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COLUMBIA RIVER BASIN PROJECT
For Water Supply and Water Quality Management

WILLAMETTE RIVER BASIN (OREGON)

IRRIGATION TRENDS

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This working paper contains preliminary data and information primarily intended for internal use by the Columbia River Basin Project staff and cooperating agencies. The material presented in this paper has not been fully evaluated and should not be considered as final.

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IRRIGATION TRENDS

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IRRIGATION TRENDS IN THE WILLAMETTE BASIN

A. General

Water quality is of considerable importance to irrigated agriculture. In addition, irrigation return flows can influence the quality of receiving waters. Because of their similarity to other water supply problems, irrigation withdrawals and quality requirements have been examined elsewhere in this report. However, in order to provide a basis for anticipating future irrigation needs, and in order to relate irrigation to land requirements, irrigation trends (both historical and potential) are briefly examined in the following parts of this section.

B. Upper Willamette

1. Present Situation

Agricultural use of water in the upper Willamette basin is fast growing. A higher proportion of farms make use of irrigation in the upper basin than in either the middle or lower portions of the basin, and the percentage of total farm land irrigated is somewhat higher than in the other areas. In 1959 about 37.3 percent of the farm land in the region was in irrigated farms, while 6.2 percent of the farm land was actually irrigated. The comparable figures in 1954 showed 31.3 percent of farm land in irrigated farms and 4.4 percent actually under irrigation during the year. Because the cost of irrigation is high, its use is restricted to crops which provide a high return per acre under cultivation. (For example, in 1959, 94 percent of the vegetable crops and 93 percent of the mint crop were produced under irrigation.)

Irrigation is conducted largely with sprinklers and on an individual basis. Three small irrigation districts accounted for only about 1,640 acres of the 22,469 acres irrigated in the area in 1959, and supplemented farm sources on another 940 acres. Farm ground waters irrigated 8,358 acres; farm surface waters irrigated 8,700 acres; and 3,091 acres were irrigated by a combination of farm ground and surface waters.

TABLE I [1/]

Irrigation in Upper Willamette Basin (Lane County)

	1954	1959
Total farm land (acres)	442,158	365,310
Percent of farms irrigated (acres)	24.4%	31.7%
Land irrigated (acres)	19,457	22,469
Land irrigated by sprinkler systems		85.6%
Land irrigated by farm ground water		37.2%
Land irrigated by farm surface water		38.6%
Land irrigated by combination of ground and surface waters		13.7%
Land irrigated by irrigation organization water		6.1%

2. Potential Use

Irrigation requirements may be expected to mount steadily in the upper basin. Development of an expanded food processing industry, as outlined in the economic base study, is one reason for anticipating the rise in irrigation; processors of many types of crops will not grant harvest contracts unless irrigation is available. The drop in farm acreage, and more intensive agricultural practices as farm output becomes concentrated in fewer hands, is another reason to expect progress in irrigation: from 1954 to 1959 the upper basin witnessed a 15 percent rise in acres under irrigation, compared to a 23 percent rise in the lower basin and an 11 percent rise in the middle basin--yet the number of acres of farm land

1/ U. S. Census of Agriculture, 1959.

dropped 17 percent in the upper basin, only 3.5 percent in the middle basin, and rose one percent in the lower basin, indicating that contraction in available farm land probably results in greater proportionate use of irrigation on land remaining under cultivation. Another reason for anticipating greater use of irrigation in the future is a demonstrated tendency in recent years to irrigate pasture.

The U. S. Department of Agriculture has, on the basis of population projections similar to the ones employed by this office, indicated that by 2010 irrigation will characterize 80 percent of cropland under cultivation in the upper Willamette basin. Water needs for irrigation are expected to amount to about five percent of the annual water budget, as compared to less than one percent in 1960.

TABLE II [2/]

Anticipated Increase in Upper Willamette Basin Irrigation, 1959 - 2010

	1959	~~1958~~ 1985	2010
Acres under Irrigation	22,469	45,000	100,000+
Required water volume (acre-feet)	66,420	110,000	224,730

C. Middle Willamette

1. Present Situation

The middle Willamette basin is one of the Northwest's major agricultural areas, but the moderate, moist climate and the nature of farm output has restrained development of irrigation to some extent. In 1959, 31 percent of the middle basin's total farm acreage was in irrigated farms, and 6.5 percent of the total agricultural area was actually irrigated.

2/ USDA and Oregon State Water Resources Board: USDA Report on Water and Related land Resources, Upper Willamette River Basin, Oregon, May 1961.

In spite of some contraction in farm land, and a very noticeable drop in number of farm units--conditions normally associated with broad use of irrigation and other intensive farm practices--the level of irrigation in 1959 was little changed from 1954, when 31.2 percent of the farm land of the basin was contained in irrigated farms, and 5.7 percent of total farm acreage was irrigated.

Irrigation is conducted largely on an individual basis with water derived from farm sources. In 1959 irrigation organizations provided water for only 7,105 of the 101,037 acres irrigated. Farm ground water sources were used on 36,813 acres; farm surface water sources supplied 32,363 acres; and farm ground and surface sources in combination were used to irrigate another 19,326 acres. In a small number of cases, farm water supplies were supplemented by irrigation organization water.

Sprinkler systems provide the principal method of irrigation in the middle basin, and were used on 94 percent of the land irrigated in 1959. The northern counties, Polk and Yamhill, rely to a greater extent on surface waters for irrigation than do Benton, Linn and Marion counties, and they also lead in the proportion of irrigation conducted by sprinklers.

TABLE III 3/

Irrigation: Prevalence and Trend, by Counties, 1954-1959

County	Farm land (acres) 1959	Farm land (acres) 1954	Percent Farms Irrigated 1959	Percent Farms Irrigated 1954	Land Irrigated (acres) 1959	Land Irrigated (acres) 1954
Benton	205,340	214,342	27.5	24.5	9,716	9,139
Linn	490,060	509,899	26.9	21.5	23,478	19,099
Marion	351,397	367,754	35.9	27.9	44,861	42,131
Polk	232,683	237,321	18.3	14.5	9,485	8,808
Yamhill	260,673	272,572	17.0	15.9	13,497	12,475
TOTAL	1,540,153	1,601,888	27.0	22.0	101,037	91,652

TABLE IV 3/

Irrigation: Sources and Method, by Counties
(As a percentage of total acres irrigated in 1959)

County	Farm Ground Waters	Farm Surface Waters	Combination of Farm Sources	Irrigation Districts	Sprinkler Systems
Benton	34%	40%	26%	a/	95%
Linn	45%	27%	17%	7%	89%
Marion	39%	25%	15%	11%	95%
Polk	38%	45%	15%	2%	98%
Yamhill	15%	49%	34%	1%	96%
TOTAL	36%	32%	19%	7%	94%

3/ U. S. Census of Agriculture, 1959

a/ Less than one percent.

2. Potential Uses

As indicated in the economic base study, agriculture is expected to continue to be a leading economic activity in the middle Willamette basin. Although the population of the middle basin is projected to significantly higher levels, the increase is expected to be concentrated in presently urbanized areas and probably may not be expected to detract to an appreciable extent from available farm land. Indeed, transition from forest to cropland and pasture may result in a net addition to farm land by 1985. 4/ Larger markets, possible shifting of crop distribution from field seeds and hay in favor of greater production of vegetables and irrigated pastureland, and the larger capitalization per acre characteristic of concentration of farm holdings--a pattern apparent in the area--should combine to contribute to an appreciable increase in irrigated farming. While the region may be expected to lag behind the upper and lower basins in application of irrigation, it is reasonable to anticipate continuation of the one percent annual rate of addition to irrigated farm land experienced in the last half of the last decade. This would involve an increase in irrigated land from about 101,000 acres in 1959 to 131,000 acres in 1985 and to 165,000 acres in 2010.

D. Lower Willamette

1. Present Situation

Agriculture is of relatively less weight in the economy of the lower Willamette basin than in the areas along the upper reaches of the river.

4/ Oregon State Committee for Development of National Inventory of Soil and Water Conservation Needs; tabular report, July 1960.

However, the larger immediate market and the relative scarcity of agricultural land contribute to use of intensive agricultural practices, including irrigation. Although a considerably smaller proportion of the farms in the lower basin are irrigated than in either the middle or the upper basin, both the proportion of total farmland in irrigated farms and the proportion of farmland irrigated compare closely with up-river areas; and in recent years, the prevalence of irrigation has spread faster in the lower basin than in other areas. In 1959 about 34.6 percent of the farmland of the lower Willamette basin was contained in irrigated farms, and about 5.9 percent of total farm acres were irrigated. These figures indicate that a marked increase occurred over 1954, when 20.6 percent of the region's farmland was in irrigated farms and 4.8 percent was irrigated.

As in other parts of the Willamette basin, farm sources of water outweigh irrigation organization sources; and sprinklers are the principal method of irrigation. However, the use of sprinklers is less marked than in other areas, being the exclusive method of irrigation on 85.1 percent of irrigated land compared to about 90 percent in the middle and upper portions of the Willamette basin. Irrigation sources supply a larger portion of total irrigation waters than in other Willamette areas, accounting for 1,774 acres in 1959 compared to 7,548 acres irrigated from farm ground waters; 23,893 acres irrigated by farm surface waters; and 2,321 acres irrigated by a combination of farm sources.

TABLE V [5/]

Irrigation: Prevalence and Trend by Counties, 1954-1959

County	Farmland (acres)		% of Farms Irrigated		Land Irrigated (acres)	
	1959	1954	1959	1954	1959	1954
Clackamas	319,048	310,550	13.9	8.8	11,064	8,099
Multnomah	89,379	71,058	26.7	11.0	10,212	4,713
Washington	211,108	236,203	20.9	14.1	15,169	16,697
TOTAL	619,535	617,811	18.0	10.9	36,445	29,509

TABLE VI [5/]

Irrigation: Sources and Method (as percentage of total acres irrigated in 1959), by Counties

County	Farm Ground Water	Farm Surface Water	Combination of Farm Sources	Irrigation Sources	Sprinkler Systems
Clackamas	30.6%	53.3%	9.3%	6.2%	90.6%
Multnomah	24.8	58.7	6.5	4.7	66.5
Washington	10.8	79.2	4.1	4.0	93.5
TOTAL	20.8%	65.7%	6.4%	4.9%	85.1%

5/ U. S. Census of Agriculture, 1959.

2. Potential Uses

Growing population in the study area indicates continuing diversion of farmland to dwelling and industrial uses. By 1960 perhaps two-thirds of the best cropland of Multnomah County had been converted to urban use; and the process continues, with greatest speed in Washington County, but in the other two counties of the area as well.

That interaction of growing consumer demand with decreasing supplies of cropland should result in more intense farming practices and greater use of irrigation seems obvious. No studies are available to indicate the probable extent of future irrigation, but a preliminary projection may be made for design purposes. The Oregon Committee for Development of National Inventory of Soil a nd Water Conservation Needs has projected the level of cropland anticipated in 1975, and it would appear likely that the prevalence of irrigation will display the same three percent annual rate of increase over that period that it has exhibited in the post-war years. On the basis of these figures, the results indicated in Table VII are obtained.

TABLE VII

Total Cropland and Irrigated Cropland in the Lower Willamette Basin, 1959-1975

County	Total Cropland (acres) 6/		Irrigated Cropland (acres)	
	1959	1975	1959 7/	1975
Clackamas	147,605	125,000	11,064	22,000
Multnomah	37,210	30,000	10,212	20,000
Washington	137,708	132,500	15,169	30,000
TOTAL	322,523	287,000	36,445	72,000

6/ Oregon Committee for Development of a National Inventory of Soil and Water Conservation Needs, March 1960.
7/ U. S. Census of Agriculture, 1959.

The indicated doubling of irrigated cropland does not seem out of place when demands on the available land and the historical trend of irrigated agriculture is considered. For the purposes of this analysis it is estimated that by 2010 almost all of the cropland of Multnomah County, and a major part of the cropland of the rest of the lower basin will be irrigated.