

U.S. BUREAU OF
RECLAMATION

YVRL ITEM



B220959

YAKIMA FEDERAL RECLAMATION PROJECT, WASHINGTON

YAKIMA
FEDERAL
RECLAMATION
PROJECT
•
WASHINGTON

627.52
UNITED STATES
RC
1939

TREES IN BLOOM



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

United States
Government Printing Office
Washington : 1939

Relander
Collection



Yakima Valley Regional Library

LIBRARY USE ONLY

BOARDROOM CASE

RC

627.52

U

United States. Bureau of Reclamation
Yakima federal reclamation project,
Washington. Washington, D. C., G. P.
O., 1939.

30p. illus. 23cm.

.50 (paper)

Map on p. [3] of cover.

DO NOT REMOVE CARDS

1. Yakima Project, Wash. 2. Reclama-
tion of land - Wash. (State) - Yakima
Valley I. Title

500149

YAKIMA

FEDERAL RECLAMATION PROJECT

WASHINGTON

LOCATION OF PROJECT

THE YAKIMA PROJECT is situated on the eastern slope of the Cascade Mountains in Yakima, Kittitas, and Benton Counties of south central Washington. It occupies a comparatively narrow strip of very fertile land on both sides of the Yakima River extending from Easton to Kennewick, a distance of about 175 miles.

CLIMATIC CONDITIONS

PROJECT LANDS range in elevation from about 400 feet above sea level on the Kennewick division to 2,200 feet on the Kittitas division. The climate is mild and free from extreme weather conditions. The abundance of sunshine makes the country a healthful as well as an invigorating and enjoyable place in which to live. The average temperature range is from a maximum of 100° F. to a minimum of 0° F., with only occasional extremes beyond this range. At Yakima, centrally located on the project, the average annual rainfall is 8.15 inches, the annual mean temperature is 50.5° F., and the frost-free period is 187 days. Extremes on the project vary somewhat from those given for Yakima, depending on the altitude. The irrigation season extends from about April 1 to October 31.

[3]

500149

YAKIMA VALLEY REGIONAL LIBRARY



The oldest homestead built on the Yakima project is still occupied

HISTORICAL

THE FIRST white settlers located in the Yakima Valley about 1860. They were cattlemen who were attracted by the wonderful stands of bunch grass, plentiful water, abundance of wild game, and the fertile bottom lands. The first irrigation ditch of which there is authentic record was constructed in 1864, when water was taken from Ahtanum Creek to irrigate a small garden above the "Catholic Mission." Productivity of the soil when supplied with sufficient moisture was demonstrated. Hops were first raised in 1872 and alfalfa was successfully grown in 1881. With the construction of the Northern Pacific Railway into the valley in 1886 the real development of irrigable lands began, for alfalfa, fruit, and hops could then be raised for shipment.

Comprehensive development of the valley was made possible by passage of the Reclamation Act in 1902, at which time approximately

120,000 acres of land were being partially irrigated by private canals on the Yakima River and its most important tributaries. As the result of a petition, dated January 28, 1903, from citizens of Yakima County to the Secretary of the Interior, presenting the very favorable opportunities for construction and development, investigations were initiated which led to the beginning of construction by the Bureau of Reclamation.

WATER SUPPLY

AN ADEQUATE and dependable water supply is obtained from the natural flow of the Yakima River and its tributaries, supplemented by storage provided in six reservoirs having a combined capacity of 1,039,330-1,063,800 acre-feet. These reservoirs and their respective capacities, in the order of construction, are as follows:

	Acre-feet			Acre-feet	
Bumping.....	34,000	33,800	Clear Creek....	5,830	5,300
Kachess.....	210,000	239,000	Tieton.....	202,500	197,000
Keechelus.....	152,000	153,000	Cle Elum.....	435,000	435,700

Hops are a money crop on the Yakima project





Plowing sagebrush

Bumping Lake Dam is of the earth-fill type and has a volume of 247,700 cubic yards. The dam is 3,425 feet long with a maximum height above the stream bed of 45 feet. Construction was begun in 1908 and completed in 1910. The spillway has a capacity of 6,000 cubic feet per second. Five hundred and fifty cubic feet per second can be released through the outlet works. Bumping Lake Dam is located at the lower end of a natural lake and creates a reservoir which is 4 miles long and covers an area of 1,300 acres.

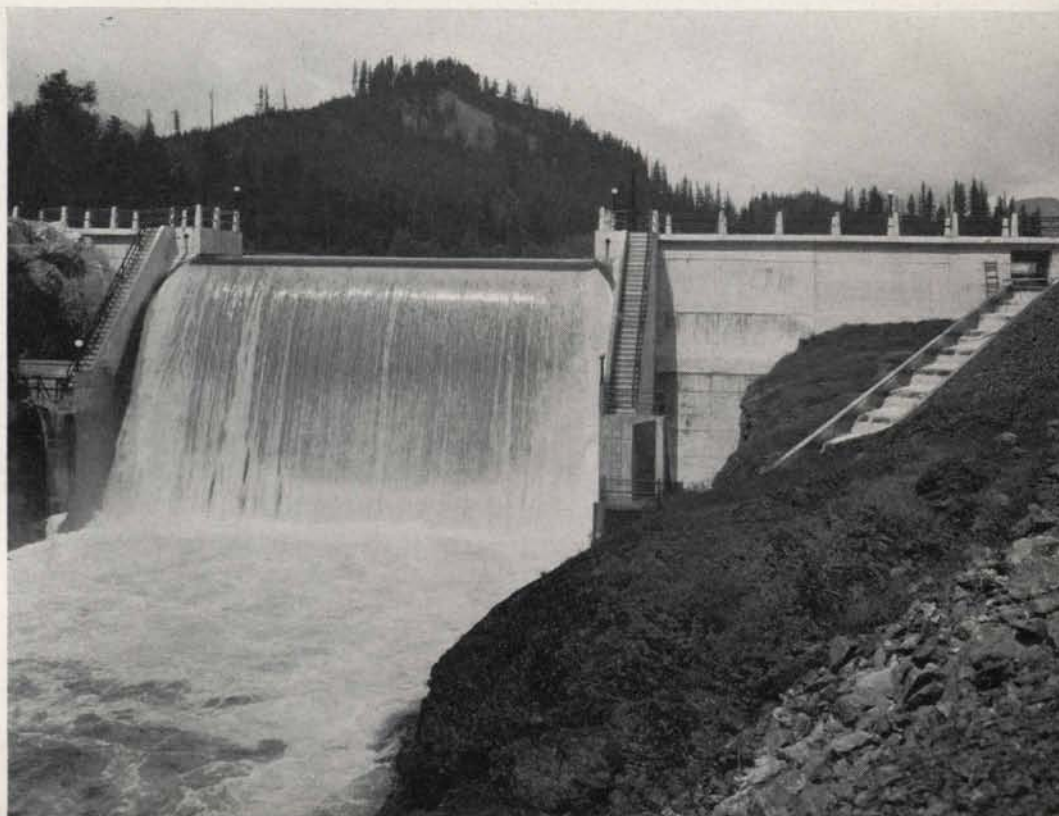
Kachess Dam is an earth-fill type structure having a volume of 193,300 cubic yards. This dam is 1,400 feet long and has a maximum height above the stream bed of 63 feet. Construction was begun in 1909 and completed in 1912. A new spillway and channel constructed in 1936 has a capacity of 4,000 cubic feet per second. The outlet works can discharge 2,000 cubic feet per second. This dam, also built at the

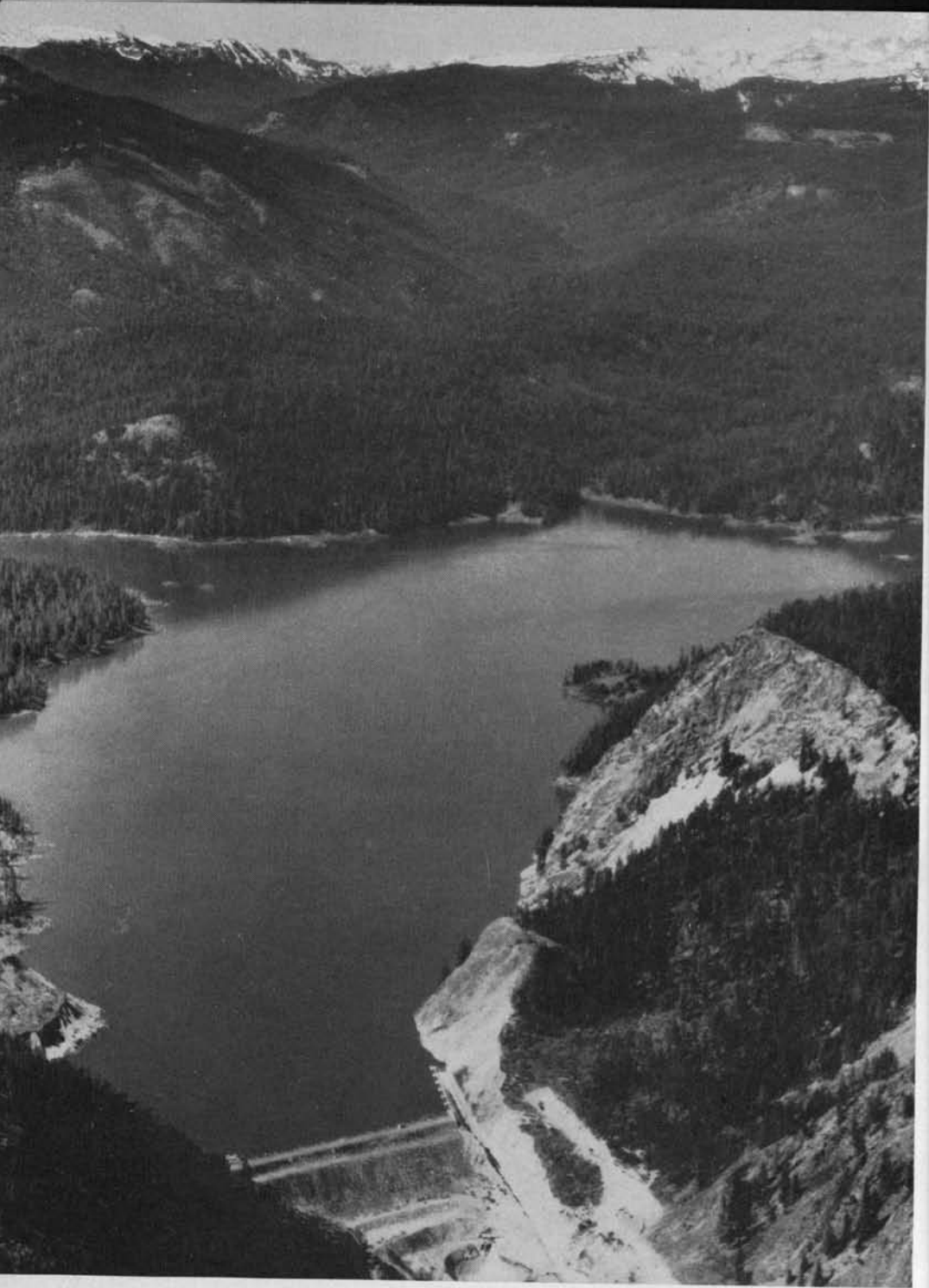
lower end of a natural lake, creates a reservoir 12 miles long and covers an area of 4,540 acres.

Keechelus Dam, constructed at the lower end of a natural lake, is of the earth-fill type and has an embankment volume of 639,000 cubic yards. This embankment is 6,500 feet long and has a maximum height above the stream bed of 70 feet. Construction was begun in 1912 and completed in 1917. The spillway capacity is 10,000 cubic feet per second and an additional 2,000 cubic feet per second can be released through the outlet works. The reservoir is 6 miles long and covers an area of 2,550 acres.

Clear Creek Dam is a concrete arch with straight gravity section concrete abutments at either end, and contains 4,100 cubic yards of concrete. The crest is 404 feet long and 58 feet above the stream bed. A first stage of this dam was built in 1914, and in 1918 the dam was completed to its present elevation. Although an overflow spillway is provided, water also flows over the dam crest in times of flood. Two 36-inch diameter pipes through the dam are capable of releasing 320 cubic feet per second.

Easton diversion dam



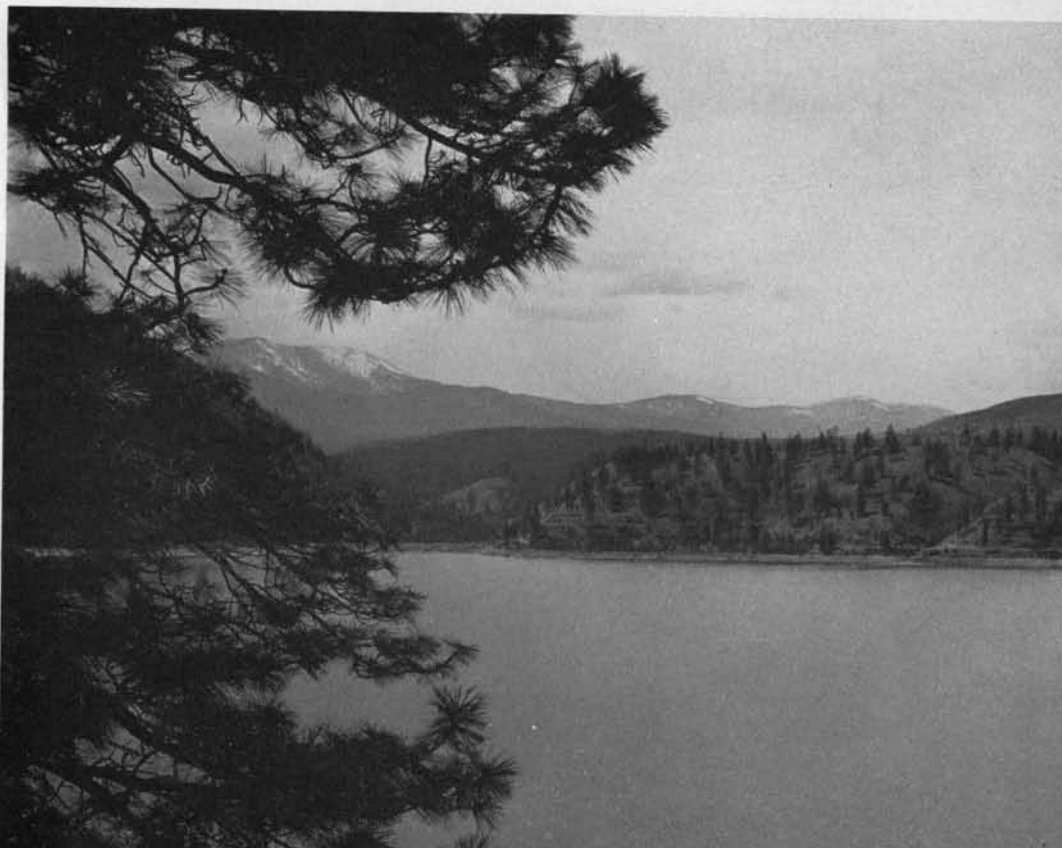


An air view of Tieton Dam and Reservoir

Tieton Dam is of the earth and rock-fill type with a concrete core-wall extending from the crest to tight material some 100 feet below the river bed, and contains 1,995,000 cubic yards of embankment material. The dam crest is 222 feet above the stream bed and has a length of 905 feet. Construction was started in 1917, suspended in 1918, resumed in 1921, and completed in 1925. The spillway capacity is 30,000 cubic feet per second and over 2,000 cubic feet per second additional can be released through the outlet works. The reservoir is 9 miles long and covers an area of 2,500 acres.

Cle Elum Dam is of the earth-fill type without a core wall. The gross total volume of embankment is 1,300,000 cubic yards. Height of the dam is 135 feet above stream bed and the crest length is 783 feet. Construction of the present dam was started in 1931 and except for the parapet wall and spillway gates was completed in 1933. The spillway capacity is 40,000 cubic feet per second and 5,000 cubic feet per second can be released through the outlet works. The dam forms a reservoir 9 miles long with an area of 4,700 acres.

Cle Elum Lake





Outlook pumping plant, Sunnyside division

IRRIGATION WORKS

THE YAKIMA RIVER SYSTEM serves as the source of water supply for all the project irrigation works. Storage water is released from the six reservoirs into the river system and delivered in the river channels to the various canal headgates. Project irrigation works, constructed or acquired by the Bureau of Reclamation, including the Tieton, Sunnyside, Kittitas, and Kennewick divisions, consist of more than 1,250 miles of canals and laterals, and all other necessary structures such as diversion dams, tunnels, flumes, pipe lines, bridges, and culverts. The Tieton and Sunnyside divisions are operated by the Bureau. The Wapato division of ^{126,000}120,000 acres is being built and is operated by the United States Indian Service. Irrigation works now serving an additional 150,000 acres were constructed by private companies or individuals.

POWER DEVELOPMENT

A POWER PLANT generating 4,200 horsepower was constructed in 1932 at the end of a short power canal diverting from the Yakima River at

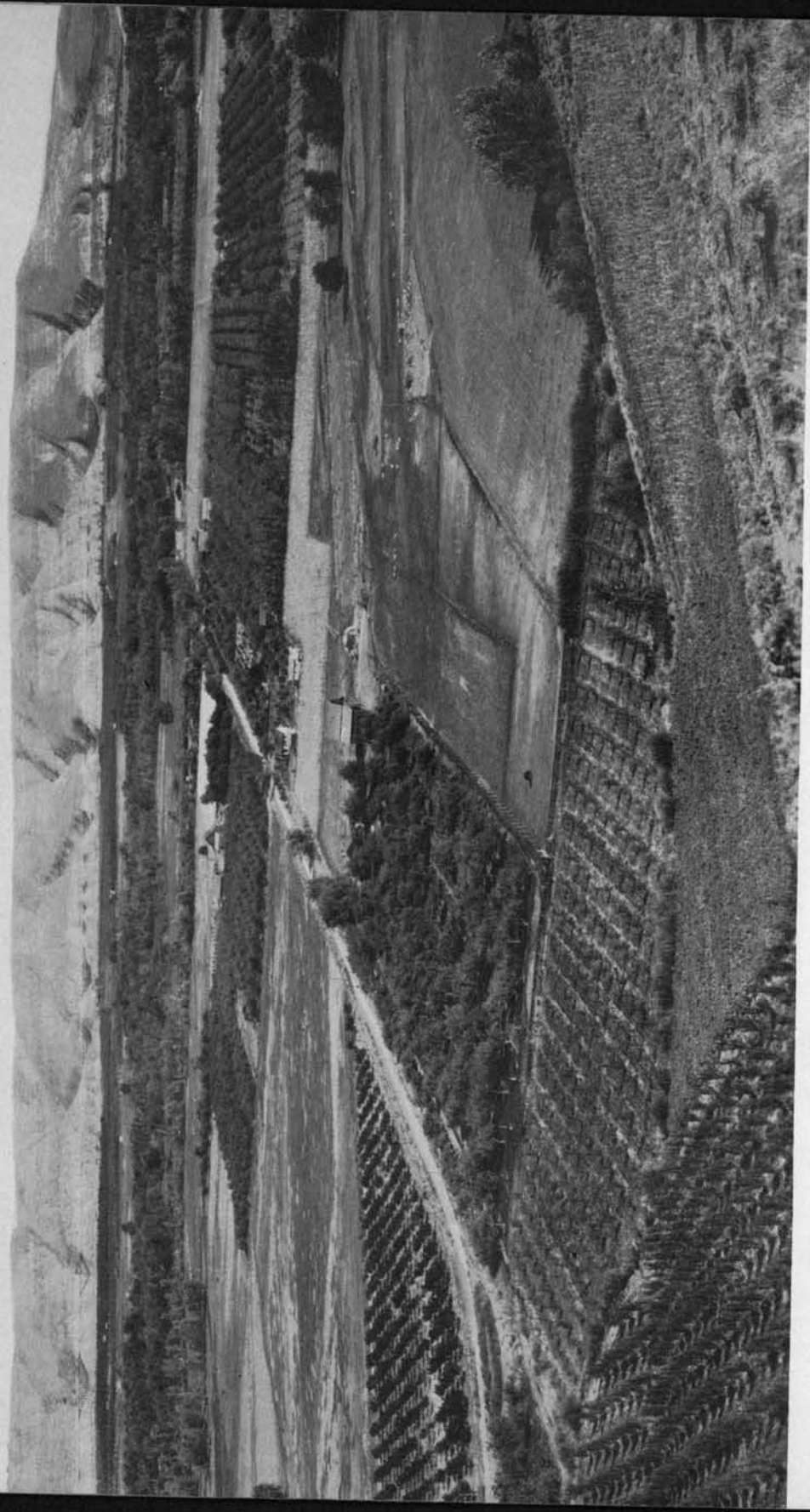
Prosser. The power is used primarily for pumping irrigation water to about 4,000 acres of developed lands in the Kennewick Highlands unit, which is a part of the proposed Kennewick division. Power for pumping is also supplied under contract to several other small irrigation districts in the vicinity of Kennewick. All surplus power is sold to the commercial power company operating in the locality.

IRRIGABLE LANDS

UPON COMPLETION of the project the total area under irrigation in the valley will approximate ^{595,000} 590,000 acres, of which about ^{430,000} 410,000 acres are now irrigated. Of this total nearly ^{330,000} 315,000 acres are supplied with water from irrigation works and storage reservoirs constructed by the Bureau of Reclamation.

The irrigable area of the project proper is divided physically into six natural divisions having a total irrigable area of about ^{441,000} 400,000 acres. The Sunnyside division, in Yakima and Benton Counties, extends southeasterly from 1 mile below Union Gap for a distance of 70 miles and has an irrigable area of ^{105,387} 102,400 acres. Sunnyside, Prosser, and Grandview are the principal towns. The Tieton division, in Yakima County, extends from 12 to 15 miles west and northwest from Yakima to about 2 miles west of Yakima, and has an irrigable area of ^{28,835} 29,800 acres. Principal towns on the division are Tieton, Wiley City, and Ahtanum. Construction of these divisions was completed some years ago and both are being operated by the Bureau. The Kittitas division, in Kittitas County, extends from Easton southeasterly beyond the town of Kittitas and has an irrigable area of ^{69,557} 70,200 acres. The main body of land surrounds Ellensburg, the county seat of Kittitas County and principal town. This division was completed in 1933 and the management turned over to the Kittitas Reclamation District on January 1, 1934. The Wapato division, in Yakima County and under construction by the United States Indian Service, has an ultimate irrigable area of ^{136,000} 120,000 acres, of which about ^{110,000} 90,000 acres are now being irrigated. Toppenish and Wapato are the principal towns.

The proposed Kennewick division, in Benton County, for which a water supply is available, has an irrigable area of 35,000 acres, but since construction of the Prosser Power Plant and the rehabilitation of the



Fruit orchards

Kennewick Highlands unit of this division, possibilities for development of the remaining area now appear remote.

There is no public land for homestead settlement on the project at the present time. Some lands in private ownership are for sale and can be purchased from the owners. Unimproved land ranges in price from \$10 to \$50 per acre. Improved lands sell at \$50 to \$750 per acre for farm land, depending on location, fertility, physical condition, water rights, and state of improvement. Small orchard tracts of 5 to 10 acres situated within a few miles of Yakima and other project towns and occupied as suburban home sites sell at rates of \$500 to \$1,000 per acre.

SOILS

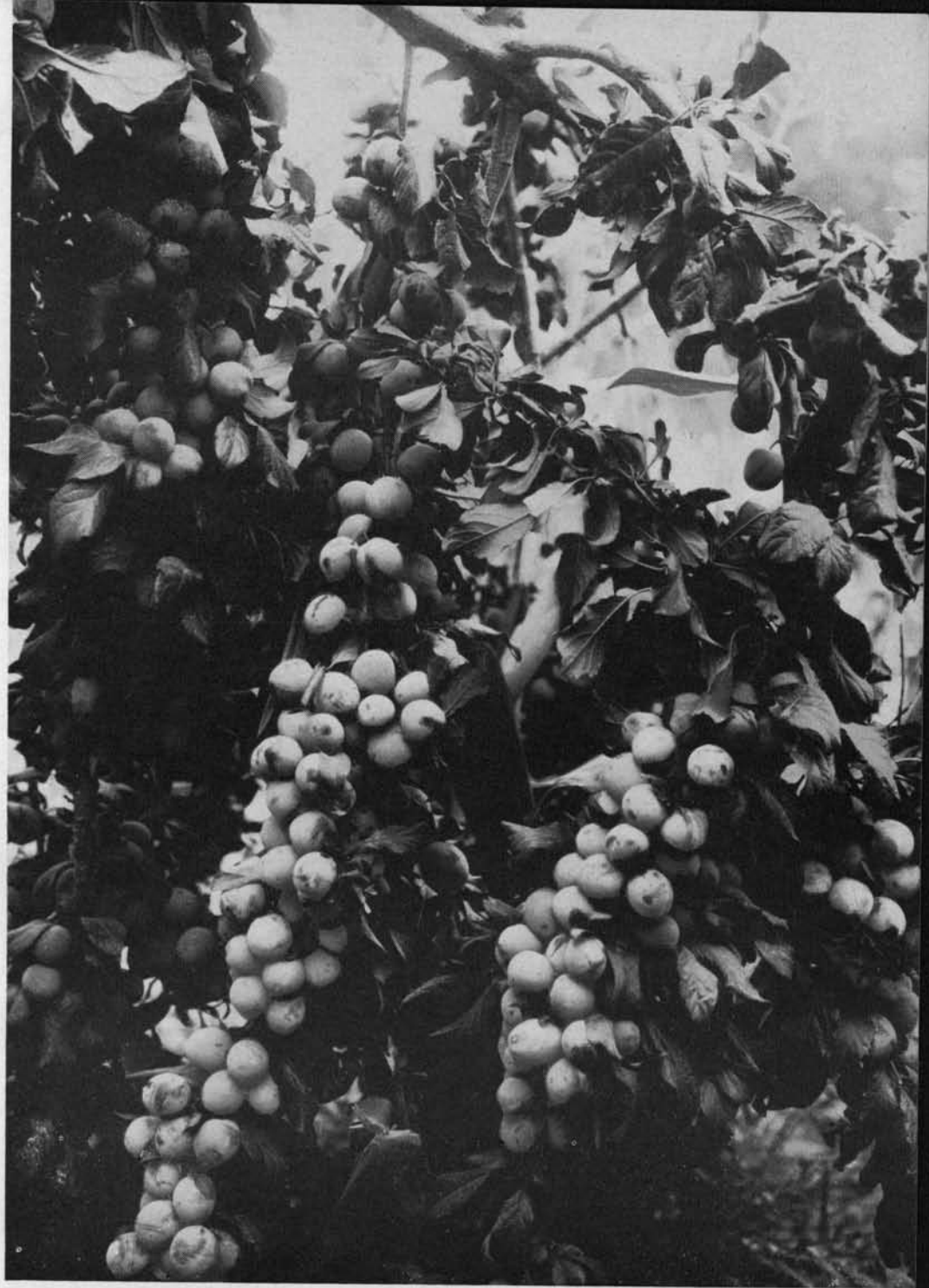
THE PREDOMINATE SOIL is volcanic ash of a fine silty texture and considerable depth, usually underlaid with gravel or decomposed basalt. Other soil types are alluvial loams, silt and sandy loams underlaid with gravel. The character of the topography is rolling, affording for the most part good natural drainage. On some of the older parts of the project are local areas affected by the presence of alkali. Drains constructed by drainage districts formed under the State law affect about 45 percent of the irrigable area of the Sunnyside division.

A small washing unit in operation in a Sunnyside orchard





Picking apples on the Tieton division



Plums in Yakima Valley



A Holstein herd in pasture



Part of the 40,000 sacks
at a single warehouse

CROPS

LANDS OF THE PROJECT are especially well adapted to all the principal field crops. Certain sections are particularly suitable for growing fruits. The principal crops are fruit, especially apples, and alfalfa hay, potatoes, and grains. An average of three cuttings of alfalfa is produced. Yields vary from 3 to 6 tons per acre. Apples produce an average of 300 boxes of graded and packed fruit per acre, and yields of 1,000 boxes of packed fruit are

not uncommon. Grain
age yield being about
production frequently
acre. A large variety of
are raised commercially
yields. Potatoes produce
acre. Seed and canning
on the Kittitas division
to become an important
ment of a blight-resistant

Hauling apples from orchard. The drey is low to avoid breaking of tree branches





of seed peas handled
Ellensburg, Wash.



Thoroughbred sheep

duce heavily, the aver-
bushels per acre with
eding 100 bushels per
vegetable and truck crops
nd produce profitable
00 to 700 bushels per
as are important crops
ugar beets are destined
sh crop since develop-
rain.

LIVESTOCK

THE MILD WINTERS are favorable for the breeding of all classes of livestock. Large numbers of sheep and cattle are grazed on open ranges in forest reserves surrounding the valley during the spring and summer, and winter on the project, creating a local demand for forage crops. Dairying and poultry raising are established industries and are showing continued growth. Proximity of coast markets provide an outlet for these products.

Yakima potatoes are grown with profit





Packing plant at Weikel, Wash.

MARKETS

PROJECT LANDS are conveniently located with reference to the principal cities of the Pacific Northwest. Produce is shipped to most of the larger marketing centers in the United States and a yearly increasing amount is exported. Many industries, such as canneries, fruit evaporating plants, meat-packing plants, creameries, a winery, grape juice and cheese factories, etc., provide a local market for many farm products. Two large cooperative fruit growers' associations and numerous produce houses provide facilities for distributing and marketing farm produce.

TRANSPORTATION

THE PROJECT is well provided with transportation facilities. The Chicago, Milwaukee & St. Paul Railway crosses the Kittitas division, and the main line of the Northern Pacific Railway traverses the entire length of the project. A branch line of the Union Pacific system runs through the Sunnyside division to a terminal at Yakima, and several

branch lines of the Northern Pacific Railway provide shipping facilities within a few miles of all farms in the valley. A concrete paved highway extends through the valley, and other well improved secondary roads provide easy access to towns and facilitate the marketing of produce. Motor coach and freight lines do a thriving business. Airport facilities are available at Yakima, Ellensburg, Cle Elum, and Easton.

INDUSTRIAL PLANTS AND UTILITIES

THE PROJECT has over 70 industries manufacturing over 100 products. These include a lumber mill, fruit and vegetable canneries, fruit evaporating plants, a winery, a beet-sugar factory, meat-packing plants, sash and box factories, bakeries, candy plants, plants manufacturing dresses, brick and concrete products, spray materials, dairy products, and bottling works. Power transmission and distribution lines extend to nearly all parts of the project. Telephone and telegraph facilities serve the entire project. Natural gas is available to several

Canning plant at Yakima



towns on the Sunnyside division. Three daily newspapers published in Yakima serve practically the entire valley, and one published in Ellensburg serves Kittitas County. First-class weekly papers are published in the larger valley towns.

TOWNS

THE IRRIGATED LAND in the Yakima Valley supports about 30 cities and towns. Yakima, with a population of approximately 30,000, including the surrounding suburban areas, is the county seat of Yakima County and the business center of the project. Ellensburg, with a population of about 5,000, is the county seat of Kittitas County and the principal trading center of the Kittitas division. The largest town on the Sunnyside division is Sunnyside, with a population of 2,100. There are several smaller towns and trading points, of which the larger are Prosser, the county seat of Benton County, Grandview, and Zillah.

A beautiful residence street in Yakima—Naches Avenue



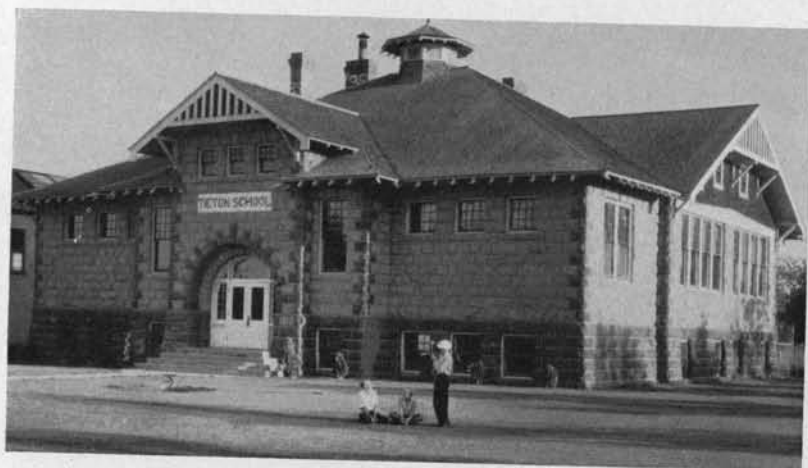


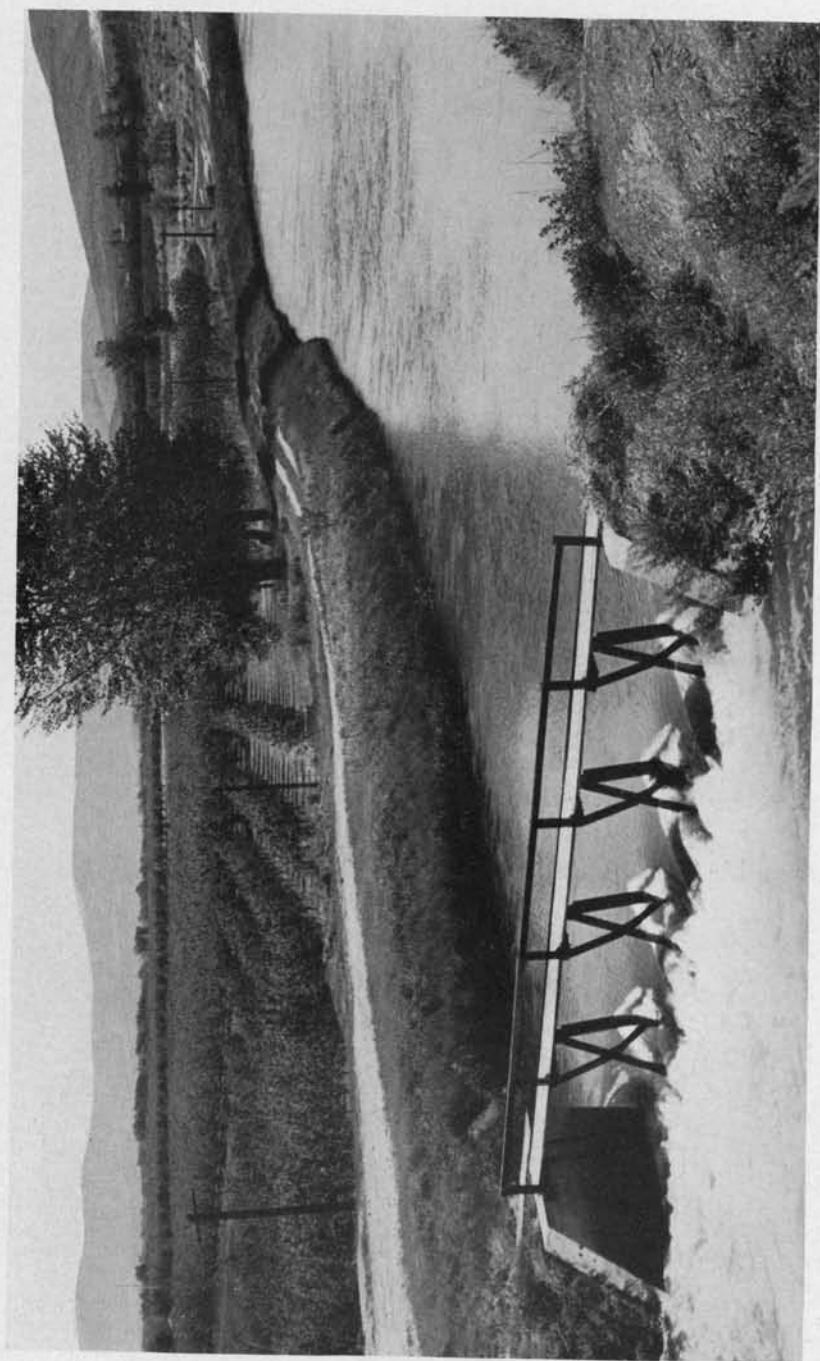
High school in Ellensburg, Wash.

SCHOOLS

EXCELLENT EDUCATIONAL FACILITIES are available, there being 26 accredited high schools, including four junior high schools. A State college of education, with an enrollment of about 1,100, is maintained at Ellensburg. Yakima has a junior college and two business colleges. Most of the school buildings are attractive and of substantial construction. School busses are operated by most of the rural schools.

A school building on the Tieton division





A main irrigation canal in Yakima irrigation system—Sunnyside district main canal

FARMERS' ORGANIZATIONS

THE NUMEROUS COMMUNITY ORGANIZATIONS, including granges and women's clubs, are active and maintain clubhouses or halls, where social recreation is provided and cooperative endeavors are promoted. The high proportion of resident owners tends to strengthen and stabilize these organizations. There are a number of producing and marketing organizations which are cooperatively owned and operated by groups of farmers. Project water users owning land within the project are organized into irrigation districts under State laws.

OPERATING CONDITIONS AND COSTS

LANDOWNERS are required to return the construction cost of the project works, without interest, in small payments over a period of years, in addition to actual annual operating cost. The total construction cost of the several divisions ranges from \$31 to \$165 per acre, including the cost of storage. Annual construction payments vary according to terms of the various contracts. Under the several moratorium acts of Congress, water users, upon request, have had the construction charges for 1931, 1932, 1933, 1934, 1935, and one-half for 1936 deferred to the end of their repayment period. In addition to the construction charge, assessment is made to cover the annual cost of operating and maintain-

Sunnyside diversion dam and canal





A farm home on the Sunnyside division

ing the system. Assessments and collections are made through irrigation districts and water-users associations.

On the Sunnyside division, construction charges, on the basis of contracted returns, vary from \$31 to \$75 per acre, payable over a period of 20 years. On most of the lands, exclusive of those in the small irrigation districts, annual payments at this time are 6 percent of the original charge of \$52 to \$64 per acre, or \$3.12 to \$3.84 per acre. Under contracts now in force, future annual construction charges on lands in the small irrigation districts will amount to \$0.81 to \$4.35 per acre. The irrigation system under the Sunnyside Valley Irrigation District, which includes most of the lands of the division, is operated by the Bureau, but maintenance covers only laterals and canals above 10 second-feet in capacity. The annual charge for this service varies from year to year as well as with the type of water-right contract. On certain lands having supplemental water-right contracts, the operation and maintenance charged is fixed at \$0.50 to \$1.50 per acre for delivery of determined amounts of water. On lands subject to public-notice rates the charge will average about \$2.20 per acre. A small acreage of lands on the division which have vested water rights pay no operation and



Orchard farm home

maintenance charge. Water is delivered on an acre-foot basis, an established amount being allowed for a fixed minimum charge. The charge for water used in excess of that amount is based on the number of acre-feet used. An additional small charge is made by the irrigation district. Assessments on lands under the small irrigation districts are fixed annually by the respective districts in an amount sufficient to cover the estimated cost of operating and maintaining the irrigation works.

Construction charges on lands of the Tieton division vary from \$93 to \$110 per acre. Present annual payments of 6 percent of the original charge are therefore \$5.58 to \$6.60 per acre. In addition, a supplemental construction charge of \$11.63 per acre is due in 8 semiannual installments beginning with the year 1940. The irrigation system is being operated and maintained by the Bureau, and the annual charge for this service averages about \$3 per acre based on the amount of water used. A minimum charge is made whether water is used or not. An additional small annual assessment is levied by the Tieton Water Users Association.

On the Kittitas division, repayment of the cost of constructing the irrigation works, amounting to about \$9,000,000, is made in annual



Morrison Canyon siphon, Kittitas main canal

installments based on 5 percent of the average gross acre income for the preceding 10 calendar years, or for all years of record if fewer than 10 are available, of the area in cultivation as determined by the Secretary of the Interior. The Kittitas division, like other divisions of the Yakima project, must also pay its proportionate share of the cost of

storage works, which amount, now tentatively set at \$2,418,000, is payable in 80 semiannual installments, without interest. The operation and maintenance of the irrigation system was assumed on January 1, 1934, by the Kittitas Reclamation District, with an office at Ellensburg. The district levies an annual assessment to cover the estimated cost of this service.

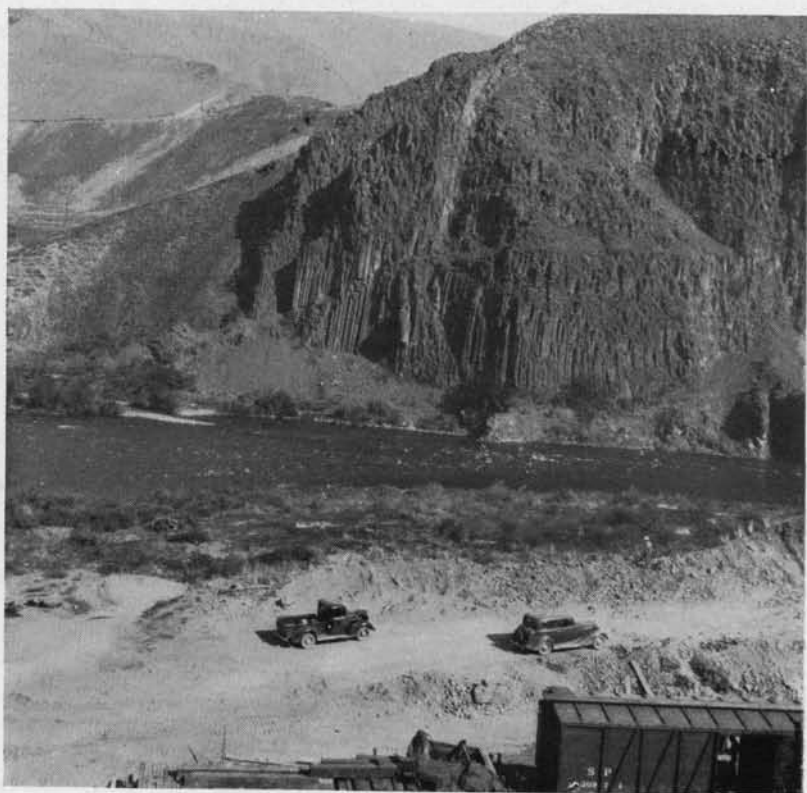
The Kennewick division is being operated and maintained by the Kennewick Irrigation District, with office at Kennewick. The Wapato division is being constructed, and operated and maintained by the United States Indian Service, with office at Wapato.

RECREATION

EXCELLENT RECREATIONAL ADVANTAGES are offered within a few hours' ride of any point in the valley. Boating, fishing, and swimming may be enjoyed at the project reservoirs located in the Cascade Mountains, and mountain climbing, hunting, fishing, and camping are attractions in surrounding areas. Mount Rainier National Park, with its glaciers and perpetual snow, is but a few hours' drive from Yakima over an excellent State highway.

Fishing from raft, Tieton Reservoir





Roza diversion dam site

ROZA DIVISION

THIS DIVISION, in Yakima and Benton Counties, occupies a narrow strip of land 90 miles in length and comprises 72,000 acres of the choicest land in the Yakima Valley within 6 miles of shipping points and social centers. The altitude of this division is 700 to 1,200 feet—higher than adjacent developed lands. A soil survey of lands within the Roza division was made some years ago. Most of the irrigable lands of the project are very fertile, easily tilled, and well adapted to general diversified farming and dairying, with certain localities particularly suitable for fruit raising.

To prevent land speculation and to arrive at the proper value of the land without consideration of the prospect of securing water

from the irrigation works being constructed by the Government, all of the land of this division has been appraised recently by a committee appointed by the Secretary of the Interior. Improvements on the land, such as buildings, leveling, ditches, or other improvements of a permanent character, are appraised separately. Lands may be sold for more than the appraised value upon the condition that 50 percent of the selling price in excess of the appraised value of land and improvements shall be turned over to the district to be applied as a credit to the water-right charge on that particular tract of land.

A contract between the United States and the Yakima-Benton Irrigation District, dated December 13, 1935, provides for construction of the Roza division and for repayment of an expenditure of not to exceed \$15,000,000. Actual construction work was started in 1936 and is now under way.

Water will be diverted from the Yakima River at the Roza diversion dam, located about half way between Yakima and Ellensburg. This structure, work on which was started in August 1938 and is ^{now} ~~scheduled~~ ^{completed} for completion in March 1940, will be a concrete ogee weir ⁵⁶⁸ 263 feet long and ⁵⁵ 55 feet high. River regulation will be obtained by two 14- by 110-foot roller gates.

A power plant containing two 6,000 kilovolt-ampere units will be located at the end of the 12-mile section of canal. Two-thirds of the generated power will be used for pumping at the ²¹⁰ 34 pumping plants to be constructed at various points along the lower canal section. About 74 miles of 66,000-volt transmission lines and 11 miles of 2,300-volt branch lines will be required. The capacities of the pumping plants will range from 4.2 to 47.8 second-feet, and the plants will pump against heads varying from 70 to 200 feet. A canal of 1,300 second-feet initial capacity starts from the power plant and extends in a generally southeast direction a distance of 87 miles. Of this length 15.8 miles are made up of tunnels, flumes and concrete lined sections. Tunnels Nos. 1 and 2 were combined and lengthened to eliminate a stretch of expensive bench flume and lined canal along a steep side hill adjacent to the river. These tunnels are concrete lined, with an inside diameter of 17 feet and a total length of 17,856 feet. They were completed on May 18, 1938.

Roxa,

Area in Cultivation and Total Crop Value

1943

² First water for irrigation supplied on Kittitas division

11 12 13 14 15 = Roy A in 1941

Agricultural Investment

Land purchase	\$13,621,400
Land preparation	3,241,985
Farm improvements	18,564,799
Farming equipment ³	2,867,407
Livestock	3,083,007
Project irrigation works ⁴	27,395,631

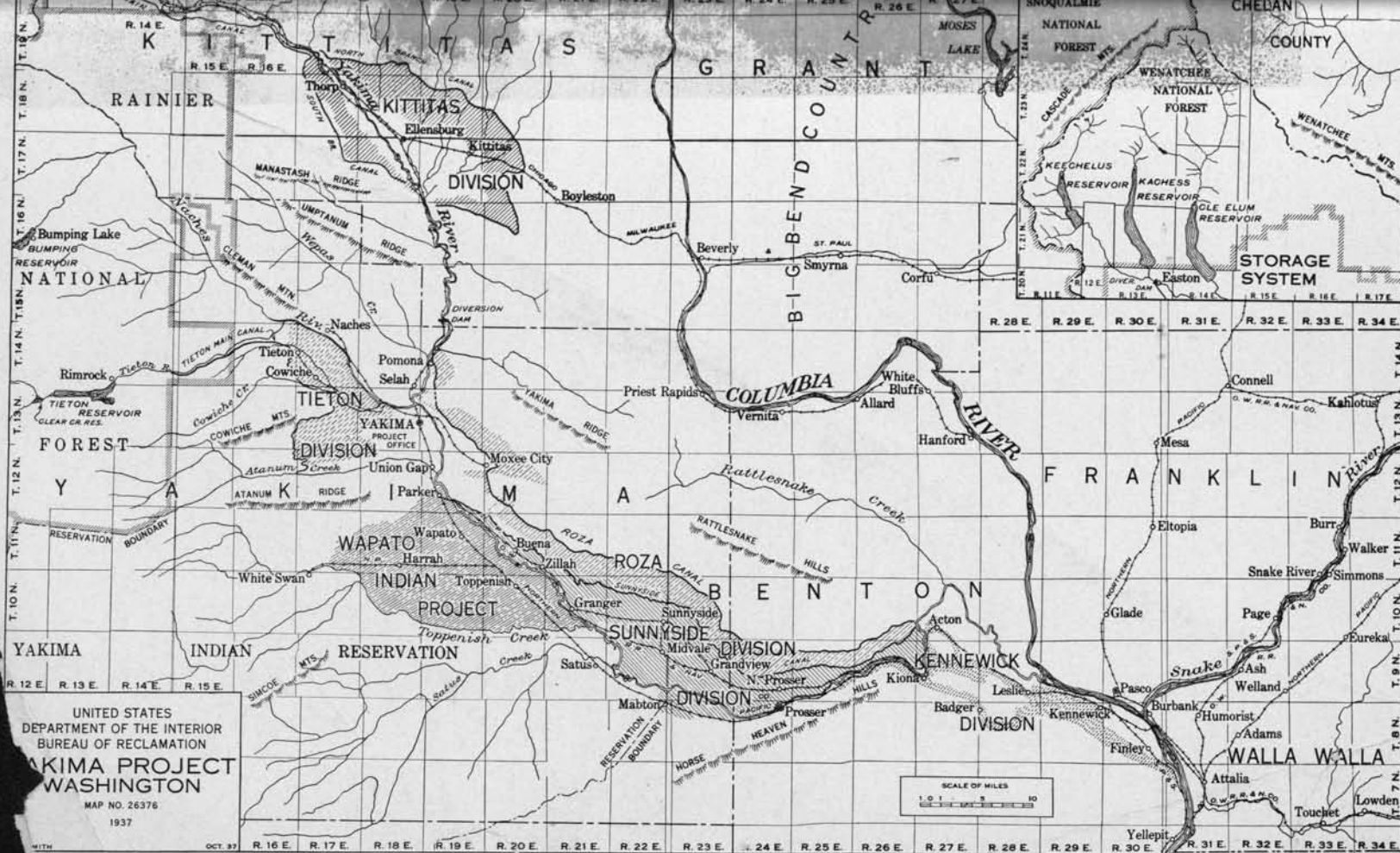
Settlement

	1912	1920	1930	1935	1936	1943
Number of irrigated farms.....	3,316	4,245	5,437	5,529	5,502	5,483
Population on farms.....	8,174	14,243	15,171	17,768	17,488	18,145
Number of towns.....	20	19	23	23	23	24
Population in towns.....	20,000	29,941	43,751	47,515	50,252	56,567
Number of schools.....	38	50	76	78	78	74
Number of banks.....	(^a)	13	15	13	13	9
Number of churches.....	(^a)	33	58	62	62	83

³ Includes value of automobiles, trucks, and tractors.

⁴ Includes total net investment of United States for storage and irrigation works on Yakima project as of June 30, 1937. Above figures do not include value of all city and town property, utilities and industries, or public improvements of any kind.

⁵ Data not obtained.



YAK B220959 RC T147130



3 7238 99055575 0

KITTITAS MAIN CANAL

