There are still uncertainties on the lower reach of this basin which need adjudication.

The Teanaway River, Big Creek, Cooke Creek and Wenas Creek have been adjudicated.

The remaining streams in the Ellensburg area must be adjudicated to determine the landowners rights.

Construction of the High Line Canal and delivery of water to lands within watersheds of the small streams have created water right duplications that cause conflict among water users. These issues also need adjudication.

Wenas Creek

The Wenas Irrigation District dam on Wenas Creek has a structural integrity problem. Engineering studies by private consultants show that, with a full reservoir, the dam presents a hazard to downstream life and property. Some measures have been taken to lessen failure risk but additional attention is needed.

The alternative solutions are:

1. Abatement of structure
2. Modify existing dam by:
 - a) Thickening dam section
 - b) Enlarging spillway
 - c) Sealing leaks by grouting
3. Enlarge reservoir incorporating recreational features: this would require a substantial commitment of funds, possibly involving federal, state and local agencies.
4. Monitor spring runoff characteristics and provide periodic surveillance of the dam.

As an interim measure, DOE has been pursuing Alternative No. 4. Alternative No. 2 was attempted, but the owner of the dam could not finance necessary repairs. The department is presently exploring Alternative No. 3.

SOUTH CENTRAL LEGISLATIVE DISTRICTS 8, 14, 15 AND 17 (Klickitat County)

This area comprises all of Benton and Klickitat counties and the southern portion of Yakima County. Local water resources issues discussed on the following pages include:

Yakima Indian water rights

Yakima River Basin.

Little Klickitat River

Klickitat Valley ground water development.

Dead Canyon (Horse Heaven Hills) ground water management

Ahtanum-Moxee ground water management.

Hanford Reservation

Columbia River-John Day/McNary Pools.

These issues relate directly to Indian Water Rights, discussed on page 44; Adjudications, discussed on page 46; Water Allocation and Management, discussed on page 18; Management of the Columbia River, discussed on page 54, and Public Involvement, discussed on page 32, all of which are particularly pertinent statewide issues.

Yakima Indian Water Rights

General adjudication of Ahtanum Creek (1925) was greatly modified by the 1964 Ninth Circuit Court

decision, which said that the Indian rights were superior to non-Indian rights after July 10 of each year. Those waters of Ahtanum Creek which are available over and above the Indian rights may be administered in accordance with the decree.

Over 200,000 acres within the Yakima Basin are considered economically and physically feasible to irrigate. Some of these acres are within the Yakima Indian Reservation. Until the amount of Indian water rights is known, planning for full development of water resources within the basin will be limited.

DOE has 80 pending applications for ground water located within the exterior boundaries of the Yakima Indian Reservation submitted by non-Indian landowners. Action will be taken on these applications when the matter of quantification of Indians' water rights is resolved as discussed in the Statewide Issues section of this report.

The Yakima Nation is developing a series of laws or regulations which would manage and regulate water use within reservation boundaries. The possible effect of these regulations and their relationship to state and federal jurisdiction is not yet known.

Yakima River Basin

In 1905, the Bureau of Reclamation withdrew the remaining unappropriated waters of the Yakima River system for development of irrigation projects. The Bureau developed a storage and distribution system for several projects. The amount of water being used based on vested rights has not yet been defined; therefore, the

exact amount of waters allocated for these rights has not been determined, creating a serious problem in the administration of the river system and precluding regulation. In addition, many holders of these vested rights cannot offer sufficient proof of their rights to satisfy lending institutions. An adjudication of the river system is very desirable for the benefit of individual water users.

The Yakima River system above the Chandler powerhouse has been closed to further consumptive appropriation for about 30 years. There is not sufficient water within this reach of the river during low water years to satisfy all uses, including the maintenance of the fishery resource. The proposed enlargement of Bumping Reservoir on the Bumping River could reduce these problems.

Ground water supplies in certain areas adjacent to the reach of the Yakima River below Chandler are very limited and there have been numerous inquiries regarding water availability in the river. Permits granted on this reach of the river since 1969 have been conditioned to maintain a 700 cfs low flow for instream uses. There are indications that flows have been below that amount during dry years. Many relatively substantial diversions have no confirmed rights; until these claims are either established or extinguished by adjudication, uncertainties about water availability will continue. These questions probably will block development and/or cause serious regulatory problems. Two major applications pending in this area are for 89 cfs for irrigation of 4,040 acres and for 80 cfs for irrigation of 3,250 acres.

Little Klickitat River

The Little Klickitat River and tributaries are a major source of surface water irrigation in central Klickitat County. Much of the water from this source has been in use since around 1900. Blockhouse Creek, a tributary west of Goldendale, has been adjudicated. Mill Creek is before the Klickitat County Superior Court for final determination of rights. Adjudication of Bowman Creek was initiated in the 1930s, but the final decree was never consummated. The unappropriated water of the Little Klickitat River system has been withdrawn for study purposes under authority of RCW 90.54 by a regulation adopted by DOE in April, 1976. This action was precipitated by recent conflicts between various parties over both in-stream and out-of-stream use of the remaining waters of the Little Klickitat River and tributaries. The basin management program being prepared should point out the need for a determination of rights.

Klickitat Valley Ground Water Development

The development of additional quantitative data on ground water availability was required because of a rapid increase in ground water development for irrigation in the Klickitat Valley. The information needed is being developed under contract with Washington State University, and will include:

- * Hydrologic boundaries of the "surface water" and "shallow" ground water in the valley.
- * An inventory of the location, depth, diameter, production and current ownership of many existing water wells in the Klickitat Valley.
- * A determination of the hydrologic parameters of the "shallow" ground water aquifer and any possible changes in the hydrologic parameters across the valley.
- * A flow net analysis of the "shallow" ground water aquifer, which can be used to determine the hydrologic boundaries of the valley and the direction and volume of flow of ground water in the "shallow" aquifer.
- * A map which shows the thickness of sediments between land surface and the bottom of the "shallow" aquifer.
- * A definition of the bottom of the "shallow" aquifer as the depth beyond which water withdrawn from the wells drilled and cased into the basaltic rocks would have little or no effect on the flow of water in surface streams.

Dead Canyon (Horse Heaven Hills) Ground Water Management

DOE has been concerned about the use of ground water within the Dead Canyon (Horse Heaven Hills) area for some time. Individual water problems and protests over the granting of additional permits to appropriate water prompted a study of the aquifer system. Study results indicate that permits have been issued fully appropriating the predicted amount of water available for withdrawal from the aquifer.

Periodic reevaluation of the amounts of water actually developed will determine any quantities which may be available for future appropriation.

Ahtanum-Moxee Ground Water Management

Yakima County has experienced a steady development of ground water over many years with some uses dating back to 1900 or earlier. Some ground water investigations were conducted in the Moxee and Ahtanum areas during these early years. Ahtanum information was updated during the trial between Indian interests and the Ahtanum Irrigation District. Due to the loss of surface water rights in the Ahtanum after July 10 of each year, a large number of applications were submitted to appropriate ground waters to replace the surface waters. DOE was concerned because of possible overdraft and local interference between wells. Much early development in the Moxee area came under the Roza project; ground water developments were often abandoned in favor of delivery from the Roza Canal. Development interest east of the Roza project resulted in the drilling of irrigation wells at a rather fast pace. These combined factors within the Ahtanum-Moxee area prompted the

development of a mathematical ground water model for the area by Battelle Northwest under contract to DOE. Using this model as a management tool, DOE will be able to make more quantitative judgments regarding the availability of waters within a given aquifer. The model was recently put to use.

Hanford Reservation

A potential problem relating to recent ground water developments for irrigation was recognized during 1974. The Atomic Energy Commission (now ERDA) expressed concern that return flow irrigation water would alter flow patterns, which might affect the sensitive ground water regimen within the Hanford Reservation.

DOE has established procedures with ERDA to advise of pending ground water applications and recent developments within the area of concern, the Cold Creek and Black Rock Spring drainages. Ground water monitoring provisions have been stipulated on permits issued during the last several years.

If the present development trend continues, additional monitoring may be necessary to determine the need for remedial measures.

Columbia River-John Day/McNary Pools

A variety of interests are looking at the John Day and McNary Pools on the Columbia River as a water source. As a result, the DOE is preparing a management program which will set forth policies regarding management and use of this water. Specific quantities of water for future uses is of special importance.

The water management program will document the state's interest in allocation decisions among various

uses of the Columbia River waters. This is especially important in dry years when trade-offs must be made between competing uses. Most importantly, the program will be an explicit expression of state posture on issues such as in-stream flows and uses not directly under state regulations on the Columbia, such as hydroelectric power. Draft policies have been developed and are now undergoing agency and public review.

There is an intense interest in the irrigation development of the Horse Heaven Hills. Collectively, the five pending applications listed below represent the diversion of a substantial quantity of water from the Columbia River.

Application No.	Quantity (cfs)	Irrigated Area (acres)
S4-23047	75	4,018
S4-23052	82	3,600
S4-23311	550	29,000
S4-23313	290	15,500
S4-24054	757.5	34,350

The DOE also is considering a power company application for appropriation of 270 cfs for a proposed nuclear power plant.

Emerging from the work to date is support for entering into an agreement with the State of Oregon for the management of the Columbia River, pending the development and ratification of an interstate compact for the Columbia-Snake River system. Also, Oregon, Idaho, and Washington are presently developing the scope of study for a regional water rights information system. Development and funding of the study is being done under sponsorship of the Regional Commission.

NORTHEAST LEGISLATIVE DISTRICT 7

This area comprises all of Pend Oreille, Stevens, Ferry and Lincoln counties and parts of Spokane and Okanogan counties. Local water resources issues include:

- Water rights administration within the boundaries of the Colville and Spokane Indian Reservations.

- Water management in the Little Spokane River Basin

- Water management in the Okanogan River Basin.

- Ground water management in the Odessa area.

- Ground water management in northern Grant County and northern Lincoln County.

These issues relate to Project Development and Financing, discussed on page 36; Indian Water Rights, discussed on page 44; Water Allocation and Manage-

ment, discussed on page 18; and Public Involvement, discussed on page 32; all of which are pertinent state-wide issues.

Indian Water Rights

The Colville and Spokane Indian Tribes have reservation lands within Legislative District 7. The Spokane Reservation lies adjacent to the north bank of the Spokane River in southern Stevens County. Chamokane Creek discharges into the Spokane River and flows southerly along the eastern boundary of the reservation. The Colville Reservation lies between the Okanogan and Columbia rivers and Lake Roosevelt in the south half of Okanogan and Ferry counties.

DOE is presently involved in federal litigation with the Spokane Tribe on the Chamokane Creek water rights

issue. The Chamokane Creek watershed includes lands outside the reservation boundary.

The Spokane Tribe has recently issued a water use authorization to Western Nuclear for water from the Spokane River for its proposed uranium mining and milling operation in the southern part of the reservation. DOE questions the tribe's jurisdiction in this matter. Within the Spokane Reservation, three ground-water applications and one surface-water application are being held and eleven applications are being held within the Chamokane Creek watershed outside the reservation.

The Department is also involved in federal litigation with the Colville Tribe concerning a water rights issue. Because of the pending litigation, 56 applications for water right permits on the reservation are being held. These applications range from small quantities for domestic and stockwater use to over 1,000 gallons per minute for irrigation uses. Many applications have been held inactive for several years, with no immediate prospects for change. A court decision on the litigated cases is of utmost importance.

Little Spokane River

The Little Spokane River is a non-navigable stream with headwaters in southern Stevens, Pend Oreille and northern Spokane counties. The main stream flows in a southerly direction in Spokane County to a point ten miles north of the city of Spokane; it then flows westerly, where it joins the Spokane River approximately ten miles northwest of Spokane. Use of the lower reaches of the river has gradually changed from farming, dairying and cattle-raising to the current predominant suburban development.

Conflicts among various individuals and groups over the use of the drainage basin waters has increased over a period of years. In 1972, a group of basin residents appealed a permit to appropriate public waters from the Little Spokane River to the Pollution Control Hearings Board. DOE had granted the permit to a rancher for irrigation. The Pollution Control Hearings Board reached the following conclusions:

1. The accepted use of public waters are gradually changing.
2. Riparian rights have given way to non-riparian appropriation for beneficial use.
3. Aesthetic and recreational uses of public waters have become as important as irrigation.
4. The general condition (flow and physical and chemical quality) of the Little Spokane River has deteriorated.
5. The Department of Ecology is responsible for establishing the minimum water flows on the Little Spokane River.

Because of the existing conflicts among water uses and in order to comply with the conclusions of the Hearings

Board, DOE withdrew the public waters of the Little Spokane River until June 30, 1976, or until a water management program had been developed, whichever occurred first.

Management program preparation began almost immediately. DOE established a citizens' committee comprised of public and private sector individuals and solicited public input through individual contact, public meetings and workshops. Through these meetings, DOE was able to identify the public interest and the major issues. A technical evaluation of the watershed in terms of ground and surface water uses and availability was made.

Base flows, for the preservation of instream values, were determined. Upon completion of the workshops and technical evaluation, the proposed program was presented to the public for evaluation and approval. Using the management program as a basis, DOE adopted a management regulation (WAC 137-555) for the waters of the Little Spokane Basin, effective February 6, 1976.

WAC 173-555 established base flows for specific stream management units with specified control points, provided for future allocation of waters within the drainage basin, and closed certain streams and lakes to further consumptive appropriation.

DOE issues permits subject to the base flows and other provisions established in WAC 173-555.

The major difficulty in processing the applications concerns applications for water rights from springs and unnamed streams which may or may not contribute to the flow of closed streams. DOE handles these applications individually, making a judgment regarding their contribution. If they do not contribute, then they are not subject to the closure or the low flow.

It appears that the quantity of water allocated for future appropriation in WAC 173-555 will not be sufficient to honor all the pending applications. DOE intends to establish an Advisory Group to obtain citizen input. That Advisory Group will make recommendations related to the necessity for revising the management program in the future to permit the use of the waters for the greatest public benefit.

Okanogan River Basin

The Okanogan River Basin Water Resources Management Program and the accompanying management regulation (Chapter 173-549 WAC) were adopted on August 14, 1976. The program (a) protects existing rights, (b) sets forth "base flows" necessary for preserving instream values, (c) establishes beneficial use preferences, (d) "closes" certain streams and natural lakes in the basin to further consumptive appropriation (with certain exceptions for domestic and stock watering uses), (e) establishes quantities of public water by stream management unit available for future appropriation, subject to the beneficial use priorities,

and (f) sets forth water resource administrative procedures.

The program consists of the program document, the management regulation (Chapter 173-549 WAC), and the Environmental Impact Statement, and is the result of three years of work by the DOE and the citizens of the Okanogan Basin. As the citizens worked to express their concerns and thoughts about the future use and development of the water resources of the Okanogan Basin, the DOE provided technical assistance and guidance. Through the use of the citizens' advisory committee, the department has developed a management program providing a base for decisions on future water resource allocation and use.

The Okanogan River Basin occupies the eastern portion of Okanogan County. From its headwaters in Canada, the Okanogan River flows south to Lake Osoyoos on the U.S.-Canadian border. The Okanogan continues south to the Columbia River and is joined by its major U.S. tributary (the Similkameen River) which has headwaters in both the U.S. and Canada. The waters originating in the U.S. flow northward into British Columbia before returning to Washington. Approximately 95 percent of the average annual flow of 2.2 million acre feet available in the U.S. portion of the Okanogan Valley flows into the U.S. through Canada.

The State of Washington has requested the assistance of the International Joint Commission (IJC) in resolving various water resource management problems of the international Okanogan-Similkameen River Basin. Contingency plans and/or designs have been or are being developed that would address these concerns if agreed upon by the participating entities.

Another water resource related concern is the treatment of Indian water rights. Current DOE policy is to retain water right applications (for priority purposes only) for the appropriation of surface or ground water from sources within the exterior boundaries of the Colville Reservation or from water occurring under, flowing through, or bordering on the Colville Indian Reservation.

The Okanogan Level B Study has also been completed. The Level B Study deals with water and related land resources and makes a number of specific recommendations. The development and adoption of the DOE Okanogan River Basin Water Resources Management Program is a specific recommendation of the Okanogan Level B Study.

Odesa Ground Water Subarea

The Odesa Ground Water Subarea includes approximately 1,800 square miles in Adams, Grant and Lincoln counties. This area has been defined as a critical ground-water area due to the continual decline in water levels from extensive irrigation ground-water withdrawals. The subarea is outlined in Figure 25 and

includes the farming communities of Odessa, Ritzville, Lind and Warden.

Ground water use for irrigation in the Odessa area began in the early 1960s. By 1963, the annual volume of ground water withdrawn was 14,000 AF/yr. Withdrawal increased to 44,000 AF/yr in 1966 and was accompanied by a marked decline in the ground-water level. A moratorium in 1967 on all pending applications for new water rights in the area became effective enabling a study to determine the long-term effects of large-scale ground-water withdrawals. The annual withdrawal however, increased to 117,000 AF/yr in 1970 as a result of development of previously-issued permits. Water level declines increased as a result of this additional withdrawal.

In September 1968, the Odessa Ground-Water Subarea was designated for management purposes. The Department of Water Resources Advisory Board and the Governor concurred that no action would be taken on applications received after August 14, 1967. Applications received after this were recorded for priority only.

In conjunction with the moratorium and in cooperation with the users, the Department accelerated its investigations and long-range monitoring of the ground-water response to pumping within the area. The Department also contracted with Washington State University to study the economics of ground-water pumping in the Odessa area. The cooperative studies included the construction of a mathematical ground-water model of the Odessa Subarea completed in late 1972. The model was designed to reflect the actual field conditions or static water levels as of 1970, with an annual pumping rate of 117,000 AF/yr within the basin. Verifying the known effects of present pumpage would permit predictions of the effects of future water allocations on the system.

Because of this research, the Odessa Ground Water Subarea was redefined in 1973 under WAC 173-128 and it was determined that a management regulation for this area must be enacted.

On January 25, 1974, under the authority of RCW 43.21A and RCW 90.44, a management regulation (WAC 173-130) was adopted. Minor amendments to the regulation were adopted on January 23, 1976. One provision of the management regulation established a maximum drawdown of static water levels, as measured each year, not to exceed 30 feet in three years.

Subsequent well development showed that the lowermost part of the Zone A aquifer system (as defined in the regulation) had very high water production capabilities; this led many new permit holders to drill to the bottom of Zone A. Since this source of water was unknown and undeveloped when the model was programmed, withdrawal from this zone is presently not reflected in the model. The exact overall effect of withdrawal from this lower zone is not known and is under investigation.

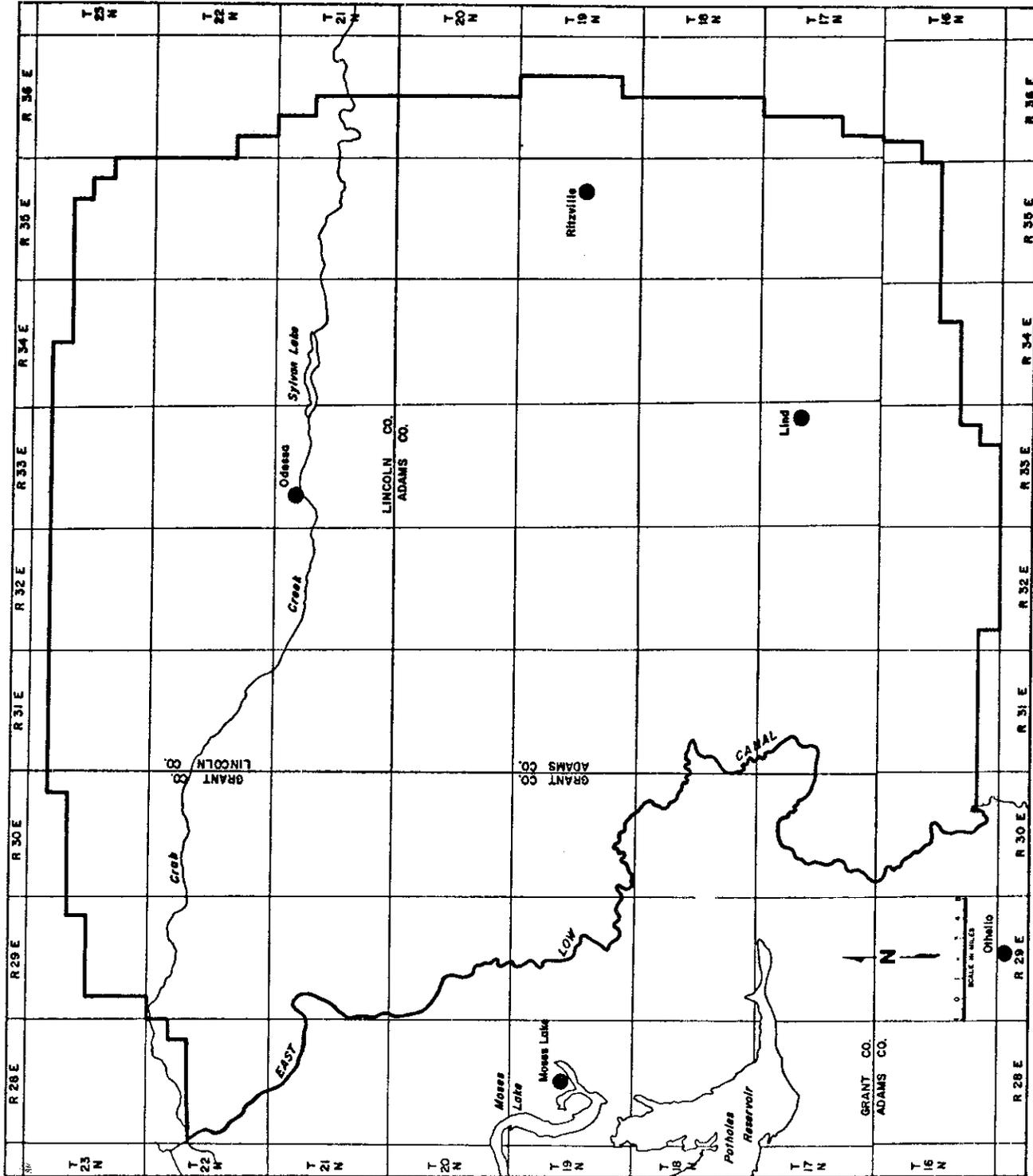


Figure 25
Odessa Ground-Water Subarea

Annual static water level measurements and annual withdrawal measurements are being made to correlate model-predicted declines with the actual measured field declines. If all new and existing wells were operating, the model could be reverified to reflect the known field condition. To date, however, many of the permitted wells have not been drilled. In many cases, these applicants are speculating on public waters and will only develop if forced to by DOE; then, in many instances, they sell the lands and water right permit.

To date, authorized withdrawal from the Odessa Basin is 265,297 AF/yr. This figure consists of 148,297 AF/yr for the new permits and 117,000 AF/yr of 1970 pumpage.

There are 157 applications pending with the Department for 234,915 AF/yr of ground water within the Odessa Basin. The computer model is being updated through the input of additional data. When this is completed, the pending applications will be evaluated and new permits issued where water is available.

Northern Grant County and Northern Lincoln County

Recently DOE has observed a marked increase in irrigation development north of the Odessa and Quincy Ground Water Subareas, bounded on the west by Banks Lake, on the north by the Columbia and on the east by a north-south line through the City of Davenport.

This area has generally been dryland farmed with only a few large irrigation projects. Many existing wells are shallow (50 to 300 feet) and have relatively low production capabilities. Domestic water is withdrawn from shallow wells and occasionally from springs. Most surface water sources, including numerous springs, provide a reliable supply for stock water and small irrigation projects.

Many surface water uses date back to before 1900 and were the primary source of water for the early homestead tracts. They remain a vital factor in many present farm economies.

Adoption of the management regulation for the Odessa Ground Water Subarea, which controls the rate of decline in the ground-water system, has resulted in a reduction in new development permits in the Odessa area. This has led to expanded development interest to the north and south of the Odessa Basin.

The area north of the Odessa and Quincy Subareas contains thousands of acres of dryland wheat and relatively undeveloped but potentially irrigable land. Recent advancements in deep basalt drilling are

attracting many potential irrigators to this area. DOE's hydrologic data is presently inadequate to evaluate long-range pumping effects within this area. The Department is particularly concerned that large irrigation projects will have a detrimental effect.

DOE has received many letters protesting applications filed in the last two years. The letter, stating the general feeling in the area, cite these new irrigation projects as based on speculation and uncontrolled development, which they say will result in a ground water decline as experienced in the Odessa Subarea. DOE has attempted to minimize the effect and ground water pumpage on surface water sources by requiring new irrigation wells to be cased below the shallow aquifers feeding these surface sources.

In some instances, the Department has required an aquifer pump test to determine the effects of pumping on surrounding ground and surface water appropriations before issuing a permit. This burden has raised the cost of initial development and will not be accepted favorably by the local dryland farm community, which lacks the capital to drill and test deep irrigation wells.

This competitive edge to outside development interests has caused irritation and is the basis for many protest letters. The local residents feel that their present source of water from shallow wells and springs should not be sacrificed to large irrigation interests, which would force the residents to bear the financial burden of seeking new water sources to sustain present operations.

The Department's requirement of pump tests and casing are a temporary solution at best. Expanded development will deplete the available water source beyond the system's recharge capabilities causing regional ground-water declines, similar to the Odessa area. DOE is considering expanding the present Odessa Model to the north to cover this area, but lack of funding has prohibited this expansion, as a new model would be required. This would entail substantial field data collection and model programming.

However, if the model could be developed and placed in use within the immediate future, DOE would have a predictive tool capable of programming development within this area. The Department then could avoid over-allocating this ground water source to the detriment of existing users.

With the experience gained in the Odessa Subarea, a set of management regulations which would define "ground water depth zones" within a subarea could be adopted for differing extents and purposes. For example, the upper shallow "zone" could be retained for domestic uses, existing irrigation and future small irrigation projects. Future permits for large irrigation tracts would require deep drilling and casing out of these upper "zones". This would preserve the presently-developed ground water sources, but allow for expanded development within the area.

SPOKANE VICINITY LEGISLATIVE DISTRICTS 3, 4, 5 and 6

This area comprises the southern portion of Spokane County, including the City of Spokane, and the northeast portion of Whitman County. The most significant local water resources issue is ground water availability in the Five-Mile Prairie area.

This issue relates directly to the statewide issue, Water Allocation and Management, discussed on page 18

Five-Mile Prairie — Spokane County

Five-Mile Prairie is a mesa located approximately five miles north of the Spokane city center. About one fourth of the 2,000-acre mesa is within the City of Spokane.

There has been much controversy over the type of development to be allowed on the Prairie since the mid-1960s. One group proposes to retain the Prairie for rural use, while an opposing group encourages residential development.

The general trend has been to subdivide farms to smaller acreages. It has been assumed that the land is suitable for the production of almost all types of crops. However, a recent report by agronomists and soil scientists indicates that less than half of the acreage can be used for hay and grain production and that the remainder is not capable of producing any crop.

The City and County of Spokane presently are establishing a Citizens Committee to assist in the

development of long-range plans for future Prairie land use. Plan development is expected to take about 18 months.

The City of Spokane has installed a main line for water service to a portion of the Prairie. Water presently is being supplied to only a very few homes within the city limits at the southern edge of the area.

Water availability on the Prairie is such that no large irrigation projects could be supported by the existing wells, which range in depth from 50 to 200 feet.

DOE's involvement has been limited to providing information and advice about the availability of ground water. Most of the water withdrawn is for single domestic supplies and therefore is authorized under the "5,000 gallons per day exemption" in the Ground Water Code. Because of this domestic use, DOE does not expect to regulate. There have been numerous complaints of short water supply. When an individual's well fails to deliver sufficient water, his only recourse generally is to deepen the existing well or to drill a new one.

Because of the continually-increasing demand for water, a community domestic water supply will probably be established in the interest of the health and welfare needs of the Prairie residents. In the interim, the shortage of water will continue to provide grounds for complaints which, in turn, increases DOE work load, especially during the summer months when water usage is high and availability of water is at a minimum.

SOUTHEAST LEGISLATIVE DISTRICTS 9 AND 16

This area comprises Asotin, Garfield, Columbia, Walla Walla, Franklin and Adams counties and portions of Whitman and Grant counties. Local water resource issues include:

Water management in the Walla Walla Basin

Ground Water management in the Odessa area (see discussion under Northeast Area)

Kahlotus Lake level fluctuation

Ground water management in Franklin County

Pullman water supply

These issues relate to the statewide issue, Water Allocation and Management, discussed on page 18

Walla Walla Basin

For the past few years, regulation problems have increased on adjudicated streams in the Walla Walla and Touchet River basins. The department's staff does not have the necessary time to devote to an effective regulation program.

DOE personnel have met with the County Commissioners and interested water users to discuss the problem and possible solutions.

The County and users want the state to hire and pay someone to regulate all adjudicated streams. DOE has taken the position that RCW 90.08 provides a means for the users to hire a stream patrolman and pay for his services on a fair share basis. The users have not

pursued this option because of the tremendous bookkeeping job required of a stream patrolman in order to collect his wages.

More recently, the County Commissioners agreed to pay, in full, for the services of a Watermaster who was hired on an annual basis in July 1976. The Department supports the county's decision to pay for the services of the Watermaster and anticipates that county funding will continue for this needed service.

Kahlotus Lake

Kahlotus Lake lies in Washtucna Coulee in north-eastern Franklin County. The total drainage basin of the area is 115 square miles and the coulee surface area is about 9 square miles. Kahlotus, the largest community in the area, is located directly west of the lake.

Historically, the water level of Kahlotus Lake has fluctuated substantially. Fluctuations between 1954 and 1968 became more pronounced and Kahlotus Lake neared total extinction several times.

As the lake level continued to decline, Kahlotus residents became more concerned and on August 15, 1974, wrote a letter to the Governor, pointing out that the waters of Kahlotus Lake were being depleted and that the lake was become a health hazard to the community because of mosquito growth in the marshy area. The Governor responded and directed DOE to investigate and determine the cause of Kahlotus Lake water level fluctuations.

A study team was sent into the area during September 1974 to survey present and past water levels of Kahlotus Lake as indicated by old beach lines. Additional data were obtained from wells in the upstream valley and adjacent to the lake. The geology of the valley and valley walls were mapped.

The study resulted in three hypotheses for the declining lake levels. The first suspected cause was below-normal precipitation for a period of consecutive years. A review of precipitation and degree-day records indicated no unusual dry cycles.

The second suspected cause was the construction of Lower Monumental Dam on the Snake River, approximately six miles due south of Kahlotus Lake. It was hypothesized that the dam intercepted artesian ground water which normally would flow toward Kahlotus Lake. The geologic study revealed the basalt aquifer, which has an artesian head at the dam site, is at a considerable depth in the vicinity of Kahlotus Lake and deep wells drilled in basalt near Kahlotus historically have been poor producers. No discernible relationship between construction of the dam and the declining lake levels was established.

The third and most likely cause was that use of both surface and ground water for consumptive purposes in the valley up-gradient from the lake is the principal cause of the declining lake level.

The results of DOE's investigation were published in December 1975. In July 1976, representatives of the Department met with the mayor and a citizens' group representative in Kahlotus to discuss study results and possible solutions to the problem.

DOE presently is working toward a solution of the problem.

Franklin County

On March 1, 1969, the Department of Water Resources adopted a regulation (WAC 508-14-010) establishing a procedure for processing applications to withdraw public ground waters within the exterior boundaries of the Columbia Basin Project in the proposed Pasco Subarea (See Figure 26). These regulations allowed permits to be issued tentatively if it appeared to the Supervisor that public ground waters were available; but no certificates could be issued until a study was completed.

An investigation program resulted in the development of a ground-water model to analyze ground water conditions in most of the Columbia Basin, including the proposed Pasco Subarea.

In the Pasco Ground Water Subarea, there are two water zones. The upper zone consists of clay, silt, sand and gravel and is most likely recharged locally by rainfall and irrigation return flow water.

The lower zone consists of basalt and interflow porous layers recharged by leakage from the upper zone; but it is likely that this zone receives most of its recharge laterally from areas beyond the subarea boundaries.

In February 1973, the United States, through the Bureau of Reclamation, had withdrawn from further appropriation all ground waters underlying a specific area within the southern portion of the Columbia Basin Project.

This area has very serious potential ground water management problems involving for the most part jurisdictional questions relating to interests of the state irrigation districts and the United States. Resolution of the problems will be a high departmental priority during the ensuing biennium to the extent of staff capability.

Pullman Municipal — Industrial — Domestic Water Supply

Continuous decline of ground-water levels around the City of Pullman remains critical. Since significant development of ground-water supply in the Pullman-Moscow area in the 1890s, the water levels in the lower basalt aquifer have declined progressively to nearly 80 feet below the predevelopment level.

A recent consultant's report for the Pullman-Moscow Water Resources Committee estimated that demand for

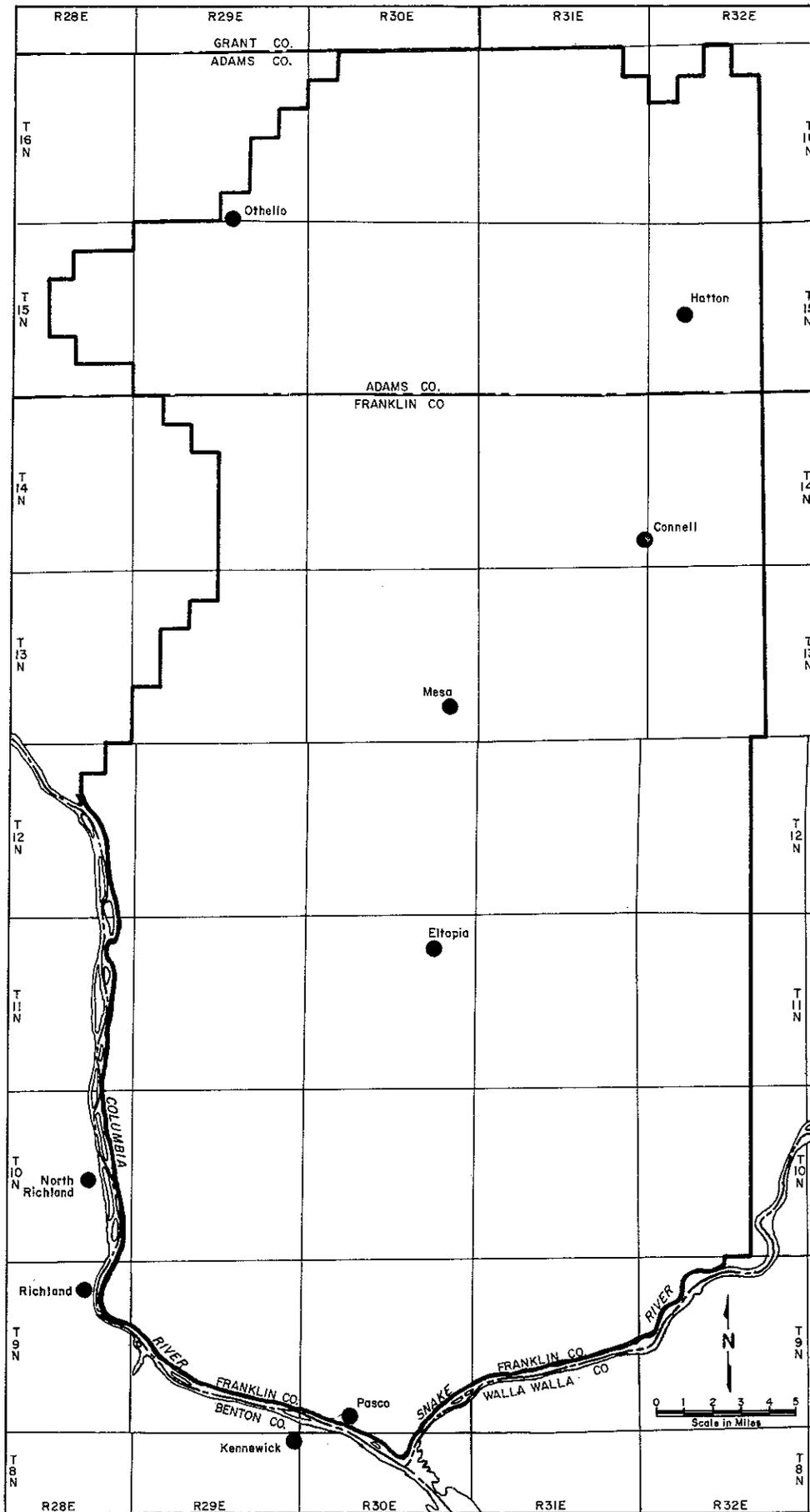


Figure 26
Othello — Pasco Ground Water Basin

municipal and domestic water supply from the Pullman-Moscow area would increase as much as three times the present withdrawal of 7,500 AF/yr by the year 2000. As a result, the ground-water level could decline as much as 60 feet below the 1975 level.

Population increases in the area will certainly cause increasing demand for ground water. Since water apparently is being removed from the system faster than it is being replaced, municipal and domestic water supply problems will become more critical.

To help solve the Pullman area municipal and domestic water supply problem, the following measures need immediate action:

1. The DOE should continue monitoring water levels in wells representing both the upper basalt aquifer zone and the lower basalt aquifer zone. The current DOE and WSU observation well should be continued to be monitored. All pumpage data in the area should be collected and compiled.
2. The DOE should study dependability of the ground-water resource. The study should evaluate

the present rate of pumpage and the recharge capability. Meanwhile, a program is needed to encourage conservation and reuse of water.

3. An alternative source of surface-water supply to supplement the depleting ground-water resource should be developed. Past studies have identified multi-purpose projects providing alternative surface-water sources. One such study was terminated by the Corps of Engineers after local residents expressed strong opposition to the location of a proposed pumped-storage reservoir. Another study (which proposed to store water in the State of Idaho as a multi-purpose water resource project) was abandoned when the Idaho Legislature adopted Idaho House Bill No. 59, which prevented multi-purpose water resource development in the north fork of the Palouse River.
4. The state should develop a comprehensive Palouse River Basin program through participation of basin residents and through coordination with other interested local, state and federal agencies.

