

# SANDY BASIN REPORT

State of Oregon

WATER RESOURCES DEPARTMENT

Salem, Oregon

March 1991

WILLIAM H. YOUNG, DIRECTOR

WATER RESOURCES COMMISSION

Members:

LORNA J. STICKEL, CHAIR

HADLEY AKINS

ROGER BACHMAN

CLIFF BENTZ

JAMES HOWLAND

MICHAEL JEWETT

## TABLE OF CONTENTS

SECTION 1. INTRODUCTION	PAGE
A. Purpose of Report.....	1
B. Planning Process .....	1
C. Report Organization.....	2
 SECTION 2. WATER ALLOCATION	
A. Problem Statement .....	3
B. Background .....	3
C. Discussion .....	19
D. Management Options .....	20
 SECTION 3. MUNICIPAL USE OF BULL RUN/LITTLE SANDY WATERSHEDS	
A. Problem Statement .....	24
B. Background .....	24
C. Discussion .....	37
D. Management Options .....	43
 SECTION 4. GROUNDWATER MANAGEMENT AND PROTECTION STRATEGIES	
A. Problem Statement .....	48
B. Background .....	48
C. Discussion .....	51
D. Management Options .....	52
 SECTION 5. WATER CONSERVATION	
A. Problem Statement .....	56
B. Background .....	56
C. Discussion .....	63
D. Management Options .....	64
 SECTION 6. APPENDICES	
A. Streams Withdrawn From Appropriation by ORS 538.200 .....	70
B. Water Availability Analysis .....	71
C. Parks and Recreation Department - Streams of Current Primary Concern For Recreation .....	73
D. Fish and Wildlife Department Streams of Interest For Fisheries Values ..	74

LIST OF TABLES

<u>TITLE</u>	<u>PAGE</u>
Table 1. Sandy Main Stem Allowed Uses .....	14
Table 2. Sandy River Tributaries Allowed Uses & Season .....	14
Table 3. Plumbing Fixtures - Water Savings & Costs .....	60
Table 4. Summary Surface & Groundwater Rights of Record .....	62

LIST OF PHOTOGRAPHS

<u>TITLE</u>	<u>PAGE</u>
Columbia River Gorge Looking East .....	2
Salmon River: A Major Tributary of the Sandy River .....	16
An Example of Forest Mangement Practices in the Bull Run Watershed Management Unit .....	30
Reservoir No. 2 in the Bull Run Watershed .....	39
Multnomah Falls: A Major Scenic Attraction in the Sandy Basin .....	58

LIST OF FIGURES

TITLE	PAGE
Figure 1. Sandy River Basin Location Map .....	5
Figure 2. Sandy River Mean Discharge at Mouth.....	6
Figure 3. Sandy Basin State Scenic Waterways & National Wild & Scenic Rivers .....	12
Figure 4. Portland Water System .....	23
Figure 5. Bull Run Reserve .....	25
Figure 6. Bull Run Watershed Management Unit .....	33
Figure 7. Groundwater Availability Map .....	42
Figure 8. Sandy Basin Groudwater Rights .....	45
Figure 9. Sandy-Boring Groundwater Management Area .....	49
Figure 10. Water Level Decline Hydrograph .....	50

## SECTION 1 INTRODUCTION

### A. PURPOSE OF REPORT

The Water Resources Commission is responsible for managing the use and control of the state's water resources. The Commission sets water policy through a series of coordinated, interagency water resources programs pursuant to Oregon law (ORS 536.300 and 536.310). Each program deals with one individual basin. These programs are periodically reviewed and revised to reflect changing conditions.

As Oregon's smallest river basin, the Sandy Basin has traditionally been considered for planning and management purposes as part of the adjacent Willamette River Basin. In a departure from past practice, this report focuses on the Sandy as a separate basin with its own water issues and problems.

This report discusses four issues which generally focus on municipal water needs, water allocation, water conservation and groundwater quantity and quality. The problems and issues were identified through input from the general public and federal, state and local government resource management agencies. This report includes descriptions of the management strategy alternatives available to the Commission in addressing each of the problems and issues. Strategies include those which the Commission can implement by rule, those requiring further study and work by the Department, and those which would be implemented by other organizations.

Two additional documents identify the decisions made on conclusion of the planning study. The basin plan contains policies and strategies addressing all of the issues discussed in the report. The plan identifies the agencies which should implement each of the selected management strategies. The basin program is an administrative rule. The rules govern future use and control of unappropriated surface and ground water in the Sandy River Basin. The program rules implement those management strategies in the plan that are within the regulatory jurisdiction of the Commission. Most other strategies in the plan would have to be implemented by other agencies.

### B. PLANNING PROCESS

The planning process for the Sandy River Basin focussed on three main elements: public participation, selected water resource issues and multi-agency cooperation.

A citizens advisory committee assisted the Water Resources Department in the planning effort. Town-hall meetings were also held to gather public input on water issues and problems and to help develop policies and select management strategies described in this report. Regular mailings were made to an extensive list of other interested citizens as well.

Other federal, state and local agencies were asked to cooperate in the planning effort. Many of the issues and management strategies cross jurisdictional boundaries. Only through cooperation can the proposed solutions be effectively implemented.

### C. ORGANIZATION

This report is divided into six major sections. The first section is the introduction. Sections 2 through 5 cover the four main issues addressed during the planning process. The last section includes the appendices.



*Columbia River Gorge Looking East . Photo courtesy of Amin Wahab*

## SECTION 2 WATER ALLOCATION

### A. PROBLEM STATEMENT

Although the smallest of the 18 separately administered basins in the state, the Sandy Basin supports a number of extremely important instream and out-of-stream uses. The waters of the Sandy Basin are extensively protected in favor of instream and scenic values through legislative withdrawals, state scenic waterway and federal wild and scenic river designations. Waters of the Bull Run and Little Sandy Rivers are protected by statute for exclusive municipal use by the City of Portland. In addition, Portland General Electric (PGE) claims pre-1909 water rights in the Sandy Basin. It diverts the Little Sandy and portions of the Sandy Rivers for power generation.

The amount of water produced in the Sandy Basin is adequate to meet current instream and out-of-stream demands in most months. However, given the statutory limits on water appropriation and the scenic waterway designation, future appropriation for out-of-stream uses may be severely restricted. Existing water allocation and management strategies need updating to reflect changing conditions.

This discussion paper focuses on a number of questions relating to water allocation in the Sandy Basin. The questions addressed are: What are the elements or tools of water allocation? What is the water allocation in the Sandy Basin now? What are the water supply problems facing the Sandy Basin? How can remaining water supplies best be allocated to meet present and future demands?

### B. BACKGROUND

#### 1. PHYSICAL SETTING

The Sandy Basin (Figure 1) is located in northwest Oregon, entirely within the boundaries of Multnomah and Clackamas counties. It is bounded by the Columbia River to the north, the Hood and Deschutes basins to the east and the Willamette Basin to the south and west. The Sandy Basin is slightly more than 582 square miles (373,400 acres) in area (Water Resources Board, 1965). The Sandy River is the major outlet of the basin to the Columbia River. It originates on the upper slopes of Mt. Hood which reaches an elevation of 11,235 feet above sea level. After flowing for 56 miles, the Sandy River joins the Columbia River near the City of Troutdale. The Sandy River and its tributaries drain 508 square miles (325,000 acres). The remaining area is drained by smaller streams that flow directly into the Columbia River.

Precipitation in the basin varies from 40 inches at the confluence of the Sandy River with the Columbia River to more than 170 inches at some higher elevations. Precipitation is mostly in the form of rain in lower elevations and snow at higher elevations. Stream discharge patterns are influenced by the form of precipitation. Heaviest precipitation in the basin occurs from November through January and lowest in July and August.

The Sandy River discharges an estimated 1,954,000 acre-feet of water into the Columbia River annually. Streams that flow directly into the Columbia River contribute another estimated 258,000 acre-feet to the discharge of the Sandy Basin (Pacific Northwest River Basins Commission, 1969). The estimated mean monthly discharge in cubic feet per second (cfs) of the Sandy River at the mouth is (also shown on hydrograph Figure 2):

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.
1395	3445	3368	3899	3761	3550	3773	3300	2065	896	539	596

The natural discharge patterns in the Sandy Basin are somewhat changed by the Portland Water Bureau municipal reservoirs in the Bull Run watershed and by the Portland General Electric diversion dams on the Sandy and Little Sandy Rivers.

#### *Land Ownership*

The federal government owns about 260,000 acres in the Sandy Basin (70 percent). The state owns another 3,100 acres. The remaining land (110,300 acres) is in private and municipal ownership (Water Resources Department, 1988). About 85 percent of the Sandy Basin is forest. The remaining land is mostly agricultural. However, only about 3,000 acres are irrigated in the Sandy Basin (Oregon Department of Agriculture, 1989).

## 2. WHAT ARE THE ELEMENTS OR TOOLS OF WATER ALLOCATION AND HOW ARE THESE TOOLS USED IN THE SANDY BASIN?

The Oregon Water Resources Commission has primary authority to allocate water in Oregon. Other authorities affect water allocation as well. The Legislature has withdrawn streams, granted cities exclusive rights to certain waters, and established scenic waterways. The Parks and Recreation Department also affects water allocation by designating scenic waterways. The Northwest Power Planning Council affects use of water for hydroelectric development through the designation of protected areas.

### a. Classification

State law, Oregon Revised Statute (ORS) 536.340, gives the Commission the authority to classify water for beneficial use. A classification prescribes the uses for which new water permits may be issued. Uses not included in the classification are not allowed. A classification may be tailored to designate the time or season of use, the amount of use and even the specific user or user group. The Commission considers legislative withdrawals and grants when classifying waters for beneficial uses.



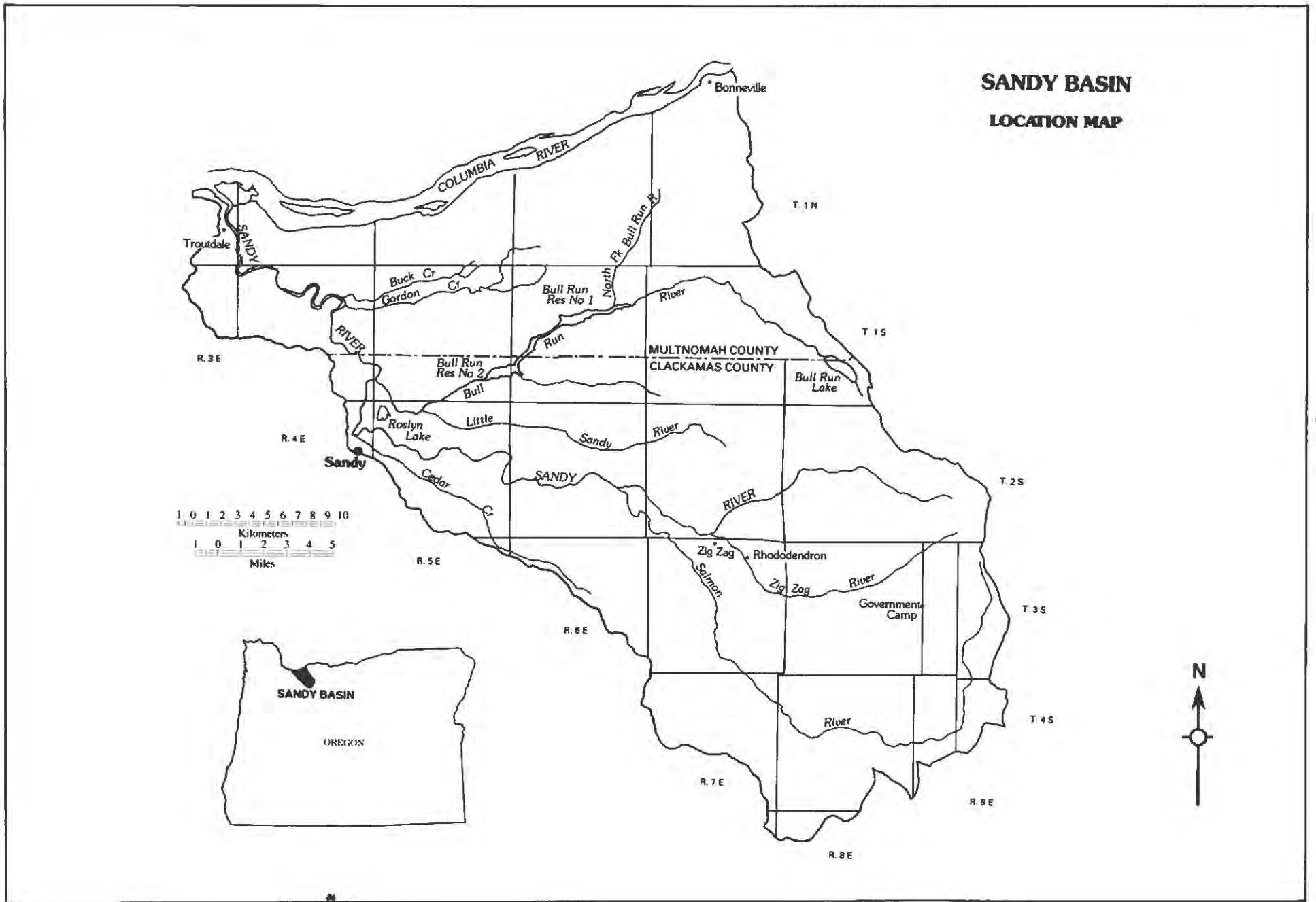


Figure 1

# ESTIMATED MEAN MONTHLY FLOWS SANDY RIVER AT MOUTH

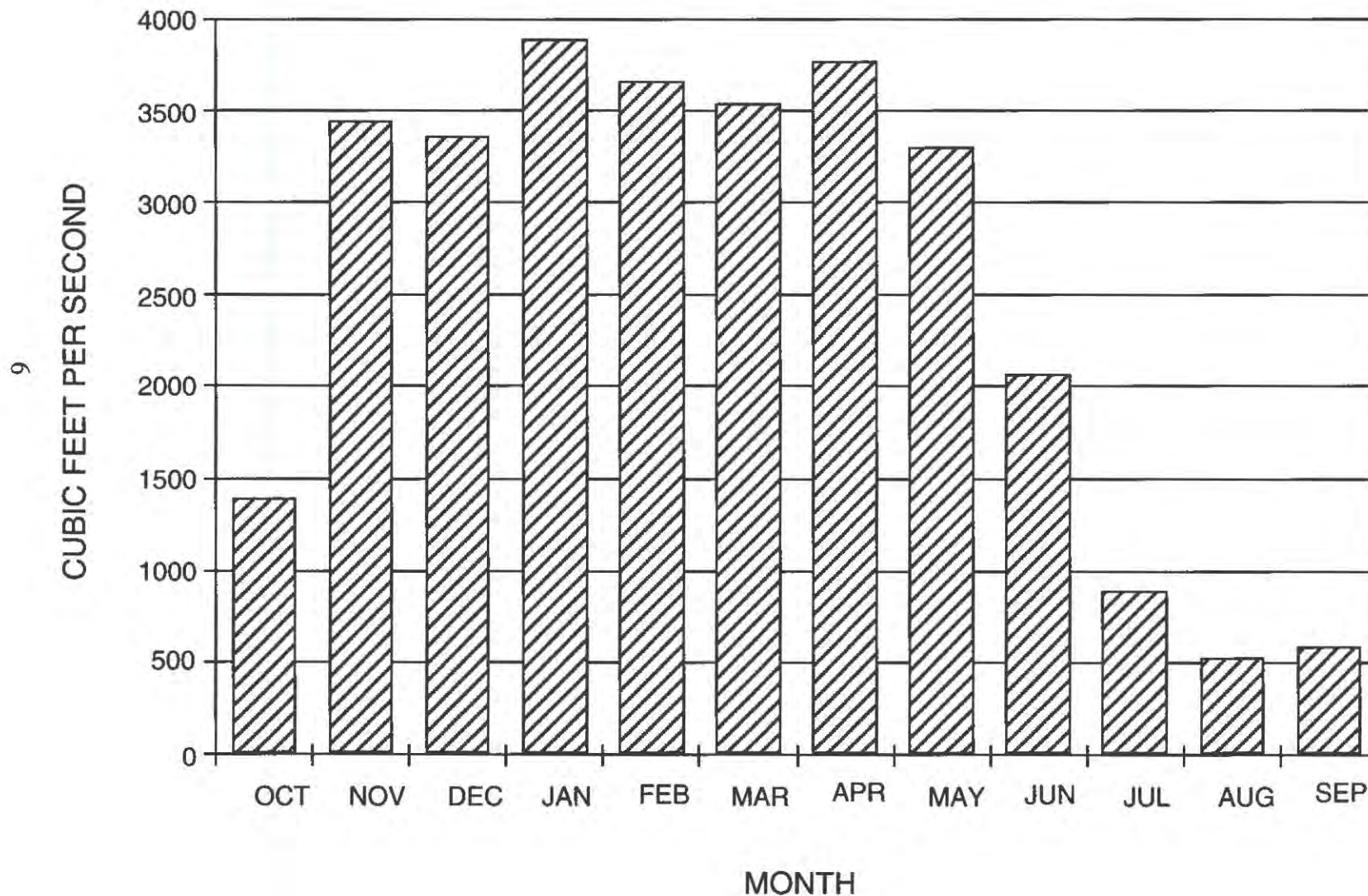


Figure 2

The Commission's water allocation is spelled out in basin water use programs. A basin water use program is a set of administrative rules that guides and controls future water use and development. A program consists of policies, objectives and regulations that govern surface and ground water use in a given basin. Basin programs use various tools to control which beneficial uses of water permits will be issued for in the future. These include minimum streamflows and instream water rights, reservations, critical groundwater area designations, serious water management problem area designations, adjudications, scenic waterway designations, and Northwest Power Planning Council protected area designations. The beneficial use categories commonly named in basin programs are spelled out in Oregon water law. They include domestic, municipal, irrigation, power development, industrial, mining, recreation, wildlife, fish life, and pollution abatement.

#### b. Withdrawal

##### *Commission Withdrawals*

The Commission's power to withdraw water from further appropriation is spelled out in ORS 536.410. A withdrawal is made by an order of the Commission following a public hearing. Withdrawals are most commonly used when streams are fully appropriated and unable to support further development. Like a classification, a withdrawal can be tailored to the time, amount of water and beneficial uses it affects. Withdrawals are well-suited to immediate responses to problems. To date, the Commission has not withdrawn any waters from appropriation in the Sandy Basin.

##### *Legislative Withdrawals and Grants*

The Legislature also may withdraw waters from further appropriation or grant special use. Legislative (statutory) withdrawals and grants have been made almost exclusively for the protection of municipal or public instream uses. Statutory withdrawals and grants are extensive in the Sandy Basin. They are listed below:

ORS 538.150 withdraws Hackett Creek, a tributary of the Sandy River located in Clackamas County, and its tributaries, from all uses except for protecting fish life.

ORS 538.200 withdraws sixteen streams in the Sandy Basin forming waterfalls near the Columbia River Highway. These streams "shall not be diverted or interrupted for any purpose whatsoever." These streams are listed in Appendix A.

ORS 538.251 and 538.260 limit appropriation or diversion, except for protecting fish life, domestic, stock, municipal, fish culture, aesthetic, recreational, or public park purposes, on:

Sandy River and its tributaries except:

Beaver Creek and its tributaries

Buck Creek and its tributaries

Big Creek and its tributaries

Trout Creek and its tributaries

All tributaries, but not the main channel, of the Sandy River are open for appropriation and storage from December 1 to June 1 of each year. Water stored during this period may be used at any time.

ORS 538.420 grants exclusive right to the use of waters of Bull Run and Little Sandy Rivers to the City of Portland. However, Portland's rights do not impair the rights of anyone who, on February 24, 1909, had any vested right or valid appropriation on the Bull Run and Little Sandy Rivers. Use of water from these two rivers is prohibited by subsequent appropriators. Portland currently utilizes about 26 percent of the annual flow of the Bull Run River. Portland has not yet made use of its right on the Little Sandy River. PGE claims a pre-1909 right on the Little Sandy and diverts the Little Sandy for power generation. The water is eventually returned to the Sandy River.

#### *State Engineer Withdrawals*

A number of withdrawals were made in Oregon by the State Engineer, one of the Commission's predecessors. Many of these withdrawals are still in effect. There are no State Engineer withdrawals in the Sandy Basin.

#### c. Minimum Perennial Streamflows

Minimum perennial streamflows (also referred to as minimum streamflows) are established administratively by the Commission under the provisions of ORS 536.325. They are subject to change by the Commission but otherwise function as a water right in the system of prior appropriation.

Minimum streamflows may only be adopted to support aquatic life, minimize pollution and maintain recreational values. By law, only the Departments of Fish and Wildlife, Environmental Quality and Parks and Recreation may apply for minimum streamflows. The Commission may also adopt minimum streamflows on its own initiative.

There are no minimum streamflows in the Sandy Basin.

#### d. Instream Water Rights

Instream water rights are a new water management tool created in 1987. They serve a similar function as minimum streamflows but have the more secure status of a water right. Once established, they are not subject to modification.

Only the Departments of Fish and Wildlife, Environmental Quality and Parks and Recreation may apply for instream water rights. Presently, the Commission does not have the authority to establish instream water rights on its own initiative.

Instream water rights may also be established by transferring an existing water right to instream use through purchase, lease or gift. Instream water rights created this way retain the original water right priority date. A leased instream water right may be used for its original purpose at the end of the lease period.

Another way to establish instream water rights is through water conservation projects that leave a portion of the conserved water instream.

No instream water rights have been established in the Sandy Basin yet.

#### e. Reservations

Reservation is another water allocation tool created by the 1987 Legislature. Any state agency may apply to the Commission to reserve unappropriated water for future economic development. The date a reservation is established becomes the priority date for a specified quantity of water to be developed under a later water right application.

Reservations function as a type of water banking. The water itself may not actually be withheld or protected, but the right to its future use is. Until the reservation (priority) is exercised, junior appropriators may be allowed to use the water. Once the reservation is put to use, the junior users are subordinated. The Commission has authority to limit how long a reservation may stand without being exercised.

#### f. Critical Groundwater Areas

Critical groundwater areas are established by order of the Commission as provided in ORS 537.735. Such a designation may be made in response to several conditions. These include excessive groundwater level declines, interference between wells, well interference with geothermal production, well interference with surface water, groundwater overdrafts, and groundwater quality which threatens public welfare, health and safety.

The Commission may include various corrective, controlling provisions in a critical area order. Commonly, critical area designations terminate further groundwater development. They may also control existing use. Controlling provisions may set the total permissible withdrawals of groundwater, prefer selected uses over others, control withdrawals by individual users, limit pumping from multiple wells held by one owner, establish a rotation system for groundwater use, and more.

There is no critical groundwater area designation in force in the Sandy Basin.

#### g. Serious Water Management Problem Areas

The 1987 Legislature passed Senate Bill 142 requiring water use reporting by certain public entities. One provision of the bill authorized the Commission to gather water use data in areas with serious water management problems (ORS 540.435). Serious water management problems include groundwater declines, user disputes, and frequent water shortages.

To date, the Commission has not applied the provisions of ORS 540.435 in the Sandy Basin.

#### h. Adjudications

The oldest permitted water rights in the Sandy Basin may not be the most senior rights. Since February 24, 1909, water rights have been established through a permit process. Each permitted right is given a priority date. The priority date establishes a water right's standing relative to all past and future rights.

Some water rights in the Sandy Basin were in place prior to the 1909 permit system. Though unpermitted, these rights are valid until determined otherwise. These rights are variously known as "undetermined vested rights", "undetermined vested claims", or "unadjudicated rights". Undetermined vested rights are assigned a priority in a judicial (court) process known as adjudication. In an adjudication, the rights become "decreed rights", "adjudicated rights", "vested rights", or "perfected rights".

Adjudication is yet to begin in the Sandy Basin. Until the entire basin has been adjudicated, the legal claims to water cannot be accurately assessed. Additionally, undetermined claims act as a cloud over the value of permitted rights. Until decided by the courts, undetermined claims constitute an unknown quantity of water that could affect the value of all junior rights.

An adjudication relies on physical evidence and testimony from witnesses with first-hand knowledge about the history of the claim. As time passes, more and more of the pre-1909 water claim record is lost as people from that time pass away. This makes adjudication increasingly difficult. In view of this fact, the 1987 Legislature passed Senate Bill 130, now codified in ORS 539.230 through 539.240. These statutes are designed to preserve the record on undetermined rights. They require that all remaining claimants to undetermined vested rights register a statement of claim with the Water Resources Department by December 31, 1992.

i. State Scenic Waterways and Federal Wild and Scenic Rivers

The Oregon Scenic Waterway System was created in 1970 by voter initiative. The act (codified in ORS 390.805-390.925) is administered by the Parks and Recreation Department. The law declares the highest and best uses of the waters in a scenic waterway are for recreation, fish and wildlife.

Scenic waterway designation protects the free flowing nature of the stream by prohibiting dams, impoundments, placer mining, new diversions and fill or removal of materials in the bed or banks of the waterway. These prohibitions affect the future allocation of water from the waterway and all its tributaries.

A recent Oregon Supreme Court decision, 306 Or 287 (1988) Diack et al. v. City of Portland et al., interpreted these statutory protections. The court said the law protects flows necessary to scenic waterways even from diversion made outside a scenic waterway reach. If diversions are permitted, findings must be made that show the scenic waterway values will not be impaired.

The court's ruling has affected the Commission's water use permitting activity on streams and tributaries that are scenic waterways. Until flows needed to maintain scenic waterway values have been determined, no new water use permits are being issued within and upstream from scenic waterways. In the Sandy Basin, this affects the entire drainage area of the Sandy River, with the exception of Beaver Creek which enters the Sandy River below the scenic waterway near the mouth.

As a result of the Diack case, recreation flow requirements for the Sandy River Scenic Waterway have been established (Cook, 1989). The Commission has determined that minimum stream flows of 1,500 cfs in December, 1,900 in January and February, and 2,000 in March through May are required for protection of salmon and steelhead habitat and will also benefit other aquatic life, wildlife and recreation uses in the Sandy River. The determination included the fact that instream flows of 1,500 cfs would provide protection for whitewater boating and angling during the period when such use is most prevalent (June -

**SANDY BASIN**  
**STATE SCENIC WATERWAYS AND**  
**NATIONAL WILD AND SCENIC RIVERS**  
**1991**

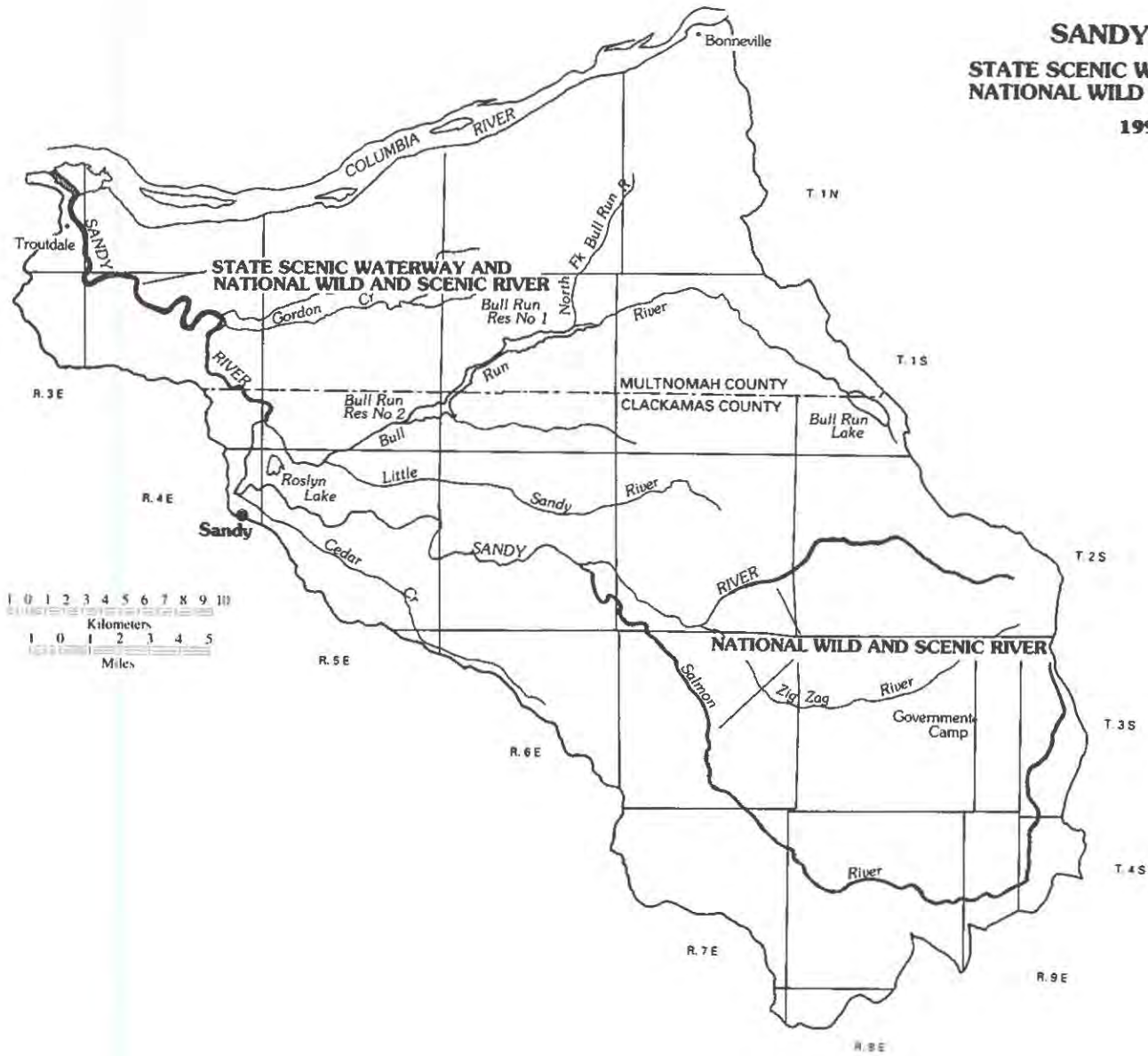


Figure 3



November) and not otherwise limited by naturally-occurring low flow. Naturally occurring low flows (below 1,500 cfs) are a problem in the Sandy River from July through October. It should be pointed out that the Commission's determination is not an adoption of minimum streamflows for the scenic waterway. It was only an acknowledgment of what was needed. There is a strong indication that these flow requirements may not be adequate to fully meet all recreational and angling needs (Ciecko and Lilly, 1990).

The Water Resources Department concurs with Parks and Recreation Department and Multnomah County that fuller assessments are warranted to better establish recreational and angling needs. The Bureau of Land Management and Parks Department planning efforts underway for the Wild and Scenic River Draft Plan may be a tool towards this end. Until this end is achieved, the Water Resources Department will use, in its permitting activities, the flow levels determined in the Diack case as levels needed to maintain scenic waterway values in the Sandy River.

The Sandy River is a state scenic waterway from its confluence with the Bull Run River (Dodge Park) to Stark Street Bridge (Dabney State Park). This reach is 12.5 miles long.

In addition to the Sandy River State Scenic Waterway, there are national wild and scenic rivers in the Sandy Basin. The Sandy River, from its headwaters to the National Forest boundary, a 12.4 mile reach (entirely within the Mt. Hood National Forest), and from Dodge Park to Dabney State Park (overlapping the state scenic waterway), is a national wild and scenic river. The Salmon River, a tributary to the Sandy River, from its headwaters to its confluence with the Sandy River is also a national wild and scenic river. Figure 3 shows the state scenic waterways and national wild and scenic rivers in the Sandy Basin.

#### j. Northwest Power Planning Council Protected Area Designation

In 1988, the Northwest Power Planning Council (NWPPC) adopted a proposal to designate some 44,000 miles of Northwest streams as "protected areas". The protected area designation amendment refers to designating certain Northwest streams and fish and wildlife habitats as protected—that is, closed to future hydroelectric development to avoid impacts on fish and wildlife in these areas (NWPPC, 1987). The amendment is a major step in the NWPPC's efforts to rebuild fish and wildlife populations, particularly salmon and steelhead runs in the Columbia River drainage, that have been damaged by hydroelectric development of the past (NWPPC, 1988).

While NWPPC does not license hydroelectric development, certain federal agencies such as the Federal Energy Regulatory Commission, Bureau of Reclamation, Bonneville Power Administration and the Army Corps of Engineers are legally obligated to take NWPPC's action into consideration in their decision-making. The NWPPC's initiative to designate "protected areas" will be helpful at the state level by providing additional leverage for water management decisions and actions (State of Oregon, 1988).

There are 103 stream reaches in the Sandy Basin that are designated protected areas by NWPPC.

### 3. WHAT ARE THE WATER SUPPLY PROBLEMS IN THE SANDY BASIN?

As mentioned earlier, the Sandy Basin produces sufficient water annually to meet present instream and out-of-stream uses. Tables 1 and 2 show when the Sandy main stem and its tributaries are open to use and which uses.

Table 1  
SANDY MAIN STEM ALLOWED USES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FSH*	X	X	X	X	X	X	X	X	X	X	X	X
MU	X	X	X	X	X	X	X	X	X	X	X	X
IRR												
DO	X	X	X	X	X	X	X	X	X	X	X	X
STO	X	X	X	X	X	X	X	X	X	X	X	X
IND												
REC	X	X	X	X	X	X	X	X	X	X	X	X
AES	X	X	X	X	X	X	X	X	X	X	X	X
PAR	X	X	X	X	X	X	X	X	X	X	X	X
OTH												

\* FSH - Fish Culture; MU - Municipal; IRR - Irrigation; DO - Domestic; STO - Stock Watering; IND - Industrial; REC - Recreation; AES - Aesthetics; PAR - Park; OTH; Other

Table 2  
SANDY RIVER TRIBUTARIES ALLOWED USES AND SEASON  
(EXCEPT BEAVER, BUCK, BIG, TROUT CREEKS AND TRIBUTARIES)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FSH	X	X	X	X	X	X	X	X	X	X	X	X
MU	X	X	X	X	X	X	X	X	X	X	X	X
IRR	X	X	X	X	X							X
DO	X	X	X	X	X	X	X	X	X	X	X	X
STO	X	X	X	X	X	X	X	X	X	X	X	X
IND	X	X	X	X	X							X
REC	X	X	X	X	X	X	X	X	X	X	X	X
AES	X	X	X	X	X	X	X	X	X	X	X	X
PAR	X	X	X	X	X	X	X	X	X	X	X	X
OTH	X	X	X	X	X							X

Beaver, Buck, Big and Trout Creeks and their tributaries are open for all uses, all the time.

While there does not appear to be a supply problem in the basin, seasonal flows can be too low to support certain activities. For example, less than 7 percent of the annual discharge of the Sandy River occurs from July through September. These three months coincide with some of the highest levels of recreation on the river. Low summer streamflows can have an impact on recreational opportunities, water quality and fisheries. On some streams existing water rights surpass estimated average natural flow during low flow months. Appendix B provides a better picture of the water availability in the Sandy Basin. It lists estimated flow levels in streams in the basin. These estimates were made using the U.S. Geological Survey flow model. They may vary significantly from actual flow levels.

Future out-of-stream uses could face a seasonal supply problem in view of restrictions on appropriation and the scenic waterway designation. Out-of-stream demand is likely to grow more rapidly in the domestic (including single users or use by unincorporated cities, resorts, etc.) water use category.

The Sandy Basin is sparsely populated. The majority of the people in the basin live along the Mt. Hood corridor. Metropolitan Service District projections for the Sandy area predict a doubling of the population by the year 2000 (Boatwright Engineering, Inc., 1983). This increase will result in increased demand for domestic water. Seasonal domestic water use is also likely to increase in the ski resorts in the basin.

Additional out-of-stream uses of existing rights by water right holders such as the City of Portland could have an impact on instream and scenic values in the Sandy River. Portland has exclusive statutory right (not affecting pre-1909 claimed rights such as PGE's) to the waters of the Bull Run and Little Sandy Rivers. It also has a well field in east Multnomah County that is operational. Portland currently utilizes about 26 percent of the average annual flow of the Bull Run River. The Portland Water Bureau system currently provides water to about 700,000 people in the Portland metropolitan area. Portland predicts that by utilizing 40 percent of the average annual flow of the Bull Run, it could serve a population of 1.5 million people. Studies are underway to determine water supply needs in the Portland metropolitan area. The Portland Water Bureau is exploring various alternatives to meet these needs.

Growing pressure on existing supplies and potential conflicts among water users suggest a role for measures to enhance supplies and even out flows. This could be achieved through storage of surplus runoff during the winter months and to a lesser degree through conservation and limitation on further appropriation.

### a. Water Availability and Public Instream Needs

Meeting public instream needs remains the controlling factor in future allocations in the Sandy Basin. Future water allocation in the basin for other uses, as permitted by statute or basin program, would depend on meeting instream and scenic values first.

The Parks and Recreation Department lists a number of streams that are of recreational value in the Sandy Basin. These include the mainstem Sandy River, the Bull Run (the Bull Run and Little Sandy Rivers are withdrawn from appropriation by statute), Salmon and Zigzag Rivers. A list providing details on recreational categories and values is provided in Appendix C. Although the Parks and Recreation Department request does not identify any smaller streams for their recreational importance, it does regard many small streams crucial for maintaining recreational values in the basin. The Parks and Recreation Department concluded (Cook, 1989):

*While the major rivers with recreational importance were represented in the study, many smaller streams which were not considered, may have significant recreational value. Some are tributaries to the streams that were examined. Actual recreational activity on them may be minimal or absent, but their relationship to mainstream waters may be of importance. They may serve as the spawning grounds or nursery for a downstream fishery; their contribution to water flow and quality may be crucial for downstream boating and other recreational activities. Therefore, the list provided only reflects those rivers and streams that have been verified or identified by staff at this time. Other rivers and tributaries should be given careful scrutiny for further recreational considerations.*

Ideal flow levels for the streams identified by the Parks and Recreation Department are not yet determined.



*Salmon River: a Major Tributary of the Sandy River. Photo courtesy of ODOT*

Flows in many streams are not sufficient during certain periods for optimum fish production (Oregon Department of Fish and Wildlife, ODFW, 1990). Low flows reduce fish holding, spawning and rearing areas, food production, and water quality. ODFW is interested in establishing instream water rights on the Sandy River and its tributaries with important fish production, habitat, aquatic life and recreational values. These streams are listed in Appendix D. The water availability analysis and ODFW subbasin salmon and steelhead plan for the Sandy Basin indicate insufficient flows in many of these streams. ODFW is in the process of determining necessary flow levels for conservation, maintenance and enhancement of fish production, habitat, and aquatic life in the Sandy Basin.

b. Current Uses

Below is a list of water rights of record (as of January 1991) in the Sandy Basin (not including rights on the Bull Run and Little Sandy Rivers). While these rights have been granted, they may not all be currently used.

Surface Water:	Agriculture	Industrial	Municipal	Domestic	Other*
cfs	12.96	19.97	33.72	26.04	39.66
acre-feet	11.27	116.00	0.00	0.00	29.00

Groundwater:

cfs	14.80	6.59	16.64	1.05	2.02
-----	-------	------	-------	------	------

\* Includes recreation, aesthetics, forest management, fire protection, pollution abatement, road construction and storage.

c. Reservations

*Agriculture*

Irrigation withdrawals in the Sandy Basin occur mostly along the lower Sandy River, downstream from the City of Sandy. However, irrigation is not extensive in the basin. The Oregon Department of Agriculture (DOA) estimates current irrigation at nearly 3,000 acres. This number closely matches the Water Resources Department's water rights of record for nearly 3,000 acres in the basin. The Department estimates that at 2.3 acre-feet per acre, current irrigation in the basin requires 6,900 acre-feet of water. Existing sources meet this demand.

DOA predicts irrigated acreage in the Sandy Basin to remain the same (3,000 acres) in the next twenty years. Therefore, no reservations for irrigation need to be made.

### *Municipal and Domestic*

The cities of Sandy, Gresham and Troutdale are partly located within the Sandy Basin. The major municipal water users getting their water directly from surface sources in the Sandy Basin are the Corbett Water District and the City of Sandy. The Corbett Water District has water rights for 4.5 cfs on Gorden and Elk creeks. The city is currently using Brownell Springs and Alder Creek for municipal purposes. Sandy's water right on these sources totals 5.1 cubic feet per second (cfs) which is enough for 10 to 12,000 people (Boatwright Engineering, Inc. 1983). The city's 1982 population was about 3,500. Its projected population for the year 2010 is about 13,500. To meet the water needs of its expanding population, the city has acquired a water right for 25 cfs on the Salmon River in the Sandy Basin.

The City of Troutdale has water rights for 7.23 cfs on four wells. At a rate of 7.23 cfs, the city could produce 4.72 million gallons of water per day. The city's highest reported daily consumption for July 1989 was nearly 1.1 million gallons per day. Troutdale's 1988 population was slightly more than 7,200 people. At the current rate of consumption, the city's water right for 7.3 cfs should be enough for more than six times its current population.

The City of Gresham, population 60,315, gets its water entirely from the City of Portland. The city has not indicated an interest in reserving water for future municipal uses. The city may have limited choices if it decides to utilize a surface source of water.

Seasonal water use is also likely to increase as ski resorts in the Mt. Hood area expand. Every winter, thousands of people make use of the recreational facilities in the Sandy Basin.

According to the State Health Division Public Water System lists for Clackamas and Multnomah counties, there are about 65 small public water systems in the Sandy Basin supplying water to small communities. Most of these systems are located along the Mt. Hood corridor in the upper parts of the basin. In addition, individual domestic water users constitute a significant segment of the basin's population. Clackamas County estimates the population of the corridor to be 3000 (excluding summer residents of homes on Forest Service lands). This number is projected to increase by another 9375. Clackamas County estimates that existing and future population can be served by a total of about 5 cubic feet per second of water.

During the basin planning process, the Department learned that many of the small public water systems in the Sandy Basin operate without permits. Clackamas County surveyed 14 of these systems. The survey shows 5 of the 14 systems operate under permits. The remaining 9 do not have permits.

Many of the small public systems supply water to a variety of users such as domestic, commercial and industrial. Others may be operating under permits, however, they may have expanded their uses in terms of connections, types and/or places of uses, and/or allowable rates. For example, a supplier with a domestic permit may be providing water to commercial and industrial establishments. Water use permits are required for those uses that do not currently have permits. An expansion or change in the authorized type of use requires a new permit or a water right transfer.

Clackamas County and Oregon Association of Water Utilities requested the waters of the Sandy Basin be classified so that existing domestic and quasi-municipal users can file for permits without facing basin program restrictions. The county and the association realize that regardless of the classifications in the basin program, any new application would be subject to the scenic waterway provisions as described in ORS 390.835. While applications can be accepted, action would wait until the recreational flow assessment in the Sandy Scenic Waterway is completed. A permit may not be issued if the proposed use is found to be detrimental to the scenic waterway values. The Sandy Scenic Waterway and its implications on the Commission's permitting activities in the basin were described earlier.

Some entities with interest in scenic waterways have indicated that allowing existing levels of use would be acceptable since the water is already being used. However, they recommend no additional out-of-stream use be allowed. If the Department's recreational flow assessment indicates there is not enough water in the Sandy Scenic Waterway to meet recreational needs, new applications would face difficulties getting permits. Applicants may have to seek a legislative fix or develop alternative sources of supply.

### C. DISCUSSION

The Sandy River Basin provides important recreational opportunities for a large population in the Portland metropolitan area. In addition, the main source of municipal water for the Portland metropolitan area, the Bull Run watershed, is in the Sandy Basin. While Portland's municipal water is stored in the Bull Run watershed, other uses in the Sandy Basin depend almost entirely on natural flows. The Sandy River Basin produces adequate amounts of water to supply existing and future needs. However, seasonal (June through October) distribution is least when demand is greatest. On some streams existing water rights of record exceed the estimated flows during the summer months.

The Lower Sandy River is a state scenic waterway. ORS 390.805-390.925 states, "It is declared that the highest and best uses of the waters within scenic waterways are recreation, fish and wildlife uses. The free-flowing character of these waters shall be maintained in quantities necessary for recreation, fish and wildlife uses." The Oregon Supreme Court, in *Diack, et al. v. City of Portland et al.*, stated that no new application for the use of water can be granted within and above a scenic waterway if the proposed use is found detrimental to the scenic waterway values. This affects the Commission's permitting activities in the Sandy Basin.

Future water allocation in the Sandy Basin is subject to existing statutory withdrawals and maintenance of scenic waterway values in the basin. The Sandy River and other streams in the basin provide important recreational opportunities. The maintenance of these values has been an important factor in legislative actions relating to the waters of the Sandy Basin.

Agency and citizens comments during the planning process reflect an overwhelming support for maintaining instream and scenic values on the Sandy River and its tributaries. The Departments of Fish and Wildlife and Parks and Recreation are interested in establishing instream water rights on several streams in the Sandy Basin. Given the flow patterns, statutory restrictions, and agency and citizens interest in maintaining instream values in the Sandy Basin, water diversions in the Sandy Basin should remain limited to existing uses only.

#### D. MANAGEMENT OPTIONS

Existing legislative controls leave little leeway for the Commission to allocate water in the Sandy Basin. These controls also limit the Commission's ability to expand any of the uses prescribed by statutes. Proposals listed below are subject to the provisions of the state scenic waterway designation as outlined in ORS 390.835 (1).

The following water allocation and management proposals are designed to address the current and future water needs and development. These proposals draw from the water management allocation tools discussed earlier in the BACKGROUND section of the paper and from public and agency input during the planning process. **These proposals apply to future applications only. Existing water rights and permits are not affected by these proposals.**

#### PROPOSED POLICY:

*To limit future surface water appropriation, except storage, in the Sandy Basin mainly to municipal and nonconsumptive, instream uses for the purpose of protecting and enhancing those statutorily preferred uses and values such as municipal, fish life, wildlife, recreation and aesthetics.*

#### MANAGEMENT ALTERNATIVES

- 1) Classify all surface waters of the Sandy Basin, not otherwise withdrawn by statutes or classified in alternatives 2 to 5, only for domestic, stock, and instream uses for fish life, wildlife, recreation and aesthetics.
- 2) Classify the Sandy River main stem only for instream uses for fish life, recreation and aesthetics.
- 3) Classify all tributaries of the Sandy River only for instream uses for fish life, recreation and aesthetics from June 1 to December 1 of each year.



4) Classify all tributaries of the Sandy River for domestic, stock, municipal, fish life, aesthetics, recreational, or public park uses from December 1 to June 1 of each year. Also classify all tributaries of the Sandy River but not the main stem for storage from December 1 to June 1 of each year. Water stored during this time may be used at any time for any beneficial use. Future permits for municipal use should be issued only on the condition that a water conservation plan be included as part of the municipal application. Failure by the municipality to implement the plan should be considered a violation of the terms of the permit.

Alternatives 1-4 would further limit uses on the Sandy River and its tributaries than currently allowed by statute. These alternatives would be consistent with the fact that the Sandy River is a state scenic waterway and the best and highest uses of the water in scenic waterway are for recreation, fish, and wildlife. Flows in the Sandy River are low in the summer months when recreational uses peak. On a number of streams, water rights of record exceed available estimated flows. The Departments of Fish and Wildlife and Parks and Recreation are particularly concerned with adequate summer flows in the Sandy River and its tributaries. The Departments believe that allowing additional consumptive, out-of-stream uses would be detrimental to recreation and fish and wildlife in the Sandy Basin. Other entities and the public also overwhelmingly support maintenance of scenic and instream values in the Sandy Basin. Alternatives 1-4 are designed to balance uses while taking into consideration statutory direction and agency and public concerns.

5) Classify surface water of the Sandy Basin, not otherwise withdrawn by statute or proposed for classification in 6, only for domestic, stock, municipal, fish culture, aesthetic, recreational, or public park uses.

6) In addition to uses listed in 5, classify all tributaries of the Sandy River but not the main stem Sandy River for storage from December 1 to June 1 of each year. Water stored during this time may be used at any time for any beneficial use.

Alternatives 5 and 6 list uses that are allowed by statute with the exception of Beaver, Big, Buck and Trout Creeks. There are no restrictions in the statutes that apply to these creeks. However, in alternatives 5 and 6, these tributaries are classified as the remaining tributaries of the Sandy River.

Although alternatives 5 and 6 are more liberal than 1-4, the uses listed in these alternatives are still subject to the provisions of ORS 390. 835 (scenic waterway designation). These alternatives would allow small public water systems and others in the Sandy Basin operating without permits or in violation of the terms of existing permits to file permit applications or otherwise comply with statutory and administrative requirements.

## RECOMMENDATIONS

Alternatives 5 and 6 are the recommended alternatives.

## REFERENCES

Boatwright Engineering, Inc. 1983. City of Sandy Long Term Water Supply Study. Salem, OR.

Ciecko, Charles / Director Multnomah County Parks and Recreation Division. June 1990. Letter to the Water Resources Department. Portland, OR.

Cook, Allan / Manager Planning and Grants - Parks and Recreation Division Department of Transportation. May 1990. Letter to the Water Resources Department. Salem, OR.

Lilly, John / Manager Water Resources Planning - Parks and Recreation Department. July 1990. Letter to the Water Resources Department. Salem, OR.

Northwest Power Planning Council. 1987. Protected Areas Fact Sheet. Portland, OR.

Northwest Power Planning Council. 1988. Letter to Interested Party. Portland, OR.

Pacific Northwest River Basin Commission. 1969. Willamette Basin Comprehensive Study - Water and Related Land Resources. Salem, OR.

Robison, George E. 1991 Water Availability for Oregon's Rivers and Streams: Volume 2; Technical Guide and Appendixes. Water Resources Department, Salem, OR.

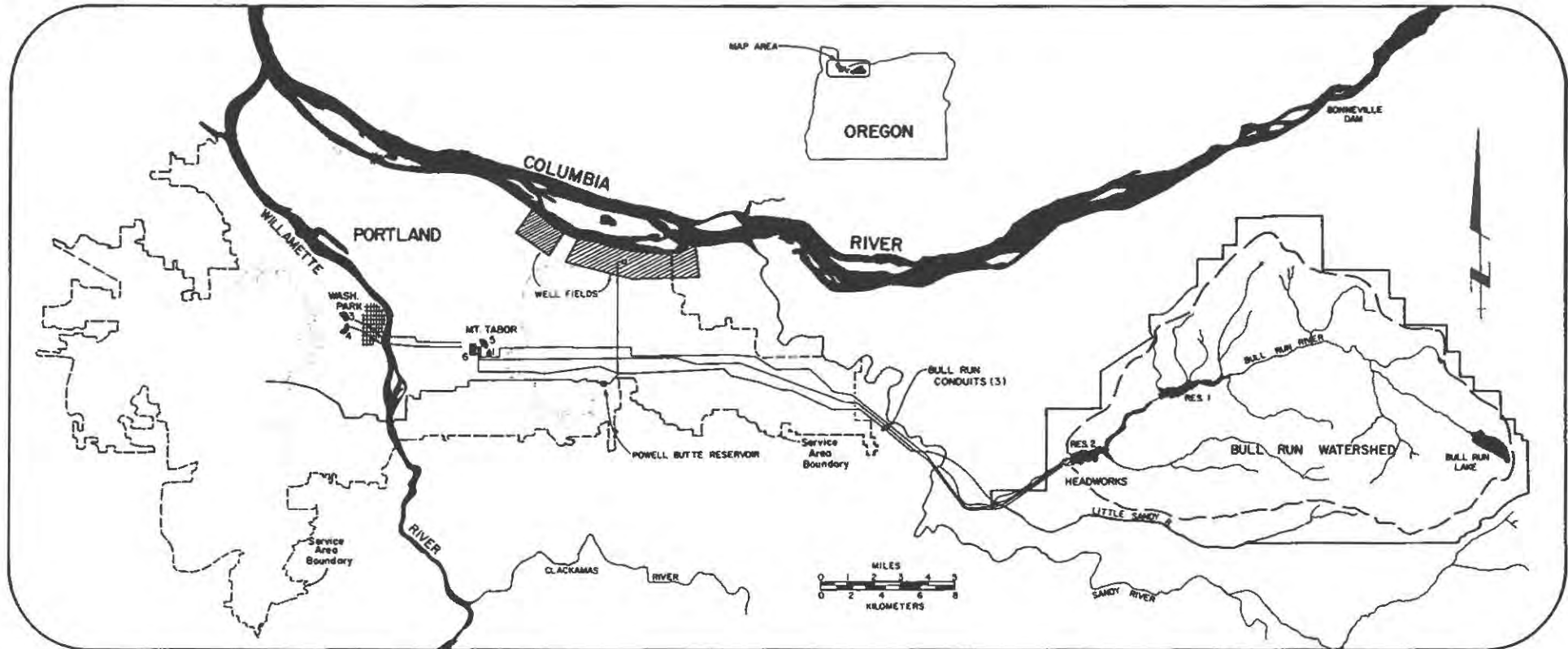
State of Oregon Water Resources Department. 1990. Willamette Basin Planning - Water Allocation Discussion Paper. Salem, OR.

State of Oregon. 1990. Oregon Water Laws. Salem, OR.

State of Oregon Office of the Governor. June 1988. State of Oregon Protected Areas Comments. Salem, OR.

State of Oregon Water Resources Board. 1967. Willamette River Basin. Salem, OR.

State of Oregon Water Resources Board. 1965. Lower Willamette River Basin. Salem, OR.



Map courtesy of City of Portland  
Bureau of Water Works

Figure 4

## SECTION 3 MUNICIPAL USE OF BULL RUN/LITTLE SANDY WATERSHEDS

### A. PROBLEM STATEMENT

The Bull Run watershed is the primary source of water for the Portland metropolitan area. The Bull Run watershed is included in the Bull Run Watershed Management Unit (unit), established by Public Law 95-200 in 1979. The unit is in federal ownership and located within the Mt. Hood National Forest. The U.S. Forest Service manages the unit according to the provisions of PL 95-200. The state granted the City of Portland exclusive rights (not affecting pre-1909 claims) to the waters of the Bull Run and Little Sandy Rivers for municipal use. Portland's statutory rights protect the two rivers from use by subsequent appropriators. Portland currently uses only the Bull Run River for municipal purposes.

Management activities in the Bull Run and Little Sandy watersheds have been the focus of attention and controversy on numerous occasions. The issues center mainly over management activities in the Bull Run and Little Sandy watersheds as these activities relate to current and future uses of these watersheds for municipal purposes. The Water Resources Commission (Commission) is interested in the role the Bull Run and Little Sandy may play as a regional water supply source.

This paper provides a background discussion of the Bull Run/Little Sandy watersheds and the issues surrounding them. The paper addresses specific questions relating to the utilization of the waters of these watersheds to meet regional water demands. Specifically, the paper addresses these questions: How are these watersheds managed? What is the status of these watersheds in terms of supply and quality? Will there be further utilization of the waters of these sources to meet regional demands? What is the Commission's role in the management and development of the water resources of the Bull Run and Little Sandy?

### B. BACKGROUND

#### 1. PHYSICAL SETTING

The Bull Run watershed is located about 30 miles east of Portland on the western slopes of the Cascade Mountains within the boundaries of the Mt. Hood National Forest (Figure 4). The watershed is roughly triangular in shape, measuring about 17 miles east to west and about 10 miles north to south. The Bull Run watershed has been the sole source of water for the Portland metropolitan area for nearly ninety years. Recently Portland developed a well field as a back-up source of water.

The watershed has relatively gentle topography for a drainage basin so close to the Cascade's summit. The average elevation in the watershed is 2,500 feet. The lowest elevation is 750 feet near the Portland Water Bureau (bureau) headworks and the highest elevation is 4,151 feet along the eastern divide.

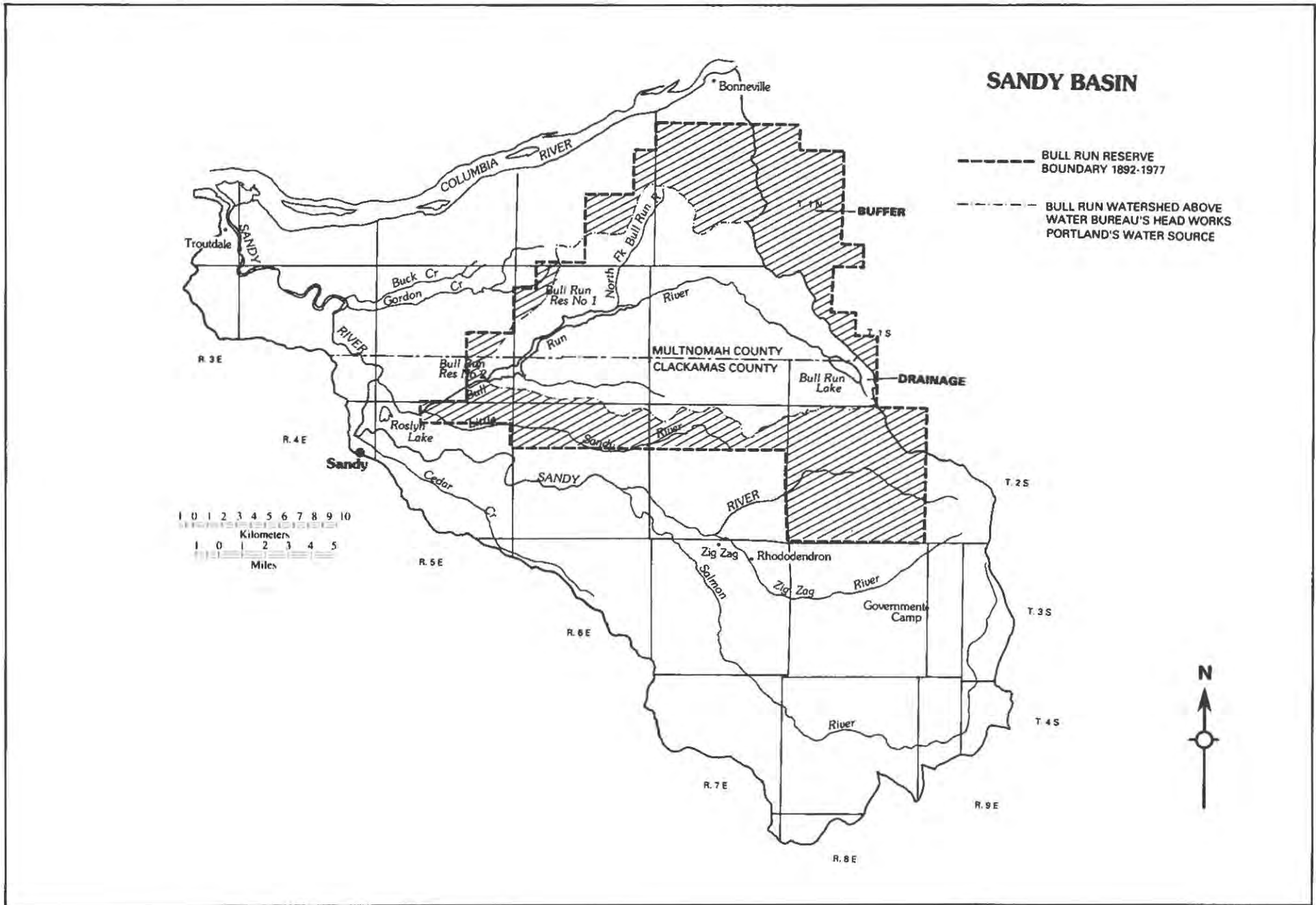


Figure 5

Climatic patterns in the watershed are typical of the Western Cascades. Precipitation and temperature vary with elevation. Average annual precipitation ranges from 90 inches near the headworks to 170 inches at the highest elevation in the watershed.

Only 10 percent of the annual precipitation occurs from June to September. This requires that winter runoff be stored to satisfy the water needs of the Portland metropolitan area. Water is stored in two bureau reservoirs and Bull Run Lake.

With the exception of the bureau's reservoirs, and a number of lakes, meadows and rock outcrops, the entire watershed is forestland. The dominant tree species in the watershed is Douglas fir. Other species of fir are common at higher elevations.

Management activities such as logging and road building, and timber blowdowns have resulted in openings in the forest canopy in the watershed.

## 2. DESIGNATION OF BULL RUN AS PORTLAND'S WATER SUPPLY

The 139,520 acre Bull Run Reserve (reserve) was created by a presidential proclamation in 1892 (Figure 5). The reserve included the entire Bull Run and nearly all of the Little Sandy watersheds and a buffer zone. The proclamation established a federal policy protecting Portland's water supply. It also allowed the Portland Water Committee to consolidate its hold on land parcels and riparian rights in the reserve (Portland Water Bureau, 1983). By 1893, the committee was ready to shift from policy matters to engineering matters. After almost two years of engineering design and construction, water from the Bull Run River arrived in Portland on January 2, 1895.

In 1897, Congress enacted the Organic Act. The act provided that, "No national forest shall be established, except to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States..." The provisions of this act allowed a wide range of activities within federal forest reserves. To protect the Bull Run Reserve from such activities, the Portland Water Board urged the Oregon congressional delegation to introduce a bill that would limit access to Bull Run (Wilson, 1989).

In 1904, the Bull Run Trespass Act was enacted. The Trespass Act was titled "An Act for the Protection of the Bull Run Forest Reserve and the Sources of the Water Supply of the City of Portland, State of Oregon." This law prohibited entry into the reserve by anyone except "Forest Rangers and other persons employed by the United States to protect the forest or to federal and state officers and employees of the Water Board of the City of Portland in the discharge of their duties."

In 1909, the State Legislature enacted Oregon Revised Statute (ORS) 538.420 which provides that "exclusive right to the use of waters of Bull Run and Little Sandy Rivers is granted to the City of Portland." Portland's rights do not impair the rights of anyone who, on February 24, 1909, had any vested right or valid appropriation on the Bull Run and

Little Sandy Rivers. ORS 538.420 prohibits use of water from these rivers by subsequent appropriators. While the statute grants Portland exclusive rights, it does not specify how and when Portland should develop its right.

In 1947, ORS 449.505 and 449.990 were enacted by the State Legislature, making trespass and grazing unlawful in the Bull Run Reserve. These statutes were repealed in the 1970's.

### 3. HISTORY OF DEVELOPMENT

The Bull Run watershed has been the main source of water for the Portland metropolitan area since 1895. The natural flow of the Bull Run River supplied sufficient quantities of water to meet demands in the Portland area until the mid-1920s. However, expanding population, a booming economy, higher living standards and other factors made the construction of storage facilities necessary.

Construction of Bull Run Dam #1 on the Bull Run River was completed in 1929. The reservoir stores about 10 billion gallons (30,684 acre-feet, ac-ft,) of water. By the late 1950's, the need for additional storage prompted plans for a second dam in the Bull Run watershed. The second dam, with a storage capacity of 7 billion gallons (21,482 ac-ft) of water, was completed on the Bull Run River in 1962. The two reservoirs and a managed natural lake (Bull Run Lake) provide a combined storage of about 21 billion gallons (64,436 ac-ft). However, only between 12 and 13 billion gallons (36,821 and 39,890 ac-ft) of the total storage capacity is usable. Turbidity problems limit the use of additional water from the two reservoirs and the Bull Run Lake. Turbidity problems arise during periods of excessive reservoir drawdown. During excessive drawdown in late summer/early fall, bottom sediments are remixed causing high turbidity.

Bull Run water is conveyed to the Portland metropolitan area via three conduits. These conduits have a combined capacity of 225 million gallons per day (mgd) or 348 cubic feet per second (cfs). In addition to these conduits, the Water Bureau operates six distribution reservoirs and 69 tanks and standpipes throughout its service area (Water Bureau, 1983). More than 35 water districts and companies receive Bull Run water for distribution in the Portland metropolitan area. This makes the Bull Run watershed an important regional water source.

Today, the Portland Water Bureau serves a population of almost 700,000 people. The system supplies an average of 130 mgd at a rate of 201 cfs to its customers. Most of this water comes from the Bull Run watershed. Portland's well field in east Multnomah County is used from time to time to meet peak demand, or to mix with, or replace Bull Run water in case of an emergency. The well field is capable of supplying 100 mgd.

In the future, the Bull Run watershed may play an even greater role as the primary source of water in the Portland metropolitan area. For planning purposes, the Portland Water Bureau defines the area roughly bounded by Vancouver, Newberg, Sandy and Forest Grove as the region to consider for coordination of municipal water supplies (Tenny, 1990). Senate Bill 1118 and House Bill 2936, by the 1989 session of the Oregon Legislature, provide the flexibility needed for municipal water system interconnection and coordination. These bills allow municipal water system interconnection and water marketing.

#### 4. SUPPLY AND QUALITY

The Bull Run watershed produces large quantities of high quality water. It is estimated that about 26 percent of the average annual discharge of the watershed is utilized. The Portland Water Bureau projects that in the year 2050, a population of about 1,110,000 people will be served by a system delivering nearly 200 million gallons (309 cfs) of water per day. Such a system would utilize approximately 41 percent of the total annual Bull Run watershed discharge.

The purity of Bull Run water has been compared to that of rainfall. However, it has also been a subject of heated debates and controversy during the last two to three decades. Some people believe that high water quality can be maintained only if the watershed is kept untouched (no logging, no road building, no public entry). Others maintain that forest management activities such as logging, road building etc. are needed to protect the watershed from fire, disease and other catastrophic events.

In 1988, Representative Ron Wyden commissioned a water quality task force (The Wyden Task Force) to conduct a technical review of the water quality monitoring program in the Bull Run. Historical water quality data were reviewed by the task force to determine trends in water quality. The task force analysis concluded:

*The waters of Bull Run are of excellent quality. On the average they have low dissolved solids (ca 21 mg/L, which approximates that of commercially available distilled water), low turbidities (undetectable to the unaided eye), and very low bacterial content. Even at its worst, the quality is usually superior to that experienced by most of the United States. The quality of the streamflow is only slightly changed from the rainfall and snowmelt.*

*Though it was not a primary goal here, review of the available data revealed no demonstrable historical trend in water quality, on either short or long term time scales. Chemically, it is very close to rainfall, and thus there is very little room for improvement.*



## 5. MANAGEMENT ACTIVITIES WITHIN THE BULL RUN RESERVE

Logging in the Bull Run Reserve dates back to the late 1920's. In 1927, the City of Portland cleared the site for the construction of its first reservoir in the Bull Run watershed (Forest Service, 1988). In 1934, the city also designed and sold the first blowdown timber sale in the watershed. With these exceptions, management activities such as logging, road building and recreation within the Bull Run Reserve were practically nonexistent until the early 1940's.

In 1940, congress passed Public Law 76-352 (National Forest Lands - Water Protection). The law stated, "Whenever national forest lands are withdrawn under this act, and the municipality concerned objects to the utilization of the timber or other resources of lands withdrawn, and the Secretary of Agriculture agrees to withhold such resources from utilization, said municipality shall pay to the Forest Service annually an amount which the Secretary of Agriculture shall determine is necessary to reimburse the United States for the loss of net annual revenues which would be derived from the resources so withheld from disposition." This law created friction between the Forest Service and the City of Portland. Portland opposed commercial logging in the reserve.

In 1943, the Forest Service, based on its interpretation of the legal opinions of the time, allowed controlled, commercial entry into the reserve. Others considered entry into the reserve a violation of the provisions of the 1904 Trespass Act. The City of Portland also expressed its opposition to entry into the reserve. Despite such opposition, the Forest Service granted logging rights in the reserve to Crown Zellerbach Corporation.

In 1944, the Portland City Council adopted a resolution urging the Oregon congressional delegation to introduce legislation that would prohibit logging in the reserve. This effort was unsuccessful and the Forest Service continued to allow logging in the reserve. Logging in the watershed, however, was limited to selective and blowdown logging.

In the 1950's, logging and road building activities increased in the reserve. Recommendations for opening up the watershed to road building and logging were made in a 1952 memo by a Mt. Hood National Forest District Ranger (Wilson, 1989). The memo indicated that one million dollars could be generated annually from sale of 55 million board feet in the watershed.

In 1957, the city cleared land for the construction of its second reservoir in the watershed. After numerous delays, the project was finally completed in 1962.

In 1958, the Comptroller General of the United States issued an opinion giving the Forest Service the right to allow controlled, commercial entry into the reserve for all multiple use purposes. The Forest Service did agree, however, to preserve the high quality of the city's water.

Soon after, the Forest Service initiated a program allowing an average of about 1 percent of the total watershed area to be logged annually. Logging included partial cuts and clearcuts. Thus, commercial logging and road building within the Bull Run watershed began in 1958. Actual logging in the watershed between 1958 and 1976 ranged from 59 acres per year to more than 1,400 acres per year (0.08 and about 2 percent of the watershed area) (USFS, 1988). During the same period, more than 160 miles of road were constructed in the watershed. Most of the road construction activities occurred in the 1960's, reaching the highest level in 1969 (USFS, 1988).



*An Example of Forest Management Practices in the Bull Run Watershed Management Unit.  
Photo courtesy of Amin Wahab*

Activities in the reserve did not remain limited to logging and road building. In 1959, an administrative order was issued by the regional forester that opened 42,500 acres of the Bull Run Reserve to the public for recreation. The order also included an active timber management program. The Portland Water Bureau did not object to this order since it did not affect the Bull Run watershed, Portland's source of water.

Since the late 1970's, management activities in the watershed have remained limited mainly to removal of blowdown trees.

## 6. MANAGEMENT ACTIVITIES AND WATER SUPPLY/QUALITY

In 1969, a survey of the Portland municipal supply was released by the Oregon State Board of Health and the U.S. Public Health Service. The report stated that several major improvements were in order to upgrade the Portland water supply system. The report was particularly critical of Portland's open distribution reservoirs and the water treatment process. The report also made specific references to management activities in the watershed and their impact on the quality of Portland's water supply. The report made the following

conclusions and recommendations (State Board of Health and U.S. Public Health Service, 1969):

*The continued use of the open reservoirs cannot be condoned. To maintain an approved status it is imperative that the Bureau of Water Works develop and implement a program to cover these reservoirs and eliminate this unnecessary hazard to the water system...Steady and satisfactory progress toward the goal of covered reservoirs must be shown, however, if the approved classification is to be continued.*

*The present treatment of the surface waters of Bull Run is minimal. Ideally, this should be expanded to include filtration with some form of pretreatment. The use of high quality surface water with disinfection as the only treatment is recognized by the Public Health Service. It is necessary, however, that these waters meet certain bacteriological requirements and also meet the physical and chemical limits of the Drinking Water Standards. There is a question as to the ability of the Bull Run waters to meet the bacteriological requirements in some months and the physical requirements for turbidity in others. Due to logging activities, the road mileage in the basin is steadily increasing as are the number of access points to the watershed. Such alterations of the basin will undoubtedly cause further deterioration of the physical quality of the water and also make the control of human access to the watershed much more difficult... The question to be answered is whether or not the watershed can produce a water of high enough quality to continue to be acceptable for the present low degree of treatment. A brief review of existing watershed management practices and past experience with water quality indicates the answer to be no... With continued logging of the basin and increasing mileage of access roads, the turbidity problem can only worsen.*

With such conclusions and recommendations, the study made a direct link between the water bureau's system operations, watershed management practices and water quality.

The amount of chlorine added to the water for disinfection has increased from 0.54 mg/l in 1958 to 1.8 mg/l in 1983. Some members of the public began to question this increase. To them there was an apparent connection between increased access to the watershed and chlorination of the water. However (Aumen et al., 1989), increase in disinfection appears to be a regulatory issue and not an access issue.

Chlorination of Bull Run water, at the rate of 0.24 mg/l, began in 1929, before any commercial activities in the watershed. Increase in chlorination has been mainly the result of increased understanding of disinfection and stringent nationwide requirements (Aumen et al., 1989). In 1974, Congress passed the Safe Drinking Water Act (PL 93-523). This law was a comprehensive effort on the Federal level to regulate drinking water quality nationwide. The law was amended in 1986, and provides regulatory authority essentially over all public water supplies in the county. The Environmental Protection Agency (EPA) is currently regulating maximum levels for 33 contaminants. An additional 50 contaminants may be added to this list by 1991 (Aumen et al., 1989). This addition to the list of contaminants could require additional disinfection and filtration of public water supplies in the country.

In 1972, particulate matter from a landslide caused high turbidity in the water supply. Turbid water eventually reached the city. After monitoring turbidity levels in the Bull Run water supply, the Oregon State Health Division (OSHD) concluded that Portland's water had fallen below acceptable standards (City of Portland, 1983). Based on its findings, OSHD recommended the Environmental Protection Agency (EPA) reclassify Portland's water. The EPA temporarily downgraded Portland's water from "approved" to "provisionally approved." A provisionally approved classification, as defined by the U.S. Public Health Service, is "...usually the result of major deficiencies or failure to act on recommendations of a previous inspection..." The previous inspection in this case apparently being the 1969 State Board of Health and the U.S. Health Service joint survey of Portland's water system.

Major timber blowdowns occurred in the watershed in 1973, 1976 and 1983. Blowdowns result from strong wind-storms. The severity of blowdowns can be directly related to climatic, topographic and soil conditions, and management activities (USFS, 1988). Blowdowns in the Bull Run watershed were mainly related to management activities, primarily clearcut logging. In 1973, about 73 percent, in 1976, about 97 percent and in 1983, about 74 percent of the blowdown was adjacent to clearcut areas (USFS 1988). In all, blowdowns were associated with about 25 percent of the clearcuts.

In addition to the blowdowns, 25 of the 40 fires in the Bull Run watershed from 1965-1987 resulted from human activities including slash burning, machinery, cooking fire, smoking, arson and blasting. The majority of these fires occurred before 1979. Of the total 40 fires, only 5 were larger than ten acres. Most fires occurring in the Bull Run are very small and burn with low intensity (USFS, 1988).

While disinfection of the water has increased, Portland's water supply is still unfiltered. The EPA has finalized its rules on filtration. Based on these rules, filtration of Bull Run water will not be required (Tenny, 1990). Studies of the water quality data by Portland Water Bureau, the Wyden Task Force and the Forest Service conclude there have been no apparent trends of changes or deterioration of water quality resulting from management activities. Residents in the Portland metropolitan area continue to use abundant, unfiltered water from the Bull Run watershed.

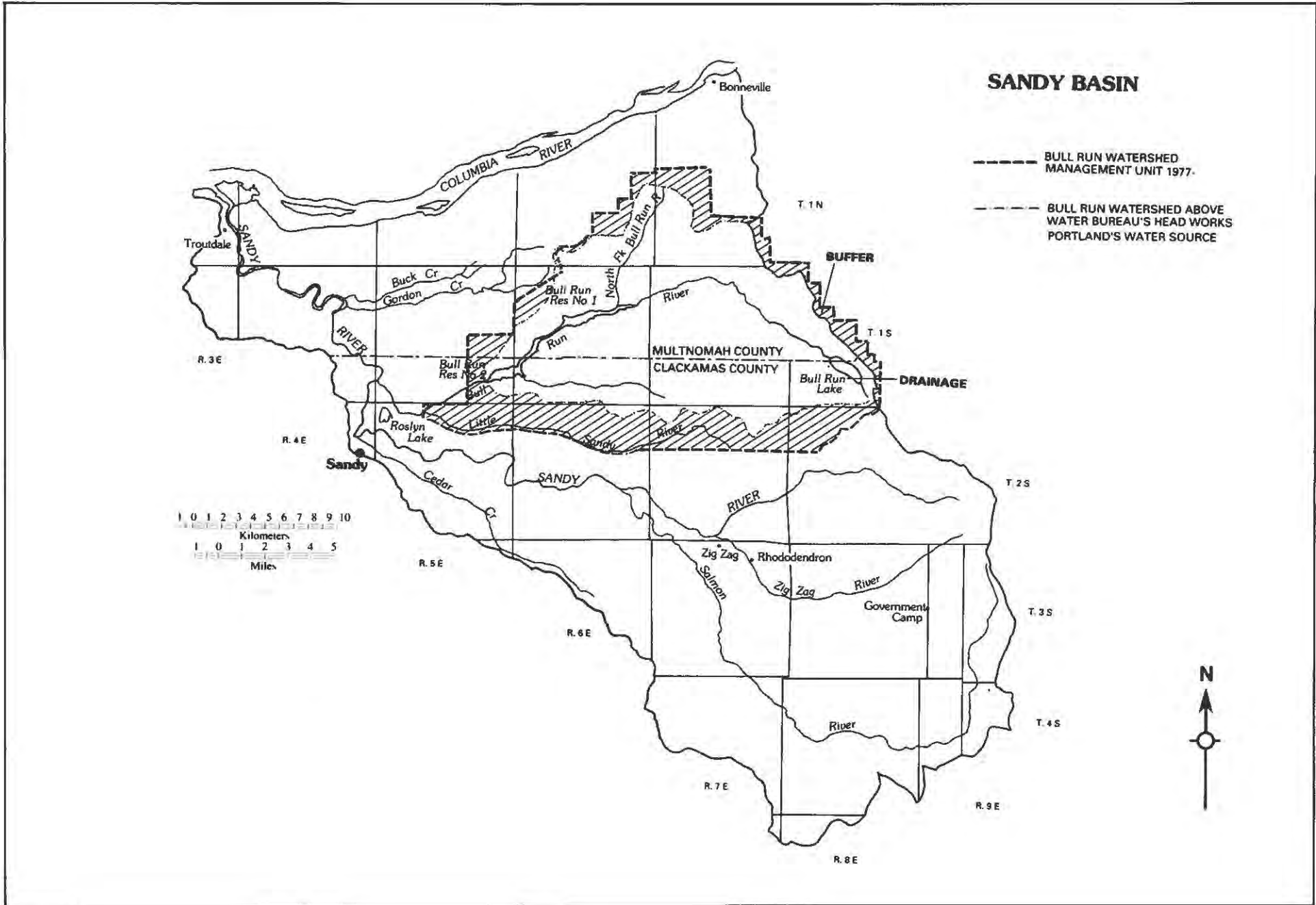


Figure 6

## 7. 1976 COURT DECISION

Concerns over Forest Service management activities, watershed protection and water quality came to a climax in 1973. A lawsuit was filed in the U.S. District Court in Portland against the Forest Service and the City of Portland. The lawsuit challenged the legality of the Forest Service management activities within the Bull Run Reserve.

The court issued its opinion in 1976. It found logging, road building and recreation in the reserve in violation of the 1904 Trespass Act. The court ordered the Forest Service to halt such activities. The court concluded that the logging program in the Bull Run Reserve, as conducted by the Forest Service, did not protect the forest from landslides, blowdowns, insects, diseases or fires as claimed by the Forest Service. On the contrary, the court stated, "Plaintiffs have shown, largely from reports and studies of the federal defendants that large-scale logging posed serious dangers to the reserve."

With this interpretation of the laws pertaining to the Bull Run Reserve, most logging activities were banned within the reserve. The ban was extended to include geothermal exploration and construction of hydroelectric power plants.

## 8. PUBLIC LAW 95-200, DESIGNATION OF THE BULL RUN WATERSHED MANAGEMENT UNIT

Parties involved in the management of the Bull Run Reserve believed that the law governing the reserve was too restrictive and not in the best interests of proper management. The Forest Service felt obligated to manage the reserve according to the provisions of the Multiple Use/Sustained Yield Act. The two acts, the Bull Run Trespass Act and the Multiple Use/Sustained Yield Act, were passed by the U.S. Congress and have had conflicting provisions. The separate interpretation and application of these laws in Bull Run usually resulted in conflict and controversy. Congressional action was deemed necessary to resolve the Bull Run controversy.

In May 1977, the Oregon Congressional delegation introduced legislation to set new directions for the management of the Bull Run Reserve. Earlier that year, Portland's City Council passed resolution #31832, conveying Portland's views to Congress. The resolution was intended to give the city a stronger voice in the planning and management of the reserve. The key points of the resolution included:

- *continued production of high quality water;*
- *open 42,000 acres of the reserve to the public, but prohibit access to the remaining 95,000 acres of the reserve;*
- *creation of the Bull Run Advisory Commission;*
- *sustained yield logging within the reserve was inappropriate;*
- *coequal status for the City of Portland in the administration of the reserve was needed.*

Except for the last two, these points were integrated into Public Law 95-200.

Public Law 95-200 (Act to Provide Improved Authority for the Administration of Certain National Forest System Lands in Oregon) was passed in the U.S. Congress and signed into law by the President in 1977. This law reduced the size of the original 139,520 acre Bull Run Reserve to a 95,382 acre unit. The new unit is called the Bull Run Watershed Management Unit (Figure 6).

The new unit includes the 68,074 acres of the Bull Run watershed above the Portland Water Bureau headworks and a 27,308 acre buffer zone. Although a tributary of the Bull Run River, a major portion of the Little Sandy River drainage became part of the buffer zone. Other portions of it were excluded from the management unit altogether.

The major provisions of the law are (USFS 1984):

*The principal management objective is the continued production of pure, clear, raw, potable water for the City of Portland and other local government units and persons in the Portland metropolitan area.*

*Management of renewable resources, such as timber, is to be administered by the Forest Service and must not have a significant adverse effect on compliance with the water quality standards.*

*Management for the primary objective is to be attained through the development, maintenance and periodic revision of land management plans.*

*Water quality standards (applicable only to Portland's current water supply) are to be developed by the Forest Service in cooperation with the City of Portland.*

*Systems for monitoring and evaluating water quality are to be maintained.*

*Generation of electrical power is consistent with the primary management objective.*

*Research needs are to be developed after consultation and coordination with the city.*

*The Forest Service is to meet annually with the City of Portland to review planned management activities and to discuss their potential impacts on water quality.*

*The Forest Service is to determine and enforce entry control restrictions after consultation with the city.*

*Binding arbitration is to be used in the event the City of Portland and the Forest Service cannot agree on certain arbitrable points.*

The new law reaffirmed and gave the Forest Service almost total responsibility for the administration and management of the Bull Run Watershed Management Unit. The Forest Service, after public participation and consultation with the City of Portland, can conduct timber sales, road building and other management activities as long as water quality standards, set by the Forest Service, are met. The law allows minor changes in the boundaries of the unit by the Secretary of Agriculture "after consultation with the city and appropriate public notice and hearings." The Forest Service drafted an environmental impact statement in 1979 (Bull Run Planning Unit Final Environmental Statement) that outlines planned management activities in the unit.

The new plan allows a variety of management activities within the Bull Run watershed above the Portland Water Bureau headworks (68,074 acres). These activities would be conducted to protect or enhance long term supplies of high quality water (USFS, 1979). Logging is permitted in the watershed. However, logging levels are not on a sustained yield basis. Road construction is also allowed in order to accommodate management activities. In addition, the utilization of other resources within the watershed can continue. Certain areas within the watershed will be treated as Special Areas. Activities in these areas will be limited. Unauthorized entry is prohibited into the watershed.

In the buffer zone, particularly in the south buffer, logging may continue at a sustained yield level for the most part. Some areas in the north buffer are managed to provide less than full timber yields. Other management activities, such as road building and utilization of rock resources, are also allowed in the buffer zone. Persons not authorized by the Forest Service are not allowed to enter the buffer zone.

## 9. FOREST SERVICE / CITY OF PORTLAND COORDINATION

Public Law 95-200 did not give the City of Portland an equal footing with the Forest Service. It did require the Forest Service to "...consult and coordinate with appropriate officials and advisors of the city" in matters relating to the management of the unit. In this way, the interests of the city would be represented in the management process without preventing the Forest Service from managing national forest lands in the national interest.

In 1979, the City of Portland and the Forest Service signed a memorandum of understanding outlining roles in the management of the unit. The memorandum states, "The Bureau (Portland Water Bureau) and the Mt. Hood National Forest will cooperate in a planning process and preparation of plans for proposed and active management activities in the unit. These plans are of two basic types. Sub-basin (Bull Run watershed) plans will assess the potential for and prioritize programs within the designated sub-basins of the drainage. The Annual Activity Schedule will describe management activities planned for the upcoming year within sub-basins, and describe proposed management activities outside the sub-basins but within the unit (buffer zone)."



## C. DISCUSSION

The Bull Run watershed is perhaps the most important municipal watershed in the state. It supplies water to a large segment of the state's population and will continue to do so in the future. Various laws, some specific to the Bull Run and some pertaining to all national forests, guide management activities in this watershed. Almost no management activity in the Bull Run watershed is without controversy. At the center of every Bull Run controversy has been its most important resource, water. This discussion focuses on concerns, issues and view points expressed during the Sandy Basin planning process. In addition, it clarifies the responsibilities of the Water Resources Commission pertaining to management and water supply in the Bull Run/Little Sandy watersheds.

### 1. WATERSHED MANAGEMENT AND WATER SUPPLY RESPONSIBILITIES

A group of citizens believes that boundaries of the old reserve should be restored to include the entire Little Sandy watershed. It also believes that the reenactment of the 1904 Bull Run Trespass Act is needed to close the Bull Run and Little Sandy watersheds to commercial logging, road building and other activities. Entry into these watersheds and management activities, the group contends, have and will continue to cause a deterioration in the quality of Bull Run water. The group believes Portland may be required by new Environmental Protection Agency (EPA) standards to construct a filtration plant. It argues a filtration plant would not be needed if management activities are restricted in the watershed. The group supports the idea of a coordinated study by the Water Resources Commission to determine future water supply needs of the Portland metropolitan area and evaluate how Bull Run/Little Sandy fit into the picture. A finding that the Bull Run and Little Sandy Rivers are important sources of water for municipal use, the group contends, would enhance the possibility of curbing management activities within these watersheds.

Changing the law pertaining to the management unit, changing the boundaries of the unit to include the entire Little Sandy watershed and the reenactment of the 1904 Trespass Act would require congressional action or action by the Forest Service. This does not seem to be an option for the Oregon Water Resources Commission to pursue nor need to at this time.

Management activities are conducted in the Bull Run/Little Sandy watersheds according to the provisions of Public Law 95-200. Such activities are relatively restricted in the Bull Run watershed. That is not the case in the Little Sandy watershed which is managed to meet State Water Quality Standards per a Memo of Understanding Between the Department of Environmental Quality (DEQ) and the Forest Service. Management activities in both the Bull Run and Little Sandy watersheds are conducted using Best Management Practices (BMP's) which are found to meet or exceed the Oregon State Forest Practices Act Rules. These rules are certified as State BMP's. BMP's designed and implemented in accordance with a state approved process will normally constitute compliance with the Clean Water

Act (Mohla, 1990). Based on the finding of the Wyden Task Force and a Portland Water Bureau Report (Bloem, 1988), the quality of Bull Run water does not show a change on either the short term or long term. The water generally meets or exceeds all existing DEQ and EPA regulations.

Given the continued high quality of Portland's Bull Run water and given the restrictions on management activities in the Bull Run, possible future filtration of Portland's water does not seem to be related to management activities in the watershed. Portland's water supply is one of the very few unfiltered water supplies of such size in the nation. Portland is exempt by the EPA, under the Surface Water Treatment Rule.

There may be other considerations relating to additional treatment or possible filtration of Portland's water supply. These considerations are described as follows in the Wyden Task Force report (Aumen et al., 1989):

*Having treatment capacity would provide the Water Bureau with operational flexibilities that it does not now have. For example, there is currently a practical limit in the amount of drawdown that can be imposed on the lower reservoir for fear of introducing unacceptable quantities of turbidities into the distribution system. This limitation effectively relegates about one-half of reservoir storage to a dead status, because it is of no practical use for water supply. As the system demand grows, it may be found that adopting treatment technology that allows use of heretofore unavailable storage may be more cost-effective than developing additional impoundment capacity.*

*While the quality of Bull Run water has been noted repeatedly to be exceptional, there are certain classes of water customer, industrial users in particular, who require more consistency in quality than the system now delivers. For example, small variations in turbidity which are undetectable by the unaided eye may require pretreatment in order to be useful in certain industrial processes.*

*The Portland Water System, as it is currently constituted, has certain vulnerabilities to episodes of water quality damage that would be difficult, if not impossible, to deal with in the absence of some water treatment capability. The possible occurrence of catastrophic fires, which has been noted herein, is one such acute event that could have devastating impacts on the operation of a water supply with no treatment capacity. It is possible to envision any number of other such acute episodes, both natural and man-made, and while any single one may have a very low probability of occurrence, the probabilities are not zero. In cases where the risk for unacceptable consequences from some such event is so high, it is prudent to take steps to protect against the impacts of even the very rare event.*

## 2. PORTLAND'S EXCLUSIVE RIGHT TO THE WATERS OF THE BULL RUN AND LITTLE SANDY WATERS

ORS 538.420 protects the waters of the Bull Run and Little Sandy Rivers for exclusive use by the City of Portland. When Legislature granted this exclusive right to Portland, it reduced the jurisdiction of the Water Resources Commission. While the statute does not dismiss any pre-1909 claims on the Bull Run and Little Sandy Rivers, it prohibits subsequent appropriations on the two rivers or their tributaries. It is in Portland's discretion to decide when and how much of its right to the waters of the Bull Run and Little Sandy to develop. Since Portland's right is a municipal right, it is exempt from forfeiture through nonuse.

The Commission recognizes the importance of the Bull Run and Little Sandy in a regional context. However, the Commission's responsibility may be limited to confirming the appropriate primary uses of the Bull Run and Little Sandy to meet regional water needs. The Commission could become more actively involved in encouraging and monitoring discussions on regionalization of water systems in the Portland metropolitan area. Portland is currently conducting a regional water supply demand study. While addressing and meeting regional needs, the discussions could include an evaluation of potential, negative and positive, impacts of additional out-of-stream uses of water from the Bull Run and Little Sandy Rivers.

Some instream flow advocates contend Portland's exclusive right to use of the entire flow of the Bull Run and Little Sandy is not in the best interest of instream values in the Sandy Basin. If Portland ever decides to develop a large percentage of the flow of the two rivers, instream values could be impacted. While these advocates cannot dispute Portland's exclusive right to the Bull Run and Little Sandy on legal grounds, they believe Portland



*Reservoir No. 2 in the Bull Run Watershed.  
Photo courtesy of Amin Wahab*

should share a common commitment to maintaining adequate flows for instream values in the Sandy Basin. To do this, Portland could implement a strong conservation program in its service area. Also, Portland's additional storage on the Bull Run and Little Sandy Rivers could serve the dual purpose of municipal use and instream flow augmentation.

The City of Portland believes that continued and additional municipal use of the Bull Run and Little Sandy Rivers alleviates pressure on other streams in the Lower Willamette Basin. In a 1990 letter to the Department, Ed Tenny, Portland Water Bureau administrator stated, "Use of Bull Run to meet municipal needs within the region allows for the use of other streams within the region for other needs. The region of use is coincident with neither the defined basins of the Sandy or the Willamette Rivers, nor with the political boundaries of any existing local or regional governmental entity. Water for municipal use has been transferred both interbasin and intergovernmentally for many years. Any reallocation of the Bull Run from solely municipal use to recreational or other in-stream uses, would of necessity, mean a greater municipal use of other streams in the region. This would reduce the ability of these other streams to meet existing recreational and instream uses. As an example, a significant portion of flow into the Tualatin subbasin under low flow conditions enters from the Bull Run via municipal use."

Some members of the public are interested in a reassessment of the legislative status of the Bull Run and Little Sandy Rivers. This reassessment would determine whether the "exclusive use" status should be redefined or changed to reduce the amount reserved in favor of instream values. Transferring Portland's exclusive right to others or changing the status or uses of the two rivers will require legislative action. The Commission has expressed no interest in pursuing this option.

Some members of the public, participating in the Sandy Basin planning process, wanted to know what "exclusive use by the city" meant. They also wanted to know if the "exclusive use" allowed or included Portland's wholesaling of water to other purveyors.

In 1976, Portland deputy city attorney issued an opinion on the question of Portland's exclusive right to the waters of the Little Sandy River. It stated, "It is our opinion that by the use of the words, "exclusive right," the legislature intended that only the City of Portland is entitled to use the water of the Little Sandy River, and that we have no authority to transfer this right without express authorization." The statute apparently did not prohibit Portland from selling water to other purveyors. Senate Bill 1118 and House Bill 2936, passed during the 1989 legislative session, provide additional flexibility needed to municipal water purveyors to buy and sell water and to interconnect municipal water systems.

### 3. THE LITTLE SANDY WATERSHED - STATUS AND USE

The Little Sandy watershed and its waters have been part of almost every Bull Run controversy. The Little Sandy River is a tributary of the Bull Run River and the City of Portland was given exclusive right to the use of its waters for municipal purposes ( ORS 538.420). Portland has not developed and has no immediate plans to develop the Little Sandy for municipal use. However, PGE, who claims a pre-1909 right on the Little Sandy River, diverts the Little Sandy for power generation at Roslyn Lake.

A group of concerned citizens contends that Portland's lack of interest in developing the Little Sandy River resulted in its exclusion from the Bull Run Watershed Management Unit. Portland's lack of interest also opened the way for a wide range of management activities within this watershed, the group argues. Pre-1977 laws restricted management activities in the Little Sandy watershed. Public Law 95-200, passed in 1977, excluded a major portion of this watershed from the newly created Bull Run Watershed Management Unit. It also allowed a wide range of management activities even in those portions that remained within the unit. The group advocates the inclusion of the entire Little Sandy watershed in the management unit and its closure to management activities. In addition, the group advocates the use of the Little Sandy by the City of Portland.

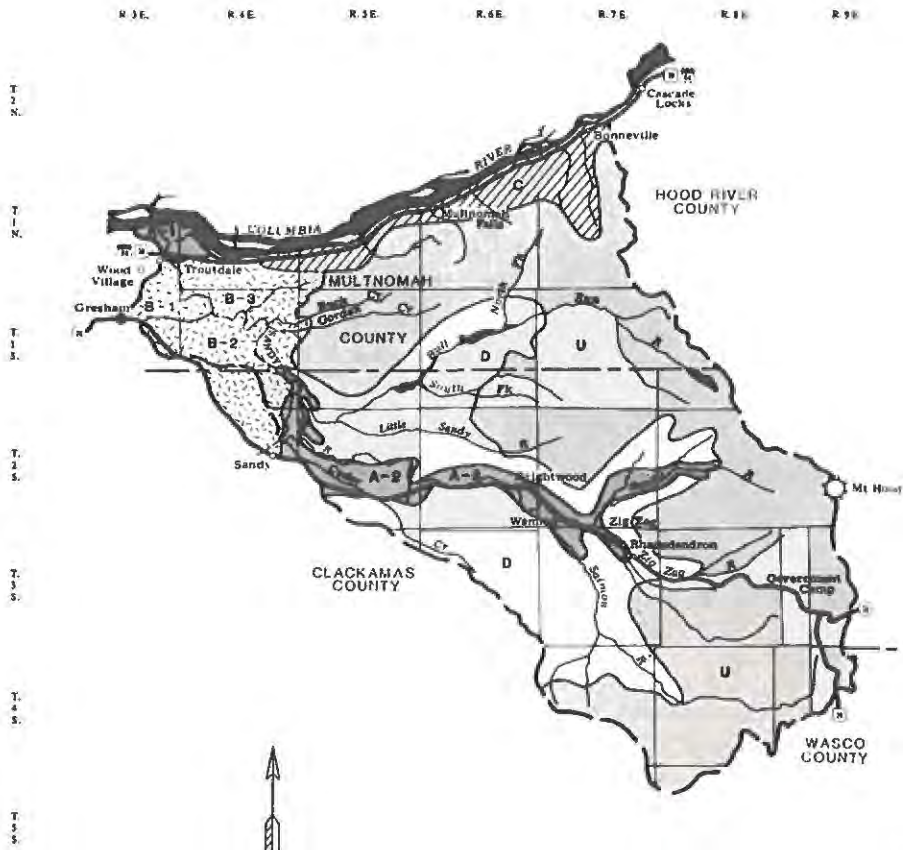
The Forest Service manages the Little Sandy watershed to meet State Water Quality Standards through application of BMP's. It believes the management of the Little Sandy watershed is consistent with both Public Law 95-200 and the terms of the agreement with Portland. There is no statute to require the Forest Service to curtail management activities in the Little Sandy watershed. It is not clear now if additional or local standards would need to be developed for the Little Sandy if it is used for municipal purposes. Management within the Little Sandy watershed could be modified based on documented needs identified by the purveyor of the water (Mohla, 1990).

The City of Portland states that it does not have any immediate plans for developing the Little Sandy for municipal use. Therefore, it does not object to the Forest Service management activities in the watershed. In addition, under existing laws, the city has no grounds on which to argue on management activities in the Little Sandy watershed.

The City of Sandy has expressed interest in developing the upper Little Sandy watershed for municipal use. Since Sandy does not have a water right on the Little Sandy River, it would have to negotiate with the City of Portland and PGE. Sandy's current sources of municipal water are Alder Creek and Brownell Springs. It also has a water right for 25 cubic feet per second on the Salmon River. Sandy has not yet developed its water right on the Salmon River. It would prefer, for economic and engineering reasons, to use the Little Sandy if at all possible. (Boatwright Engineering, Inc., 1983).

Figure 7

# SANDY BASIN AVAILABILITY OF GROUND WATER



- |   |  |
|---|--|
| <p><b>A-1</b><br/>Aquifers, alluvium and underlying Troutdale Formation. Yield 500-1,000 gpm.</p> <p><b>A-2</b><br/>Aquifer, alluvial sand, gravel, silt, and clay. Yields generally less than 50 gpm.</p> <p><b>A-3</b><br/>Aquifer, alluvial gravel and boulders. Yields up to 500 gpm.</p> <p><b>B-1</b><br/>Aquifers, Troutdale Formation and locally perched zones in piedmont or terrace deposits. Yield as much as 500 gpm from Troutdale, 5-20 gpm from perched zones.</p> <p><b>B-2</b><br/>Aquifers, Troutdale Formation, perched zones in piedmont or terrace deposits. Yield up to 300 gpm from Troutdale, 5-20 gpm from perched zones.</p> | <p><b>B-3</b><br/>Aquifers, Troutdale Formation, locally piedmont deposits. Yield as much as 100 gpm, 5-20 gpm from perched zones.</p> <p><b>C</b><br/>Aquifer, Columbia River Group (not developed). Expectable yields at least 50 gpm.</p> <p><b>D</b><br/>Aquifer, Searsville Formation, Columbia River Group, and local alluvial deposits. Yields generally 10-50 gpm.</p> <p><b>U</b><br/>Aquifer, young volcanic rocks. Yields at least 200 gpm.</p> |
|---|--|



Figure adapted from "Willamette Basin Comprehensive Study", Willamette Basin Task Force/Pacific Northwest River Basins Commission, 1969

Portland has indicated its readiness to discuss both the near and long-term potential uses of the Little Sandy and needs of the City of Sandy. Portland is aware of the water needs of the City of Sandy and is interested in cooperating with Sandy to accommodate its municipal water needs in a regional context (Tenny, 1990). PGE believes it has to be a full party to any discussions involving water diversions from the Little Sandy River. PGE diverts waters of the Little Sandy to Roslyn Lake for hydroelectric power generation. Any water diversions from the Little Sandy would have a direct impact on PGE's power generating capability and its pre-1909 claim (McPhail, 1990).

#### 4. FORMULATION OF A STATEWIDE POLICY ON MUNICIPAL WATERSHEDS ON PUBLIC LANDS

Some members of the public propose that the Water Resources Commission formulate and adopt a statewide policy addressing land management in municipal watersheds located on public lands.

Formulation of a statewide policy on municipal watersheds on public lands is not an issue specific to the Sandy Basin. This policy could be formulated outside of the Sandy Basin planning process. The watershed monitoring program in the Bull Run watershed could be used as a guide or example in formulating such a policy and implementing strategies. Adoption of a watershed policy for the Bull Run would not adequately address statewide needs. The Bull Run watershed has its own Federal law governing its management. This watershed is intensely monitored and has its own rigid raw water quality standards. All of these make the Bull Run unique. It does not represent typical municipal watersheds in the state for which the Commission may want to formulate a policy.

#### D. MANAGEMENT OPTIONS

The Commission's management options are rather limited in view of state and federal laws governing the Bull Run/Little Sandy watersheds. Action on the federal level would be needed to change the boundaries of the management unit, prohibit trespass, and limit management activities in the Bull Run and Little Sandy watersheds. Action on the state level would be needed to change the legislative status of the Bull Run/Little Sandy waters. The Commission's interest lies mainly in keeping abreast of regional water supply issues and monitoring and encouraging discussions on meeting regional needs through interconnection of supply systems.

#### PROPOSED POLICY:

*To uphold, subject to senior claims, the City of Portland's exclusive right to the waters of the Bull Run and Little Sandy Rivers for municipal use. The Commission supports further development of the Bull Run and Little Sandy Rivers for municipal use under a planned approach, designed to best meet the needs of the city and region, while encouraging water use efficiency and conservation and protecting the naturally high quality of the water.*

## MANAGEMENT ALTERNATIVES

1) The Commission could participate in a study to determine future water supply needs of communities in the Portland and outlying areas and evaluate how Bull Run/Little Sandy fit into the picture. The Commission could encourage and monitor discussions on regionalization and interconnection of water supply systems in the Portland metropolitan area. In addition, the Commission could direct staff to participate in an impact analysis of any future development and water diversions from the Bull Run and Little Sandy Rivers.

The Portland Water Bureau has already become a regional water supplier. Many communities in the Portland metropolitan area depend on the Portland system for their water supplies. For planning purposes, the Portland Water Bureau defines the area roughly bounded by Vancouver, Newberg, Sandy, and Forest Grove as its service area.

The Portland Water Bureau is currently conducting a preliminary study to determine the regional water supply demands. METRO (Morgan, 1990), "is reviewing the scope of work outlined in this study to ensure that it is adequate for assessing the entire affected region and using the appropriate planning period. The next step is to conduct a water availability/water rights study. This can be done with the cooperative efforts of METRO, City of Portland, and the Water Resources Department." The Commission could direct staff to assist the Portland Water Bureau and METRO in completing this study.

This alternative would address the City of Sandy's need for municipal water through interconnection. Portland may be able to accommodate Sandy's municipal water needs in a regional context.

2) The Commission could support an evaluation of the Little Sandy River for municipal use by the City of Portland in meeting the water needs of the metropolitan area while protecting existing uses of the river.

This evaluation could include addressing the needs of the City of Sandy which is included in the "study area" as considered by the Portland Water Bureau. The evaluation may require consultation with Portland General Electric (PGE) which diverts the Little Sandy for power generation at Roslyn Lake. Consultation may also be needed with the Oregon Department of Fish and Wildlife regarding fish flows in the river.

3) The Commission could decline to adopt a policy statement on the issue.

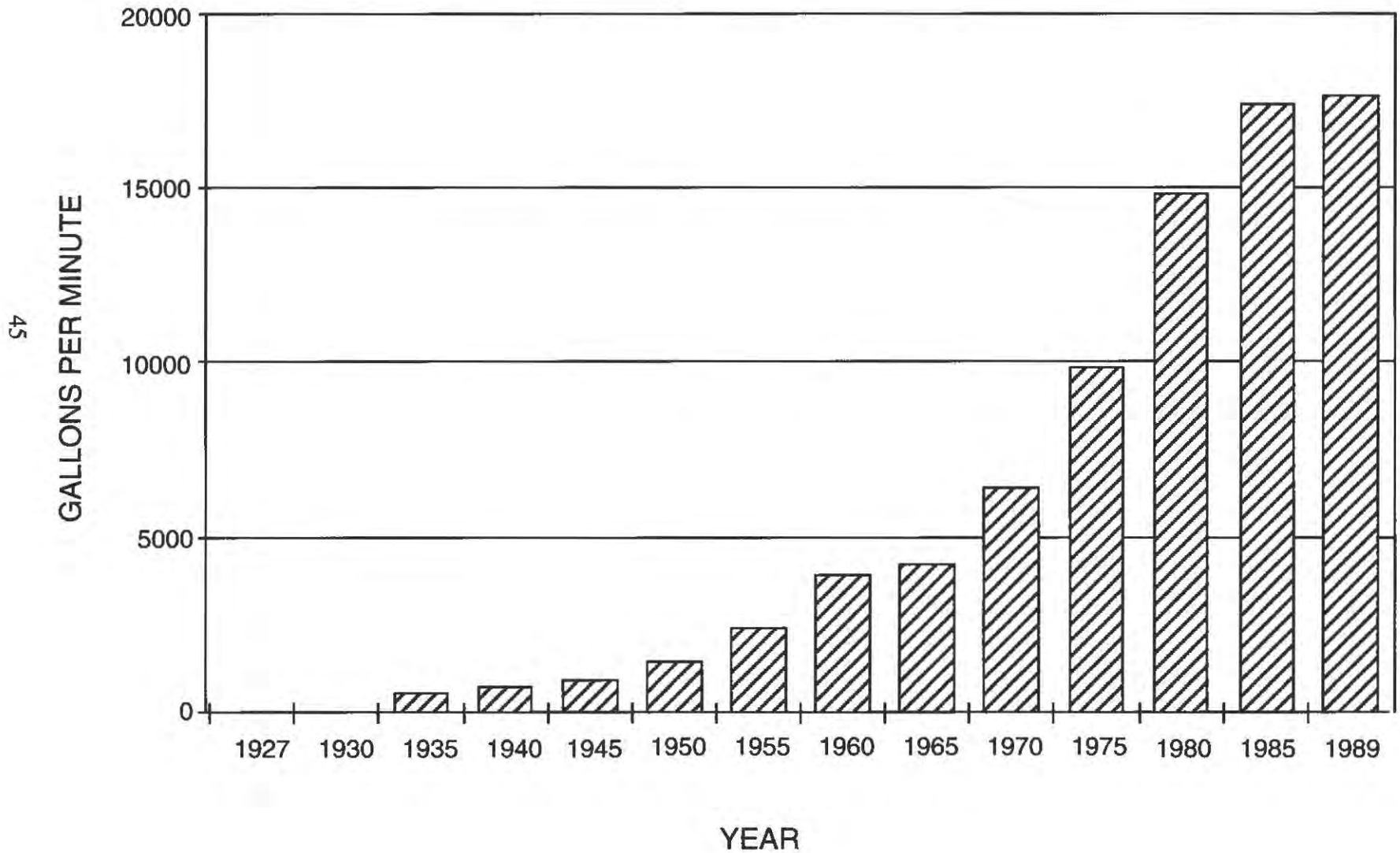
If the Commission selects this option, it would take no action on this issue. This Commission would simply allow the existing federal, state and local agencies involved to continue to provide guidance and management in the Bull Run and Little Sandy watersheds in meeting current and future regional water needs.

## RECOMMENDATIONS

Alternatives 1 and 2 are the recommended alternatives.



# SANDY BASIN GROUNDWATER RIGHTS CUMULATIVE RIGHTS ISSUED SINCE 1927



## REFERENCES

Athman, Connie / Hydrologist, Mt. Hood National Forest, Columbia Gorge Ranger District. August. 1989. Personal Communications. Troutdale, OR.

Audubon Society of Portland. 1982. Recommendations for Management Policy for National Forest Lands Adjacent to Audubon Sanctuary at Marmot. Portland, OR.

Aumen, Nicholas G. et al. 1989. Task Force Final Report - Water Quality Monitoring in the Bull Run Watershed, Oregon. Portland, OR.

Bloem, Douglas. 1988. Water Quality in the Bull Run Watershed: A Comparison of Past and Present Conditions - Report Prepared for the Portland Water Bureau. Portland, OR.

Boatwright Engineering, Inc. 1983. City of Sandy Long Term Water Supply Study. Salem, OR.

Glicker, Joe. /Water Quality Director - Portland Water Bureau. March 1990. Letter to the Water Resources Commission and Department.

McCammon, Bruce / Hydrologist, Columbia Gorge Ranger District, Mt. Hood National Forest. August 1989. Personal Communications. Troutdale, OR.

McPhail, Denise /Governmental Affairs Officer - Portland General Electric. July 1990. Letter to the Water Resources Department. Portland, OR.

Miller, Joseph. 1985. What Good is Free Speech in a Closet? - A Story of Cover-up in Planning for our Grandchildren's' Drinking Water. Portland, OR.

Mohla, David G. /Forest Supervisor - Mt. Hood National Forest. March 1990. Letter to the Water Resources Department.

Morgan, Jim / Water Resources Analyst, METRO. March 1990. Letter to the Water Resources Department.

Niss, Bruce / Watershed Specialist, Portland Water Bureau. May 1989. Personal Communications. Portland, OR.

Oregon Water Resources Department. 1988. Oregon Water Laws. Salem, OR.

Portland, City of. 1989. Annual Activity Schedule for the Bull Run Watershed Management Unit for Water Year 1989. Portland, OR.

Portland Water Bureau. 1988. Supply Facilities to 2050. Portland, OR.

Portland Water Bureau. 1983. Water - Portland's Precious Heritage. Portland, OR.

Portland Water Bureau and Mt. Hood National Forest. 1979. Memorandum of Understanding Between the Mt. Hood National Forest and the Bureau of Water Works. Portland, OR.

Portland Water Bureau U.S. Forest Service. 1962. Progressive Development of Bull Run. Portland, OR.

Tenny, Edward / Portland Water Bureau Administrator. July 1990. Letter to Water Resources Department. Portland, OR.

Tenny, Edward / Portland Water Bureau Administrator. February 1990. Comments at the Water Resources Commission Meeting. Portland, OR.

U.S. Forest Service, Mt. Hood National Forest. Undated. Bull Run Watershed Management Unit Annual Activity Schedule Water Year 1989. Gresham, OR.

U.S. Forest Service, Mt. Hood National Forest. 1988. Proposed Land and Resource Management Plan Mt. Hood National Forest. Gresham, OR.

U.S. Forest Service, Mt. Hood National Forest. 1984. The Bull Run - Protection Plan: Past, Present, and Future of Portland's Water Supply.

U.S. Forest Service, Mt. Hood National Forest. 1979. Bull Run Planning Unit Final Environmental Statement. Gresham, OR.

U.S. Forest Service, Mt. Hood National Forest. Undated. Bull Run Blowdown Final Environmental Impact Statement. Gresham, OR.

U.S. Forest Service, Mt. Hood National Forest, Columbia Gorge Ranger District. Undated. Bull Run - Portland's Sparkling Water. Troutdale, OR.

U.S. Forest Service, Mt. Hood National Forest. Undated. Forest Service Manual - Municipal Water Supply Watershed. Gresham, OR.

Walker, Mike / Public Works Director - City of Sandy. March 1990. Letter to the Water Resources Department.

Wilson, Roy. 1989. Cooperation and Conflict in a Federal-Municipal Watershed: A Case Study of Portland, Oregon. A Thesis for the Degree of Doctor of Philosophy. Oregon State University, Corvallis, OR.

## SECTION 4 GROUNDWATER MANAGEMENT AND PROTECTION STRATEGIES

### A. PROBLEM STATEMENT

Although groundwater supplies in the Sandy Basin appear to be plentiful, the availability is limited in some areas of greatest demand. A small part of the basin near Sandy is included in a special Water Resources Department study area. The area is served by two aquifers, separated by a horizontal clay layer. Long-term water level measurements in wells in the area show the static water level in the upper aquifer to be steadily declining. Late summer groundwater levels approach the bottom of the shallow aquifer. The aquifer recharges during winter, but usually not to the previous spring's high. Groundwater supply problems in the rest of the Sandy Basin appear minor. The small population is concentrated in the flatter lands and along the stream corridors. Most of the basin is rugged forestland.

Contamination is a major concern facing groundwater users in the Sandy Basin. As the population of the basin has grown, the incidence of groundwater contamination has increased. Septic systems are major contributors of contaminants to groundwater. Agricultural and industrial practices reportedly contribute lesser amounts of pollutants.

In 1953 and 1961 the Legislature withdrew all but four basin streams from appropriation between June 1 and December 1, except for domestic, stock, municipal, fish culture, esthetics, recreational, or public park purposes. Along the stream corridors, and in shallow gravel, groundwater is in hydraulic connection with the streams. Wells in these gravels may actually draw water from adjacent streams which are closed to appropriation.

The groundwater management questions in order of importance are: What is necessary to protect groundwater quality in the Sandy Basin? Are special measures necessary to manage groundwater appropriations? Is it necessary to make a special groundwater study of the basin?

### B. BACKGROUND

Figure 7 is a generalized aquifer map of the Sandy Basin. The extent of the aquifer units shown is approximate only. Units may overlap, so a well may penetrate more than one unit. Geologic discontinuities may truncate an aquifer, with no indication at land surface. Groundwater levels may vary over a short distance because of subsurface discontinuities.

Near the mouth of the Sandy River, alluvium and the underlying Troutdale Formation contain an abundant supply of water (aquifer unit A-1 on Figure 7). This area generally lies between Gresham and the Sandy River north of Interstate 84. The City of Portland operates a well field a short distance west of the Sandy Basin. The field taps deeper zones

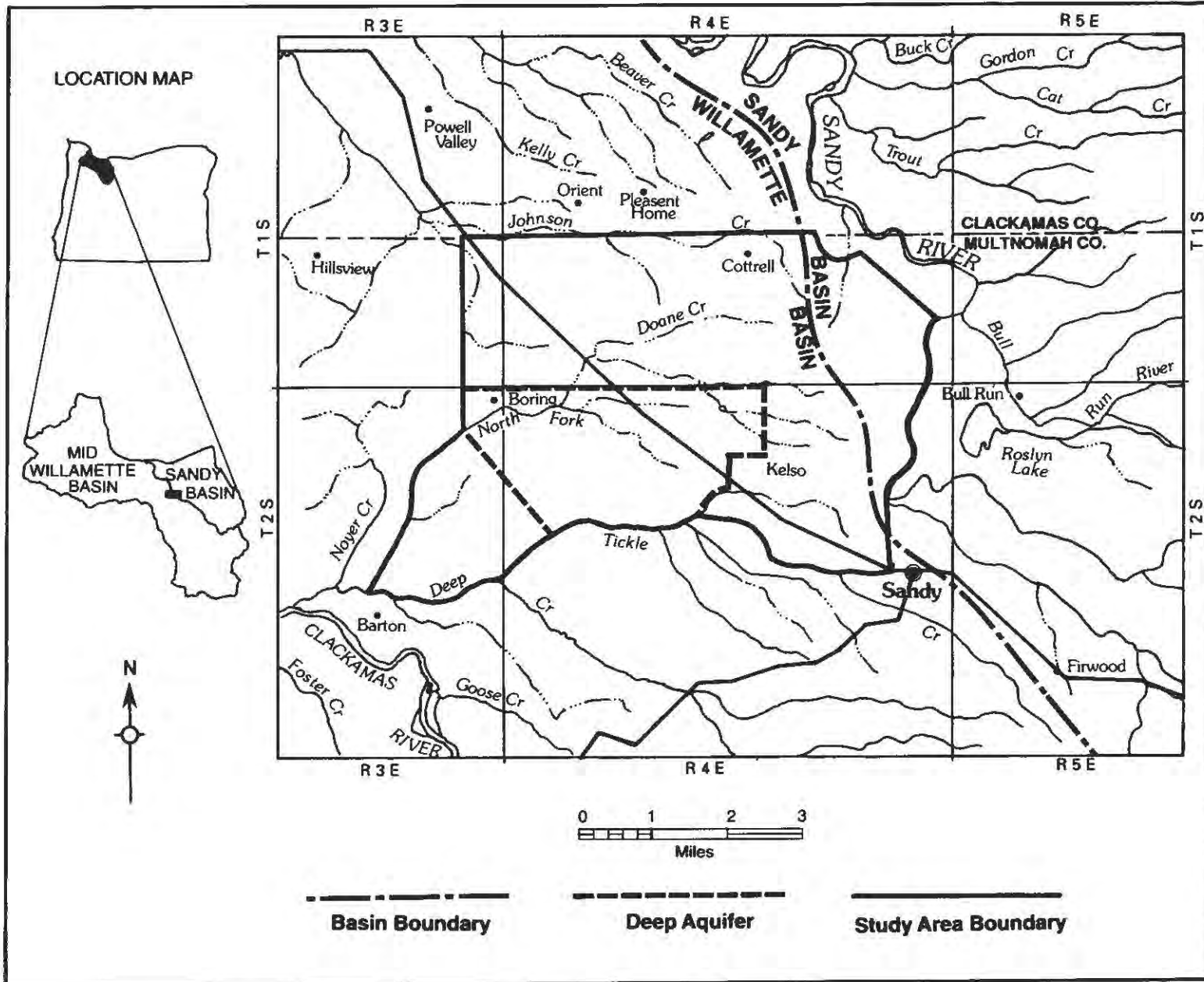
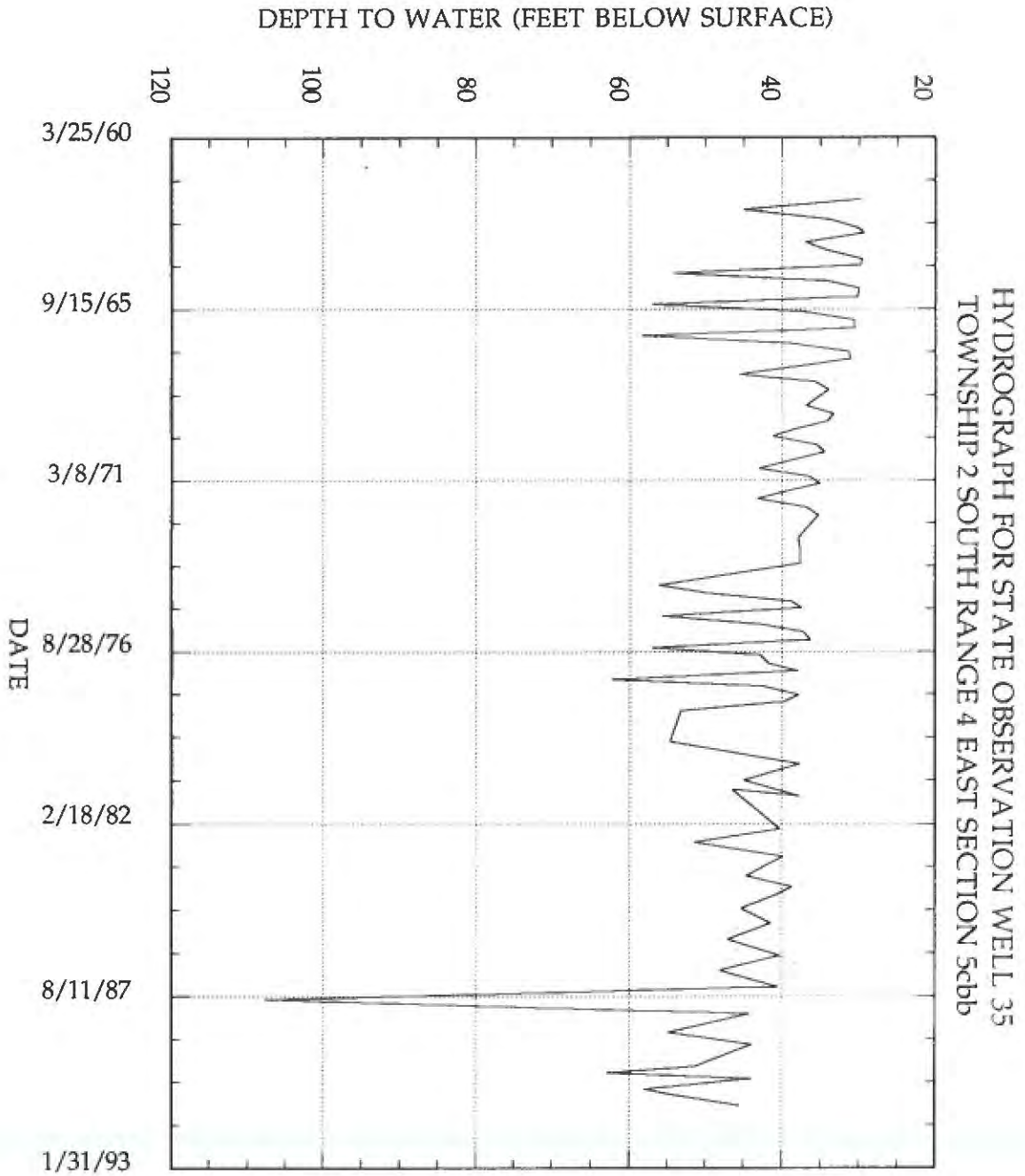


Figure 9

Figure 10



of these aquifers. The well field can produce up to 100 million gallons of water per day.

Other alluvial aquifers (A-2 and A-3) are found along the Sandy River upstream from river mile 15. The aquifers lie along both sides of the river and its tributaries, and are hydraulically connected to the streams.

Below Sandy and away from the streams, the Troutdale Formation is the main groundwater reservoir. This is shown on the aquifer unit map as units B-1, B-2, and B-3. In places along the Sandy River, the Troutdale Formation is thin and yields are small. Some wells tap shallower perched zones of water. These zones contain limited amounts of water, and heavy use can deplete them. Near Sandy, heavy pumping has caused local declines in groundwater level.

The Columbia River Basalt Group, aquifer unit C, is a series of lava flows underlying the Troutdale Formation. The flows vary in thickness from a few feet to more than 100 feet. Water is usually contained in rubbly zones between flows. Wells have been drilled into the basalt in only a few places, mostly along the Columbia River Highway (I-84). Basalt wells usually yield 20 to 50 gallons per minute.

Two volcanic formations, the Columbia River Basalt Group and the Sardine Formation, are lumped together as unit D. These similar lavas cover a large portion of the southwest part of the basin. Together, they are several hundred feet thick. Yields are on the order of 20 to 50 gallons per minute from wells that may exceed 500 feet in depth.

At higher elevations (about one third of the basin), groundwater is found in younger volcanic rocks (aquifer unit U). Few wells penetrate the aquifer, so its characteristics are not well known. It may be possible to obtain yields of up to 200 gpm. For maximum yields, wells must be several hundred feet deep.

Annual natural recharge to the Sandy Basin is estimated at about 500,000 acre-feet (Robison, 1968). The recharge is unevenly distributed throughout the basin. Some areas receive much more water than others. Areal distribution of recharge depends on geology, topography and vegetative cover. Recharge has not been a high priority item in the basin, so no studies have been done.

The Water Resources Department has issued permits for the use of over 17,000 acre-feet of groundwater per year. Figure 8 shows permitted water rights. Municipal needs account for about 71% and agriculture for about 28%. The remaining 1% is for industrial and recreational uses. Most of the use is probably from the Troutdale Formation. Water well reports usually do not identify separate geologic units, so the amount of water pumped from each aquifer is unknown.

### C. DISCUSSION

The Water Resources Department has been monitoring water levels in wells in an area near Sandy (Figure 9). Water level declines and large seasonal fluctuations have been measured in several wells. Figure 10 is a long-term record of water levels in one of the wells. Outside the Sandy area, no significant declines in groundwater levels have been detected. If wells were used to serve a large increase in population, or if large users of water moved into the basin, water levels may decline in the growth areas. Surface flows may also be affected.

A major problem in the Sandy Basin is that of groundwater contamination from human activities. In the past, improper sewage disposal had caused problems between Gresham and the Sandy River and along Sandy River from Cherryville to near Government Camp (PNRBC, 1969, Sweet & Lissner, 1974). Regional sewerage systems have corrected some of these problems. The Oregon State Parks and Recreation Division reported contamination in the lower Sandy River during summer low flows (Oregon State Parks, 1983).

Unless major sewage disposal systems are built, an ever-increasing number of individual septic systems will likely continue to contaminate aquifers and streams. Sophisticated treatment systems or curtailment of groundwater use would then become necessary.

A comprehensive management plan must take into account illegal users. Regardless of Basin alternatives chosen, illegal users must either be made to file for a water right or stop using groundwater.

Given the large number of illegal users, and would-be users, the Commission may open a window for filing of water right applications. A time limit for accepting applications could be set. The window may be opened for a time after adoption of the plan or only for applications pending at the time of basin program adoption.

### D. MANAGEMENT OPTIONS

#### PROPOSED POLICY:

*To carry out the state groundwater management policy by addressing groundwater declines near Sandy, controlling interference with surface supplies and protecting the quality of shallow aquifers.*

Six different groundwater management tools are available to the Water Resources Commission (WRC). Other state agencies and/or local governments have their own management programs. Elements of these tools may be combined if necessary for effective groundwater resource management.



1) **Serious Water Management Problem Area:** ORS 540.435 authorizes the Water Resources Commission to declare a Serious Water Problem Management Area because of decline or any other serious groundwater problem. The designation does not impose water use controls. It does allow WRD to require the installation of meters and require water users to report annual water use. The data can be used to improve management of the resource. It also may be used to develop new regulations where needed.

2) **Permit Conditions:** Under existing statutes and administrative rules, the WRC can impose special conditions on any new groundwater use permit issued. The conditions can be tailored for circumstances unique to a certain aquifer.

3) **Special Well Construction Standards:** Wells tapping more than one aquifer may mix water with different hydraulic heads or chemical qualities. Problems of mixing (commingling) are most likely in the Columbia River Basalt Group, with its multi-layered character. Commingling may result in contamination or loss of water from an aquifer. If commingling is to be minimized, WRD must require strict adherence to the well construction standards. Special well construction standards do not regulate water use from a well.

4) **Classification:** The Water Resources Commission may classify an aquifer for any or all beneficial uses (ORS 536.340). For example, classifying aquifers only for uses exempt from WRD permit requirements would prevent the issuance of new municipal, industrial or irrigation permits. Classification does not affect existing uses.

When supplies are limited the statutes express a policy of assuring adequate and safe supplies for human consumption, while conserving water for other uses to maximize beneficial use. The classification may also establish preferences among types of use, describe the quantity available for use, and establish a maximum rate or duty for any use. The Commission may also classify to preclude exempt uses when water quality problems limit the value of water to certain uses.

5) **Withdrawal:** Withdrawal of an aquifer from new appropriation (ORS 536.410), should prevent increased rates of decline in an already stressed aquifer. The Commission can withdraw an aquifer from any or all uses. If a withdrawal order addresses permits only, the WRD would not accept new water use applications. New exempt uses would still be allowed. A withdrawal order cannot be structured to not affect existing permits.

6) **Critical Groundwater Area:** Once a problem has been established, the most direct and effective groundwater management tool available to the Commission is a Critical Groundwater Area. A Critical Groundwater Area, as authorized by ORS 537.730 to 537.740, allows the WRC to:

- a) stop further appropriation,
- b) limit the amount of water pumped by day, month or year,
- c) set priorities based on the type of use.

A Critical Groundwater Area can be tailored to solve a particular problem. The Water Resources Department can develop a management program most suited to the level of existing and preferable future development. The Water Resources Commission can require regulation of all groundwater uses, even those otherwise exempted from permit requirements by statute (ORS 537.545).

## MANAGEMENT ALTERNATIVES

The following alternatives suggest methods of aquifer management. Alternatives range from allowing the aquifers to be used for all beneficial uses to allowing no new permitted uses.

- (1) The Water Resources Commission should classify the two-square-mile part of the Sandy Groundwater Management Area in the Sandy River Basin for exempt uses only. The area is shown in Figure C. Groundwater in the balance of the basin should be classified for all beneficial uses except in 1/4 mile buffer strip along streams in hydraulic connection with groundwater.
- (2) The Water Resources Commission should declare the Sandy Groundwater Management Area a Serious Water Management Problem Area. Meters and annual water use reports for all wells with water right permits should be required.
- (3) The Water Resources Department should condition all new groundwater use permits to stop use of water from a well if the water level declines more than a specified amount.
- (4) The Water Resources Department should review well reports and add properly constructed wells to the wellnet.
- (5) The Water Resources Department should assist DEQ in taking water quality samples from wells, when that agency investigates water quality in the basin.
- (6) The existing rules in OAR 690-09 for the management of groundwater-surface water hydraulic connection are probably sufficient for the Sandy Basin. No additional rules are recommended.

## RECOMMENDATIONS

Alternatives 1-5 are the recommended alternatives.

## REFERENCES

- Baldwin, E.M., 1981, Geology of Oregon: Kendall/Hunt Publishing Co., Dubuque, Iowa, 170 p.
- Griffin, W.C., Watkins, F.A., Jr., and Swenson, H.A., 1956, Water Resources of the Portland, OR, and Vancouver, WA, Area: U.S. Geological Survey Circular 372, 45 p.
- Leonard, A.R., and Collins, C.A., 1983, Groundwater in the Northern Part of Clackamas County, Oregon: Oregon Water Resources Department Groundwater Report 29, 85 p.
- McFarland, W.D., 1983, A Description of Aquifer Units in Western Oregon: USGS Open-File Report 82-165, 35 p.
- Oregon Department of Environmental Quality, 1986, Oregon 1986 Water Quality Program, Assessment and Program Plan for Fiscal Year 1987, 184 p.
- Oregon Department of Environmental Quality, 1989, Overview of Groundwater Quality in the Willamette - Sandy Basin: memo to Oregon Water Resources Department Groundwater Work Group, 2 p. plus attachment.
- Oregon State Parks and Recreation Division, 1983, Sandy River Gorge Study, 82 p.
- Oregon State Water Resources Board, 1969, Oregon's long-range requirements for Water, 395 p.
- Oregon Water Resources Commission, 1988, Oregon Water Management Program, 1989 - 1991 Biennial Program and Agenda for the Future, 75 p.
- Pacific Northwest River Basins Commission, Willamette Basin Task Force, 1969, Willamette Basin Comprehensive Study, App. A - Study Area, App. B - Hydrology.
- Peck, D.L., Griggs, A.B., Schlicker, H.G., Wells, F.G. and Dole, H.M., 1964, Geology of the Central and Northern Parts of the Western Cascade Range in Oregon: USGS Professional Paper 449, 56 p.
- Robison, J.H., 1968, Estimated Existing and Potential Ground-Water Storage in Major Drainage Basins in Oregon: USGS Open-File Report, 13 p.
- Sweet, H. R. & Lissner, F. L., 1974, Oregon State Engineer: Mt. Hood Study, "Ground Water", unpublished report, 15 p.
- Wells, F.G., and Peck, D.L., 1961, Geologic Map of Oregon West of the 121st Meridian: USGS, Miscellaneous Investigations Series - 321, scale 1:500,000.

## SECTION 5 WATER CONSERVATION

### A. PROBLEM STATEMENT

The Sandy River Basin is the smallest of the 18 separately administered basins in the state. Statutory limits on appropriation and the Sandy River scenic waterway designation protect the waters of the Sandy River Basin for instream uses and scenic values. In addition, the Bull Run watershed in the Sandy Basin is the main source of municipal water for the Portland metropolitan area. Exclusive right (not affecting pre-1909 rights) to the waters of the Bull Run and Little Sandy is granted to Portland by law. While no water shortages have been reported in the Sandy Basin, these restrictions limit chances to appropriate water in the Sandy Basin.

Future seasonal shortages may occur and increase in severity as growth continues and various uses compete for available supplies. Water conservation is one method of dealing with potential water shortages. Conservation, as experienced in other places, can be instrumental in ensuring dependable water supplies.

This discussion paper addresses water conservation in the Sandy Basin. Specifically, the paper addresses two questions. One, why is water conservation important in the Sandy Basin? Two, what can be done to promote water conservation and water use efficiency in the Sandy Basin?

### B. BACKGROUND

#### 1. CONSERVATION AND WATER USE EFFICIENCY

Water conservation is defined in numerous ways. Oregon Revised Statute (ORS) 537.455 states that conservation is a "reduction of the amount of water consumed in the process of satisfying an existing beneficial use, achieved either by improving the technology or method for diverting, transporting, applying or recovering the water or by implementing other approved conservation measures." Conservation is achieved mainly through public education, incentives, standards and regulatory measures.

The purpose of efficient water use is to increase the benefits to the public and private users gained from a fixed supply of water, and to minimize waste. More efficient use of water is achieved through better equipment, facility operation, and water management. The level of efficiency reached depends on personal preference, technology, time and cost. Increasing water use efficiency is usually viewed as reducing water use. This is achieved mainly through public education and information, and incentives.

Conservation and use efficiency are often used interchangeably. Both convey the concept of beneficial use without waste. Waste is viewed as the quantity of water diverted that exceeds the quantity needed to meet a specific beneficial use while using the best available methods in storage, delivery and application systems. Determination of the best available technology includes an evaluation of economic and social factors and the time needed to make system modifications.

Conservation involves short and long-term measures to meet water demands with as little water as economically possible. Conservation and better water use efficiency help stretch existing water supplies and reduce impact of drought and other water shortages.

#### a. Statewide Water Conservation Efforts

Oregon is usually viewed as a state with ample water supplies. Recently, low-flow years, seasonal shortages in some basins, growing water demands and reduced availability have led to greater conservation awareness. In addition, public interest in instream flows and values makes conservation an important tool for enhancing these values.

Conservation is one of the more promising methods of enhancing water supplies in many over-appropriated streams. For this reason, conservation is becoming an important component in water resource planning and management.

By law (ORS 536.300), the Water Resources Commission (Commission) is to "proceed as rapidly as possible to study: Existing water resources of this state, means and methods of conserving and augmenting such resources..."

ORS 536.710 (2) states, "The Legislative Assembly finds it necessary in the event of an emergency to promote water conservation and to provide an orderly procedure to assure equitable curtailment, adjustment, allocation or regulation in the domestic, municipal and industrial use of water resources where more than one user is dependent upon a single source of supply." Also, in case of drought or potential drought, the Commission can order state agencies and political subdivisions to develop water conservation and/or curtailment plans (ORS 536.720 (2)).

Conservation and increased water use efficiency are consistent with the principles of the doctrine of prior appropriation. This doctrine states, "a water right is limited to the quantity of water which is beneficially used without waste." Conservation and increased water use efficiency are also consistent with ORS 540.610 which states, "beneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state." The use of the state's waters without waste is also echoed by ORS 536.310 (1). This statute says, "...all of the waters within this state belong to the public for use by the people for beneficial purposes without waste."

The doctrine of prior appropriation and state laws provide the guidance and flexibility for exploring and implementing measures to increase water use efficiency.

The Water Resources Department (Department) conservation efforts date back to the 1976-1977 drought year. In 1985, the Commission directed Department staff to report on other states' conservation programs. Staff presented its report to the Commission in June 1986.

In March 1987, the Commission adopted an interim conservation policy and approved an interim report on water conservation. The Commission authorized formation of the State-wide Conservation Advisory Committee in 1988. The committee assisted staff in drafting a policy statement and recommending strategies to implement a statewide conservation program. The conservation policy and strategies were adopted by the Commission in 1990.



*Multnomah Falls, A Major Scenic Attraction in the Sandy Basin. Photo courtesy of Amin Wahab*

The 1987 Legislature passed Senate Bill 24 (Conservation and Use of Conserved Water). This legislation (codified in ORS Chapter 537) is intended to aggressively promote water conservation, increase beneficial use and enhance streamflows throughout the state. It provides incentives to conserve water by allowing water right holders to lease or reserve conserved water for instream use or future out-of-stream use. A percentage of the conserved water is allocated for public instream uses.

Several other laws, enacted in 1987 and 1989, directly or indirectly promote conservation and increased water use efficiency throughout the state. A good example is Senate Bill 156, passed in 1989. This bill gives the Commission the power to impose civil penalties for violations of Oregon water law or terms of permits.

## b. Benefits of Water Conservation

Properly selected and carefully applied conservation measures can reduce, postpone and in some cases may eliminate the need for costly water projects. Conservation also reduces costs for water, pumping, distribution, application, water treatment, sewage treatment and effluent disposal.

Water conservation helps maintain and enhance water quantity and quality for aesthetic and other environmental reasons. The public has a growing expectation that water should be used efficiently to enhance environmental and aesthetic values. The availability of sufficient, high quality water is crucial for fish, wildlife and pollution abatement.

Water conservation can reduce point and non-point source pollution. Efficient irrigation diversion, conveyance and application can reduce contaminated return flows to surface and groundwater bodies. Municipal, domestic and industrial water conservation can reduce the amount of wastewater that is discharged into streams and other water bodies.

An easily recognized benefit of water conservation is the reduction of drought effects. In the fall of 1987, the Portland Water Bureau asked its customers to reduce water use. This resulted in 19 percent reduction in demand. Significantly, this lower water use was achieved without any significant hardship.

## c. Conservation Opportunities, Technologies, Savings and Costs

Conservation opportunities exist in most water use categories (CA. Department of Water Resources, 1984). Water savings can result from simple modification of existing systems and public education. Significant quantities of water can be conserved through a mix of voluntary measures, incentives, and regulations. Some measures are more effective than others depending on locality and type of use. Costs of conservation measures can vary depending on the measures applied.

The California Department of Water Resources estimates that 15 to 20 percent of the water used in irrigated agriculture can be saved. This saving results mainly through better scheduling, efficient conveyance and application, reducing runoff and percolation, and monitoring soil moisture conditions. Even higher irrigation efficiencies are possible through more costly conservation measures such as changing irrigation methods.

Irrigators benefit directly and indirectly from improving irrigation efficiency. Under Oregon law, they may receive a new permit to apply the conserved water to additional acreage or sell or lease it to someone else. Conservation can also reduce irrigation water and power costs, improve crop yield and reduce soil erosion.

In the Sandy Basin, where irrigation is a small fraction of total water use, costly conservation measures may not be needed now. However, such measures are not discouraged.

Conservation can also be achieved in the municipal water use sector. In the summer/fall of 1987, the Portland Water Bureau implemented a conservation plan which was based upon public education and requests for voluntary cutbacks in outdoor water use (Portland Water Bureau, 1988). As a result, water use was reduced by 19 percent. This amounted to a savings of more than 20 million gallons per day. In addition, the bureau detected and repaired a large number of leaks in its delivery and distribution systems. The leak detection and repair program is saving the bureau significant amounts of water. This amount, however, is small compared to the overall amount used.

The Portland Water Bureau's success occurred over a short time span in a drought year. Conservation projections, however, cannot be based on user response to a short-term water shortage. In normal water years, users may respond much differently to requests for conservation. For example, Seattle has achieved a reduction of 8 percent through conservation efforts (Tenny, 1990).

Permanent water savings of up to 35 percent are achievable through changes in existing plumbing fixtures, installation of new fixtures and better water use practices (Portland Water Bureau, 1988). For example, up to 40 gallons a day per person can be saved by installing flow restrictors, aerators or low-flow faucets, shower heads, nozzles and toilet inserts in homes (California Department of Water Resources, 1981, 1984; Portland Water Bureau, 1988). The cost of purchasing and installing these fixtures is usually very low. The table below provides some examples (figures reflect savings and costs in 1986-1987): Even greater water savings are possible by water-efficient appliances and plumbing fixtures, and lawn sprinkling systems. However, the benefits of these more costly measures should be determined before they are more actively promoted.

Table 3  
Plumbing Fixtures-Water Savings & Cost

Measure	Est. Water Savings Gallons/Person/Day	Cost in Dollars Per Unit*
Faucet Flow Restrictor	0.5-1.0	1.00
Faucet Aerator	6.5	3.00
Toilet Inserts	1.5-2.5	1.00
Shower Flow Restrictor	3.7-5.0	1.00
Low Flush Toilets	8.0-15.0	80.00
Low Flow Shower Head	7.5-11.3	4.00
Hose Nozzle	varies	5.00
* These costs do not include installation costs.		



Industries can also conserve water and improve efficiency. Common industrial conservation measures include water use monitoring, water management programs, employee training and education, recycling, process modification, automatic shut-off valves, air cooling, low-flow plumbing fixtures, leak detection and eliminating nonessential water flow. The California Department of Water Resources estimates that employing one or more of these measures can reduce use by an average of 30 percent. Costs of these measures vary, but are usually offset by the benefits. For example, in 1989, a California computer parts company reported saving \$63,000 in water and sewer costs. The savings resulted from installing a recycling system that cost \$5,000 (CA. Department of Water Resources, 1989). Industrial water conservation can be crucial to continued operation during drought conditions.

## 2. FACTORS NECESSITATING WATER CONSERVATION IN THE SANDY BASIN

Sandy Basin streams are among the most protected in the state. A number of restrictions control further appropriation from the Sandy and its tributaries (see Sandy Basin Water Allocation, 1990). These restrictions protect the waters of the Sandy Basin for scenic and instream values. Portland's exclusive right to the waters of the Bull Run and Little Sandy Rivers further limits water availability in the Sandy Basin. Water users need to use available supplies efficiently in light of limits on new appropriation.

### a. Statutory Restriction

ORS 538.420 restricts use of the Bull Run and Little Sandy Rivers. The statute states, "Exclusive right to the use of waters of Bull Run and Little Sandy Rivers is granted to the City of Portland." While the statute does not affect pre-1909 water rights on the two rivers (such as those claimed by PGE), use of these two rivers is prohibited by subsequent appropriators.

The Bull Run watershed is the designated municipal watershed for the City of Portland. It supplies water to almost 700,000 people in the Portland metropolitan area. Portland currently uses about 26 percent of the average annual flow of the Bull Run River. Portland has no immediate plans for additional supply development on the two rivers. The Water Bureau has undertaken demand and supply studies for the Portland region that could necessitate additional supplies (Tenny, 1990).

ORS 538.200 restricts the use of 31 streams forming waterfalls near the Columbia River Highway. The statute states, "The streams and waters thereof forming waterfalls or cascades in view of, or near, the Columbia River Highway, from Sandy River to Hood River, the first 16 of which are in Multnomah County (Sandy Basin) and the remainder of which are in Hood River County, are withdrawn from appropriation or condemnation, and shall not be diverted or interrupted for any purpose whatsoever, except as mentioned in ORS 538.210."

ORS 538.251 limits appropriation on streams that are tributaries to the Columbia River. It states, "Except as otherwise provided in this section, the following waters, all being tributaries of the Columbia River, are withdrawn from appropriation and shall not be diverted or interrupted for any purpose, except for protecting fish life therein by the State Fish and Wildlife Commission...Sandy River and its tributaries in Multnomah and Clackamas Counties...". The statute adds exception, allows certain uses.

b. Major Water Use Categories in the Sandy Basin

Consumptive water use in the Sandy Basin is relatively small. Not including the Bull Run and Little Sandy Rivers, permitted surface and groundwater withdrawals are as follows in the Sandy Basin (as of January 1991):

Table 4  
Summary Surface and Groundwater Rights of Record

	Agriculture	Industrial	Municipal	Domestic	Other*
Surface Water					
cfs	12.96	19.97	33.72	26.04	39.66
acre-feet	11.27	116.00	0.00	0.00	29.00
Groundwater					
cfs	14.80	6.59	16.64	1.05	2.02

\* Includes recreation, aesthetics, forest management, fire protection, pollution abatement, road construction, storage

Total annual discharge of the Sandy Basin is several times greater than the amount needed for all uses combined. However, flows may not be adequate during the summer months to meet all consumptive and non-consumptive uses simultaneously.

c. Future Water Needs in the Sandy Basin And Potential for Conservation

Water use in the Sandy Basin is expected to increase in the future. Two use categories likely to experience rapid growth are municipal and domestic.

The major municipal water users in the Sandy Basin are the Corbett Water District and the City of Sandy. The Corbett Water District has water rights for 4.5 cfs on Gorden and Elk creeks. The city's 1982 population was about 3,500. Its projected population for the year 2010 is about 13,500. The city is currently using Brownell Springs and Alder Creek for municipal purposes. Sandy's water right on these sources totals 5 cubic feet per second (cfs) which is enough for 10 to 12,000 people (Boatwright Engineering, Inc. 1983).

Sandy is exploring various options to supply the water needs for a growing population. It has acquired but not used a water right for 25 cfs on the Salmon River. This source will require extensive capital expenditure to develop. The city is also interested in developing

the Upper Little Sandy River for municipal use. Achieving this goal is uncertain since Sandy does not have a water right on the Little Sandy River. PGE and the City of Portland hold senior and exclusive rights to the waters of the Little Sandy River. Allowing the City of Sandy to use the Little Sandy would require negotiations between PGE, Portland and Sandy. While Sandy is looking for additional water, it has not implemented a conservation program to stretch its existing supply.

Not all of the Sandy Basin population lives within the city limits of Sandy. A number of small public water systems in the Sandy Basin supply water to their customers. Most of these systems are located along the Mt. Hood corridor in the upper parts of the basin. In addition, individual domestic water users constitute a significant segment of the basin's population. Domestic water uses include domestic, group domestic, stock, public rest room and schools. Metropolitan Service District growth projections for the Sandy area predict a doubling of population for the area by the year 2000 (Boatwright Engineering, Inc., 1983). As a result, domestic water use would also increase in the basin.

Seasonal water use is also likely to increase as ski resorts in the Mt. Hood area expand. Every winter, thousands of people make use of the recreational facilities in the Sandy Basin.

Agricultural and industrial uses may grow slower in the Sandy Basin. The Oregon Department of Agriculture estimates about 3,000 acres will be irrigated in the Sandy Basin by the year 2010. This number is not much higher than the number of acres for which water rights of record exist already. Lack of good irrigable land may limit irrigation expansion in the Sandy Basin. Industrial water demands from new food processing plants is not expected to be significant.

Growing pressure on existing supplies to meet instream and out-of-stream demands, and potential conflicts among water users suggest a role for conservation. Potential exists for increased municipal, domestic, agricultural and industrial water use efficiency. Conservation efforts should be applied in each of these uses with a stronger emphasis on large-scale users.

### C. DISCUSSION

Generally, members of the public and others involved in the Sandy Basin planning believe that voluntary conservation through public education and information should be encouraged in the Sandy Basin. This view stems from the fact that there are no current documented water shortages that demand regulatory measures. In addition, there are many statutory restrictions on water use in the Sandy Basin already.

Public education is usually an effective way to raise awareness about water conservation. Public awareness about the value of water and the benefits of water conservation would result in overall water use efficiency basinwide. It also prepares people to more effectively deal with water shortages when they occur.

Public education is a method of conveying the message that inefficient water use detracts from other beneficial uses. It also paves the way for more stringent conservation measures. Any general regulatory measures needed would be determined by the Statewide Conservation Advisory Committee and have a statewide application.

Work group participants and staff recognized problems with targeting some water use categories for more conservation measures than others. Some water users may be able to apply conservation measures more easily than others. This is not to say that the potential for water conservation is greater in sectors where measures can be easily implemented. For example, conservation measures can be more easily implemented in the municipal sector than in the agricultural sector. Municipal water purveyors are commonly perceived to have the money and resources to promote conservation. They can invest more in conservation related activities. However, the amount of water conserved may not be significant when compared to the amount that could be conserved in irrigated agriculture. One percent savings in total water use in agriculture can be tens of times greater than one percent saved in the municipal sector. Conservation opportunities exist in all sectors. In order for efforts to be successful, conservation should be encouraged in all categories basinwide. In the Sandy Basin, however, municipal use of water surpasses all other uses combined. This warrants strong municipal conservation measures.

The potential impact of conservation on water system revenues concerns some municipal purveyors. Water sales are the only source of revenue for most water purveyors. While conservation is a wise thing to do, it is not intended to give people the impression that there is a drought or to drive water purveyors out of business. The public should know how to use water wisely and to conserve or curtail when asked or needed. Water conservation should be a long-range educational goal and efforts should be made to use available supplies as efficiently as possible without causing hardship. The user should not be confronted with sudden price increases or sudden reduction in water use. Sudden reduction in water use may be needed when a water purveyor is faced with short supply.

#### D. MANAGEMENT OPTIONS

Strategies promoting conservation and increasing water use efficiency vary. Voluntary conservation through public education and information, incentives and mandatory (regulatory) measures are some examples. An appropriate mix of these strategies would be most effective in the Sandy Basin. Measures that promote voluntary conservation should be given highest priority to achieve basinwide efficiency. Such measures would be more acceptable to Sandy Basin citizens given existing supply and demand conditions in the basin.

The conservation efforts in the Sandy Basin must conform with the Commission's statewide conservation policy listed below. Additional local measures may be needed in the Sandy Basin.

**POLICY:**

*The elimination of waste and improving the efficiency of water use are high priorities. Use of water without waste is required by state statute and the prior appropriation doctrine. Programs to eliminate waste shall be implemented. In addition, improving the efficiency of water use through implementation of voluntary conservation measures can help restore instream flows and provide for future needs including public uses and continued economic development. Priority shall be given to developing subbasin conservation plans and providing public assistance in areas of known over-appropriation of surface water and groundwater and of water quality problems.*

The following principles would guide programs to achieve this policy:

- (a) Water users shall construct, operate and maintain their water systems in a manner which prevents waste and minimizes harm to the waters of the state and injury to other water rights.
- (b) Major water users and suppliers shall prepare water management plans under guidance of schedules, criteria and procedures which shall be adopted by rule. The plans shall evaluate opportunities for conservation and include a quantification of losses of water from the system, an evaluation of the effectiveness and costs of alternative measures to reduce losses, and an implementation schedule for all feasible measures. During the planning processes, consideration shall be given to the environmental impacts from and time needed for implementation of system modifications. The Department shall assist water users and suppliers in the preparation of water management plans.
- (c) The Commission shall encourage and facilitate the development of subbasin conservation plans throughout the state by local advisory committees. Subbasin conservation plans shall include measures to assist water users in eliminating waste, other methods to improve water use efficiency in the subbasin, funding proposals to implement the measures and procedures to protect water dedicated to instream uses from further diversion. Priority shall be given to development of subbasin conservation plans in serious water management problem areas, critical groundwater areas and other areas where water supplies are not sufficient to meet demands. The Commission shall adopt rules to guide formation of broad-based committees, the preparation subbasin plans, and the submittal of plans to the Commission for approval.
- (d) When wasteful practices are identified in water management plans and subbasin conservation plans, the Commission shall adopt rules prescribing statewide and subbasin standards and practices that ensure beneficial use without waste. The rules shall recognize that conditions vary for different parts of the state and for different uses.

(e) A conservation element shall be developed and included in each basin plan when a major plan review and update is performed.

(f) The collection, analysis and distribution of information on water use and availability are necessary to ensure that the waters of the state are managed for maximum beneficial use and to protect the public welfare, safety and health. The ability to measure flows at authorized points of diversion is essential to the management of water and the elimination of waste.

(g) The Commission shall support public education programs, research and demonstration projects to increase citizen and water user awareness of water conservation issues and measures in the state.

(h) The Commission shall support programs to provide economic assistance to water users to implement desired conservation measures, particularly where the benefits of implementing the measures are high.

Based on this policy and guiding principles, work group and staff input, the following management options appear suitable for implementation in the Sandy Basin.

## MANAGEMENT ALTERNATIVES

### VOLUNTARY MEASURES

1) The Commission could encourage and work with water purveyors in the basin (such as the cities of Portland and Sandy, and ski resorts) and METRO to explore alternatives to increase municipal/domestic and industrial water use efficiency. This may be achieved through participation in Portland Water Bureau's regional water supply and demand studies and conservation planning, preparation of water management plans and distribution of conservation related information and other measures. The Portland Water Bureau and METRO have indicated interest in this option.

2) The Department could, in coordination and cooperation with federal, state and local agencies, professional organizations, and others, assemble and distribute conservation-related information and technical expertise to agricultural water users (specifically container nursery operators) in the Sandy Basin. Information can be made available through Multnomah and Clackamas county extension offices, and Soil and Water Conservation Districts (SWCD's). Water users should use that information to make low-cost modifications to increase efficiency.

3) The Commission could encourage the cities of Portland and Sandy, being the largest water purveyors in the Sandy Basin to have on-going public education and information programs on the value of water and increasing water use efficiency. This could be achieved through the distribution of conservation-related information and technical assistance to customers.

#### INCENTIVES

1) The Department could assist water users and purveyors in identifying and securing grants, loans, tax credits and other incentives to implement conservation measures. Some of these incentives may already exist while others may have to be created. The conserved water would benefit and enhance important instream uses and values in the Sandy Basin.

2) Water purveyors could explore adoption of rate structures that would encourage conservation.

#### REGULATIONS

1) The Commission could consult with other agencies, professional organizations, users interest groups and others, to develop conditions and standards for all new permits to increase water use efficiency. These conditions and standards shall also apply to existing permits as they are reviewed for time extension.

2) The Commission could explore the effectiveness of water use reporting in increasing water use efficiency on a trial basis. If effective, water use reporting could be required of all major water purveyors in the basin. This may require legislation.

#### RECOMMENDATIONS

Alternatives 1-2 (voluntary); 1-2 (incentives) are the recommended alternatives.

## REFERENCES

- American Water Works Association. 1980. Water Conservation Strategies - An AWWA Management Resource Book.
- Boatwright Engineering, Inc. 1983. City of Sandy Long Term Water Supply Study. Salem, OR.
- California Department of Water Resources. 1978. A Pilot Water Conservation Program. Sacramento, CA.
- California Department of Water Resources. 1980. Summary Report - Effects of Water Conservation-Induced Waste Water Flow Reduction - A Perspective. Sacramento, CA.
- California Department of Water Resources. 1984. Water Conservation in California - Bulletin 1981-1984. Sacramento, CA.
- California Department of Water Resources. 1984. Water Conservation Reference Manual - Urban Conservation Measures. Sacramento, CA.
- California Department of Water Resources. 1988. Water Conservation Guidebook no. 6 - Agricultural Drought Guidebook. Sacramento, CA.
- California Department of Water Resources. 1988. Water Conservation Guidebook no. 7 - Urban Drought Guidebook. Sacramento, CA.
- California Department of Water Resources. July, 1989. Water Conservation News. Sacramento, CA.
- Lane Council of Governments. 1981. Water Resources Working Paper. Eugene. OR.
- Montana Department of Natural Resources and Conservation, Water Resources Division. 1988. Montana Water Plan - Management Section - Subsection: Agricultural Water Use Efficiency. Helena, MT.
- Portland Water Bureau. 1988. Drought/Water Shortage Plan. Portland, OR.
- State of Oregon Water Resources Board. 1967. Willamette River Basin - Volumes A-M. Salem, OR.
- State of Oregon Water Resources Commission. Undated. State of Oregon Water Use Programs. Salem, OR.
- State of Oregon Water Resources Department. 1988. Oregon Water Laws. Salem, OR.



State of Oregon Water Resources Department. 1988. Umatilla Basin Report. Salem, OR.

State of Oregon Water Resources Department. 1989. Evaluation of Opportunities for Requiring Improvement in the Efficiency of Water Use in Oregon. Salem, OR.

State of Washington Department of Ecology. 1988. Final Report of the Washington State Water Use Efficiency Study Committee. Olympia, WA.

State of Washington Department of Social and Health Services. 1988. Guidelines for the Preparation of Water Shortage Response Plans. Olympia, WA.

State of Washington Executive Water Emergency Committee. 1988. Initial Drought Action Program for 1988. Olympia, WA.

Tenny, Edward / Portland Water Bureau Administrator. July 1990. Written Comments on Draft Discussion Papers.

Willamette Basin Planning - Conservation/Drought Planning WorkGroup. 1989-90. Salem, OR.

## APPENDIX A

### SANDY BASIN STREAMS WITHDRAWN FROM APPROPRIATION BY ORS 538.200

1. Latourell Creek - Forming Latourell Falls.
2. An unnamed stream whose waterfall is approximately at the southwest quarter of the southwest quarter of the northwest quarter of section 28, township one north, range five east, at the northern edge of Tax Lot 27/28. The fall is on the south side of the old Columbia River Highway, .7 mile west of the highway bridge at Young Creek.
3. An unnamed stream whose waterfall is approximately at the southeast quarter of the southwest quarter of the northwest quarter of section 28, township one north, range five east, at the northern intersection of Tax Lot 27/26. The falls are on the south side of the old Columbia River Highway, .6 mile west of the highway bridge at Young Creek.
4. An unnamed stream whose waterfall is approximately at the northeast quarter of the northeast quarter of the northwest quarter of section 28, township one north, range 5 east, Tax Lot 3. The falls are on the south side of the old Columbia River Highway, .1 mile west of the highway bridge at Young Creek.
5. Young Creek - forming Shepperd Dell Falls.
6. Bridal Veil Creek - forming Bridal Veil Falls.
7. Coopey Falls Creek.
8. Mist Falls Creek.
9. Wahkeena Creek - forming Wahkeena Falls, formerly known as Gordon Falls.
10. Multnomah Creek - forming Multnomah Falls.
11. Oneonta Creek - forming Oneonta Falls and Gorge.
12. Horse Tail Creek - forming Horse Tail Falls.
13. Tumalt Creek.
14. McCord Creek, formerly known as Kelly Creek - forming Elwah Falls.
15. Moffatt Creek - forming Wahe Falls.
16. Tanner Creek - forming Wahclella Falls.

APPENDIX B

SANDY BASIN  
WATER AVAILABILITY ANALYSIS

Little Zigzag R. at Twin Bridges, near Rhododendron OR #14131000

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	24	24	24	24	24	22	21	19	19	20	23	24
50% Exceed.	27	28	27	28	27	25	23	22	21	23	27	28

Zigzag R. near Rhododendron, OR #14131400

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	75	78	76	81	80	68	56	49	48	52	69	78
50% Exceed.	94	94	88	95	93	79	64	56	54	62	87	97

Zigzag R. at Rhododendron, OR #14131500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	151	162	155	175	170	127	91	72	69	76	127	162
50% Exceed.	215	217	192	221	213	159	109	85	80	101	187	228

Sandy R. above Salmon R. at Brightwood, OR #14133500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	598	662	633	746	715	482	313	234	218	243	477	658
50% Exceed.	933	942	804	956	917	626	378	273	252	343	773	1006

Salmon R. near Government Camp, OR #14134000

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	29	29	29	41	58	47	31	23	20	20	26	31
50% Exceed.	42	41	37	52	77	68	42	28	24	24	36	45

Salmon R. at Welches, OR #14135000

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	331	394	435	579	464	218	121	91	90	113	281	358
50% Exceed.	599	601	587	739	685	373	163	105	115	189	529	649

Salmon R. above Boulder Cr. near Brightwood, OR #14135500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	365	475	411	476	460	263	140	97	89	111	241	394
50% Exceed.	616	696	555	670	665	381	182	115	106	172	449	647

Sandy R. near Marmot, OR #14137000

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	1095	1239	1180	1432	1363	851	514	365	334	377	836	1227
50% Exceed.	1842	1862	1546	1893	1804	1148	631	428	391	562	1472	2015

Cedar Cr near Sandy, OR #14138400

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	50	53	57	57	40	22	12	7	8	13	31	52
50% Exceed.	85	79	79	77	52	35	16	9	11	21	61	85

Blazed Alder Cr. near Rhododendron, OR #14138800

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	43	45	44	55	53	22	6	3	4	12	43	55
50% Exceed.	80	77	64	82	83	38	10	4	8	29	87	95

Fir Cr near Brightwood, OR #14138870

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	30	37	32	37	28	14	5	3	4	9	29	39
50% Exceed.	54	56	46	51	41	22	8	4	8	19	55	64

Cedar Cr. near Brightwood, OR #14139700

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	54	64	59	69	49	27	15	11	13	22	54	67
50% Exceed.	95	98	82	95	70	42	20	14	19	40	95	107

S. Fk. Bull Run R. near Bull Run, OR #14139800

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	98	118	101	114	83	44	22	14	17	34	96	116
50% Exceed.	166	171	144	160	117	69	30	19	28	65	169	180

\*Bull Run R. near Bull Run, OR #14140000

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	522	597	548	694	652	375	200	130	119	145	380	596
50% Exceed.	1030	1046	831	1078	1004	580	284	180	158	248	790	1146

Little Sandy R. near Marmot, OR #14140500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	56	81	78	98	97	49	22	16	15	17	29	46
50% Exceed.	135	180	156	193	201	102	39	27	24	28	52	100

Little Sandy R. near Bull Run, OR #14141500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	123	142	127	152	117	59	26	16	20	41	111	150
50% Exceed.	214	212	178	203	164	96	37	21	32	77	202	239

Sandy R. below Bull Run R. near Bull Run, OR #14142500

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	1790	2061	1932	2425	2288	1323	727	483	439	513	1308	2044
50% Exceed.	3335	3379	2714	3455	3254	1914	952	606	542	832	2567	3704

Cold Springs Cr. at Gage #14113350

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	18	18	18	19	18	16	14	14	14	16	18	18
50% Exceed.	30	31	30	33	29	27	23	20	22	26	31	31

Still Cr. at mouth

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	42	51	48	56	64	52	29	20	21	22	36	43
50% Exceed.	69	78	70	78	104	78	40	26	29	31	55	68

Boulder Cr. at mouth

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	27	31	30	35	35	24	13	9	10	13	24	29
50% Exceed.	44	48	43	49	55	37	19	12	14	21	39	46

Gordon Cr at mouth

Flows	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
80% Exceed.	42	51	48	56	64	52	29	20	21	22	36	43
50% Exceed.	69	78	70	78	104	78	40	26	29	31	55	68

Source: Robison- Water Resources Department

APPENDIX C

SANDY BASIN  
PARKS AND RECREATION DEPARTMENT  
STREAMS OF CURRENT PRIMARY CONCERN FOR RECREATION

- 1 - Sandy River at its confluence with the Columbia River
- 2 - Sandy River at its confluence with Bull Run River
- 3 - Bull Run River (outside of Bull Run Watershed Management Unit)
- 4 - Salmon River
- 5 - Zigzag River

The general recreational categories chosen for evaluation were:

- 1 - Recreational Boating - power boating, canoeing, kayaking, drift boating.
- 2 - Recreational Fishing - salmon/steelhead fishing, resident trout fishing, warm water fishing.
- 3 - Other Recreation - hiking, swimming, camping, nature viewing.

The classes for each recreational value were:

- Outstanding recreational resource .....(1)
- Substantial recreational resource .....(2)
- Moderate recreational resource .....(3)
- Limited recreational resource .....(4)
- Little or no recreational resource .....(5)
- Unknown .....(6)

See next page for stream rating for each recreational value and overall rating.

APPENDIX D

SANDY BASIN  
FISH AND WILDLIFE DEPARTMENT  
STREAMS OF INTEREST FOR FISHERIES VALUES

1 - Sandy River

Alder Creek  
Badger Creek  
Bear Creek  
Beaver Creek  
Cedar Creek  
Clear Creek  
Clear Fork Sandy River  
Gordon Creek  
Hackett Creek  
Lost Creek  
Trout Creek  
Wildcat Creek

Bull Run River

Little Sandy River

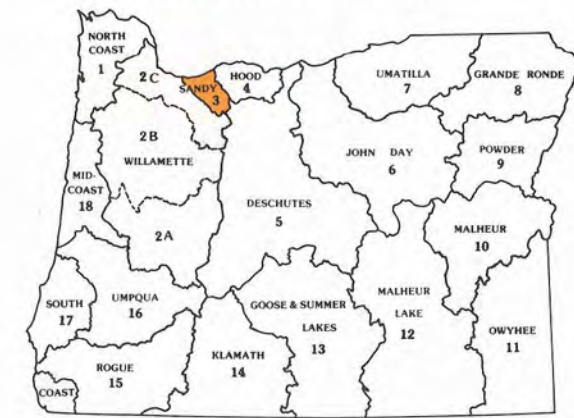
Salmon River

Bighorn Creek  
Boulder Creek  
Cheeney Creek  
S. Fork Salmon River

Zigzag River

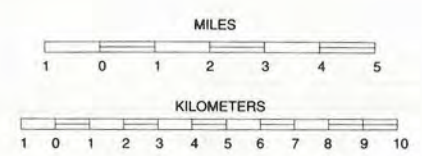
Camp Creek  
Henry Creek  
Lady Creek  
Still Creek  
Cool Creek

DRAINAGE BASIN KEY



LEGEND

- INCORPORATED CITY OVER 10,000 ..... GRESHAM
- 1,000 - 10,000 ..... SANDY
- UNINCORPORATED COMMUNITY ..... Zigzag
- PLACE NAME ..... Salmon
- FORMER COMMUNITY ..... (Swim)
- ROADS: PAVED, GRAVEL, DIRT
- AIRPORTS: PUBLIC, PRIVATE
- BOAT LANDING
- PARK, CAMPGROUND PARK, CAMPGROUND
- RANGER STATION LOOKOUT
- ELEVATION IN FEET: LAND, ROAD
- BULL RUN WATERSHED MANAGEMENT UNIT (Closed to public entry)
- PERENNIAL STREAM, LAKE
- INTERMITTENT STREAM, LAKE
- STREAM MILES (MILES ABOVE MOUTH)
- GLACIER
- STREAM OR CANAL GAGE
- RESERVOIR
- FALLS
- SPRING
- MARSH, MEADOW
- NATIONAL FOREST
- WILDERNESS AREA
- ROADGATE



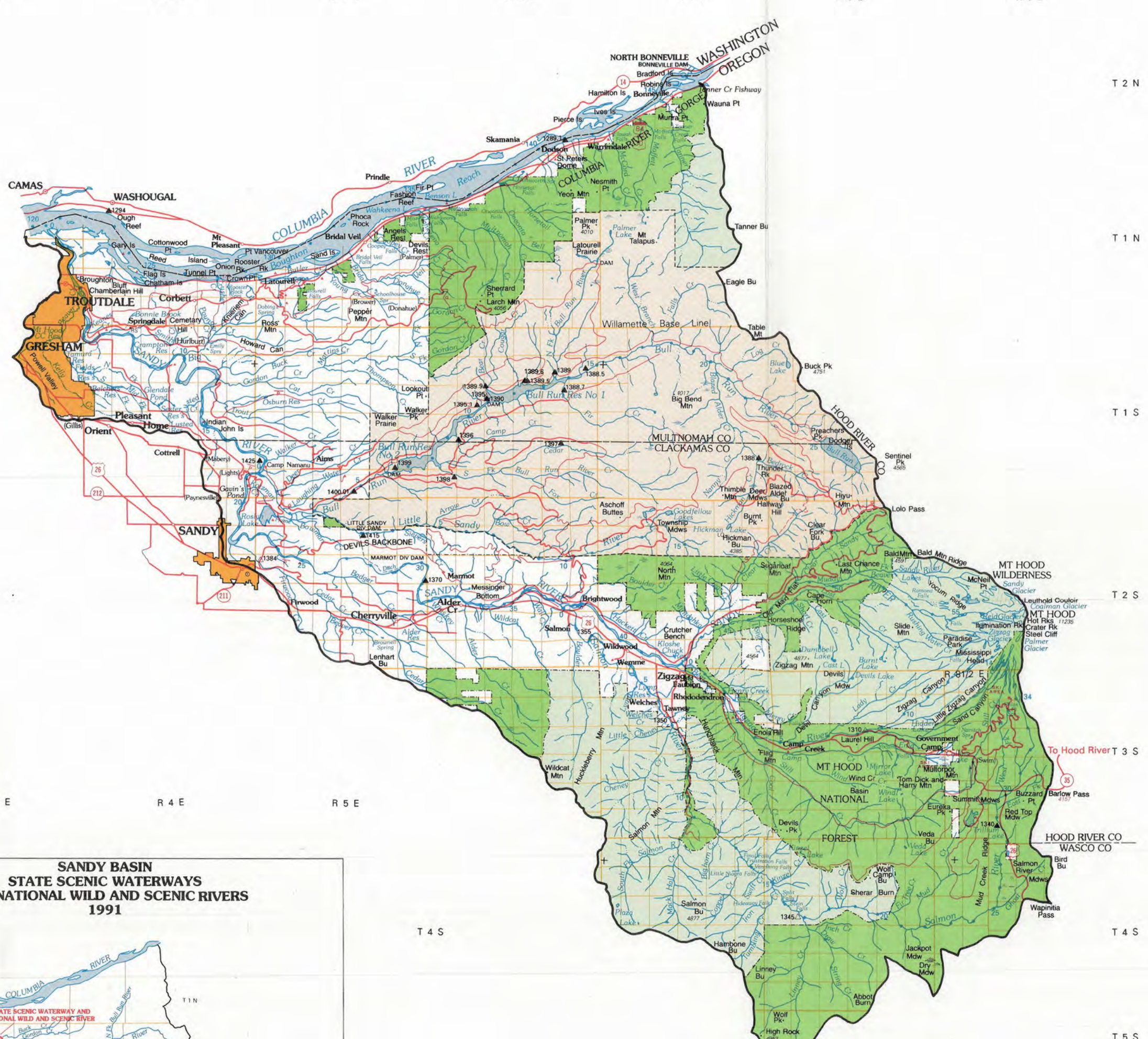
POLYCONIC PROJECTION  
NORTH AMERICAN DATUM 1927



OREGON WATER RESOURCES DEPARTMENT  
SALEM, OREGON

# SANDY DRAINAGE BASIN OREGON

MAP NO. 3.6



### SANDY BASIN STATE SCENIC WATERWAYS AND NATIONAL WILD AND SCENIC RIVERS 1991

