PUGET SOUND REGION

WAR AND POST-WAR DEVELOPMENT

MAY 1943

•

PUGET SOUND REGIONAL PLANNING COMMISSION

AND

WASHINGTON STATE PLANNING COUNCIL

in cooperation with

NATIONAL RESOURCES PLANNING BOARD

UNITED STATES GOVERNMENT PRINTING OFFICE - WASHINGTON : 1943

NATIONAL RESOURCES PLANNING BOARD

Frederic A. Delano, *Chairman*
Charles E. Merriam
George F. Yantis

ADVISORS

Henry S. Dennison
Beardsley Ruml

DIRECTOR

Charles W. Eliot

FIELD OFFICE—PACIFIC NORTHWEST

B. H. Kizer, *Chairman*
James E. Maxwell
Arthur D. McVoy
Roy F. Bessey, *Counselor*
Otto W. Croy
T. H. Elliott
Joshua H. Vogel, *Consultant*

Report prepared in cooperation with

Washington State Planning Council

and

Puget Sound Regional Planning Commission

417 Social Science Hall, University of Washington, Seattle

Representing 12 Counties of the State of Washington

Clallam
Jefferson
Mason
Thurston
San Juan
Island
Kitsap
Pierce
Whatcom
Skagit
Snohomish
King

May 1943

FOREWORD

The Puget Sound Region has faced great problems in adjusting to the wartime demands upon the human and natural resources, the facilities, and institutions of the area. In the post-war adjustment equally great problems seem certain to arise. The forward-looking citizens of the region want to understand what they face and to make plans and programs to assure the continued progress and development of the group of counties around Puget Sound.

This report on the War and Post-War Development of the Puget Sound Region was prepared by the people of the area. The Board has assisted in the work through its field office and by providing consulting services of competent advisers.

In the belief that the plans and methods of attack on these problems developed by the Puget Sound Regional Planning Commission may be suggestive and helpful to other congested war areas and regions in making their own post-war plans, the Board authorized the publication of this report.

CHARLES W. ELIOT,
Director.

SEPTEMBER 15, 1943.

PUGET SOUND REGIONAL PLANNING COMMISSION

Chairman

HARRY P. CAIN, Mayor, City of Tacoma

Executive Board

HARRY P. CAIN (Chairman).
LESLIE A. STONE (Secretary), Chairman, Orting City Planning Commission.
JOSHUA H. VOGEL (Executive Secretary), Consulting Engineer, Seattle.
R. V. WELTS (Vice Chairman, Dist. No. 1), Attorney, Mount Vernon.
OTWAY PARDEE (Vice Chairman, Dist. No. 2), Secretary, King County Planning Commission.
HENRY A. BROWN (Vice Chairman, Dist. No. 3), Chairman, Kitsap County Board of Commissioners.

Standing Committees

Basic Data: Chairman, ALFRED L. MILLER, Professor of Mechanics and Structures, University of Washington.
Public Health: Chairman, RICHARD G. TYLER, Professor of Hydraulics and Sanitary Engineering, University of Washington.
Resources: Chairman, H. H. MARTIN, Professor of Geography, University of Washington.
Transportation: Chairman, L. J. WRIGHT, Assistant County Engineer, Skagit County.
Government Organization: Chairman, DONALD H. WEBSTER, Associate Professor of Political Science, University of Washington.
Finance: Chairman, H. O. WALBERG, Civil Engineer, Skagit County.

Executive Secretary

JOSHUA H. VOGEL, Planning Consultant, Seattle

PUGET SOUND REGIONAL PLANNING COMMISSION

417 SOCIAL SCIENCE HALL, UNIVERSITY OF WASHINGTON
SEATTLE, WASH.

May 1, 1943.

WASHINGTON STATE PLANNING COUNCIL,
Olympia, Wash.
NATIONAL RESOURCES PLANNING BOARD,
Washington, D. C.

GENTLEMEN: We are happy to submit herewith a report of the Puget Sound Regional Planning Commission entitled *Puget Sound Region—War and Post-War Development.*

This report summarizes the thinking of a number of representative people of the 12 northwestern Washington counties comprising the Puget Sound region, and reviews their experience with regional problems, together with a summation of their plans and hopes.

We consider this report to be a substantial contribution looking toward the solution of some of the more pressing problems of the region, and hope that it may serve as well as a model and inspiration for other similar regions in their consideration of current and post-war problems.

Therefore, it is our considered opinion that *Puget Sound Region—War and Post-War Development* is worthy of preservation in a more permanent form and for this reason we respectfully request that it be printed under the auspices of the National Resources Planning Board.

Most respectfully yours,

HARRY P. CAIN,
Chairman.

WASHINGTON STATE PLANNING COUNCIL

404 TRANSPORTATION BUILDING
OLYMPIA, WASH.

May 29, 1943.

MR. CHARLES W. ELIOT,
Director, National Resources Planning Board,
Washington, D. C.

DEAR MR. ELIOT: In transmitting this report dealing with war and post-war development in the Puget Sound region it is rather difficult to choose the points to be emphasized. Of possible greatest importance is the demonstration of cooperation of Federal, State, county, city, and other public and private organizations, together with the people of the region. It is not a report that has been written in the "ivory towers;" rather it is the result of down-to-earth joint discussion and study of the various interests involved. Too much emphasis cannot be placed on this type of approval.

With the great upsurge of post-war thinking the report's publication is most opportune. It not only reviews the basis of the Puget Sound region's economy but points to new opportunities for expansion within its natural resource base. Long recognized as an area offering the maximum of enjoyable living, the report points out means for the expansion of services and facilities for the further well-being of the region's people.

The assistance, financial and advisory, of your board is most appreciated and here acknowledged. Your regional office in Portland, under the able leadership of Roy F. Bessey, produced the majority of the maps and was of constant assistance. Without the services of Joshua H. Vogel, whom your board assigned as consultant on this task, it is doubtful if the report could have been completed in the limited time and with the excellent results as above mentioned.

We commend the report, its procedures, findings and recommendations through you to national, State, county and city authorities and to the people of the region.

Very sincerely yours,

B. H. KIZER,
Chairman.

ACKNOWLEDGMENTS

This report could not have been written without unstinting assistance and cooperation from a large number of individuals and agencies in the Puget Sound region.

For assistance in addition to that for which recognition is given in the various chapters and section headings, the Puget Sound Regional Planning Commission gratefully acknowledges the contributions in work, counsel, and advice of the following:

State of Washington Agencies.—Washington State Planning Council, Department of Public Health, Department of Education, Department of Conservation and Development, Department of Highways, Department of Fisheries, and State Parks Committee.

University of Washington.—Prof. H. H. Martin of the Geography Department, Prof. N. H. Engle of the Bureau of Business Research, Prof. Gordon Marckworth of the College of Forestry, Profs. Jesse F. Steiner and Calvin F. Schmid of the Department of Sociology, and Prof. Richard G. Tyler of the College of Engineering.

College of Puget Sound.—Dr. Paul R. Fossum, Department of Economics, and Dr. Marvin R. Schafer, Department of Sociology.

Washington State College.—Prof. Ben H. Pubols, College of Agriculture, Department of Farm Management and Agricultural Economics.

Federal Agencies.—United States Geological Survey, National Park Service, Bonneville Power Administration, United States Engineers, United States Forest Service, Civil Aeronautics Administration, United States Employment Service, National Housing Agency, Soil Conservation Service, and National Resources Planning Board.

And The Association of Washington Cities, the City Light Departments of Seattle and Tacoma, the Puget Sound Power and Light Co., and Jesse Epstein and Allen R. Potter of the Housing Authority of Seattle.

The National Resources Planning Board provided technical assistance in the final preparation of the report. Thanks are due to James E. Maxwell for economic research, to Otto W. Croy for public works financial analysis, to T. H. Elliott, J. H. Post, and Arthur D. McVoy for preparing maps, to George Sundborg and Florence E. Wolfe for editing the manuscript and, most particularly, to Joshua H. Vogel for shouldering the main task of organizing and directing the work from which this report has resulted.

Drs. Fossum and Schafer have requested that the following acknowledgments be made pertaining to their sections of this report and also to the Tacoma progressive urban plan, which was developed with the cooperation of the National Resources Planning Board:

College of Puget Sound.—Dr. Charles Battin and Ellery Capen of the Department of Economics, Dr. Frank Williston and Dr. L. S. Shelmidine (now lieutenant, United States Navy) of the Department of Political Science, Prof. F. A. McMillin of the Department of Geology, Prof. James R. Slater of the Department of Biology, Prof. Arthur Frederick of the Department of Religious Education, Librarian Warren L. Perry (now lieutenant, United States Army; Miss Helen Lewis, Acting Librarian, is functioning in his place on the Tacoma project), Dr. R. L. Powell (lieutenant, United States Army) and Mr. Gibbs of the Department of Education, Prof. R. D. Sprenger of the Department of Chemistry, President Emeritus Dr. Edward H. Todd and President Dr. R. Franklin Thompson.

Other Tacomans.—Chairman S. J. Maxwell and Lee Merrill (lieutenant junior grade, United States Navy) of the City Planning Commission, J. M. Grey of the Weyerhaeuser Sales Corporation, Frank Walsh, of the Chamber of Commerce, V. B. Jones of Tacoma City Light, George Osgood of the Port Commission, W. W. Durham of the City Schools, Carl D. Forsbeck, City Engineer, and the entire Metropolitan Park Board.

PUGET SOUND REGION, WAR AND POST-WAR DEVELOPMENT

CONTENTS

	Page
I. Introduction: Purpose and General Problems	1
II. The Region and Its Present Status	7
1. The Puget Sound Region	9
Geographical Description	9
Climate	11
Geographical Relationships	14
Resource Base and Human Activities	14
2. Population	16
A. Growth and Distribution	16
Influence of World Position	16
Location of Early Settlements	16
Pioneer Pattern of Settlement	16
Distribution Map of 1900	17
Map of 1910	17
Maps of 1920 and 1930	17
1940 Pattern	17
The Pattern Today	17
Forecast of Future Pattern	23
B. Composition and Trends	23
Distribution and Trends	23
Composition	25
3. The Regional Economy in General	31
The Region's Major Economic Functions	31
Regional Maturity	31
General Economic Relationships	31
III. Current and Anticipated Problems and General Plans to Meet Them	33
1. Agriculture and Agricultural Land Use	34
Extent and Nature of Agriculture	34
Agricultural Land Use	34
Agricultural Enterprises and Types of Farming	39
Agricultural Income	39
Agricultural Capital	39
Land Ownership	39
Relationship of Agriculture to Other Economies	40
Land Use and Conservation	40
Potential Cropland Expansion and Development	41
New Farm Possibilities	44
Probable Types and Sizes of Farms	44
Classification and Cost of Proposals	44
War and Post-War Problems	45
2. Mineral Resources	46
The Mining Industry	46
Potential Resources	46
Coal	46
Location of Deposits	47
3. Forests and Forest Land Use	52
Present Status of Forest Resources	52
Forest Protection	52
Rehabilitation	55
Industrial Plans	55
Program	55

	Page
III. Current and Anticipated Problems and General Plans to Meet Them—Continued	
4. Water Resources	58
Water Supplies	58
Flood Control	59
Navigation	61
Power Resources	64
Sewage and Stream Pollution	69
Fisheries	75
Irrigation	78
Recreation	80
Consolidated Plan for Water Resources	80
5. Industry	83
Manufacturing	83
Lumbering	85
Paper and Wood Pulp	85
Agriculture	88
Mining	88
Fishing	89
6. Commerce	90
A. Pattern of Commercial Activity	90
Retail Trade	90
Service Establishments	90
Wholesale Trade	90
B. The Trade Position of the Region	93
Inshipments and Outshipments	93
Composition of the Trade	93
Trade with Alaska	95
7. Transportation and Communication	96
Highways	96
Description of Proposed Projects	98
City Traffic Projects	99
Financing and Coordination	101
Railroads	101
Ports and Terminals	101
Air Transportation	101
Communications	107
Conclusions	107
8. Urban Problems	108
A. Communities and Facilities	108
Puget Sound Pattern of Communities	108
Effect of War	108
Program and Activities	109
B. A Progressive Plan: The Tacoma Project	110
Problem and Objective	110
Elements of the Plan	110
Results	111
9. Housing	113
Status of Housing	113
Post-War Implications	113
10. Recreational Facilities	116
Recreation in National Forests	116
State-owned Recreational Areas	119
County-owned Recreational Areas	119

Page

III. Current and Anticipated Problems and General Plans to Meet Them—Continued
10. Recreational Facilities—Continued
Metropolitan and Municipal Nonurban Parks 119
Semipublic, Private and Commercial Areas 119
Wildlife Resources 120
Winter Sports Facilities 120
Water Recreational Opportunities 120
Other Sports 121
Potential Areas 121
Parkways and Scenic Highways 121
Urban Facilities 122
Library Facilities 122
Conclusions 122
11. Medical and Public Health Services 125
Distribution 125
Physicians 125
Nurses 127
Hospitals 127
Dentists 127
Public Health Personnel 127
Medical Insurance 128
12. Education 129
The Reorganization of School Districts 129
Summary of Planning Council's Findings 129
Progress 130
Results of School District Reorganization 130
Building Construction 130
13. Analysis of War and Post-War Population Needs 132
Complementary Regions 132
Power Resources 132
Food 133
Industrial Opportunities 135
Conclusions 135

Page

IV. Direction of Post-War Readjustments, Reconstruction and Development 137
1. Review of Major Economic Functions 139
Light Metals 139
Heavy Industry 139
Forest Resources 139
Markets 139
Transportation 140
2. Summary of Post-War Problems of the Puget Sound Region 141
Statement of the Problem 141
Suggested Solutions 143
Public Works 146
Conclusion 147
3. Public and Private Construction and Improvement Programs 151
Planning 151
Projects 152
Recommendations 153
Conclusions 153
V. Conclusions 155
A. Summary of Recommendations 157
The Puget Sound Region 157
The Current Situation 157
General Plans 157
Land and Agriculture 157
Minerals 158
Forests 158
Water Resources 158
Industry and Commerce 159
Transportation 159
Communities and Facilities 159
Housing 159
Recreation 159
Medical and Public Health Services 159
Education 159
B. What Is To Be Done? 159

PART I

INTRODUCTION: PURPOSE AND GENERAL PROBLEMS

By P. Hetherton

PART I

INTRODUCTION: PURPOSE AND GENERAL PROBLEMS

By P. Hetherton [1]

The Puget Sound region, composed of the 12 counties bordering the indented shores of the island-filled salt waters of that name (see fig. 1) has experienced the impact of war to about as great an extent as has any other similar area in the United States. Not only is it producing ships, planes, light metals, chemicals, alloys, food, forest products, and clothing, but also it contains many military establishments and ports of embarkation for men and supplies to Alaska and the Pacific war arenas. Within the area is the Puget Sound Navy Yard equipped to build and repair the largest of naval vessels.

As the country's might becomes concentrated against Japan this region, with other Pacific coast points, will increase greatly in relative importance, magnifying further the difficulties of war and post-war readjustments.

Early recognizing the growing problem of this area where more than 60 percent of the State's population is now found, the National Resources Planning Board suggested to the Washington State Planning Council the formation of a regional planning commission and later proposed the use of that organization to examine war and post-war problems and to produce a preliminary statement.

The following report is the result. It will be noted that it is composed of the viewpoints of various specialists and it should not be considered as a final word on the various problems. The body responsible for its issuance will revise it periodically, presenting the revisions to the various legislative bodies of cities, counties, port authorities, public utility districts, etc., representatives of which are members of the Puget Sound Regional Planning Commission. The Commission, itself, has no administrative or executive functions.

The experience gained, the methods adopted, the public relations formed, and the use of existing organizations to assist in the investigations all may serve other communities facing similar situations and form a base for further refinement of plans in this area.

Perceiving the value of this study as an important contribution to its State-wide consideration of war's effect on the economy, the State Planning Council, aided materially by the Pacific Northwest Regional Planning Commission through the National Resources Planning Board, rendered every assistance and encouragement.

The general problem facing the area is conversion of its war-expanded facilities to peace uses and, through private enterprise, aided by State, county, and municipal governments, the maintenance of employment opportunities for all seeking employment. From a region depending too much upon semimanufactured forest products it has been converted to one now producing, in addition, intricate machines of war. While its forests as sources of saw logs are greatly depleted, a stronger and more diversified economic base may be built on the products of its forest lands through the application of war-accelerated uses of veneer, cellulose, lignin, and synthetic resins. Pig aluminum and magnesium plants whose output now goes largely to planes may supply the raw material for countless peacetime uses in all modes of transportation, farm, road, and miscellaneous machinery, structures, and appliances. The skills and equipment created to build ships may well be continued to be applied to the construction of vessels better adapted to meet a revived international trade through the region's own ports. But the region must, before war's end, possess pig iron producing facilities to meet its needs for plates, shapes, and alloy steels. The advances made in the growing and preserving of farm products for lend-lease and for war should open new peacetime markets. Washington's ability to reach distant markets in the States and in foreign lands has been based largely on the production of quality products—apples, eggs, lumber, pulp, and canned goods. Still greater emphasis should be placed on this practice. The area's recreational facilities, neglected during the war, will again provide enjoyment and relaxation to its people and attract a growing share of the nation's tourist dollar.

In the solution of the problem of maintaining employment, the conservation and upbuilding of our natural resources should play an important part so that the region's outstanding values may continue to be the base for its economic development and for the enjoy-

[1] Executive Officer, Washington State Planning Council.

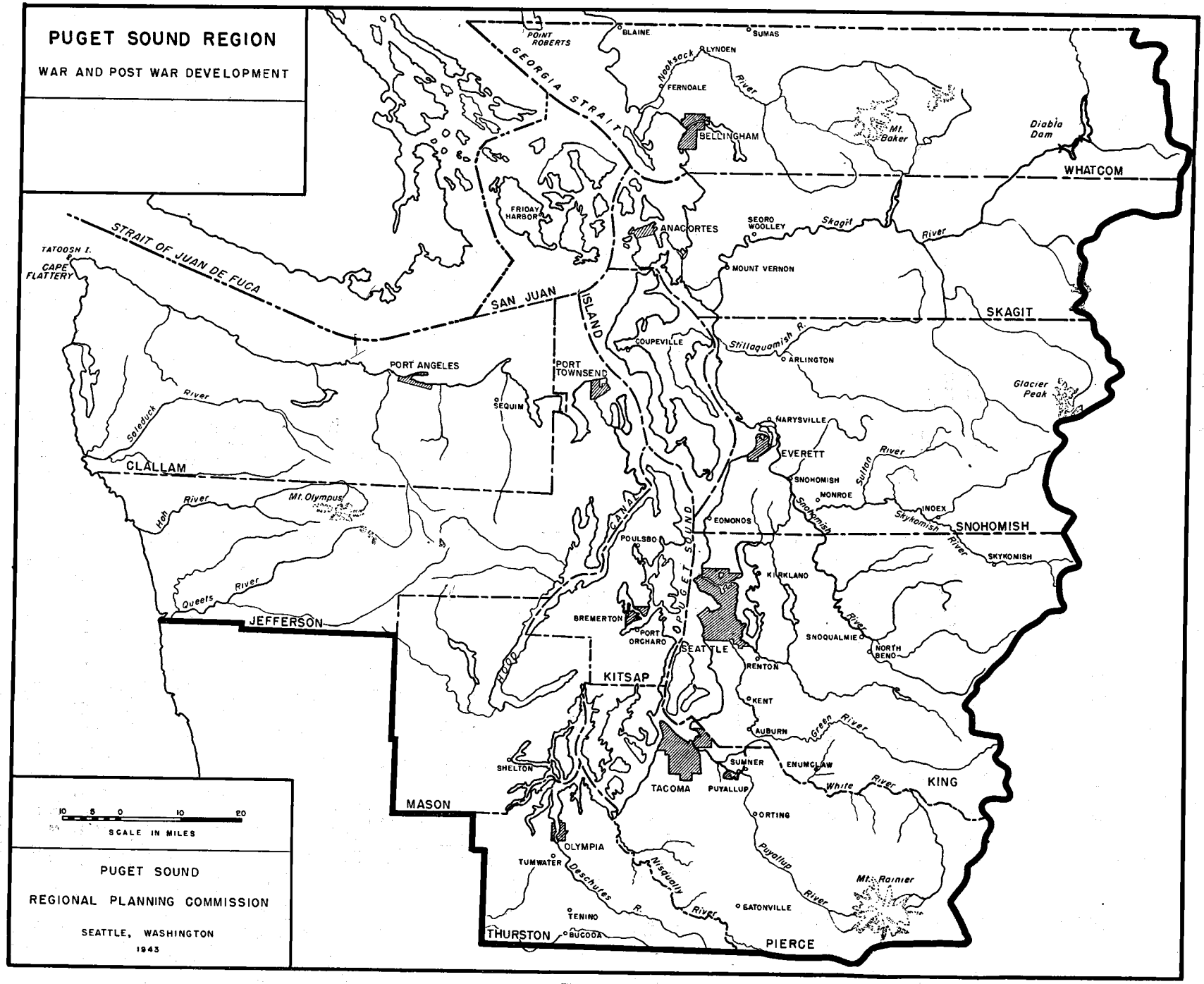

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
Nooksack River
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
TATOOSH I.
CAPE FLATTERY
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
Glacier Peak
Soleduck River
MARYSVILLE
EVERETT
Sultan River
CLALLAM
SNOHOMISH
MONROE
INDEX
Hoh River
Mt. Olympus
EDMONDS
Snohomish
Skykomish River
POULSBO
SKYKOMISH
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
Snoqualmie River
NORTH BEND
RENTON
HOOD CANAL
PUGET SOUND
KITSAP
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
KING
SHELTON
TACOMA
PUYALLUP
ORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
TENINO
EATONVILLE
THURSTON
BUCODA
PIERCE
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 1.

ment of its people. While its settlement is of relatively recent origin, much has to be done in the physical reconstruction of its cities and public facilities if the region is fully to adapt itself to its new estate, to its new position in national and world affairs following the war. With proper forethought the region may continue to offer greater opportunities for its people to work and to enjoy life to the fullest.

The advantages of abundant low-cost firm electric energy, of a strategic position in the world's air and sea routes, of proximity to resources of farm and forest, mines and water, of location in the center of a vast region awaiting development—the Pacific Northwest, British Columbia, Yukon Territory, and Alaska—cannot be taken from the area. Its future rests on the energy, forethought, and united efforts of its people.

PART II

THE REGION AND ITS PRESENT STATUS

	Page
1. The Puget Sound Region—By William H. Pierson	9
2. Population	16
A. Growth and Distribution—By Carl H. Mapes	16
B. Composition and Trends—By Max Moss	23
3. The Regional Economy in General—By N. H. Engle	31

PART II

1. THE PUGET SOUND REGION

By William H. Pierson [1]

Geographical Description

The 12 counties that comprise the Puget Sound region (see fig. 1) all front upon the inland salt waters of northwestern Washington. The 16,500-square-mile area dealt with in this report is functionally, though not all topographically, a part of the Puget Sound lowlands. Lowlands are characteristically seats of compact populations and centers of commerce and industry toward which focus the human activities of adjacent mountainous areas. This holds true in the Puget Sound region. Despite varied relief, the region has a common environment, economic and cultural unity, and common problems and prospects for progressive development.

The region extends westward from the crest of the Cascade Mountains to encompass all the counties bordering on Puget Sound, as well as the greater part of the Olympic Peninsula. The international boundary, on land and through the Gulf of Georgia and Strait of Juan de Fuca, separates the region from friendly foreign soil. The drainage divide of the Cascade Mountains from Canada to the south line of Pierce County forms a natural regional boundary on the east. On the south and southwest the boundary is drawn along county lines, descending westward from the Cascades to cross the Puget Sound trough, and thence jogging northward and westward to the Pacific Ocean. This south and southwest boundary separates with approximate accuracy, from the areas that face the Columbia River and Grays Harbor urban centers, the territory that focuses its local trade and civic interest upon Puget Sound cities. The region is, therefore, a human activity subregion of western Washington, blocked out roughly along political boundaries which conform approximately to natural topographic and drainage features. (See fig. 2.) It is the near hinterland of Puget Sound, a small part of the still greater hinterland of the entire Northwest, for which Puget Sound cities function as seaports, market and distribution centers, and cultural focuses.

Within the region are three major topographic units, each trending north to south. The westernmost unit is the Olympic mountain range which occupies the larger part of the Olympic Peninsula. This high and scenic mountain mass has as its main axis a series of northwest-southeast trending folds. It is largely constructed of sedimentary rocks of Tertiary age and of volcanics, thrust upward by folding and faulting, upon which glaciation and subaerial erosion have acted to produce a spectacularly rugged range of Alpine characteristics. So difficult is the terrain that the innermost parts are seldom penetrated.

The easternmost topographic unit of the region is the Cascade Range, the crest of which delimits the region on the east. In the Cascades, mountain tops average about 6,000 feet in altitude and have a uniformity of height which, together with the other indications of their origins, suggests that the range is essentially a high plateau that has undergone mature dissection. The upland has been sculptured into a rugged and precipitous range having relative relief of about 4,000 feet.

Westward-flowing streams, carrying the heavy runoff from a copious rainfall and aided by glaciers, have cut deeply into the west flank of the range to make numerous valleys which penetrate at low levels far back into the mountains. These valleys provide routes of ingress and in some instances elongated strips of alluvial agricultural lands. Valleys are separated by steep-sided mountain spurs, the west ends of which rise abruptly out of the Puget Sound lowland.

Upon the Cascade Range is superimposed a string of volcanic peaks that rise spectacularly above the general crest level. Mount Baker, elevation 10,750 feet, is near the Canadian boundary; Glacier Peak, elevation 10,436 feet, rises far back in the range in eastern Snohomish County; and Mount Rainier, elevation 14,408 feet, stands in the southeast corner of the region. Mount Baker is quiescent rather than extinct, but has been inactive for a period longer than Indian legends penetrate the past. Both Mount Baker and Mount Rainier are visible in clear weather from most of the Puget Sound lowland. The difficult and continuous barrier which the Cascade Mountains impose between Puget Sound and its interior hinterland has been surmounted at great cost by three highways

[1] Department of Geography, University of Washington.

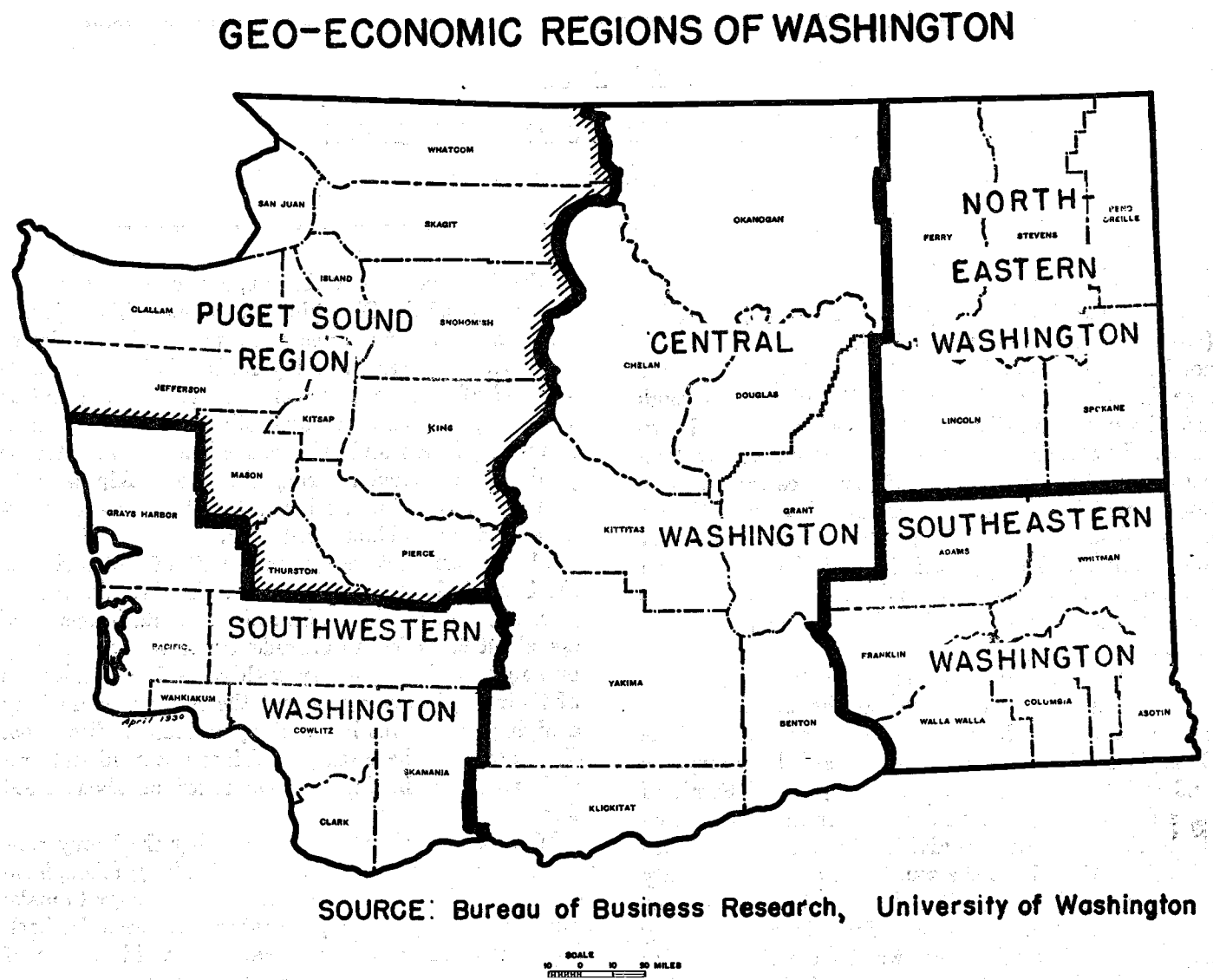


FIGURE 2.

and three railroads. It has major significance also as a climatic barrier and because of its effects upon water supply in both western and eastern Washington.

The central unit of the region is the Puget Sound trough or lowland. Its north-to-south extent of about 350 miles reaches beyond the limits of the region proper. The trough is approximately 50 miles wide. The altitude of the floor is nearly everywhere below 500 feet and the lowest portions are flooded to form the Puget Sound arm of the sea.

During the last two glacial periods a tongue of the great Cordilleran ice sheet pushed southward out of Canada to excavate Puget Sound and spread glacial detritus over the lowland as far south as the drainage divide between the Sound and the Chehalis River, thus glaciating most of the lowland. Simultaneously valley glaciers from the Olympics and Cascades deepened the lateral valleys descending to the lowlands and added their work to that of the main Cordilleran ice mass. The last glacial period produced minor modifications in the already heavily glaciated topography of the region.

The Puget Sound lowlands are a decidedly uneven plain blanketed with glacial materials, most of which are gravelly and have weathered under heavy rainfall and forest cover into soils of poor fertility. Some of the larger morainic accumulations constitute large hills which give the lowland floor marked relative relief. The glaciated surface is at frequent intervals interrupted by the alluvium floored valleys of rivers which cross the lowlands laterally in their descent from the mountains to the sea. These highly fertile alluvial valleys contain most of the good agricultural lands of the region. Where level enough for cultivation, the morainic intervalley sections are of inferior fertility, being both stony and excessively leached. The larger

stream valleys are found on the east side of Puget Sound where the expanse of lowland is in general some miles in width. Each east shore county contains one or more of these rich agricultural valleys within which its population centers, while county boundaries often follow the intervening mountain spurs that form natural divides between population groups.

The topography of the region focuses communication and transportation lines upon Puget Sound. The lateral stream valleys which penetrate far into both mountain masses tie their life to that of the main lowland where north-south land travel is easy along the shores of the sound. A narrow but easily traversed coastal fringe encircles the Olympic Mountains to link the activities of the peninsula to the heart of the region. Puget Sound itself is a magnificent water highway blessed with secure deep-water harbors at frequent intervals, rendering it ideal for use by the largest ocean vessels.

Climate

The temperate marine or west coast middle latitude climate of the region is essentially the counterpart of the climate of the British Isles and results from similar causative factors. Basic controls of the Puget Sound climate are: upper middle latitude position facing an ocean to the west from which prevailingly westerly winds almost continuously bring in damp air and mild temperatures; and the Cascade mountain barrier which blocks out the dry air and temperature extremes of the continental interior. As with the British Isles, a warm ocean drift raises the temperature of the waters along the coast by a few degrees, making the Puget Sound climate somewhat more humid and mild than it would be from other causes.

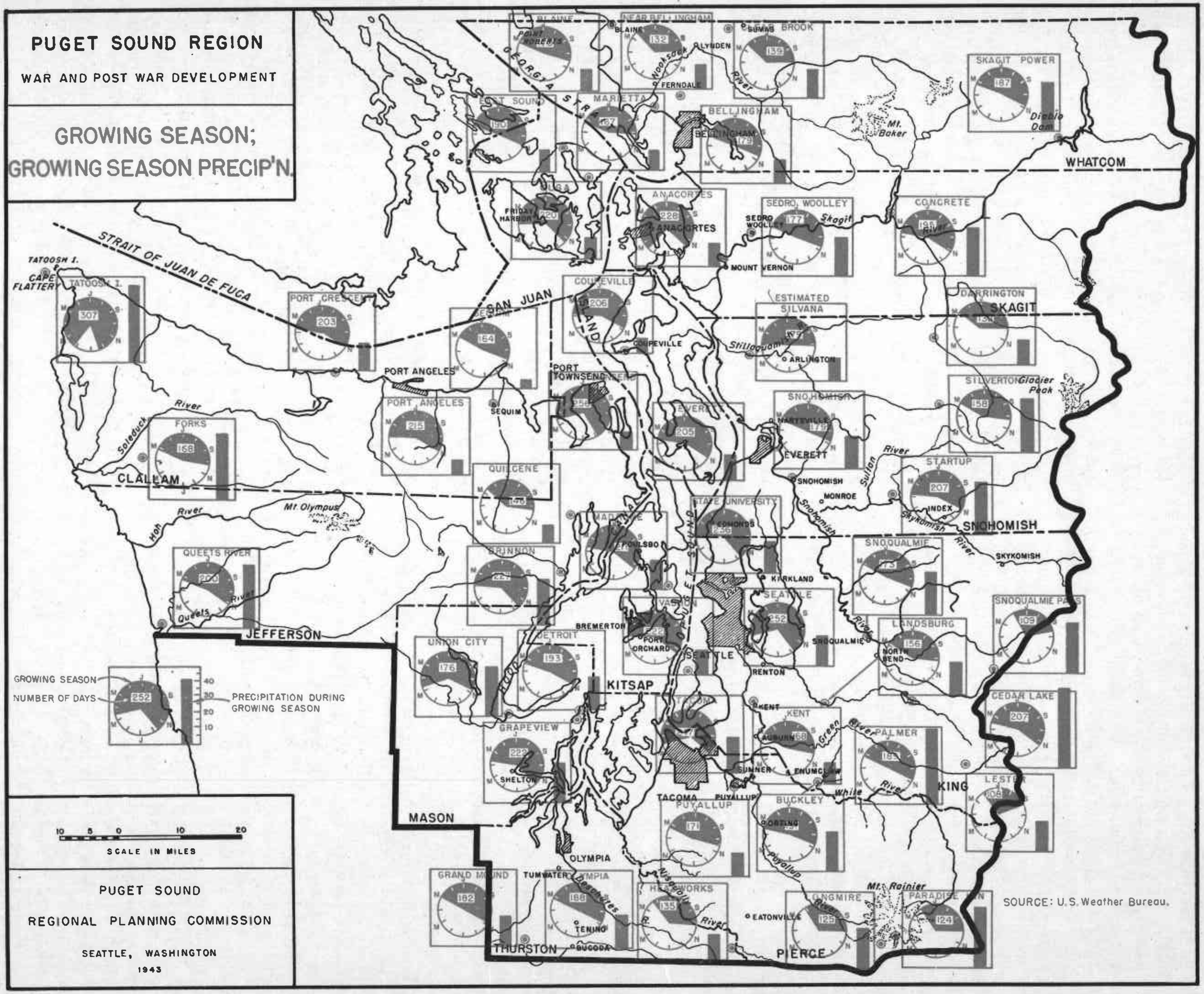
The most striking climatic characteristic is mild temperature despite high latitude position. Yearly mean temperatures vary but little over the region, being everywhere between 48° and 52° F. Winter temperatures at low altitudes everywhere average well above freezing. They are mildest on the Pacific littoral, where the moderating effect of ocean winds is greatest, averaging 42° in the coldest month (January). The Puget Sound lowland has slightly colder winters because it is farther removed from the ocean, but here all places have January means between 35° and 40°. During an average winter, cold air from the continental interior spills over the Cascade mountain wall five to seven times to bring the region its only severely cold weather. The lowest temperature ever recorded at Seattle was 3° above zero, and only the north end of the region has experienced sub-zero weather near tidewater. Here the Fraser River valley admits cold air from the interior more freely so that cold snaps are more frequent. Bellingham has had weather as cold as 4° below zero. In contrast, Yakima and Spokane on the other side of the Cascades, have experienced temperatures of 24° and 30° below zero respectively, due chiefly to continental location and secondarily to higher altitudes.

The region's summer season is long and cool, punctuated by occasional sultry days when temperatures climb into the high eighties or nineties. The highest temperature ever recorded at Seattle was 102° F. The frost-free season (see fig. 3) varies from 9 or 10 months along the ocean shore to just under 6 months at Bellingham, near the Fraser Valley gap. Seattle has an average of 251 days continuously frost-free. This is a longer growing season than that of Atlanta, Ga.

Amount of precipitation varies markedly with altitude and exposure. (See fig. 4.) At low altitudes the Pacific coast receives between 90 and 130 inches annually, while the higher windward slopes of the Olympics receive an estimated 250 inches or more. This southwest slope of the Olympics is the wettest area within continental United States. The Puget Sound lowland, being farther removed from the ocean and to leeward of the coastal mountains, receives between 30 and 52 inches. Tacoma receives 40, Seattle 33, and Bellingham 31 inches. Sequim, on the Olympic Peninsula, lying northeast of the highest Olympics, receives as little as 14 inches, and the adjacent area, including much of Whidby Island, less than 25 inches because of the rain shadow cast by the high Olympics. The west slope of the Cascades receives, like the Olympics, extremely heavy precipitation, the general average being about 100 inches on the higher elevations.

Everywhere in the lowlands snowfall is moderate, averaging only 5 inches on the Pacific shore and about 11 inches near Puget Sound. Here temperatures are rarely low enough to permit precipitation in the form of snow. At higher altitudes conditions are reversed and the Olympics and Cascades are among the snowiest parts of the continent. Annual snowfall at Snoqualmie Pass (altitude 3,000 feet) is 398 inches, at Mount Baker Lodge (4,200 feet), 477 inches, and at Paradise Inn (5,550 feet), 591 inches.

All the Puget Sound region, as is true of all western Washington and Oregon, has a marked seasonal distribution of precipitation. (See fig. 4.) Autumn, winter and early spring are decidedly rainy with persistent cloudiness and high relative humidity, while from May through August rainfall is scant. About 66 percent of all precipitation is received between October 1 and March 31, with the maximum occurring in late November or December. The driest month is July. Tacoma, with 6.54 inches in December and only 0.58 inch in July, is typical. The carry-over of winter moisture in the soils, and the low evaporation rate resulting from mild temperatures during the summer prevent the



PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
GROWING SEASON;
GROWING SEASON PRECIP'N.
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
SAN JUAN
WHATCOM
SKAGIT
SNOHOMISH
CLALLAM
JEFFERSON
KITSAP
KING
MASON
THURSTON
PIERCE
GROWING SEASON
NUMBER OF DAYS
PRECIPITATION DURING
GROWING SEASON
SCALE IN MILES
SOURCE: U.S. Weather Bureau.
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 3.

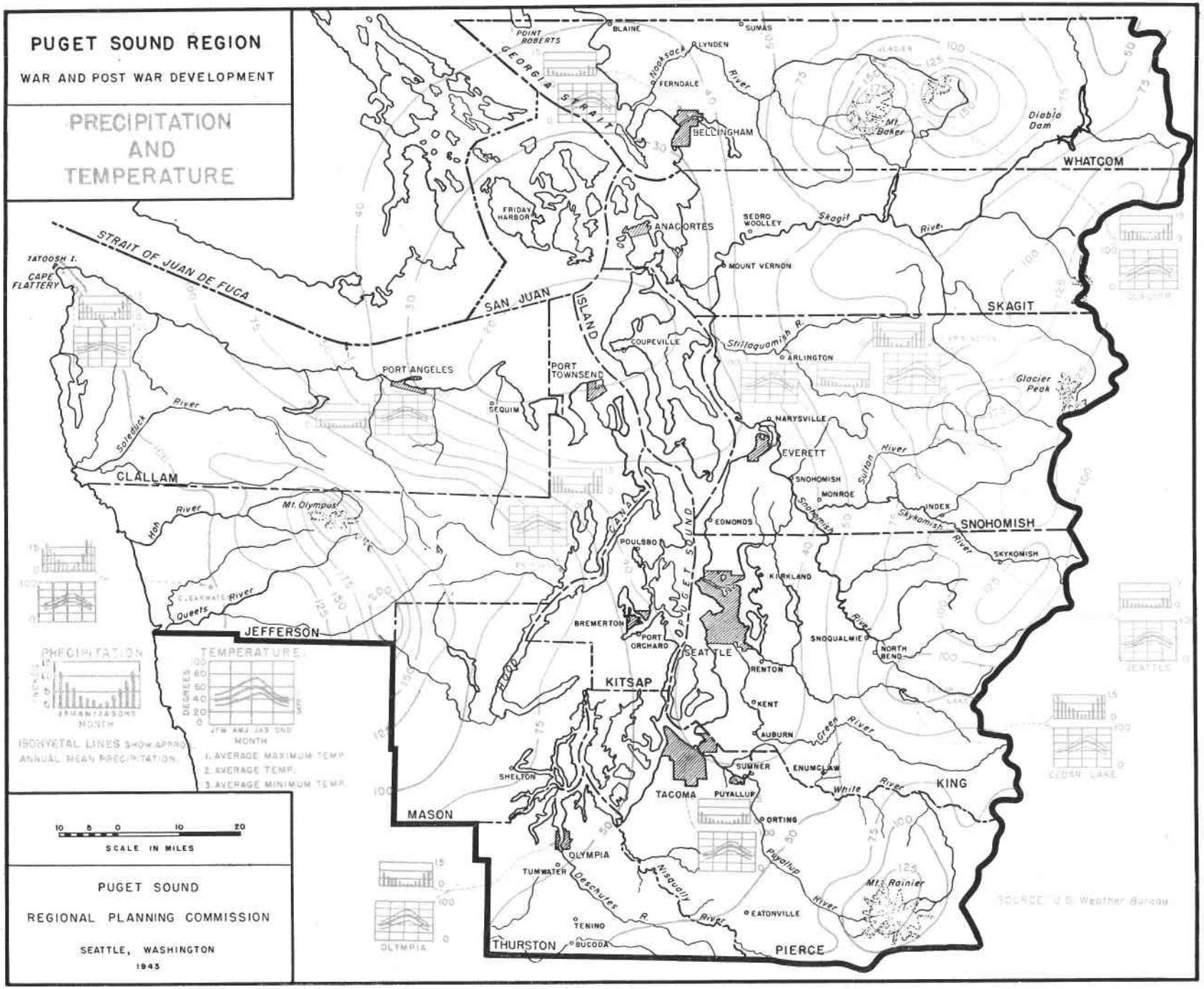

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
PRECIPITATION AND TEMPERATURE
PUGET SOUND REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SCALE IN MILES
ISOHYETAL LINES SHOW APPROX. ANNUAL MEAN PRECIPITATION.
1. AVERAGE MAXIMUM TEMP.
2. AVERAGE TEMP.
3. AVERAGE MINIMUM TEMP.
SOURCE U.S. Weather Bureau
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
PUGET SOUND
CANAL
LAKE WASHINGTON
BELLINGHAM
FERNDALE
BLAINE
SUMAS
LYNDEN
POINT ROBERTS
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
MOUNT VERNON
COUPEVILLE
ARLINGTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
TATOOSH I.
CAPE FLATTERY
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
SNOQUALMIE
NORTH BEND
SKYKOMISH
INDEX
KENT
AUBURN
SUMNER
ENUMCLAW
TACOMA
PUYALLUP
ORTING
SHELTON
OLYMPIA
TUMWATER
TENINO
BUCODA
EATONVILLE
Mt. Baker
Diablo Dam
Glacier Peak
Mt. Olympus
Mt. Rainier
Nooksack River
Skagit River
Stillaguamish R.
Sultan River
Snohomish River
Skykomish River
Snoqualmie River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Soleduck River
Hoh River
Queets
Clearwater River
PRECIPITATION
INCHES
TEMPERATURE
DEGREES
MONTH
OLYMPIA

FIGURE 4.

region from being arid during the growing season. (See fig. 3.) Crop failures from drought are unknown and yields are quite consistent from year to year, but it is believed that the adoption of supplemental irrigation would measurably enhance crop yields.

Geographical Relationships

The location of the region is highly significant both as an asset and a liability.

Within both the State of Washington and the Pacific Northwest as a whole the Puget Sound cities share with Portland and Spokane the functions of metropolises. Puget Sound cities function as seaports, financial centers, market outlets and commodity distribution centers. In addition, a major portion of the Pacific Northwest's manufacturing is done on the shores of Puget Sound.

The location of the region in the far northwest corner of the United States results in high railroad transportation costs upon commodities brought from or sold to the populous eastern part of the country. Distance from the eastern markets and the sparseness of population within the interior western States are handicaps to be overcome as the Puget Sound region and the Pacific Northwest expand their industrial activities along the lines of products intended for distribution in the markets of the Nation. The long rail haul is, however, partially offset by favorable water rates, and in this respect the region enjoys a distinct advantage over competing inland cities.

Because of its strategic northwest position, Puget Sound is the natural gateway to Alaska. As the present small population of Alaska increases and its huge mineral, timber and agricultural resources are developed, the value of this position will be even more enhanced. At present the bulk of the Alaskan fish catch is marketed through Puget Sound ports and a substantial amount of general trade flows between Alaska and Puget Sound.

Seattle, Tacoma, and Everett are some hundreds of miles nearer the ports of Japan, Manchuria, and China than the competing Pacific coast ports, vessels from which must pass near the northwest coast of Washington in following the Great Circle route. The port cities of Puget Sound should share fully in the expected increase of trade between the Pacific coast ports of the United States and the Far East.

Much seaborne commerce in lumber, fruit and fish moves between the Puget Sound region and western Europe by way of the Panama Canal. Although distances are much greater than between the Atlantic seaboard and Europe, the cheapness of water haulage makes this trade feasible and profitable.

Resource Base and Human Activities [2]

In the fertile alluvial valleys of the region an intensive and highly diversified agriculture has developed in which dairying, poultry, cash grains, small fruits and vegetables are important farm industries. (See Part III, Section 1, Agriculture and Agricultural Land Use and figs. 17–21.) While dairying and poultry are general throughout the region, there is a marked tendency for each locality to specialize in some one crop or combination of farm activities. In addition to local specializations featuring the farm industries mentioned above, there are notable concentrations of bulb growing and field and garden seed production.

Intensification is surprisingly great for a region in which agriculture is so new. This results from a combination of environmental factors. The high cost and much labor entailed in brush clearing and stump removal, which exceeds the value of good raw logged-off land, has kept cultivation by individuals confined to small acreages. Soil and climate combine to favor crops which require the application of much labor to small acreages and are best utilized by dairying and poultry keeping. Furthermore, the specialty crops of the region—berries and small fruits, potatoes, vegetables, seeds and bulbs—all require intensified use of land.

The acreage of land in farms has become nearly static, as virtually all the alluvial lands and much of the better moraine lands have passed into farm holdings. (See figs. 17 and 18.) There is an unusual amount of part-time farming within the region, especially upon moraine lands. It often consists merely of a bit of pasture and meadow kept for a cow or two, a garden and a small poultry flock maintained principally for home use by persons employed in logging or urban industries.

Except for the highest peaks and a very few minor prairies, the region was covered by a magnificent forest of Douglas fir, cedar, spruce, and hemlock. (See Part III, Section 3, Forests and Forest Land Use and figs. 25 and 26.) Logging is the region's oldest industry and, together with sawmilling and the manufacturing of wood products, constitutes its most important activity. Until very recently timber was exploited without thought for the permanency of the industry. Forests have been stripped from virtually all the more accessible lowlands and many mountain slopes. The attainment of sustained-yield forest utilization is

[2] Because the resources, industry and commerce of the region are discussed in detail in various other sections of this report, the over-all summary given here is somewhat more brief than would be expected in a geographical article intended to stand alone. References are given to text and figures where a more complete treatment of the various subjects may be found.

essential if the region is to avoid serious economic dislocations.

Coal, sand, and gravel are at present the most important minerals forming the basis of industries in the region. (See Part III, Section 2, Mineral Resources and figs. 22 and 23.) Owing to glaciation, all parts of the region are amply endowed with sand and gravel. Coal deposits flank the west base of the Cascades and are mined in Pierce, King, and Whatcom Counties. Coal reserves in or accessible to western Washington, while small in comparison with Appalachian fields, are estimated to be ample for several centuries at the present rate of exploitation. Local coals vary widely in quality, the bulk being medium grade bituminous, of which large quantities are suitable for coking.

A number of mineralized areas containing a wide variety of metallic ores—iron, copper, manganese, chrome, lead, gold, silver—are known in the Cascades and Olympics, and several mines are operating within the region. (See fig. 23.) Development of the mineral wealth has been retarded by several environmental factors. The mountain topography is extremely rugged, making the construction of transport facilities costly. Prospecting is difficult because of dense forests which blanket all but the highest crags. (See fig. 24.) Forests are wet from the persistent rainfall or deep in snow during more than half of the year. Furthermore, the forests hold in place a veneer of soil and forest litter which conceals surface mineral indications.

Rugged mountains in combination with copious precipitation make the region rich in water resources. (See Part III, Section 4, Water Resources and figs. 26–38.) The total run-off from the mountains is huge and admirably uniform at all seasons as the result of several environmental factors. The precipitation comes as slow cyclonic rainfall which is well absorbed and favors regularity of stream flow. Deep snow and glaciers in the mountains help to maintain summer stream flow. The heavy forests exert, of course, a major regulatory effect at all seasons.

Thus endowed, the region has enormously valuable water power resources, of which only a small part has been utilized (see figs. 29–33), and abundant water for all industrial and human consumption needs (see fig. 26).

Newness of settlement, preoccupation with forest exploitation and remoteness from large markets account for the present modest development of manufacturing in the Pacific Northwest. The bulk of the Northwest's industry, however, is located west of the Cascades where it centers on Puget Sound (see Part III, Section 5, Industry, and figs. 39–42) and the lower Columbia River.

The wood-using industries account for the major part of all manufacturing done in the region. (See fig. 40.) Other industries of importance are milk processing, flour-milling, the canning of fish and farm products (see fig. 39), shipbuilding and aircraft fabrication. All these industries, except aircraft fabrication, are causally related to the regional environment and the recent development of a major aluminum industry utilizing Northwest hydroelectric power has also given the aircraft industry an environmental basis.

That the region is in an early stage of industrial development is indicated by the nature of its manufactures, most of which fall into one of two classes: (1) the making of simple products for local consumption, or (2) the simple processing of raw materials before marketing them. Higher or more complex types of manufacture are represented by shipbuilding and aircraft fabrication.

The region possesses most of the elements necessary for industrial expansion. It has abundant and cheap hydroelectric power. Easily available to its factories are ample and varied supplies of raw materials, including wood, fish, a diversity of agricultural products, wool, hides, and minerals. It has access to the sea. In its healthful, invigorating climate it has an intangible but fundamental asset. The availability of a suitable labor supply seems assured as needed. The chief drawback is the limited home market, both in the region itself and in the larger western interior of the Nation.

The Puget Sound cities can more accurately be described as commercial than industrial. (See Part III, Section 6, Commerce.) They compete with Columbia River ports as sea outlets for the whole interior west of the crest of the Rockies and, in competition with other centers of the Pacific Northwest, distribute manufactured goods from the eastern States over the same vast territory. Over their wharves passes a sizable commerce with Alaska, the Far East and Europe, and an even larger flow of intercoastal trade with the cities of the eastern part of the United States.

PART II

2. POPULATION

A. GROWTH AND DISTRIBUTION

By Carl H. Mapes[1]

Influence of World Position

Situated as it is on the western fringe of North America, in the latitude of greatest continental width, the Puget Sound area was one of the last temperate regions of the world to be reached by the global expansion of European peoples. Its oceanic position in the northeast corner of the Pacific made it a far distant part of the world from the maritime nations of western Europe during the age of transportation by sail. Neither of the oceanic routes around the southern continents to the spice lands of the Far East brought ships anywhere near the northwest coast of North America. Consequently, it is not strange that the inland sea of Puget Sound remained undiscovered throughout the three hundred years of oceanic exploration and trade that followed the opening of the water route to the Indies and the discovery of the New World.

Nor was the land position of the region any more favorable to its early exploration. Three thousand miles of continental expanse lay between it and the earliest European colonies upon the Atlantic and Caribbean shores. No easy route of overland travel led from the interior of the continent to the northern shores of the Pacific. Instead, the way was blocked by broad plains, high mountains, deep canyons, and tortuous rivers. Not until a new, lusty nation had become firmly established upon the Atlantic seaboard of North America, and had developed western outposts on the frontier of the Mississippi basin, did exploration by land reach the Pacific Northwest. More than two centuries passed after the landing of the Pilgrims at Plymouth in New England, before the first land-based party of white explorers launched their canoes upon the waters of Puget Sound.

Location of Early Settlements

The 12 Washington counties which border upon Puget Sound form a subregion of the Pacific Northwest possessing a high degree of historical, geographic, and economic unity. Although discovered from the sea as early as 1792, the region acquired its first permanent white settlement in 1845 when a small group of American pioneers moved northward from the Willamette Valley and established homes near the southernmost inlet of Puget Sound. Water power from the falls of the Deschutes River, prairie soils, and nonforested land on the nearby glacial plains, nearness to settled communities on the Cowlitz and Columbia Rivers, and access to the navigable waterways of Puget Sound were significant factors in determining the location of this earliest settlement at Tumwater.

In 1846 and during the years immediately following, other settlers came to Puget Sound. The town of Olympia also was founded on Budd Inlet, not far from Tumwater, where better facilities existed for deep-water navigation. Throughout the pioneer period from 1850 to 1870, it remained the largest town in the region.

From the southern shores, settlement spread rapidly but thinly eastward and northward along the shoreline. By 1855 sawmill settlements had been established at Seattle, Port Orchard, Port Ludlow, Port Townsend, Bellingham Bay, and other scattered localities. Agricultural settlement at this time was centered on the prairies of Thurston and Pierce Counties, in the Puyallup and White River Valleys, and on the prairies of Whidby Island and the Dungeness district.

Pioneer Pattern of Settlement

A special territorial census in 1853 showed the region to have 2,063 inhabitants, about half of whom were located in Thurston County. By 1860 population had increased to almost 5,000, giving definite form to the pioneer pattern of scattered, shoreline mill towns and prairie or valley farms. Growth from this date until 1940 is shown in table 1 by counties and principal cities.

Pioneer settlement ended with the decade of the seventies. In the eighties came the railroads and the advance wave of the timber-rush migration. Population increased from about 25,000 in 1880 to slightly over 180,000 in 1890. During the same decade, Seattle jumped from 3,500 to 40,000, and Tacoma from 1,100 to 36,000. Whereas earlier settlement had been rather evenly divided between the eastern and western shores of the Sound, this new population concentrated more

[1] Geography Department, University of Washington.

TABLE 1.—*Growth of population in the Puget Sound region by counties and major cities, 1860–1940*

	1860	1870	1880	1890	1900	1910	1920	1930	1940
COUNTY									
Clallam	149	408	638	2,771	5,603	6,755	11,368	20,449	21,848
Jefferson	531	1,268	1,712	8,368	5,712	8,337	6,557	8,346	8,918
Mason	162	289	639	2,826	3,810	5,156	4,919	10,060	11,603
Thurston	1,507	2,246	3,270	9,675	9,927	17,581	22,366	31,351	37,285
Kitsap	544	866	1,738	4,624	6,767	17,647	33,162	30,776	44,387
Island	294	626	1,087	1,787	1,870	4,704	5,489	5,369	6,098
San Juan	(1)	554	948	2,072	2,928	3,603	3,605	3,097	3,157
Whatcom	352	534	3,137	18,591	24,116	49,511	50,600	59,128	60,355
Skagit	(1)	(1)	(1)	8,747	14,272	29,241	33,373	35,142	37,650
Snohomish	(2)	599	1,387	8,514	23,950	59,209	67,690	78,861	88,754
King	302	2,120	6,910	63,989	110,053	284,638	389,273	463,517	504,980
Pierce	1,115	1,409	3,319	50,940	55,515	120,812	144,127	163,842	182,081
Total	4,956	10,919	24,785	182,904	264,523	607,194	772,529	909,938	1,007,116
Percent increase		120	127	638	45	130	27	18	11
MAJOR CITIES									
Seattle		1,107	3,533	42,837	80,671	237,194	315,312	365,583	368,302
Tacoma			1,098	36,006	37,714	83,743	96,965	106,817	109,408
Bellingham				8,135	11,062	24,298	25,585	30,823	29,314
Everett					7,838	24,814	27,644	30,567	30,224
Olympia		1,203	1,232	4,698	3,863	6,996	7,795	11,733	13,254
Bremerton						2,993	8,918	10,170	15,134

[1] Included in Whatcom County.
[2] Included in Island County.

Source: U. S. Census.

around the larger harbors of the eastern shoreline and their tributary valleys. River, rail, and road transportation provided access to the eastern lowlands, while the forested uplands and alluvial valley soils supplied the basic resources for lumbering and farming.

Distribution Map of 1900

The census of 1900 furnishes a complete tabulation of population by local precincts and thus makes possible the first of the series of distribution maps which comprise the major contribution of this study. Comparison of the 1900 distribution (see fig. 5) with that of an earlier period, such as 1870, would show the extent to which population increased along the eastern shores and valleys. It would also show the widespread development and growth of towns and cities which accompanied the 30 years' increase of more than 250,000 inhabitants. By 1900 Seattle was clearly the major commercial city, with more than twice the population of its rival, Tacoma. Bellingham, Everett, Ballard, Port Townsend, Port Angeles, and Olympia were the chief secondary ports and lumber centers, while Puyallup, Snohomish, and Mount Vernon were the most important valley towns.

Map of 1910

The population map of 1910 (see fig. 6) portrays the basic pattern of settlement resulting from the timber rush. With a population of more than 230,000, Seattle was the commercial and financial metropolis of the region. As the major seaport and railroad center, it had tripled its population during the decade since 1900. The other port cities also showed increases for this period, Tacoma and Bellingham more than doubling in size, and Everett tripling to become third largest city on the Sound. Bremerton, as a navy yard center, and Anacortes, as the rail head and lumber port of Skagit County, had risen to importance since the last census. Agricultural settlement in the larger valleys of the eastern lowlands showed increasing density as additional farm land was needed to feed the growing industrial and commercial population. Logging camps and inland mill towns had sprung up in the shoestring valleys which provide access to surrounding forests. And the coal fields of central King and Pierce Counties showed clustered centers of population along the Cascade foothills.

Maps of 1920 and 1930

The population maps of 1920 and 1930 (see figs. 7 and 8) show continued urban growth and steadily increasing densities in the agricultural valleys. The most marked development revealed by these maps, however, is suburban growth around the larger cities. Seattle's expansion, restricted by water bodies west and east, had moved northward and southward. Tacoma had extended its suburban areas to the south. Among the secondary ports, Port Angeles made the greatest gain in population during the decade from 1920 to 1930. Shelton, in Mason County, also experienced a rapid increase. In both places, the development of wood pulp industries was largely responsible for growth. Most of the other cities made normal gains between 1910 and 1930, but the map for the latter date shows decreases or static conditions in certain inland areas. This is especially true of the coal mining communities in King and Pierce Counties, whose industries were beginning to suffer from the competition of California fuel oil, and of the logging centers in the upper river valleys, whose timber resources were showing signs of severe depletion.

1940 Pattern

The 1940 map (see fig. 9) shows the population pattern resulting from almost a century of exploitation of forest and soil resources and utilization of waterways and harbors. The trend toward urban and suburban concentration is even more striking than in earlier distributions. A great metropolis of Puget Sound appears to be developing within a radius of about 30 miles from the center of Seattle. Approximately three-fourths of the region's 1 million people are located within this area, which extends from Everett to Tacoma and from Bremerton to Snoqualmie. Manufacturing, shipping, trade, and service industries support this concentrated nucleus of population.

The Pattern Today

Estimates of growth since the census of 1940 indicate that even greater concentration has resulted from the

534268—43——2

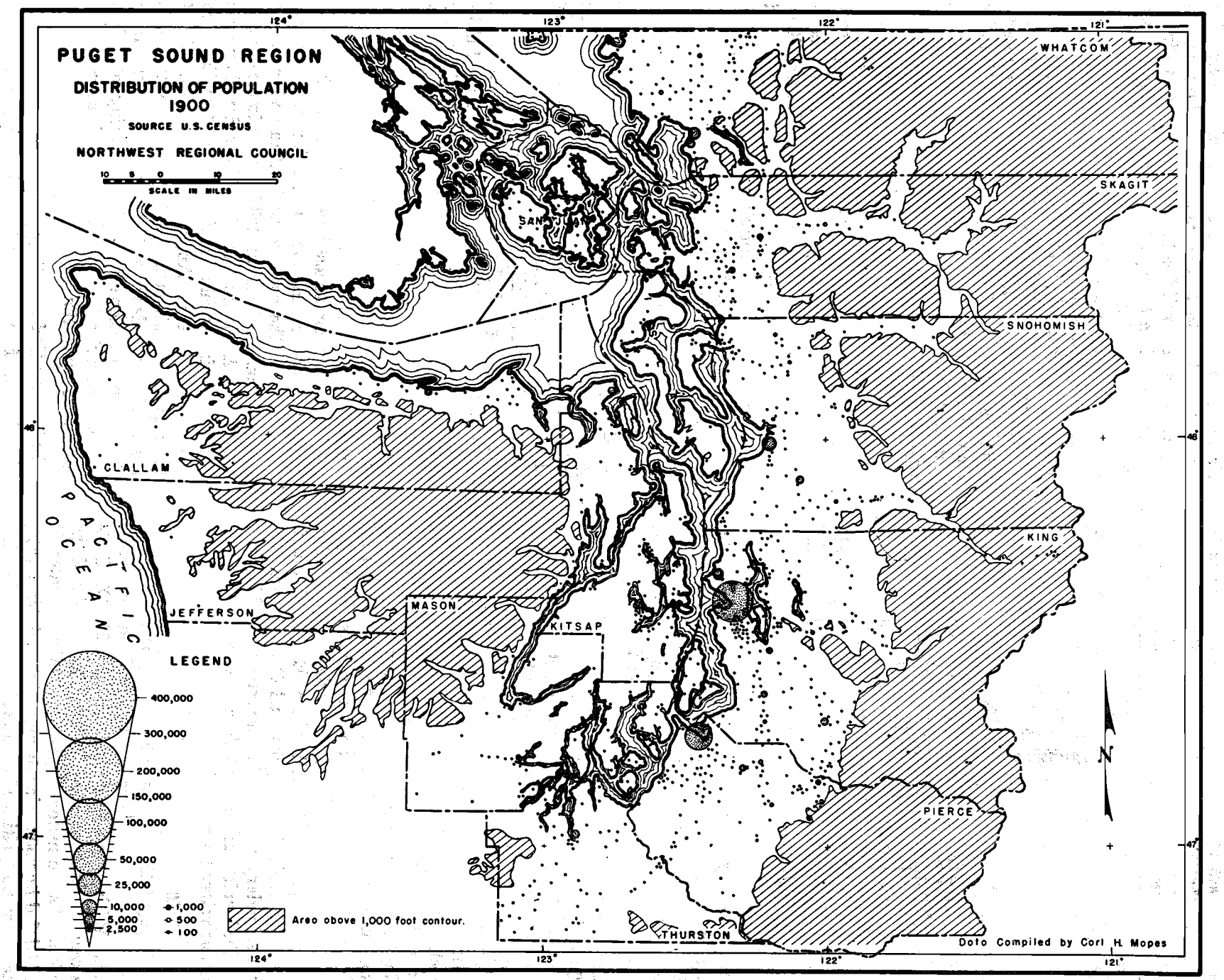

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1900
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
124°
123°
122°
121°
48°
47°
WHATCOM
SKAGIT
SAN JUAN
SNOHOMISH
CLALLAM
KING
PACIFIC OCEAN
JEFFERSON
MASON
KITSAP
PIERCE
THURSTON
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
Area above 1,000 foot contour.
N
Data Compiled by Carl H. Mapes

FIGURE 5.

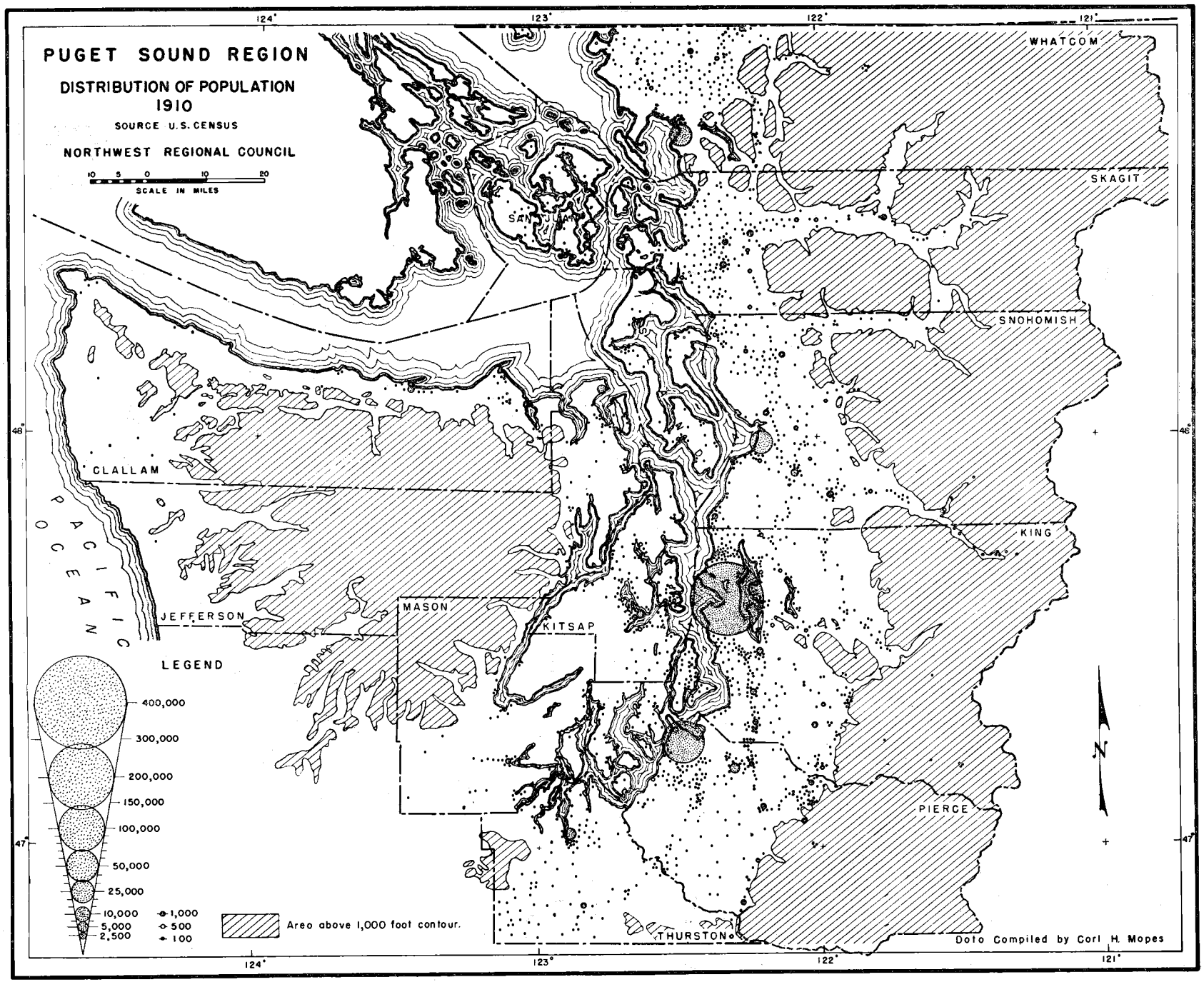

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1910
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
124°
123°
122°
121°
48°
47°
WHATCOM
SKAGIT
SAN JUAN
SNOHOMISH
CLALLAM
KING
PACIFIC OCEAN
JEFFERSON
MASON
KITSAP
PIERCE
THURSTON
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
Area above 1,000 foot contour.
N
Data Compiled by Carl H. Mapes

FIGURE 6.

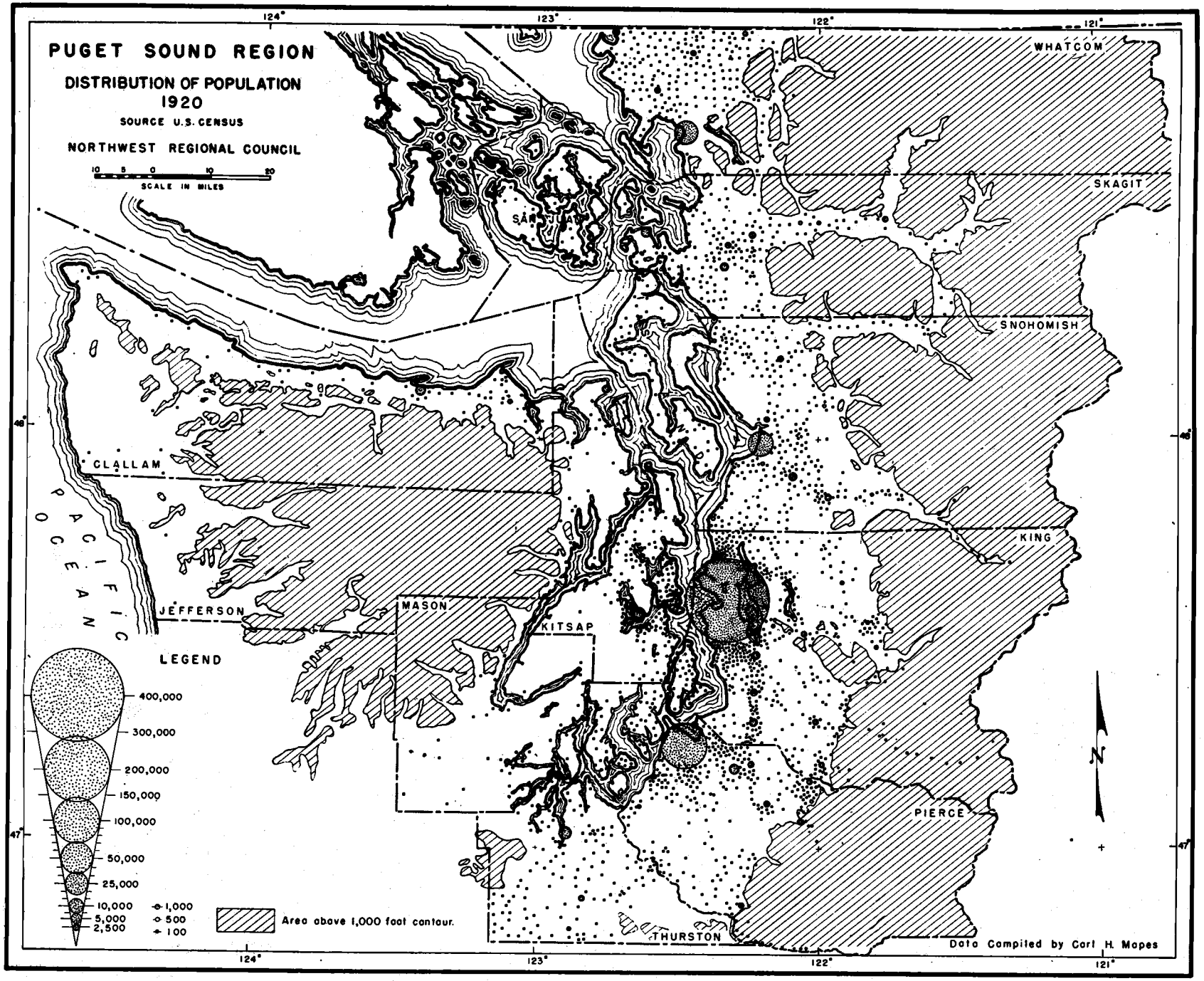

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1920
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
124°
123°
122°
121°
48°
47°
WHATCOM
SKAGIT
SAN JUAN
SNOHOMISH
CLALLAM
KING
PACIFIC OCEAN
JEFFERSON
MASON
KITSAP
PIERCE
THURSTON
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
Area above 1,000 foot contour.
Data Compiled by Carl H. Mapes
N

FIGURE 7.

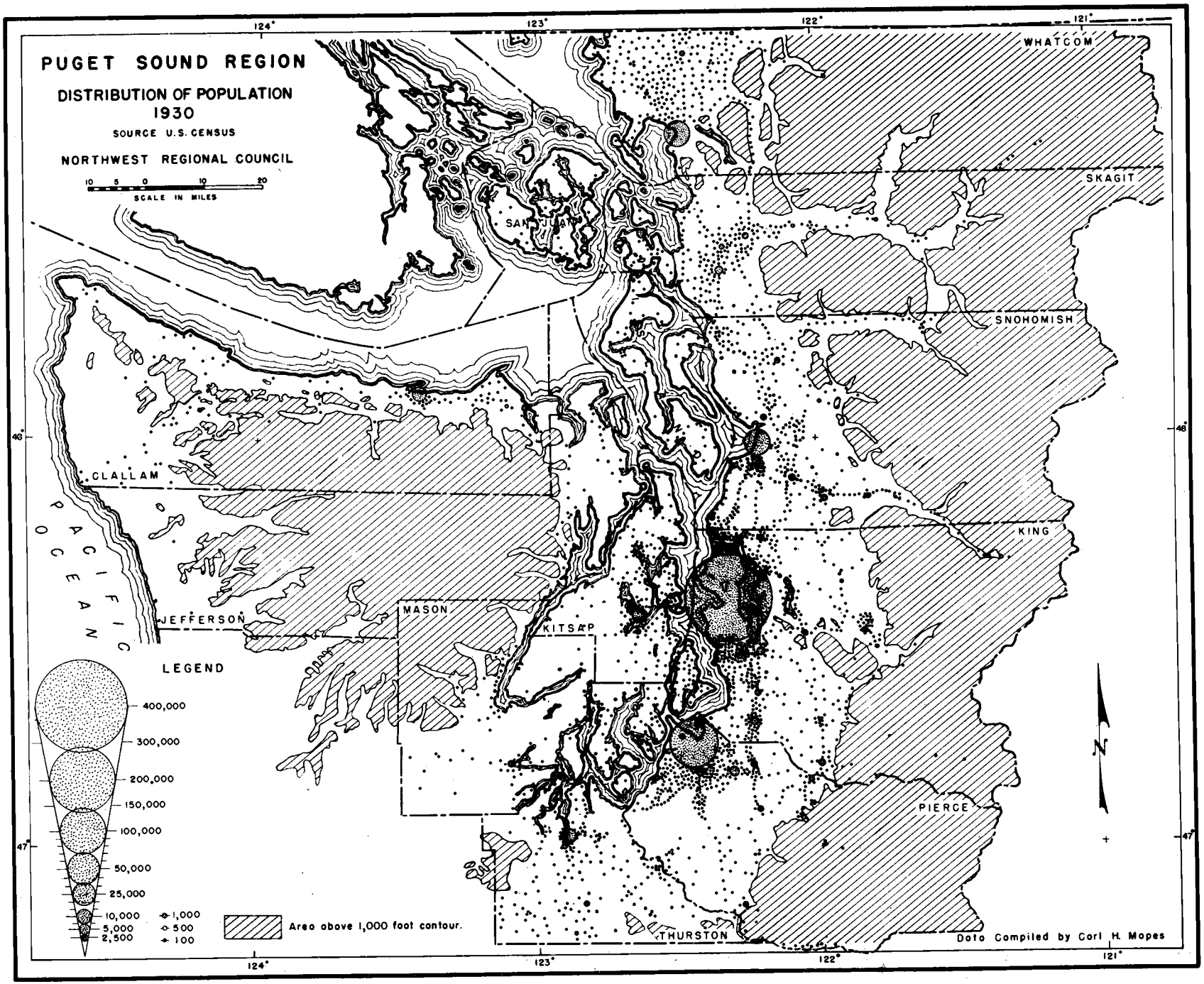

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1930
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
WHATCOM
SKAGIT
SAN JUAN
SNOHOMISH
CLALLAM
KING
JEFFERSON
MASON
KITSAP
PACIFIC OCEAN
PIERCE
THURSTON
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
Area above 1,000 foot contour.
Data Compiled by Carl H. Mapes
124°
123°
122°
121°
46°
47°
N

FIGURE 8.

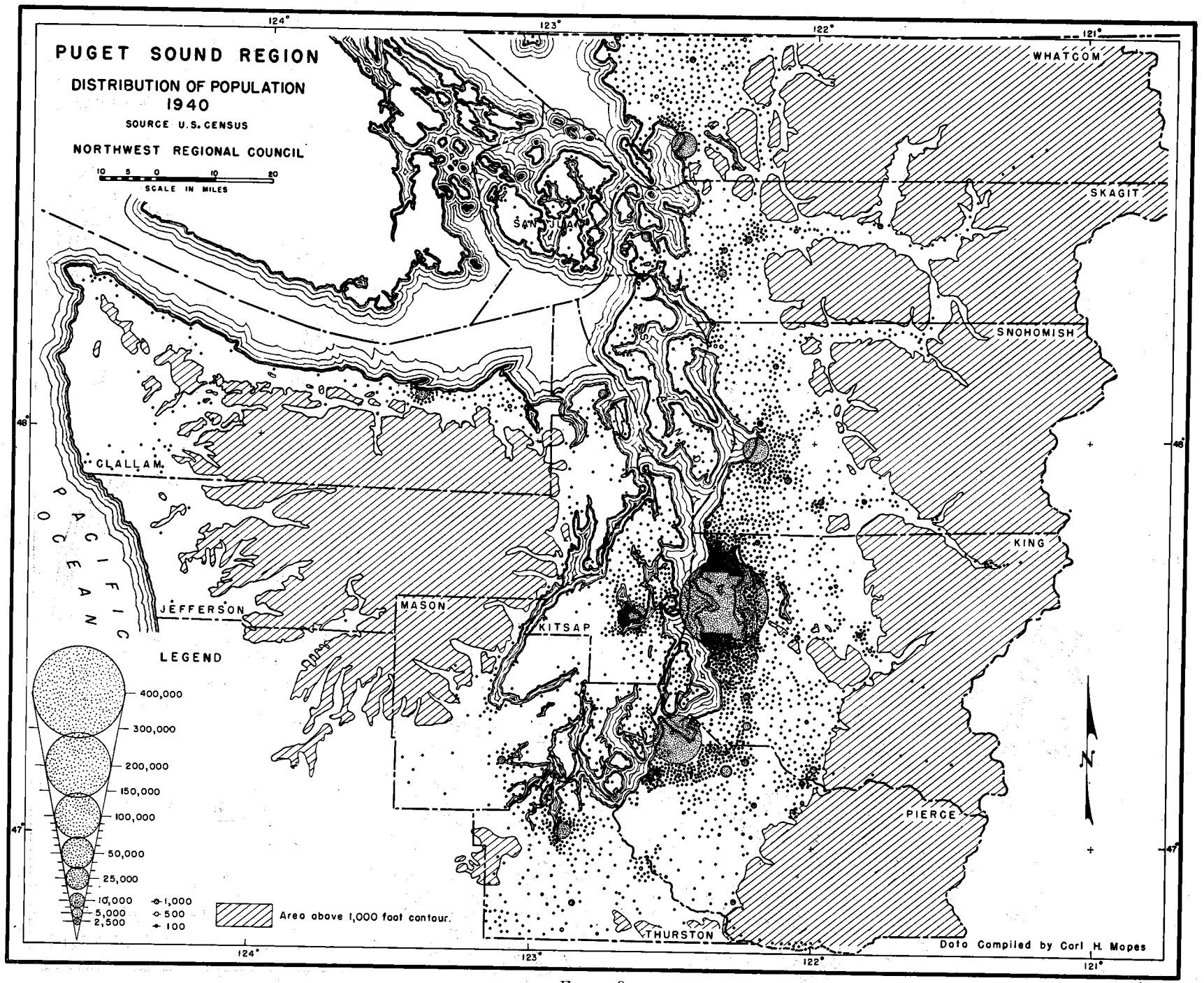

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1940
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
124°
123°
122°
121°
WHATCOM
SKAGIT
SAN JUAN
SNOHOMISH
46°
CLALLAM
PACIFIC OCEAN
KING
JEFFERSON
MASON
KITSAP
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
Area above 1,000 foot contour.
PIERCE
47°
THURSTON
Data Compiled by Carl H. Mapes
N

FIGURE 9.

forced development of war industries. The Puget Sound Regional Planning Commission foresees a population of 1,315,000 in the region by the end of 1943, largely concentrated in the Seattle-Tacoma-Bremerton industrial area. (See fig. 10.) If some of the new war industries can be made permanent, or others developed to utilize their physical plants and reservoir of skilled labor, the region may indeed be entering upon a second century of growth and development which could easily result in another million people within the area.

Forecast of Future Pattern

Although the Puget Sound population pattern of the future will unquestionably continue to reflect the influence of topography and shoreline configuration, a diversified manufacturing economy should develop forms of settlement differing somewhat from those of a logging and lumbering economy. Heavy industries and shipping services will necessarily center around the improved, deep-water harbors of the eastern shoreline where rail and water meet. Thus the great industrial city of Puget Sound, which appears to be taking form, can have twin harbors, Elliott Bay and Commencement Bay. Linking the two by land is the level Puyallup-White River Valley which might easily be transformed from a farming area into a belt-line district of small manufacturing plants of the light-industry or service type. Neighboring uplands could provide home-sites for the workers in these industries.

Some of the secondary ports of Puget Sound may be selected as locations for plants by specialized heavy industries whose raw materials and finished products can come and go by water. The same transportation factors which contributed to the decentralization of lumber manufacturing may also aid in spreading certain types of industries around the smaller harbors of the region.

With an increased industrial population to be supplied with food, the valleys and deltas of the northern section may be used to a still greater extent for dairying and truck farming. Even the narrow flood plains of the shoestring valleys could be utilized for garden crops under more favorable market conditions. Through more intensive agriculture of the gardening type, with some supplemental irrigation during the dry summer season, the lowlands of the region could support a larger population.

It therefore seems reasonable to assume that the population maps of the future, say the one for 1970, may not differ so very much in pattern from that for 1940. It is altogether likely that there will be a major agglomeration around the ports of present-day Seattle, Tacoma, and Bremerton, with minor concentrations around the other deep-water harbors. Agricultural clusters will occupy the large deltas and broad valleys, with shoestrings of population extending into the upper valleys. The glacial uplands will probably carry a dense residential settlement where they adjoin industrial centers, and be much more sparsely settled where they support a rural population. On the whole, waterways, topography, soils, and strategic location will unquestionably continue to be dominant factors in determining the general pattern of population.

B. COMPOSITION AND TRENDS

By Max Moss [2]

Distribution and Trends

Some 58.2 percent of the people of Washington live in the Puget Sound region in 24.6 percent of the State's area. Population in 1940 was 1,007,116, equivalent to about two-thirds that of the city of Los Angeles. Population density was 63.6 persons per square mile as compared with 25.9 for the State. (See fig. 11.) Within the region density varies widely. King County has the heaviest (236.4 per square mile in 1940) and Jefferson County the least (4.9).

Population, which in 1920 was 772,529, had by 1930 increased to 909,938, a gain of 17.8 percent, while the population for the State increased only 15.2 percent. Between 1930 and 1940 the relative rate of growth was reversed; there was an increase of 10.8 percent for the 12 counties (see fig. 12), while for the entire State an increase of 11.1 percent was recorded. The 1920 and 1930 populations represented 57.1 and 58.2 percent respectively of the State's total population.

More than half the people live in urban areas, a condition which has existed since 1900. (See fig. 13.) In 1940 there were 621,137, or 61.7 percent, listed as urban, and 385,979, or 38.3 percent, rural. The urban population gained but 2.9 percent between 1930 and 1940, while the rural gained 26.0 percent. The region in 1940 contained 66.0 percent of the entire urban population of the State, while it had 44.6 percent of the State rural population. A striking feature is the large proportion of the population living in cities of 10,000 or more. (See fig. 14.) In 1940 six such cities contained a total of 565,636 persons, or 56.2 percent of the population of the region. Although the actual numbers living

[2] Prepared under the direction of Calvin F. Schmid, Professor of Sociology, University of Washington.

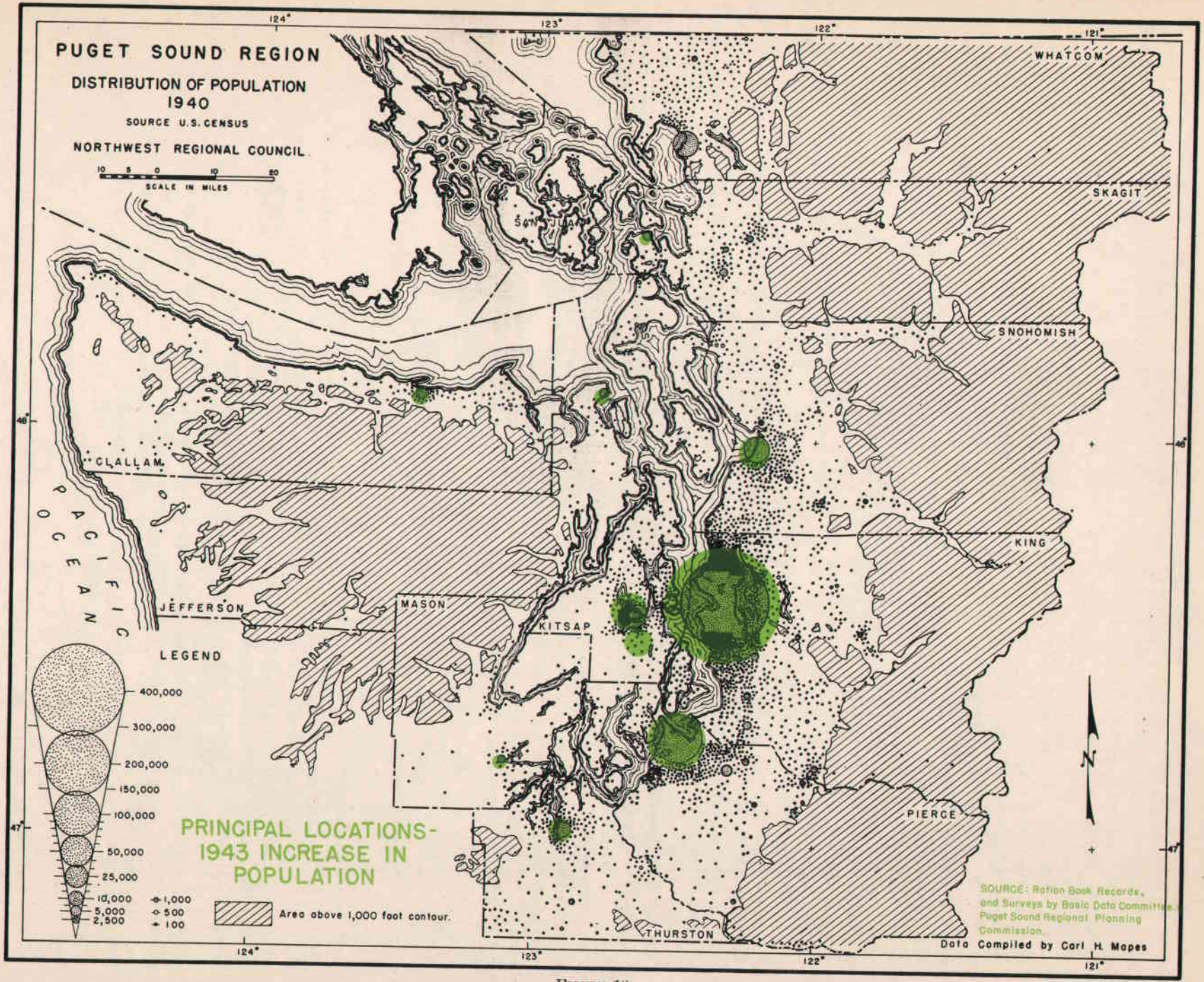

PUGET SOUND REGION
DISTRIBUTION OF POPULATION
1940
SOURCE U.S. CENSUS
NORTHWEST REGIONAL COUNCIL
10 5 0 10 20
SCALE IN MILES
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
PACIFIC OCEAN
LEGEND
400,000
300,000
200,000
150,000
100,000
50,000
25,000
10,000
5,000
2,500
1,000
500
100
PRINCIPAL LOCATIONS-
1943 INCREASE IN
POPULATION
Area above 1,000 foot contour.
SOURCE: Ration Book Records, and Surveys by Basic Data Committee, Puget Sound Regional Planning Commission.
Data Compiled by Carl H. Mapes
124°
123°
122°
121°
48°
47°

FIGURE 10.

within the cities remained practically the same from 1930 to 1940, the percentage declined. The continued trends toward suburbanization, which began several decades ago, would account for the relative decline in population within larger corporate cities.

Composition

In composition, the population shows a fairly normal predominance of males, 520,594, or 51.7 percent, as against 486,522, or 48.3 percent females. (See fig. 15.) The region contains 57.5 percent of the State's total number of males and 58.6 percent of the females. A striking fact as to age composition is the increase between 1930 and 1940 in the number of old people (65 or over) from 60,257 to 87,668 or from 6.1 percent to 8.3 percent of the total population. The number of children under 5 remained practically constant at 6.3 percent of the total population. (See fig. 15.)

The 1940 census showed that 83.8 percent of the people in the Puget Sound region were native-born white, comprising 844,509 or 56.5 percent of the total for the State. The 1930 proportion was 56.4 percent. Foreign-born whites in 1940 comprised 14.1 percent (142,255) of the region's population, but 70.0 percent of the State foreign-born whites. This is consistent with the 1930 figure (69.0 percent). Of the 12 counties of the region, Thurston has the largest proportion of native-born white (90.9 percent), while King has the smallest (80.9). Island County has the largest proportion of foreign-born whites (16.9 percent), Mason County the smallest (7.4). (See fig. 16.) Of the foreign-born whites, 27,083, or 18.1 percent, were born in Canada, 21,968, or 14.7 percent, in Norway, and 20,222, or 13.6 percent, in Sweden. A total of 41 countries of birth was reported.

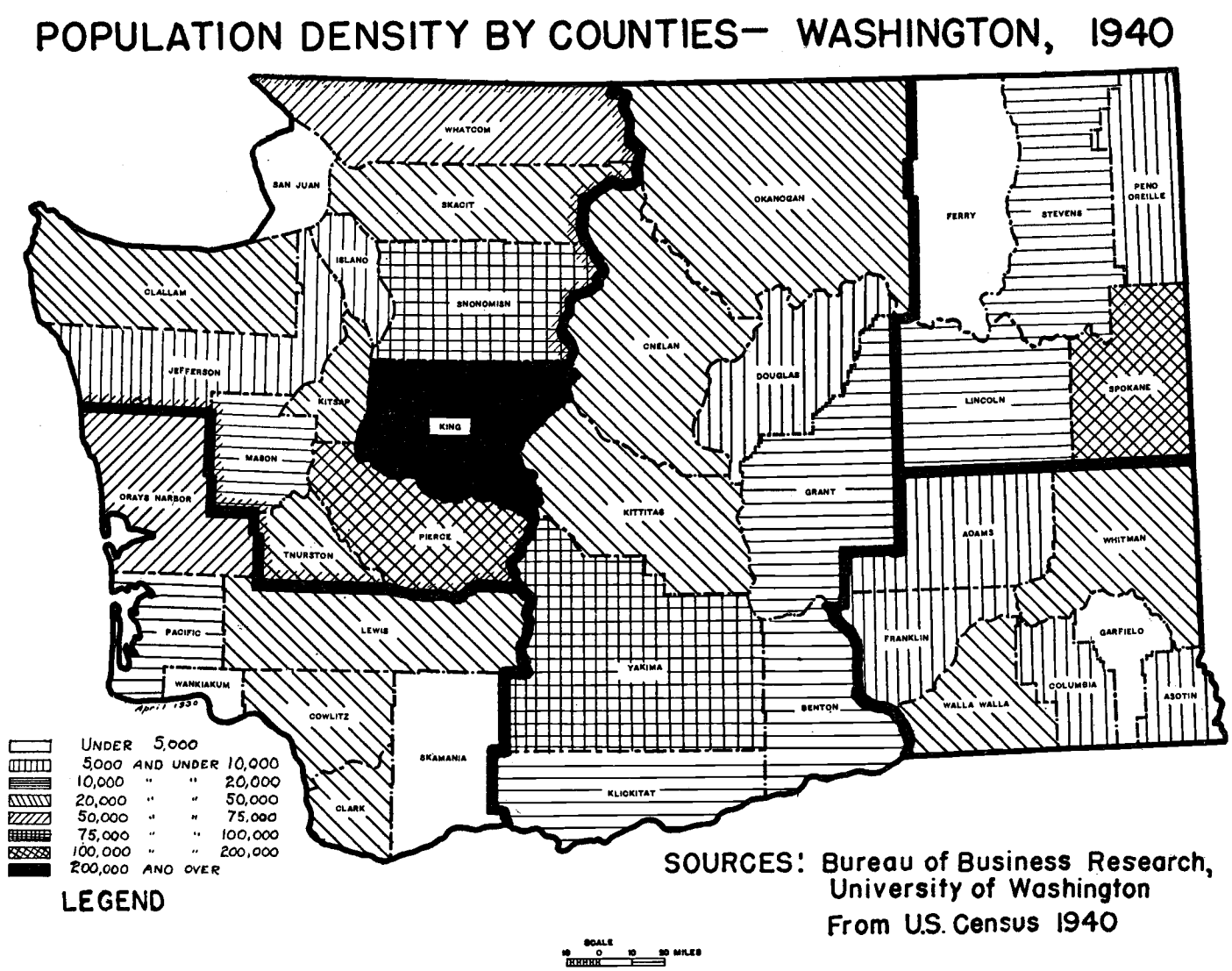


FIGURE 11.

534268—43——3

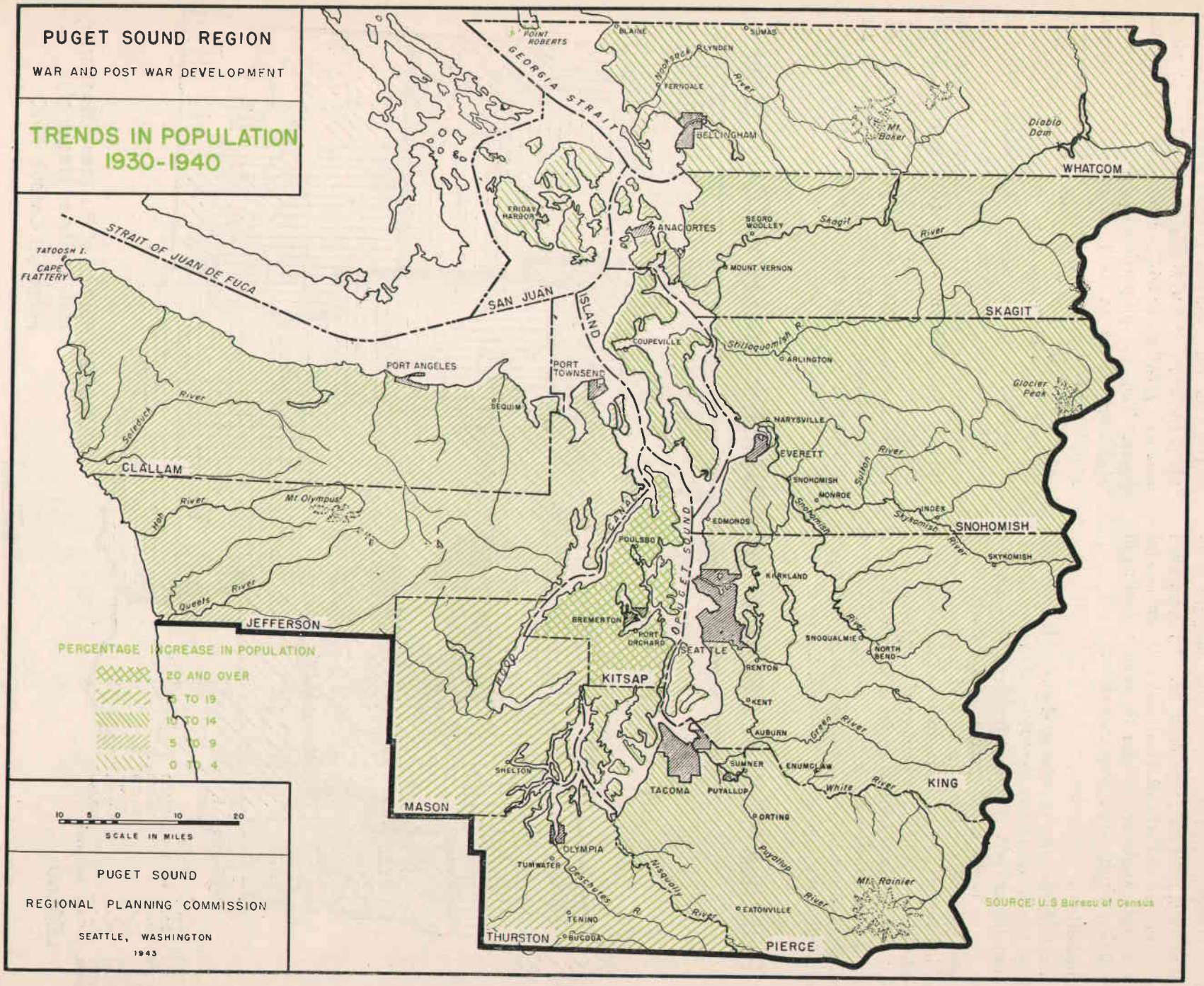

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
TRENDS IN POPULATION
1930-1940
PERCENTAGE INCREASE IN POPULATION
20 AND OVER
15 TO 19
10 TO 14
5 TO 9
0 TO 4
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: U.S Bureau of Census
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
KITSAP
MASON
THURSTON
JEFFERSON
CLALLAM
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
PUGET SOUND
BELLINGHAM
ANACORTES
MOUNT VERNON
EVERETT
SEATTLE
TACOMA
OLYMPIA
PORT ANGELES
PORT TOWNSEND
SEQUIM
BREMERTON
PORT ORCHARD
POULSBO
EDMONDS
KIRKLAND
RENTON
AUBURN
KENT
SUMNER
ENUMCLAW
PUYALLUP
ORTING
SHELTON
TUMWATER
EATONVILLE
TENINO
TOLEDO
ARLINGTON
MARYSVILLE
SNOHOMISH
MONROE
SNOQUALMIE
NORTH BEND
SKYKOMISH
COUPEVILLE
FRIDAY HARBOR
BLAINE
SUMAS
LYNDEN
FERNDALE
POINT ROBERTS
SEDRO WOOLLEY
TATOOSH I.
CAPE FLATTERY
Nooksack River
Skagit River
Stillaguamish R.
Sultan River
Snohomish River
Skykomish River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Queets River
Quillayute River
Hoh River
Sol Duc River
Mt. Baker
Diablo Dam
Glacier Peak
Mt. Olympus
Mt. Rainier

FIGURE 12.

King County has the most Negroes, this race accounting for approximately 1 percent of the county population, while San Juan, Island, and Mason Counties have none at all. The Negro population of the State is concentrated largely within the region, which has 72.5 percent of the total, but the 5,387 Negroes in the region represent only 0.5 percent of its population. The balance of the population is composed of the following minority racial groups: Japanese, 12,578; Chinese, 1,972; Indians, 4,801; all others, 2,064. Some 69.3 percent (as against 72.5 percent in 1930) of the State's total of these racial groups was concentrated in the region, but these 21,415 persons comprised only 2.5 percent of its population.

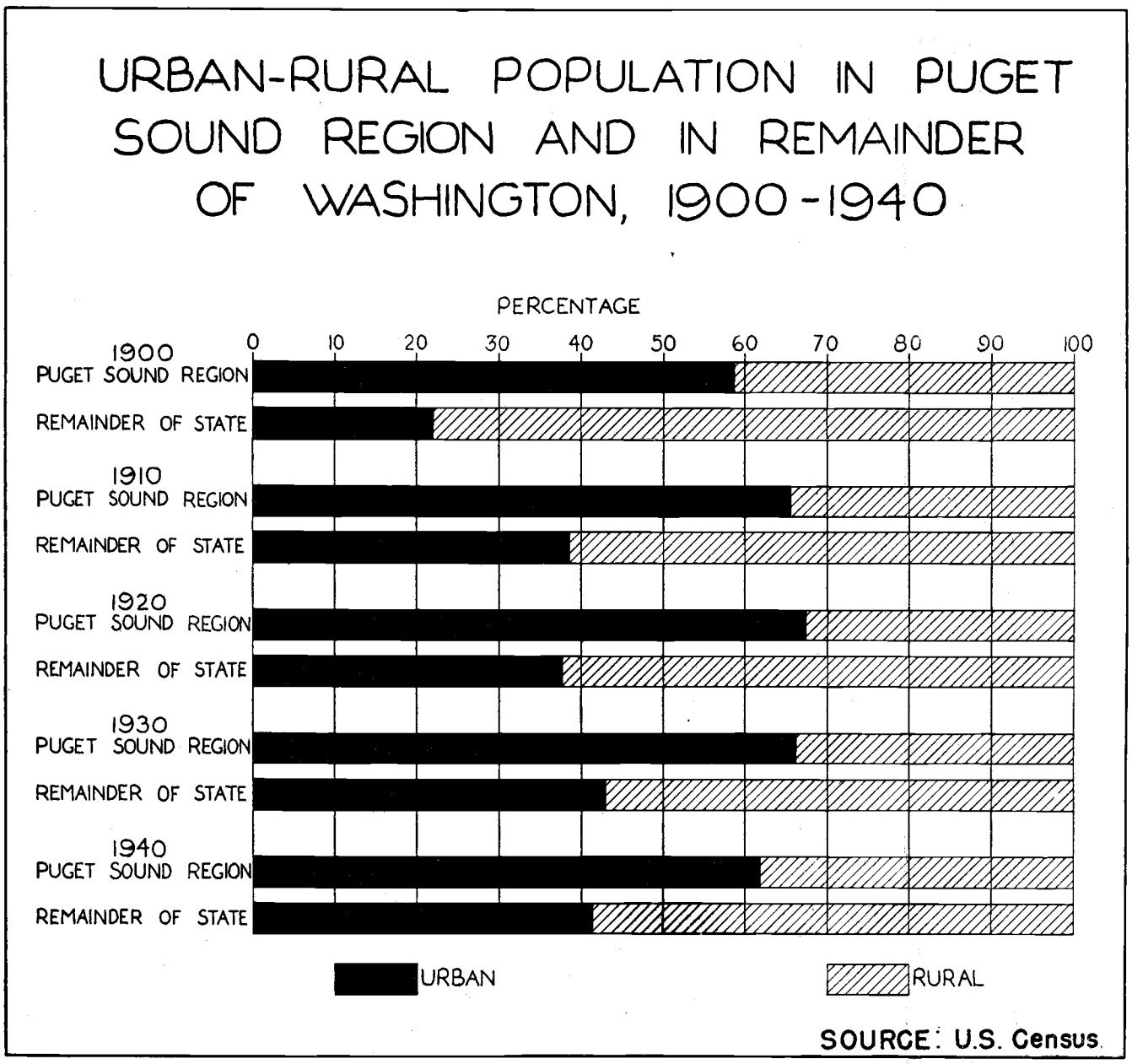


FIGURE 13.

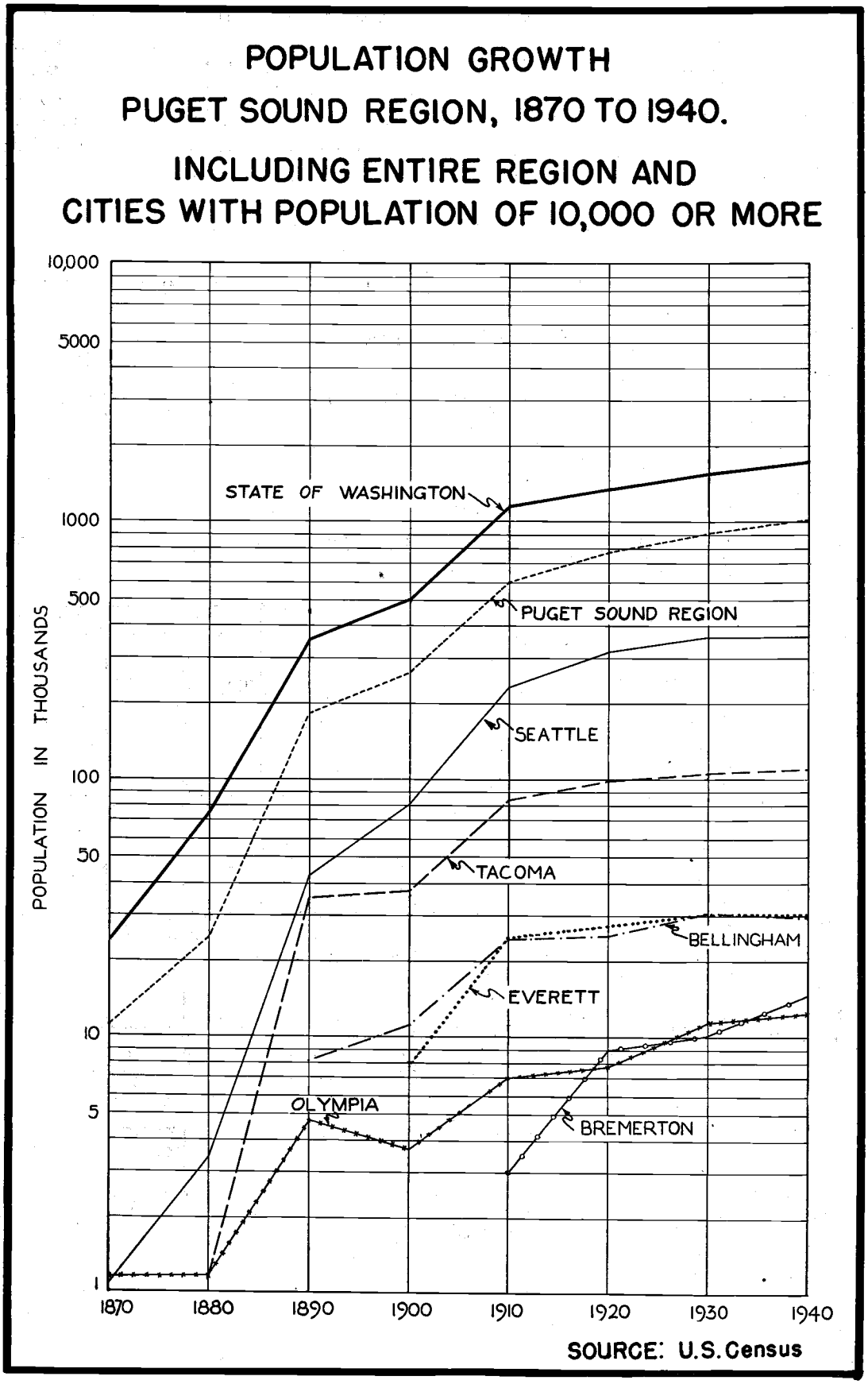

POPULATION GROWTH
PUGET SOUND REGION, 1870 TO 1940.
INCLUDING ENTIRE REGION AND
CITIES WITH POPULATION OF 10,000 OR MORE
POPULATION IN THOUSANDS
10,000
5000
1000
500
100
50
10
5
1
STATE OF WASHINGTON
PUGET SOUND REGION
SEATTLE
TACOMA
BELLINGHAM
EVERETT
OLYMPIA
BREMERTON
1870
1880
1890
1900
1910
1920
1930
1940
SOURCE: U.S. Census

FIGURE 14.

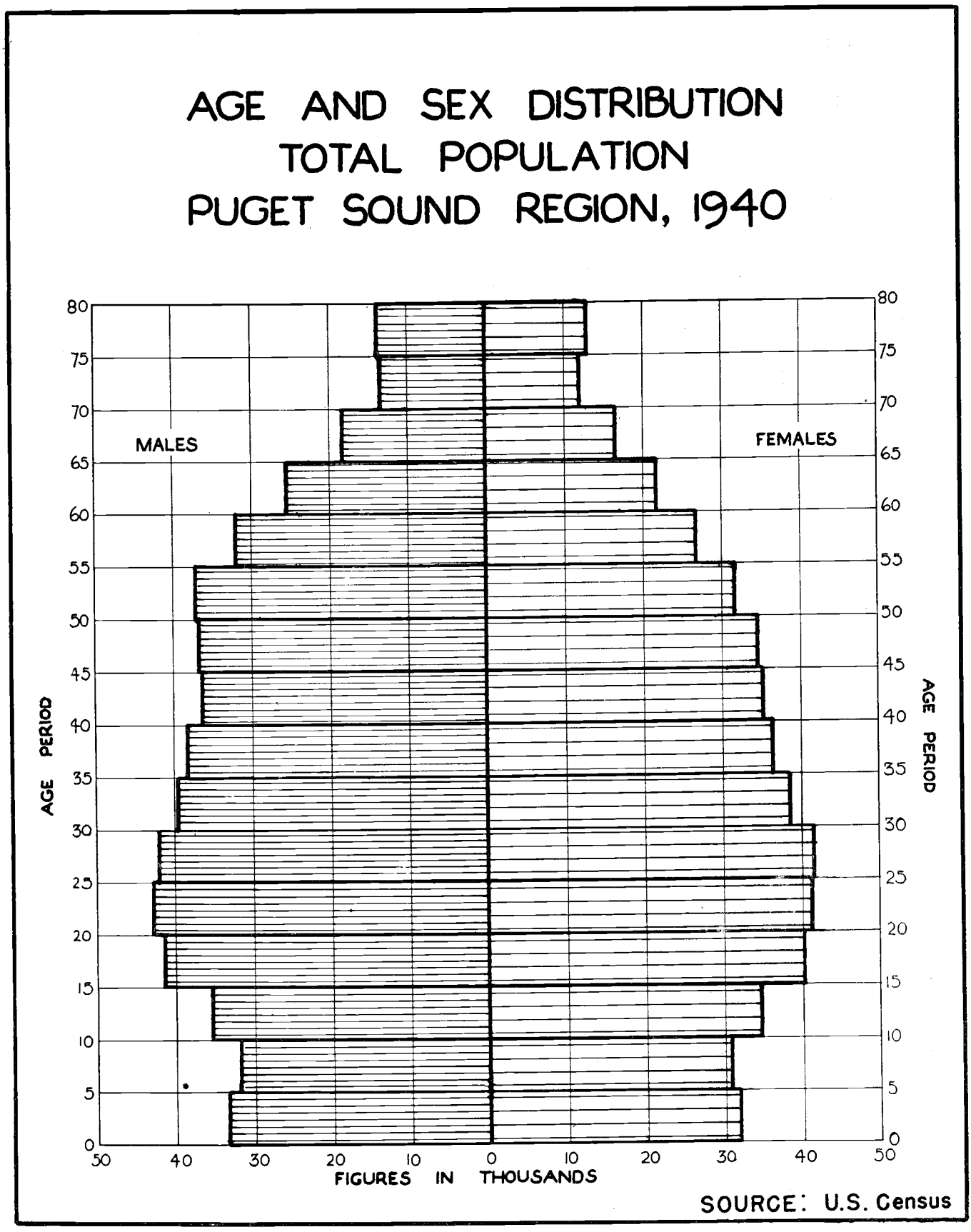

AGE AND SEX DISTRIBUTION
TOTAL POPULATION
PUGET SOUND REGION, 1940
MALES
FEMALES
AGE PERIOD
AGE PERIOD
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
50 40 30 20 10 0 10 20 30 40 50
FIGURES IN THOUSANDS
SOURCE: U.S. Census

FIGURE 15.

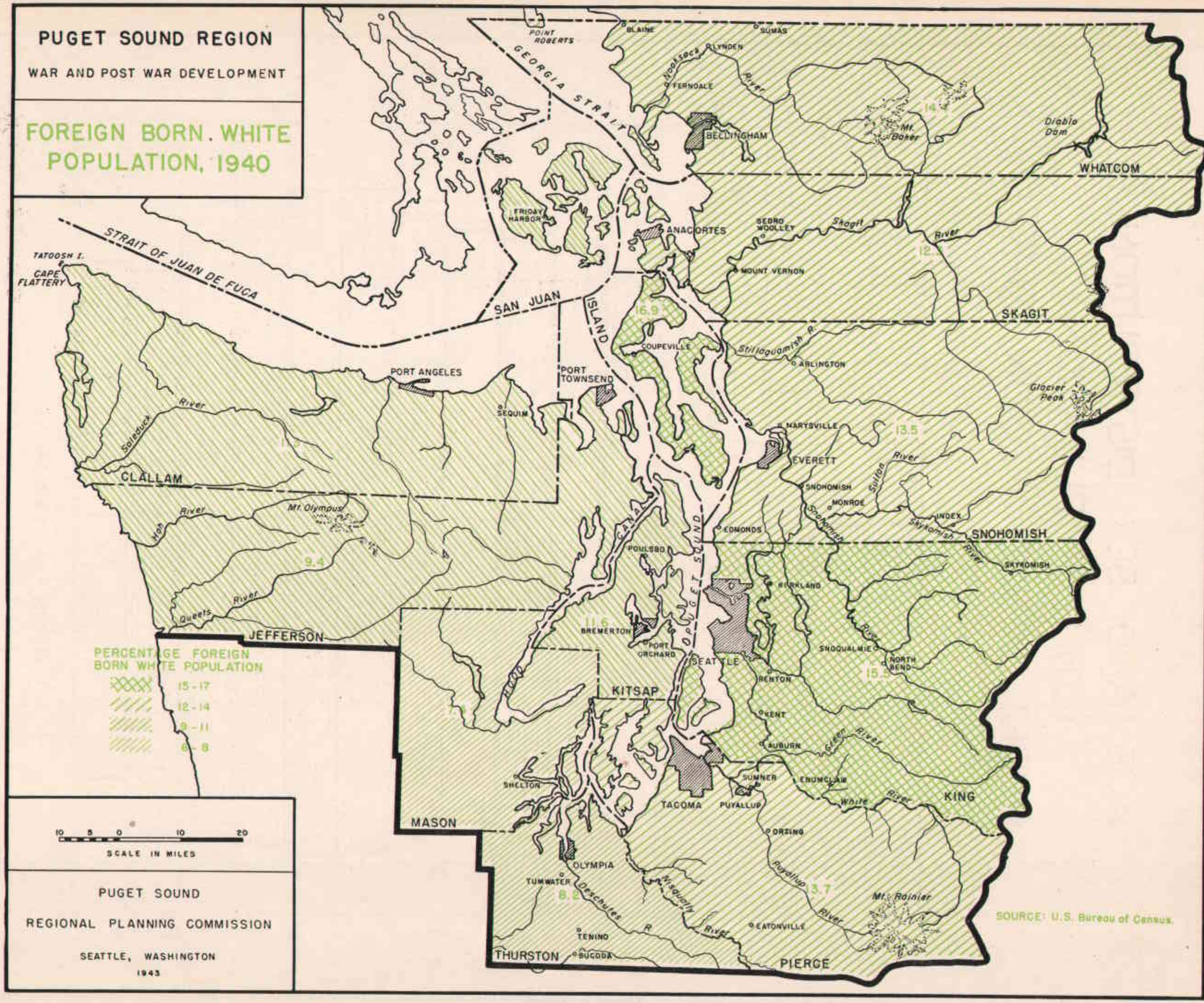

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
FOREIGN BORN. WHITE POPULATION, 1940
PERCENTAGE FOREIGN BORN WHITE POPULATION
15 - 17
12 - 14
9 - 11
6 - 8
SCALE IN MILES
10 5 0 10 20
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: U.S. Bureau of Census.
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
PUGET SOUND
TATOOSH I.
CAPE FLATTERY
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
MOUNT VERNON
Skagit River
COUPEVILLE
PORT TOWNSEND
PORT ANGELES
SEQUIM
Stillaguamish R.
ARLINGTON
Glacier Peak
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
INDEX
Sultan River
Skykomish River
SKYKOMISH
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
SNOQUALMIE
NORTH BEND
RENTON
KENT
AUBURN
Green River
ENUMCLAW
White River
SUMNER
PUYALLUP
TACOMA
ORTING
Puyallup River
Mt. Rainier
EATONVILLE
Nisqually River
OLYMPIA
TUMWATER
Deschutes R.
TENINO
BUCODA
SHELTON
Mt. Olympus
Soleduck River
Hoh River
Queets River
16.9
13.5
12
14
9.4
11.6
15.5
13.7
8.2

FIGURE 16.

PART II

3. THE REGIONAL ECONOMY IN GENERAL

By N. H. Engle [1]

The Region's Major Economic Functions

The basic economic functions of the region just prior to the war are revealed by the following census tabulation showing employed workers by industry in 1939:

Economic group	Number	Percent
Manufacturing	86,100	23.8
Services	83,720	23.2
Trade	73,795	20.6
Extractive industry	32,961	9.3
Transportation	32,099	8.9
Government	24,996	7.0
Construction	20,412	5.7
Not reported	4,818	1.5
Total	358,901	100.0

Manufacturing, although the dominant occupation, was only slightly more important than the service industries. Trade and transportation, if taken together, would overshadow manufacturing, reflecting the fact that a major function of the population centers of the region is to provide marketing and shipping services for Alaska and the Orient, as well as for other regions of the State. Extractive industries, largely agricultural activity (since mining represents but a small part of the region's economic life), provided less than 10 percent, government about 7 percent, and construction less than 6 percent of the job opportunities in the region.

Regional Maturity

Even before the war began to have its widespread effect upon the region, there was evidence that the pioneer economy was giving way to one more mature. Dependence on the basic natural resources, while still dominant, was showing signs of relaxation. Forest reserves had been depleted to such a stage that Oregon took the lead from Washington in reserves of virgin timber, and there was beginning to be recognized the need for conservation and, indeed, cultivation of forests as a long-term crop.

Evidence of industrial diversification was revealed in the allocation of war orders to the region. The spectacular aircraft industry and the renaissance of shipbuilding should not obscure the fact that many small industries were found able and willing to convert to war production. Not only woodworking industries, but textile and heavy industries were included. Thus the stage was set for diversification. The war has but added impetus to a development already initiated. The future depends upon the willingness and ability of the entrepreneurs of the region to capitalize fully upon the opportunities now before them. These include a labor force trained in both ferrous and nonferrous metalworking, an expanded iron and steel processing capacity, an aluminum metal plant, expanded smelting facilities, and numerous lesser advantages.

General Economic Relationships

This brief introduction should not leave the impression that the region is or can be self-sufficient. Despite its homogeneity, both geographically and economically, it is an integral part of the State, of the Pacific Northwest, and of the United States. Problems which affect the larger regions, whether of war or of peace, must also affect Puget Sound.

Regional relationships are shown by the following 1940 population and income comparison with the State and with other geo-economic regions. (See fig. 2)

Area	Population	Income payments	Per capita income
The State	1,736,000	$1,040,799,000	$600
Puget Sound region	1,007,000	647,446,000	643
Southwestern region	209,000	107,123,000	513
Central region	225,000	117,866,000	524
Northeastern region	207,000	119,897,000	579
Southeastern region	87,000	48,467,000	557

War in-migration is estimated to have accounted for a Puget Sound gain of some 225,000 or 230,000 over 1940 population, increasing slightly the percentage of the State total residing in the region. The war has increased the Puget Sound income payment figures greatly until the present annual total of salaries, wages, interest, rent, profits, and other income is estimated at $1,250 million, and the per capita at more than $1,000. This phenomenal increase has resulted from the virtual elimination of unemployment and from longer working hours, higher rates of pay, and increased incomes from profits and property. The region has shared with the State and with the Nation in these increases, probably exceeding both in the rate of expansion.

[1] Director, Bureau of Business Research, University of Washington.

PART III

CURRENT AND ANTICIPATED PROBLEMS AND GENERAL PLANS TO MEET THEM

	Page
1. Agriculture and Agricultural Land Use.—By Ben H. Pubols and William A. Rockie	35
2. Mineral Resources.—By State Department of Conservation and Development	46
3. Forests and Forest Land Use—By Puget Sound Regional Planning Commission	52
4. Water Resources.—By Richard G. Tyler	58
5. Industry.—By Grant I. Butterbaugh	83
6. Commerce—	
A. Pattern of Commercial Activity.—By Grant I. Butterbaugh	90
B. The Trade Position of the Region.—By James C. Rettie and James E. Maxwell	93
7. Transportation and Communication.—By Transportation Committee, Puget Sound Regional Planning Commission	96
8. Urban Problems.—	
A. Communities and Facilities.—By Joshua H. Vogel	108
B. A Progressive Plan: The Tacoma Project—By Marvin R. Schafer	110
9. Housing.—By Ellis Ash	113
10. Recreational Facilities.—By Resources Committee, Puget Sound Regional Planning Commission	116
11. Medical and Public Health Services.—By Public Health Committee, Puget Sound Regional Planning Commission	125
12. Education.—By State Committee for Reorganization of School Districts	129
13. Analysis of War and Post-War Population Needs.—By Paul R. Fossum	132

PART III

1. AGRICULTURE AND AGRICULTURAL LAND USE

By Ben H. Pubols [1] and William A. Rockie [2]

Extent and Nature of Agriculture

Agriculture constitutes one of the major uses of the land of the region. It is conducted chiefly on the lowlands, river valleys, and lower uplands, extending from the Sound to the foothills of the Cascade Mountains to the east and the Olympic Mountains to the west. (See fig. 17.) Most of the agriculture is confined to elevations of less than 500 feet.

The soils are of glacial origin, and hence vary greatly in composition and quality, even within relatively short distances. The most fertile soils are to be found along the coastal plain and in the river valleys. The uplands have poorer quality soils, and hence are more limited in their adaptability to crops. The climate is mild throughout the year, but dry in summer. (See figs. 3 and 4.) Most of the agriculture is conducted under natural conditions of moisture. Soils and moisture are the two principal natural factors limiting crop production within the farming areas.

Wide variation in soils and topography has led to a jumbled pattern of prosperous, well-kept bottomland farms and impoverished, unkempt hillside "stump ranches." Frequently these extremes are found in close juxtaposition, as on opposite sides of a road running at the edge of a valley. A shoestring pattern of settlement (evident in figs. 17, 18, and 19) has made for a high cost of roads and schools in relation to value of the land in some communities. The impecunious settlers who came to the region in large numbers as a result of depression and Great Plains droughts have sought refuge on the poorer lands, aggravating a situation which was already bad. The troublesome pattern of settlement which these various factors have created and the labor and expense wasted in attempting to clear unproductive acres are matters of grave concern to the region.

Agricultural Land Use

Approximately 1,358,000 acres, representing 13.4 percent of the land area of the region, were in farms in 1940. (See table 2.) These farms comprised approximately 9 percent of the State's total farm acreage. In number, the region contained 34,590 farms, or 42 percent of the State's total. This means that the average size of farm, 36.3 acres, was considerably smaller than the State average, 185.9 acres.

TABLE 2.—*Total land area, land in farms, number of farms, and average size of farms, Puget Sound region, 1940*

County	Total land area	Land in farms	Proportion of land in farms	No. of farms	Average size of farms
	Acres	*Acres*	*Percent*		*Acres*
Clallam	1,121,920	70,844	6.3	1,226	57.8
Island	131,840	54,969	41.7	1,044	52.7
Jefferson	1,159,680	42,884	3.7	518	82.8
King	1,367,040	152,770	11.2	5,760	26.5
Kitsap	257,280	46,196	18.0	2,102	22.0
Mason	618,880	43,995	7.1	769	57.2
Pierce	1,075,200	162,747	15.1	5,622	28.9
San Juan	110,080	68,017	61.8	497	136.9
Skagit	1,110,400	152,758	13.8	3,242	47.1
Snohomish	1,344,000	188,304	14.0	6,231	80.2
Thurston	460,160	177,885	38.7	2,876	61.9
Whatcom	1,376,640	196,750	14.3	4,703	41.8
Total	10,133,120	1,358,119	13.4	34,590	36.3

Source: Census of Agriculture, 1940.

The principal uses of the land in farms are indicated in table 3. Of the total, 347,187 acres, or 26 percent, were used for crops, 200,000 acres as plowable pasture, and more than 400,000 acres as woodland, some of which provided pasture. The 12 Puget Sound counties contain more than one-fourth of the land area of the State, but only 10 percent of the land used for crops.

TABLE 3.—*Principal uses of land in farms, Puget Sound region, 1939*

County	Land used for crops	Idle or fallow cropland	Plowable pasture	Woodland	All other land	Total land in farms
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Clallam	17,512	709	12,856	26,077	13,690	70,844
Island	15,590	682	5,654	20,043	13,000	54,969
Jefferson	6,042	574	4,103	23,969	8,196	42,884
King	41,877	3,718	31,890	35,074	40,211	152,770
Kitsap	9,620	1,539	5,906	18,678	10,453	46,196
Mason	5,614	620	2,842	24,760	10,159	43,995
Pierce	34,310	4,634	20,483	48,299	55,021	162,747
San Juan	10,377	901	8,319	27,703	20,717	68,017
Skagit	59,916	1,286	26,953	38,893	25,710	152,758
Snohomish	48,563	2,576	32,176	55,777	49,212	188,304
Thurston	30,183	5,509	21,287	39,983	80,924	177,885
Whatcom	67,583	2,657	29,402	41,925	55,183	196,750
Total	347,187	25,405	201,871	401,181	382,475	1,358,119

Source: Census of Agriculture, 1940.

Figure 18 shows a generalized agricultural land classification for the entire region. Comparison with

[1] Head, Department of Farm Management and Agricultural Economics, State College of Washington.

[2] Chief, Project Plans Division, Soil Conservation Service.

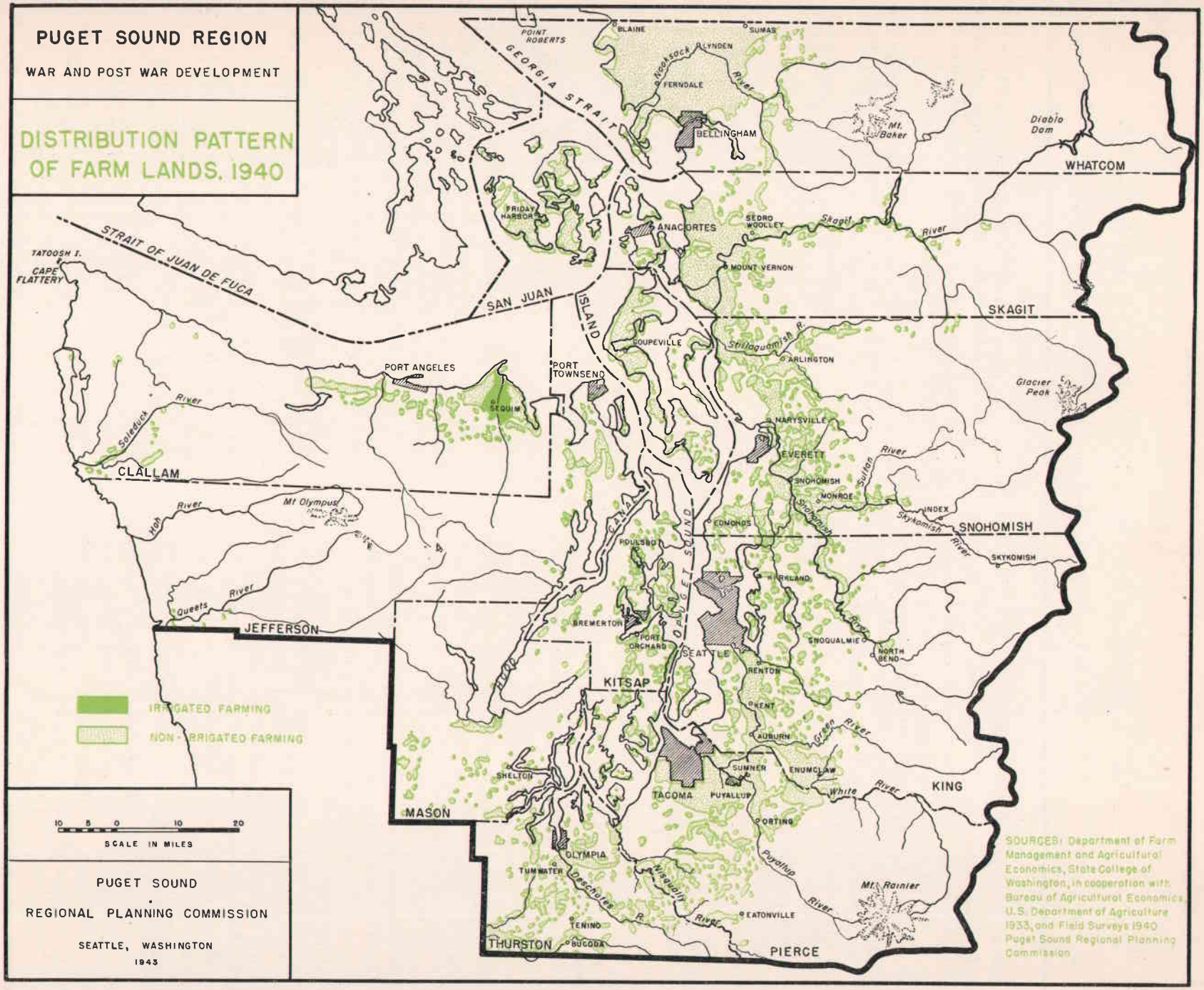

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
DISTRIBUTION PATTERN OF FARM LANDS, 1940
IRRIGATED FARMING
NON-IRRIGATED FARMING
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCES: Department of Farm Management and Agricultural Economics, State College of Washington, in cooperation with Bureau of Agricultural Economics, U.S. Department of Agriculture 1933, and Field Surveys 1940 Puget Sound Regional Planning Commission
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
Nooksack River
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
STRAIT OF JUAN DE FUCA
TATOOSH I.
CAPE FLATTERY
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
Glacier Peak
Soleduck River
NARYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
INDEX
Skykomish River
SNOHOMISH
SKYKOMISH
CLALLAM
Hoh River
Mt Olympus
EDMONDS
POULSBO
PUGET SOUND
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
AUBURN
Green River
SHELTON
SUMNER
ENUMCLAW
White River
TACOMA
PUYALLUP
KING
PORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
BUCODA
THURSTON
PIERCE

FIGURE 17.

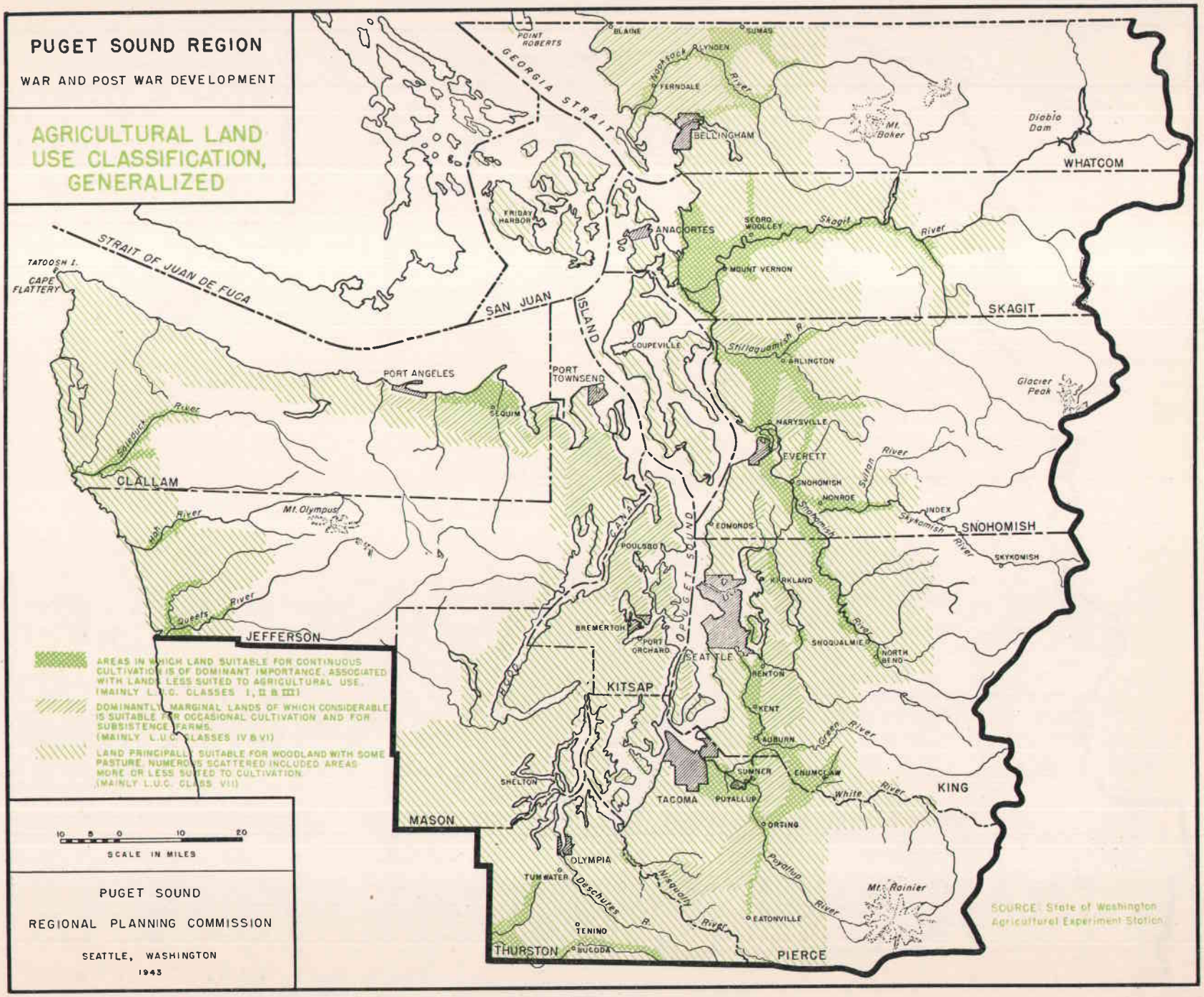

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
AGRICULTURAL LAND USE CLASSIFICATION, GENERALIZED
AREAS IN WHICH LAND SUITABLE FOR CONTINUOUS CULTIVATION IS OF DOMINANT IMPORTANCE, ASSOCIATED WITH LANDS LESS SUITED TO AGRICULTURAL USE. (MAINLY L.U.C. CLASSES I, II & III)
DOMINANTLY MARGINAL LANDS OF WHICH CONSIDERABLE IS SUITABLE FOR OCCASIONAL CULTIVATION AND FOR SUBSISTENCE FARMS. (MAINLY L.U.C. CLASSES IV & VI)
LAND PRINCIPALLY SUITABLE FOR WOODLAND WITH SOME PASTURE. NUMEROUS SCATTERED INCLUDED AREAS MORE OR LESS SUITED TO CULTIVATION. (MAINLY L.U.C. CLASS VII)
10 5 0 10 20
SCALE IN MILES
PUGET SOUND REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: State of Washington Agricultural Experiment Station
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
TATOOSH I.
CAPE FLATTERY
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
MARYSVILLE
EVERETT
Sultan River
Snohomish River
SNOHOMISH
MONROE
INDEX
Skykomish River
SKYKOMISH
Sol Duc River
CLALLAM
Mt. Olympus
Hoh River
EDMONDS
PUGET SOUND
POULSBO
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
Cedar River
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
KING
SHELTON
TACOMA
PUYALLUP
MASON
ORTING
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
TENINO
EATONVILLE
THURSTON
BUCODA
PIERCE

FIGURE 18.

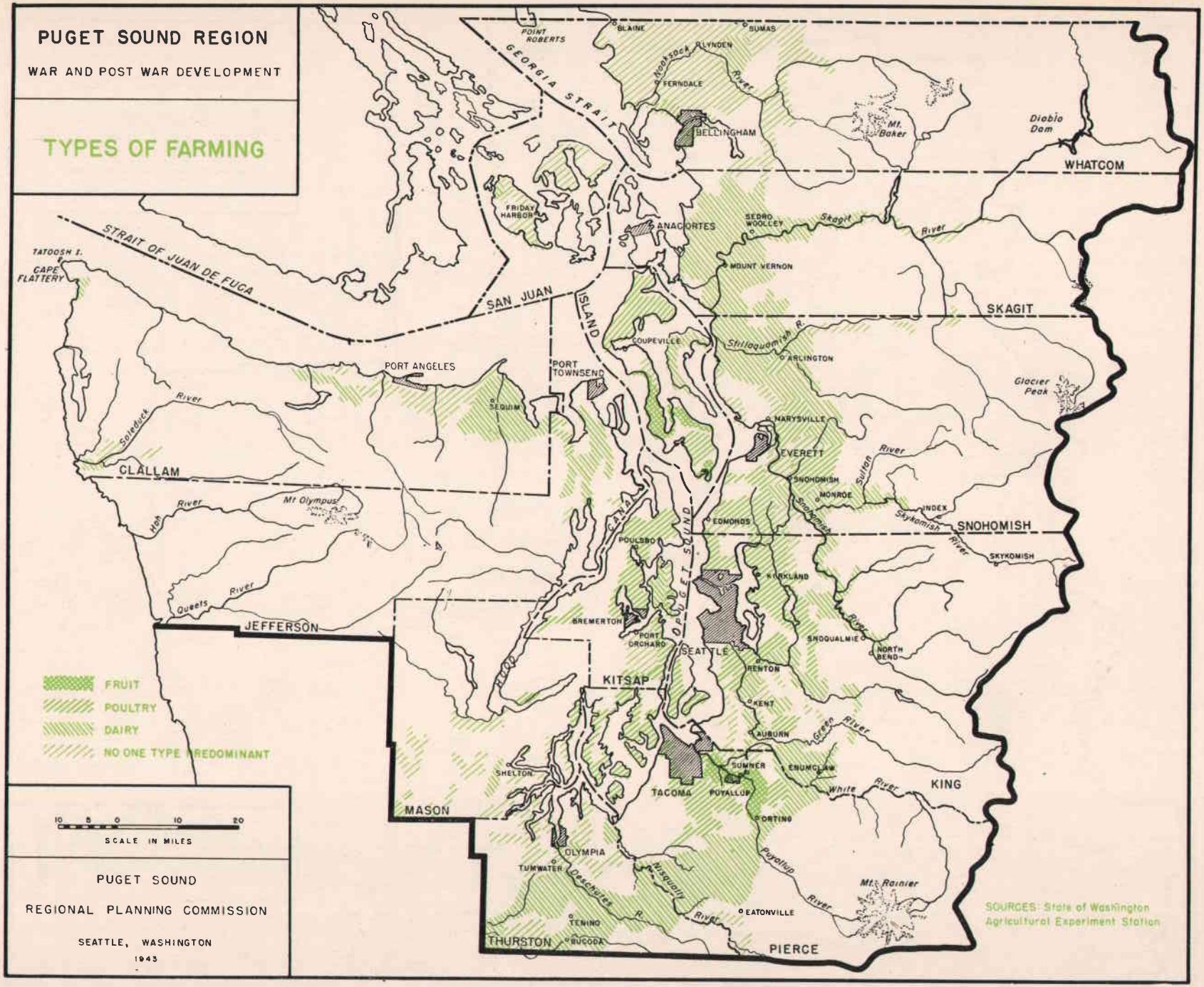

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
TYPES OF FARMING
FRUIT
POULTRY
DAIRY
NO ONE TYPE PREDOMINANT
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCES: State of Washington
Agricultural Experiment Station
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
KITSAP
MASON
THURSTON
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
PUGET SOUND
LAKE WASHINGTON
BLAINE
SUMAS
BELLINGHAM
FERNDALE
LYNDEN
ANACORTES
FRIDAY HARBOR
MOUNT VERNON
ARLINGTON
COUPEVILLE
PORT TOWNSEND
PORT ANGELES
SEQUIM
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
INDEX
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
SNOQUALMIE
NORTH BEND
SKYKOMISH
KENT
AUBURN
SUMNER
ENUMCLAW
TACOMA
PUYALLUP
ORTING
SHELTON
OLYMPIA
TUMWATER
TENINO
BUCODA
EATONVILLE
POINT ROBERTS
TATOOSH I.
CAPE FLATTERY
Nooksack River
Skagit River
Stillaguamish R.
Sultan River
Snohomish River
Skykomish River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Hoh River
Queets River
Soleduck River
Mt. Baker
Diablo Dam
Glacier Peak
Mt. Olympus
Mt. Rainier

FIGURE 19.

figures 17 and 19 demonstrates to how large an extent present development has blanketed the good land and reached out into marginal and submarginal areas little suited to agricultural use.

Agricultural Enterprises and Types of Farming

The Puget Sound agricultural land is adapted to the production of a large number of kinds of crops and livestock. Small fruits and berries are grown extensively in the Puyallup Valley, truck crops on the rich bottomland soils, vegetable seed as specialty crops, strawberries on both upland and lowland soils. Dairy cattle and poultry, including turkeys, are the principal livestock kept. Dairy and poultry farms predominate. (See fig. 19.) Many part-time farms are found in the vicinities of the larger cities, particularly Seattle and Tacoma. The cities provide ready markets for large quantities of truck crops and dairy and poultry products. Strong cooperatives exist for their marketing.

Agricultural Income

The value of farm products is shown in table 4. The total value, more than $35,000,000 in 1939, comprised 27 percent of the value of all farm products of the State. In the region, livestock and livestock products accounted for 62 percent and crops for 22 percent. King County led all others in value of farm products, while Jefferson, Mason, and San Juan were the least important agriculturally.

TABLE 4.—*Value of farm products sold, traded, or used by farm household, Puget Sound region, 1939*

County	Livestock and livestock products	Crops	Forest products	Farm products used by farm households	All farm products
Clallam	$699,604	$170,715	$27,998	$223,809	$122,126
Island	915,656	196,144	5,232	163,066	1,280,098
Jefferson	288,705	40,889	31,610	104,309	465,513
King	4,497,436	2,262,838	32,182	818,771	7,611,227
Kitsap	995,055	220,191	7,836	384,515	1,607,597
Mason	223,165	35,644	8,946	143,318	411,073
Pierce	3,135,973	1,815,603	12,458	819,247	5,783,281
San Juan	259,789	134,780	7,377	96,128	498,074
Skagit	2,432,068	1,178,508	21,686	507,408	4,139,670
Snohomish	3,254,065	707,446	32,727	856,382	4,850,620
Thurston	1,183,211	220,045	19,104	468,729	1,891,089
Whatcom	4,143,681	821,979	20,656	726,916	5,713,232
Total	22,082,408	7,804,782	227,812	5,312,598	35,373,600

Source: Census of Agriculture, 1940.

Agricultural Capital

Total value of farm real estate in 1940 was reported to be more than $166,000,000, implements and machinery, approximately $12,000,000, and livestock $15,000,000. (See table 5.) These three items of farm capital comprised approximately $200,000,000 or 28 percent of the State total. The largest total value was recorded for King County, and the smallest for Mason County.

TABLE 5.—*Value of specified items of farm capital, Puget Sound region, 1940*

County	Value of farms (land and buildings)	Value of implements and machinery	Value of livestock	Total
Clallam	$5,652,448	$440,361	$698,677	$6,791,486
Island	4,513,110	365,641	452,639	5,331,390
Jefferson	2,423,945	211,624	242,496	8,209,455
King	30,654,050	2,051,684	2,440,109	35,145,843
Kitsap	7,698,910	458,843	479,947	8,637,700
Mason	2,880,845	266,023	230,772	3,377,640
Pierce	25,981,561	1,619,690	1,720,745	29,321,996
San Juan	2,987,889	237,220	264,367	3,489,476
Skagit	20,160,915	1,450,761	2,007,342	23,619,018
Snohomish	28,520,393	1,985,532	2,362,400	32,868,325
Thurston	11,415,527	916,040	1,039,431	13,370,998
Whatcom	23,351,635	1,807,002	3,050,407	28,209,044
Total	166,241,228	11,810,421	14,989,332	198,372,371

Source: Census of Agriculture, 1940.

Land Ownership

Less than half of the total land area of the region is in private ownership (see tables 6 and 7), though it should be remembered that much of the region consists of land of no value for farming or settlement. This, chiefly in national forests, national parks, and Indian reservations (see fig. 52 and tables 8 and 9), is federally owned. State land comprises approximately 9 percent, county land 8 percent, and railroad land 3 percent of the total, leaving 41 percent in private ownership. Some 85.2 percent of farms are operated by owners.

TABLE 6.—*Land ownership, Puget Sound region*

County	Federal	State	County	Railroad	Private	Total
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Clallam	384,305	154,882	191,529	64,421	326,783	1,121,920
Island	85	6,245	15,519	0	109,991	131,840
Jefferson	630,305	192,326	127,316	32,706	177,027	1,159,680
King	340,784	77,949	32,855	135,528	779,924	1,367,040
Kitsap	7,753	15,685	49,857	0	183,985	257,280
Mason	170,823	61,869	62,406	2,870	320,912	618,880
Pierce	[1] 359,108	44,281	104,788	46,226	520,797	1,075,200
San Juan	3,060	7,227	1,490	0	98,303	110,080
Skagit	512,575	100,037	49,087	0	448,701	1,110,400
Snohomish	663,027	118,356	68,891	6,358	487,368	1,344,000
Thurston	6,352	72,646	17,995	4,299	358,868	460,160
Whatcom	886,567	45,184	84,975	0	359,914	1,376,640
Total	3,964,744	896,687	806,708	292,408	4,172,573	10,133,120

[1] Military reservations not included.

Source: National Resources Planning Board, Region IX.

TABLE 7.—*Land ownership, Puget Sound region*

County	Federal	State	County	Railroad	Private	Total
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Clallam	34.3	13.8	17.1	5.7	29.1	100.0
Island	.1	4.7	11.8	0	83.4	100.0
Jefferson	54.3	16.6	11.0	2.8	15.3	100.0
King	24.9	5.7	2.4	9.9	57.1	100.0
Kitsap	3.0	6.1	19.4	0	71.5	100.0
Mason	27.6	10.0	10.1	0.5	51.8	100.0
Pierce	33.4	4.1	9.8	4.3	48.4	100.0
San Juan	2.8	6.6	1.3	0	89.3	100.0
Skagit	46.2	9.0	4.4	.0	40.4	100.0
Snohomish	49.3	8.8	5.1	.5	36.3	100.0
Thurston	1.4	15.8	3.9	.9	78.0	100.0
Whatcom	64.4	3.3	6.2	0	26.1	100.0
Total	39.1	8.8	8.0	2.9	41.2	100.0

Source: National Resources Planning Board, Region IX.

TABLE 8.—*Distribution of federally owned land by administering agencies*

County	Forest Service	Indian Service	Public domain	National Parks	Other	Total
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Clallam	98,715	0	2,108	283,022	460	384,305
Island	0	0	20	0	65	85
Jefferson	118,126	4,489	1,472	506,168	50	630,305
King	333,734	3,751	3,294	0	5	340,784
Kitsap	0	7,486	249	0	18	7,753
Mason	130,046	4,471	751	35,555	0	170,823
Pierce	131,051	21,565	0	206,111	[1] 381	[1] 359,108
San Juan	0	0	1,319	0	1,741	3,060
Skagit	496,993	10,073	3,901	0	1,608	512,575
Snohomish	639,928	21,391	1,708	0	0	663,027
Thurston	323	5,789	240	0	0	6,352
Whatcom	865,490	16,276	4,375	0	426	886,567
Total	2,814,406	95,291	19,437	1,030,856	4,754	3,964,744

[1] Military reservations not included.

Source: National Resources Planning Board, Region IX.

TABLE 9.—*Distribution of federally owned land by administering agencies*

County	Forest Service	Indian Service	Public domain	National Parks	Other	Total
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Clallam	25.7	0	0.5	73.7	0.1	100.0
Island	0	0	23.5	0	76.5	100.0
Jefferson	18.8	0.7	.2	80.3	(1)	100.0
King	97.9	1.1	1.0	0	(1)	100.0
Kitsap	0	96.6	3.2	0	.2	100.0
Mason	76.1	2.6	.5	20.8	0	100.0
Pierce	36.5	6.0	0	57.4	.1	100.0
San Juan	0	0	43.1	0	56.9	100.0
Skagit	96.9	2.0	.8	0	.3	100.0
Snohomish	96.5	3.2	.3	0	0	100.0
Thurston	5.1	91.1	3.8	0	0	100.0
Whatcom	97.6	1.8	.5	0	.1	100.0
Total	71.0	2.4	.5	26.0	.1	100.0

[1] Less than 0.05 percent

Source: National Resources Planning Board, Region IX.

Relationship of Agriculture to Other Economies

Agriculture is intimately connected with the region's urban and industrial economies. The rural areas supply food and other materials, and provide labor and homes, for the cities and industries. Many of the manufactured products of the cities and industries find a market in the rural areas. Hence, agricultural prosperity is closely associated with that of the cities and industries.

Land Use and Conservation

Farms are actually checkerboarded and shoestringed throughout the entire portion of the region which is not in Federal ownership (see fig. 17), although conservative authorities now recognize only a very small proportion of this area as being at all suited to agriculture. (Fig. 18).

Improper use of land has been attempted in innumerable instances. Widespread exploitative removal and considerable accidental destruction of the virgin forests (succeeded by much too diligent promotional sales of the cut-over land), proximity to urban developments, and erroneous impressions of the land's capabilities were important contributing factors.

In spite of an indiscriminate lack of planned thought or care for the land, relatively little noticeable land injury has occurred. There are several reasons for this result. Much of the land that was sold for agriculture was so gravelly and droughty that the buyer quickly became aware of its unsuitability as farmland, and in most instances cleared relatively little acreage. Where soil was good the stumps were so large and so numerous and clearing was so expensive that cultivation was accomplished rather slowly. Therefore, much of the best land still remains uncleared.

Still other factors existed which tended to minimize land damage. This was nature's immediate reclamation of practically all unused land by one of the many sorts of plant cover that are common to the region; fireweed, bracken and other ferns, thistles, grasses, mosses, lichens, alders, maples, firs, and numerous other vegetative types took early possession of the land following denudation. Most of the actual land clearing has been on lands which are either flat or gently sloping. These are quite safe from most types of land damage. A large proportion of the better farm lands has resulted from diking of marshlands, followed by drainage and cultivation. Stream-bank erosion is the only important respect in which land has suffered recognized heavy losses. This is believed to be on the increase, presumably from denudation of ever-increasing acreage within the various watersheds.

In table 10, the latest available total acreages of properly cultivable lands are summarized. Some of the best lands (class I) are now in woodland or grazing use, while considerable acreages suited only to woodland or pasture are cultivated today. These maladjustments should be righted. A very minor portion of privately held lands is deemed capable of successful agricultural use. The remaining acreages have been classified from their physical characteristics as nonagricultural. This table does not include figures on the noncultivable lands (classes V to VIII), nor does it include the large block of forested Federal lands that adjoins the Puget Sound lowlands.

TABLE 10.—*Present land use and land use capability classes [1] of agricultural areas in Puget Sound region*

Counties	Class I	Class II	Class III	Subtotal for classes I, II, and III	Class IV	Total for classes I, II, III, and IV
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
	CROPLAND					
Whatcom	15,501	25,835	11,521	52,857	11,521	64,378
Skagit	20,035	23,211	9,773	53,019	7,085	60,104
Snohomish	9,002	13,345	14,100	36,447	11,991	48,438
King	6,624	13,247	8,833	28,704	11,039	39,743
Pierce	7,964	10,859	8,688	27,511	6,878	34,389
San Juan	564	1,692	4,511	6,767	3,383	10,150
Island		3,246	6,493	9,739	5,681	15,420
Thurston	6,599	11,251	10,954	28,804	5,337	34,141
Kitsap	332	2,436	3,321	6,089	3,321	9,410
Mason	617	1,299	1,851	3,767	1,542	5,309
Clallam	1,694	6,399	6,357	14,450	2,526	16,976
Jefferson		1,388	2,614	4,002	2,287	6,289
Total	68,932	114,208	89,016	272,156	72,591	344,747
	GRAZING OR PASTURE LAND					
Whatcom	3,438	9,435	7,753	20,626	6,437	27,063
Skagit	12,846	3,810	3,721	20,377	3,721	24,098
Snohomish	6,482	15,448	6,482	28,412	4,001	32,413
King	9,328	6,501	8,480	24,309	6,445	30,754
Pierce	4,694	7,041	2,934	14,669	2,582	17,251
San Juan	1,208	2,417	2,417	6,042	1,937	7,979
Island		1,464	3,221	4,685	2,343	7,028
Thurston	2,732	5,146	3,751	11,629	7,738	19,367
Kitsap	367	980	1,225	2,572	1,102	3,674
Mason		301	150	451	225	676
Clallam		3,046	2,714	5,760	2,207	7,967
Jefferson		1,043	2,033	3,076	1,017	4,093
Total	41,095	56,632	44,881	142,608	39,755	182,363
	WOODLAND					
Whatcom	293	587	587	1,467	587	2,054
Skagit	933	933	933	2,799	2,178	4,977
Snohomish	558	1,543	854	2,955	1,543	4,498
King	246	351	700	1,297	350	1,647
Pierce	773	773	386	1,932	773	2,705
Thurston					539	539
Total	2,803	4,187	3,460	10,450	5,970	16,420
Grand total	112,830	175,027	137,357	425,214	118,316	543,530

[1] Lands are classified according to their capabilities:
Suitable for cultivation:
Class I, suitable for cultivation without special practices.
Class II, suitable for cultivation with simple practices.
Class III, suitable for cultivation with intensive practices.
Class IV, suitable for cultivation with occasional cultivation.
Not suitable for cultivation:
Class V, pasture or range and/or woodland slightly susceptible to deterioration.
Class VI, pasture or range and/or woodland moderately susceptible to deterioration.
Class VII, pasture or range and/or woodland highly suceptible to deterioration.
Not suitable for productive vegetation:
Class VIII, not suitable for cultivation, for grazing or for woodland use.

Potential Cropland Expansion and Development

Proposals for agricultural land development by means of irrigation, drainage, and clearing in the Puget Sound region comprise 540,300 acres. (See table 11 and figs. 20 and 21.) About two-thirds of this amount represents new land to be brought into crop production, but less than a quarter is proposed primarily to provide additional farms. A major objective of many proposals is to relieve an existing, acute small-farm problem either by expanding cultivated acres per farm through land clearing, or by increasing the productive capacity of present cropland through drainage or supplemental irrigation.

TABLE 11.—*County classification of agricultural land development proposals by acreage, type, and purpose of development, Puget Sound region*

County	Classification [1]	Total involved	Irrigation	Drainage	Clearing
		Acres	*Acres*	*Acres*	*Acres*
Clallam	A	13,000	1,200	0	13,000
	B	25,380	5,500	0	25,380
	C	37,400	2,600	0	34,800
Total		75,780			
Island	A	0	0	0	0
	B	9,250	[2] 1,000	0	8,250
	C	0	0	0	0
Total		9,250			
Jefferson	A	7,500	0	[3]	7,500
	B	10,750	3,000	0	7,750
	C	13,700	12,000	[3]	1,700
Total		31,950			
King	A	1,200	0	0	1,200
	B	9,000	9,000	0	0
	C	0	0	0	0
Total		10,200			
Kitsap	A	620	0	320	620
	B	0	0	0	0
	C	0	0	0	0
Total		620			
Mason	A	0	0	0	0
	B	12,000	12,000	0	0
	C	25,700	0	[3]	25,700
Total		37,700			
Pierce	A	15,000	0	0	15,000
	B	6,000	[2] 6,000	0	0
	C	600	0	600	0
Total		21,600			
San Juan	A	3,000	0	200	3,000
	B	3,900	0	0	3,900
	C	700	0	0	700
Total		7,600			
Skagit	A	11,700	0	0	11,700
	B	91,000	[2] 60,000	0	31,000
	C	6,000	0	0	6,000
Total		108,700			
Snohomish	A	30,000	0	[3]	30,000
	B	25,000	[2] 20,000	3,800	1,200
	C	50,000	[2] 20,000	[3]	50,000
Total		105,000			
Thurston	A	24,000	0	4,600	24,000
	B	2,300	2,300	0	0
	C	0	0	0	0
Total		26,300			
Whatcom	A	58,700	0	[3]	58,700
	B	9,900	0	0	9,900
	C	37,000	[2] 30,000	0	7,000
Total		105,600			
Total	A	164,720			
	B	204,480			
	C	171,100			
Grand total		540,300			

[1] A. Those proposals with no apparent disqualifying limitations to feasibility.
B. Those proposals for which there are apparent minor limitations to feasibility, or for which the limited information available does not give convincing evidence of feasibility or lack of it.
C. Those proposals for which there are apparent major limitations to feasibility, or those which have been superseded by other projects or proposals, or abandoned.
[2] Largely individual irrigation systems to supplement summer rainfall.
[3] Some.

Source: National Resources Planning Board, Development of Resources and of Economic Opportunity in the Pacific Northwest. Appendix: Project Tabulations and Part II: Agricultural Land Development, Northwest. (Joint study by Bureau of Agricultural Economics and Pacific Northwest Regional Planning Commission, 1941).

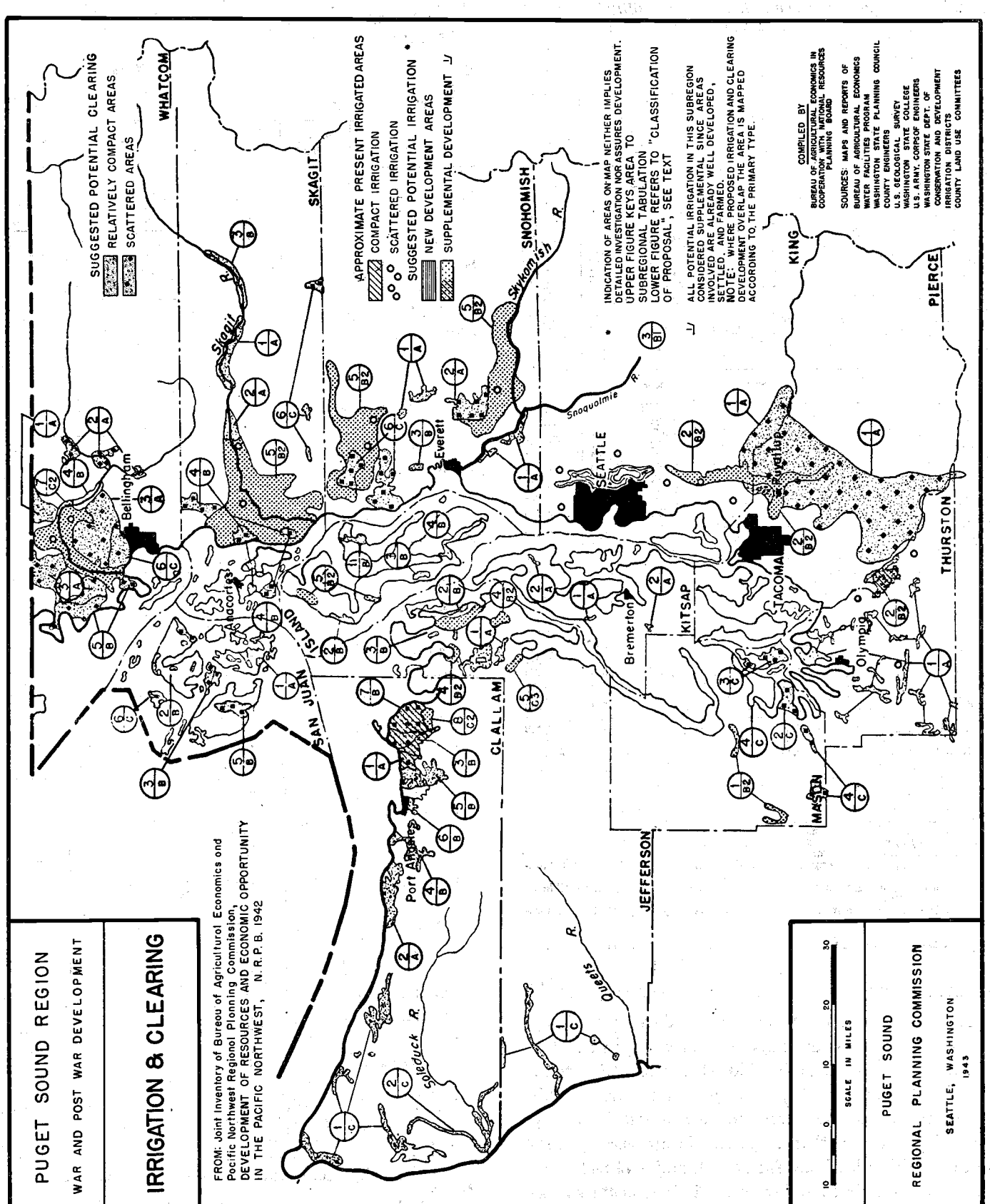

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
IRRIGATION & CLEARING
FROM: Joint Inventory of Bureau of Agricultural Economics and Pacific Northwest Regional Planning Commission, DEVELOPMENT OF RESOURCES AND ECONOMIC OPPORTUNITY IN THE PACIFIC NORTHWEST, N.R.P.B. 1942
SUGGESTED POTENTIAL CLEARING
RELATIVELY COMPACT AREAS
SCATTERED AREAS
APPROXIMATE PRESENT IRRIGATED AREAS
COMPACT IRRIGATION
SCATTERED IRRIGATION
SUGGESTED POTENTIAL IRRIGATION *
NEW DEVELOPMENT AREAS
SUPPLEMENTAL DEVELOPMENT J/
INDICATION OF AREAS ON MAP NEITHER IMPLIES DETAILED INVESTIGATION NOR ASSURES DEVELOPMENT. UPPER FIGURE KEYS AREA TO SUBREGIONAL TABULATION "CLASSIFICATION OF PROPOSAL", SEE TEXT
J/ ALL POTENTIAL IRRIGATION IN THIS SUBREGION CONSIDERED SUPPLEMENTAL SINCE AREAS INVOLVED ARE ALREADY WELL DEVELOPED, SETTLED AND FARMED.
NOTE: WHERE PROPOSED IRRIGATION AND CLEARING DEVELOPMENT OVERLAP THE AREA IS MAPPED ACCORDING TO THE PRIMARY TYPE.
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
BUREAU OF AGRICULTURAL ECONOMICS
WASHINGTON STATE PLANNING COUNCIL
COUNTY ENGINEERS
U.S. GEOLOGICAL SURVEY
WASHINGTON STATE COLLEGE
U.S. ARMY, CORPS OF ENGINEERS
WASHINGTON STATE DEPT. OF CONSERVATION AND DEVELOPMENT
IRRIGATION DISTRICTS
COUNTY LAND USE COMMITTEES
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
KITSAP
MASON
JEFFERSON
CLALLAM
SAN JUAN ISLAND
Bellingham
Anacortes
Port Angeles
Sequim
Everett
SEATTLE
Bremerton
TACOMA
Puyallup
Olympia
Skagit R.
Skykomish R.
Snoqualmie R.
Quelet R.
Coleduck R.
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 20.

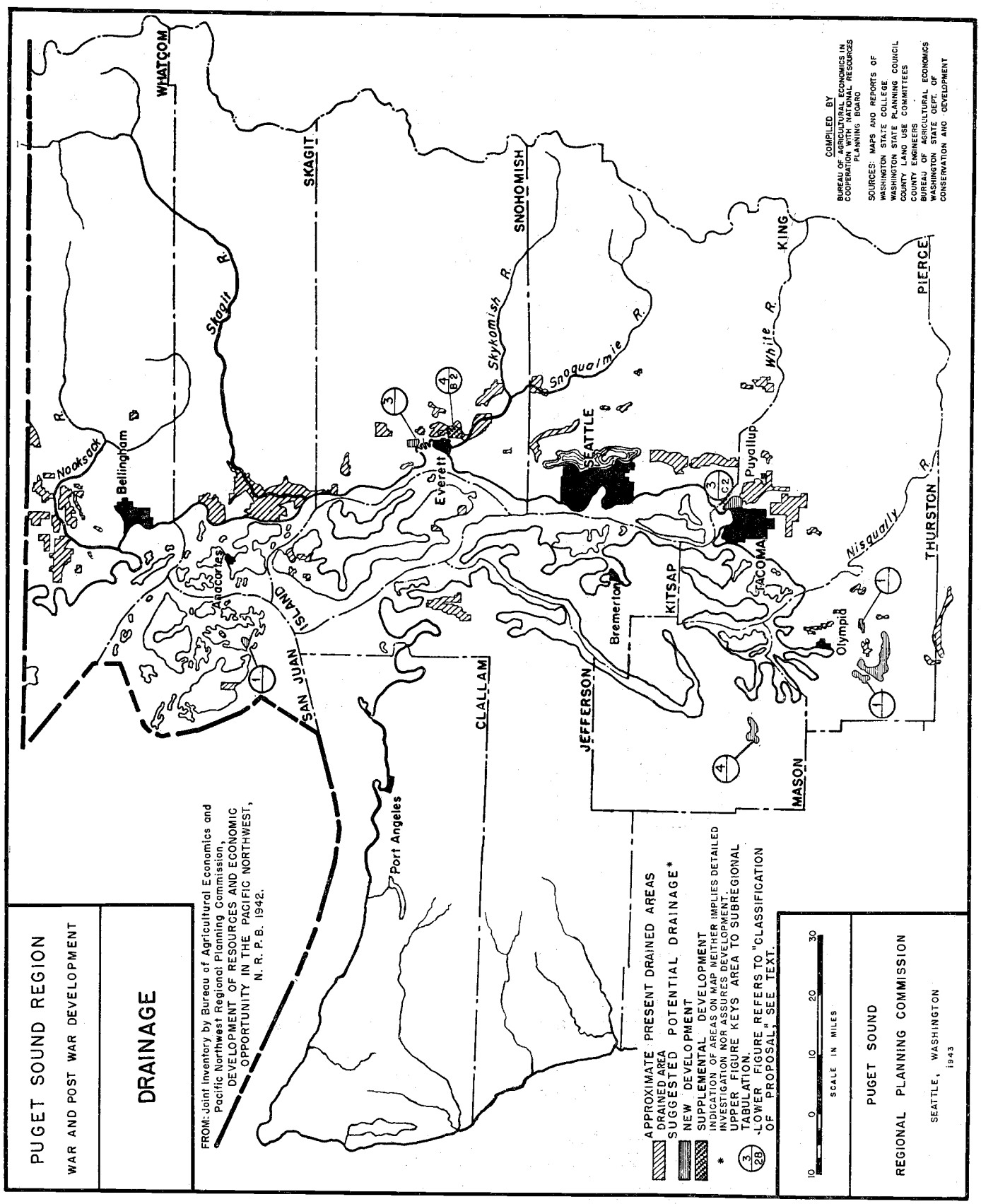

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
DRAINAGE
FROM: Joint Inventory by Bureau of Agricultural Economics and Pacific Northwest Regional Planning Commission, DEVELOPMENT OF RESOURCES AND ECONOMIC OPPORTUNITY IN THE PACIFIC NORTHWEST, N. R. P. B. 1942.
APPROXIMATE PRESENT DRAINED AREAS
DRAINED AREA SUGGESTED POTENTIAL DRAINAGE*
NEW DEVELOPMENT
SUPPLEMENTAL DEVELOPMENT
* INDICATION OF AREAS ON MAP NEITHER IMPLIES DETAILED INVESTIGATION NOR ASSURES DEVELOPMENT.
(3/2B) UPPER FIGURE KEYS AREA TO SUBREGIONAL TABULATION. LOWER FIGURE REFERS TO "CLASSIFICATION OF PROPOSAL," SEE TEXT.
10 0 10 20 30
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
COMPILED BY
BUREAU OF AGRICULTURAL ECONOMICS IN COOPERATION WITH NATIONAL RESOURCES PLANNING BOARD
SOURCES: MAPS AND REPORTS OF
WASHINGTON STATE COLLEGE
WASHINGTON STATE PLANNING COUNCIL
COUNTY LAND USE COMMITTEES
COUNTY ENGINEERS
BUREAU OF AGRICULTURAL ECONOMICS
WASHINGTON STATE DEPT. OF CONSERVATION AND DEVELOPMENT
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
Nooksack R.
Skagit R.
Stykomish R.
Snoqualmie R.
White R.
Nisqually R.
Bellingham
Anacortes
Port Angeles
Everett
SEATTLE
TACOMA
Puyallup
Bremerton
Olympia

FIGURE 21.

Land-clearing proposals (fig. 20) are concerned predominantly with cut-over upland areas and represent essentially the extent of new lands considered to have favorable possibilities for cultivation.

With the exception of 21,300 acres on the Olympic Peninsula and 2,300 acres in Thurston County, all irrigation proposals (fig 20) have in view an emphasis on sprinkler systems. Nearly all lands proposed for such irrigation are now in crop production and, in the main, represent the best agricultural lands not only in the region but in the entire Pacific Northwest. New land to come into crop production as a result of irrigation development probably would not exceed 7,000 acres.

Drainage development proposals (see fig. 21) are limited in the main to bottom-land areas. A considerable amount of the land proposed for clearing and some proposed for irrigation will require drainage as well. New lands to be brought into production through drainage development under the present proposals are quite limited, since the more economic diking and drainage developments on bottom-land soils were carried out years ago.

New Farm Possibilities

The proposals summarized in table 11 would provide for about 1,628 new farms, increasing by 4.7 percent the number of farms in the region. Of these, about 650 are included in proposals that are rated in class A. An addition of 650 farms would increase the total number in the region by 1.85 percent. The remaining thousand are about evenly divided between Class B and Class C. The feasibility of improving such land will be conditioned by the probable long-range returns in comparison with the costs. The proposed land improvements would benefit about 12,000 existing farms, or one-third of the region's 1940 total. Because of the small-farm problem it is not recommended that new farms be created by subdivision of present units. It follows, therefore, that the new farms would be on lands not now farmed.

Probable Types and Sizes of Farms

Dairying is definitely the predominant type of farming recommended for the proposed development areas. Other recommendations include poultry, small fruit production, and truck gardening. Farm woodlands are of special importance in this area and provide a desirable source of farm income. It is usually recommended that dairy farms on bottom-land soils, if favorably located with respect to markets and transportation facilities, should include 60 acres—at least one-half of which are improved cropland. Fruit or berry farming on such lands can be practiced on much smaller tracts, 10 acres being considered ample on the Puyallup River bottoms. Truck farming of an intensive type likewise requires only 10 to 15 acres of such land for a full-time farm. On the upland soils it has been suggested that a family-sized dairy farm on cut-over lands probably should contain at least 80 acres, of which 30 should be cleared for hay and grain production and 30 used for seeded stump pasture. Fruit and poultry farms in upland areas can be considerably smaller.

In marked contrast to the recommended sizes of farms, especially in the cut-over areas, stands the average sizes of present farms. Several surveys in recent years have revealed not only that the average total size of farms is small, but also that the proportion of cleared and cropped acres per farm is extremely small. On the upland cut-over areas of western Washington in 1939, about one-third of all occupied farms were less than 20 acres, and an additional 43 percent were only 20 to 45 acres. More significant, the cleared area per farm was less than 10 acres for about 75 percent of all farms and less than 2 acres for nearly one-third of all farms. The wide difference between the total acres in farms and the cropped acres indicates an opportunity, in many cases, to expand crop acres without combining farms or displacing farmers.

Classification and Cost of Proposals

Clearing proposals, especially where clearing is the sole or the primary development involved, are located almost entirely on the upland soils, accounting for the high percentage carrying B and C classifications. Probably the two most important factors hindering an accelerated clearing program are excessive cost for clearing and lack of adequate long-term credit. A study of costs under the bulldozer method reveals a range from $18 to $80 per acre, with two-thirds falling in a $39 to $57 range. The costs of preparing a field of its first seeding after the bulldozer work often exceed the initial clearing cost by 50 percent. However, much of the latter is for labor, which may be done largely by the farmer.

The preponderance of class B irrigation proposals and the few class A proposals are largely accounted for by a past lack of interest and a consequent lack of technical investigation both as to the extent of groundwater availability and the value of supplemental water to agriculture. An analysis of climatic and agronomic conditions reveals that rainfall drops off decidedly during the growing season (see figs. 3 and 4) and that crop growth is greatly retarded during midsummer drought periods. The value of irrigation will be to provide supplementary moisture to present farms during the midsummer growing season, thereby increasing yields, stabilizing production, and, if development is economical, increasing and stabilizing farm income. The cost of installing sprinkler equipment on farms in western Washington will average from $35 to $50 per acre. A

recent study found that the average investment cost on 32 such farms was $36.50 per acre.

The recommended drainage, clearing, and irrigation enterprises can be accomplished by individual action through the formation of drainage districts. A financial problem exists, however, as much of the land to be drained or reclaimed is tax-title land. A Federal program is recommended, to be set up under the Bureau of Reclamation or by the Soil Conservation Service under the Water Facilities Act. Most of the diking and drainage projects cannot be carried out until flood-control levels, the location of stream beds, etc., are determined by the Army Engineers, a task which has not been completed owing to lack of funds and congressional authorization.

War and Post-War Problems

Farmers in the Puget Sound area, like many farmers elsewhere, are experiencing acute problems arising from the war. Particularly serious is the problem of sufficient labor. Even such labor as is available can be had generally only at wages competitive with those paid by war industries, resulting in higher production costs. Unless correspondingly higher prices can be obtained for farm products, net farm incomes are reduced, or actual losses are incurred. In many cases operators of small farms have discontinued farming in favor of employment in war industry, utilizing their farms merely as residences. Shortages of equipment and materials, as of labor, are impeding production. Uncertainty concerning future availability of such items makes farming operations difficult.

Although farmers are experiencing all these difficulties and high costs because of the war, they also are obtaining higher prices for their products. The enormous growth of industries and population has created, among other things, sharply increased demands for fresh fruits, vegetables, milk, meat, and other food items.

The prospective decline in war activities will create new problems, one of which is likely to be a back-to-the-land movement. This suggests that the settlement and development of the land be carefully controlled, particularly at the close of the war, so that only the best potential agricultural land will be settled. While State of Washington laws permit county zoning regulations, they are not specific as to the control of agricultural lands and would not prevent a man from trying to grow crops on any piece of land he owns. It is recommended that a suitable amendment be adopted. Attempts along this line at the last three legislative sessions have been unsuccessful. The best method at present to prevent settlement on inferior lands is through an educational program. Where soil-conservation districts have been formed by farmers, they can restrict the use of lands.

Authorities of the respective counties and agricultural agencies can do much to direct future settlement and development of land along sound lines.

PART III

2. MINERAL RESOURCES

By State Department of Conservation and Development

The Mining Industry

The mineral resources of the region are varied and abundant and have supported an important mining industry since the earliest days. Production has varied through the years, changing with market demands and with the economics of individual operations, but in normal years the value of the regional output is approximately 40 to 50 percent of the total production for the State. The value of State production during the period 1921–40, has averaged $20,312,428 annually and has ranged from $9,387,645 in 1933 to $31,590,023 in 1939. The exact amounts produced by the 12 counties are not available for each year, but the average for the region is approximately $9,000,000 annually, a very substantial sum and one subject to marked increase with the improvement of the various factors affecting mining, particularly in the metallic field.

The metallic resources of the region comprise ores of antimony, arsenic, chromium, copper, gold, iron, lead, manganese, molybdenum, nickel, silver, titanium, and zinc. The nonmetallic resources include alunite, ceramic clays, cement materials, coal (anthracite, bituminous—both coking and free-burning—and subbituminous), diatomite, graphite, mineral pigments, mineral water, natural gas, olivine, pumicite, limestone, sand (glass and molding), silica rock, stone (granite, sandstone, and other varieties), strontium ores, structural sand and gravel, talc, and soapstone.

Potential Resources

In table 12 the principal potential mineral resources of the individual Puget Sound counties are given. The minerals, metallic ores, and aggregates recently produced are shown in italics, and the approximate percentage of the annual output for each county is given in relation to the value of the total production for the region. For brevity, the term "metallic minerals" is used to include one or more of the mineral sources of the common metals not otherwise specifically mentioned, such as gold, silver, copper, lead, and zinc.

Coal

The United States Geological Survey has estimated that the original coal reserves of Washington were approximately 64 billion tons. On this basis, some 63 billion tons remain, all in the Puget Sound region and in the adjacent Kittitas, Lewis, and Cowlitz County fields. Although such an estimate is virtually uncheckable, it is certain that, of all the Pacific Coast States, Washington has by far the largest coal resources and virtually the only coking coals of commercial importance. The significance of these reserves has been overshadowed by the development of local water power and competition from California fuel oil. Some of the coals have a high ash content, particularly those otherwise suitable for manufacture of coke. On the other hand, their sulfur content is generally low, and phosphorus is present in only moderate amounts.

The extent of the coal resources of the State is fairly well known. Much detailed information on specific localities can be found in reports of the United States Geological Survey and Bureau of Mines, as well as in bulletins of the Washington Geological Survey and State Division of Geology. The State reports deal in greater detail with the more important producing areas and give data on methods of mining, preparation of

TABLE 12.—*Mineral resources, Puget Sound region, outlined by counties*

County	Potential resources	Percentage of regional output
Clallam	Clay, coal, *gold*, limestone, *magnanese*, *mineral waters*, *sand*, *gravel*, *stone*.	Less than 1.[1]
Island	*Sand*, *gravel*, *stone*	Do.
Jefferson	Clay, limestone, manganese, *sand*, *gravel*, *stone*	Do.
King	*Clay*, *clay products*, *coal*, diatomite, *glass sand*, iron, *limestone*, *metallic*, *minerals*, *mineral waters*, peat, *portland cement*, *structural sand* and *gravel*, *molding sand*, *stone*.	45 to 55.
Kitsap	Clay, peat, sand, gravel, *stone*	1 to 2.
Mason	Clay, limestone, manganese, *sand*, *gravel*, stone	Less than 1.
Pierce	*Abrasives*, clay, *clay products*, *coal*, diatomite, limestone, *metallic minerals*, mineral pigments, *mineral waters*, *sand*, *gravel*, *stone*.	15 to 20.
San Juan	Feldspar, *lime*, *limestone*, sand, gravel, stone	2 to 4.
Skagit	*Abrasives*, asbestos, chromite, *clay*, *clay products*, coal, diatomite, graphite, iron, limestone, *metallic minerals*, nickel, olivine, *portland cement*, pumicite, *sand*, *gravel*, *silica*, *stone*, *strontium*, *soapstone*, *talc*.	10 to 20.
Snohomish	Clay, *clay products*, coal, graphite, iron, *limestone*, *metallic minerals*, *mineral waters*, *sand*, *gravel*, *stone*, sulfur.	Less than 1.
Thurston	Abrasives, clay, *coal*, mineral pigments, *sand*, *gravel*, *stone*.	1 to 2.
Whatcom	Chromite, *clay*, *coal*, diatomite, graphite, iron, *limestone*, *metallic minerals*, mineral waters, olivine, natural gas, *peat*, *portland cement*, *sand*, *gravel*, silica, *stone*.	15 to 20.

[1] Manganese production is not included in this calculation, owing to wartime restrictions.

coal, and economics of production, in addition to discussions of geologic factors. The more important facts regarding the distribution of coal resources are summarized in the following pages.

The coal fields or districts extend in a discontinuous belt along the west-slope margins of the Cascade Range in Whatcom, Skagit, King, Pierce, and Thurston Counties. Coals of all ranks from lignite to anthracite occur, but the major production is in bituminous and subbituminous varieties.

Anthracitic coal has been found near Glacier in Whatcom County, but the commercial possibilities of this field have not been demonstrated, although considerable prospecting has been done. Bituminous coal occurs in the Whatcom, Skagit, King, and Pierce County areas near the main Cascade Range. The beds of bituminous coal are sharply tilted; some are intensely folded and faulted and in some instances are intruded locally by igneous rocks. The bituminous coals include both free-burning and coking varieties. Percentages of fixed carbon and volatile matter in many seams differ decidedly within a few miles, consequently coking properties vary. The subbituminous ranks generally are found away from the foothills of the Cascade Range in regions of low relief and little geologic disturbance.

Known coking coals of the region are chiefly in the eastern part of the King County coal fields and in the Wilkeson-Carbonado-Fairfax area of Pierce County. Isolated deposits exist also in Skagit County near Cokedale, where coke was made as early as 1895, in the southern part of Pierce County, near Ashford, and probably in sections of Whatcom County. However, these deposits have no significance at present in connection with projected operations. The eastern King County areas tentatively must be classed as of secondary interest because of the limited extent of known coking coals and lack of actual coking tests. The Pierce County area around Wilkeson, Carbonado, and Fairfax remains the principal source of coal suitable in quantity and quality for coking, though the possibility of utilizing coking coals from the adjacent Kittitas County field for blending must not be overlooked.

Table 13 indicates the present readily available tonnage from developed mines in the principal coal counties of the region. Many billions of tons of coal exist in undeveloped beds.

TABLE 13.—*Readily available coal tonnage*

County	Number principal mines	Rank of coal	Ash		Available from mines[1] (million tons)	Estimated cost of mine plant and washery		Mining cost (per ton)	Washing cost (per ton)	Estimated selling price of coal at the mine (per ton)
			Run-of-mine coal (percent)	Washed coal (percent)		Cost	Daily production (tons)			
King	38	Subbituminous Bituminous	5 to 20	4 to 18	[2] 130	$100,000 $350,000 to $400,000	200 500 to 800	$2.45 to $3.25	$0.25 to $0.35	$2.95 to $3.75.
Pierce	16	Bituminous Semibituminous[4]	15 to 20	8 to 14	[3] 164	$50,000 $500,000	200 1,000	$2.90 to $3.90	$0.25 to $0.40	$3.40 to $4.40.
Thurston	6	Subbituminous	8 to 14	7 to 10	41	Unknown		$1.50 to $1.90	$0.20 to $0.25	$2.35 to $2.70.
Whatcom	2	Subbituminous Anthracite	18 to 30	15 to 19	15	$150,000 to $350,000 Unknown	300 to 1,000	$2.25 to $2.50	$0.25	$3.05 to $3.25. $3.50 to $4.

[1] Much coal in addition to these amounts is available but undeveloped.
[2] Includes 200,000 tons of stripping and 9,000,000 tons of water-level coal.
[3] Includes 7,000,000 tons of water-level coal.
[4] Coking grade.

Source: From data supplied by Geo. W. Evans.

Location of Deposits

Certain broad generalizations can be made regarding the areas and geologic formations in which various mineral resources occur. The value of these more or less theoretical considerations may be materially increased by the addition of information on the location and nature of existing mines and quarries. These data have been assembled on figures 22 and 23. It must be realized, of course, that some overlapping of resource areas is always present and that occasional isolated occurrences may be outside the areas designated.

Mineral sources of gold, silver, copper, lead, zinc, nickel, iron, and a few other metallic elements are found chiefly in an area of Paleozoic metamorphic rocks that have been intruded by acidic, granitoid rocks of Mesozoic or younger age. Limestone, talc, soapstone, and some additional nonmetallic minerals are also largely associated with these metamorphic rocks and confined to this area. It forms the eastern part of the region and extends westward to include the San Juan Islands and an adjacent portion of the mainland. (See fig. 22.)

Chromium, as chromite, occurs principally in certain basic intrusive rocks (chiefly olivine) of Mesozoic age that compose the Twin Sisters Mountains of Whatcom and Skagit Counties and most of Cypress Island in Skagit County. (See fig. 22.)

Manganese, as bementite, and as the valuable but scarce hausmannite, occurs in a thick series of more or less altered basic volcanic rocks and interbedded argillites and siliceous limestones of Eocene age that forms an irregular belt around the north, east, and south sides of the Olympic Peninsula (see fig. 22.)

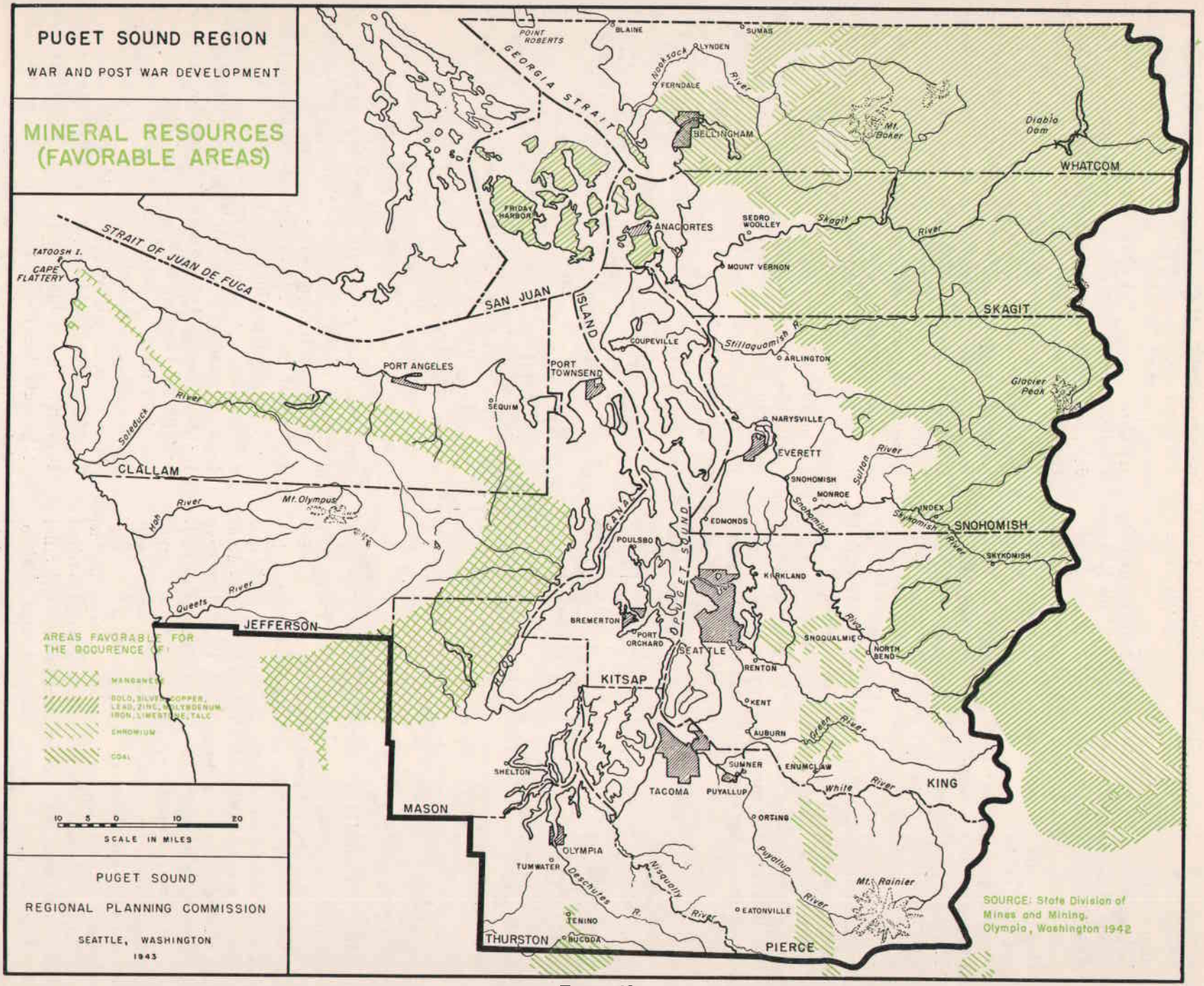

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
MINERAL RESOURCES
(FAVORABLE AREAS)
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
Nooksack River
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
STRAIT OF JUAN DE FUCA
TATOOSH I.
CAPE FLATTERY
SAN JUAN ISLAND
COUPEVILLE
Stillaquamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
Soleduck River
CLALLAM
NARSYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
Snohomish River
INDEX
Skykomish River
SNOHOMISH
Hoh River
Mt. Olympus
EDMONDS
POULSBO
SKYKOMISH
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
AUBURN
Green River
SHELTON
SUMNER
ENUMCLAW
White River
KING
TACOMA
PUYALLUP
MASON
ORTING
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
BUCODA
THURSTON
PIERCE
AREAS FAVORABLE FOR THE OCCURENCE OF:
MANGANESE
GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, IRON, LIMESTONE, TALC
CHROMIUM
COAL
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: State Division of Mines and Mining, Olympia, Washington 1942

FIGURE 22.

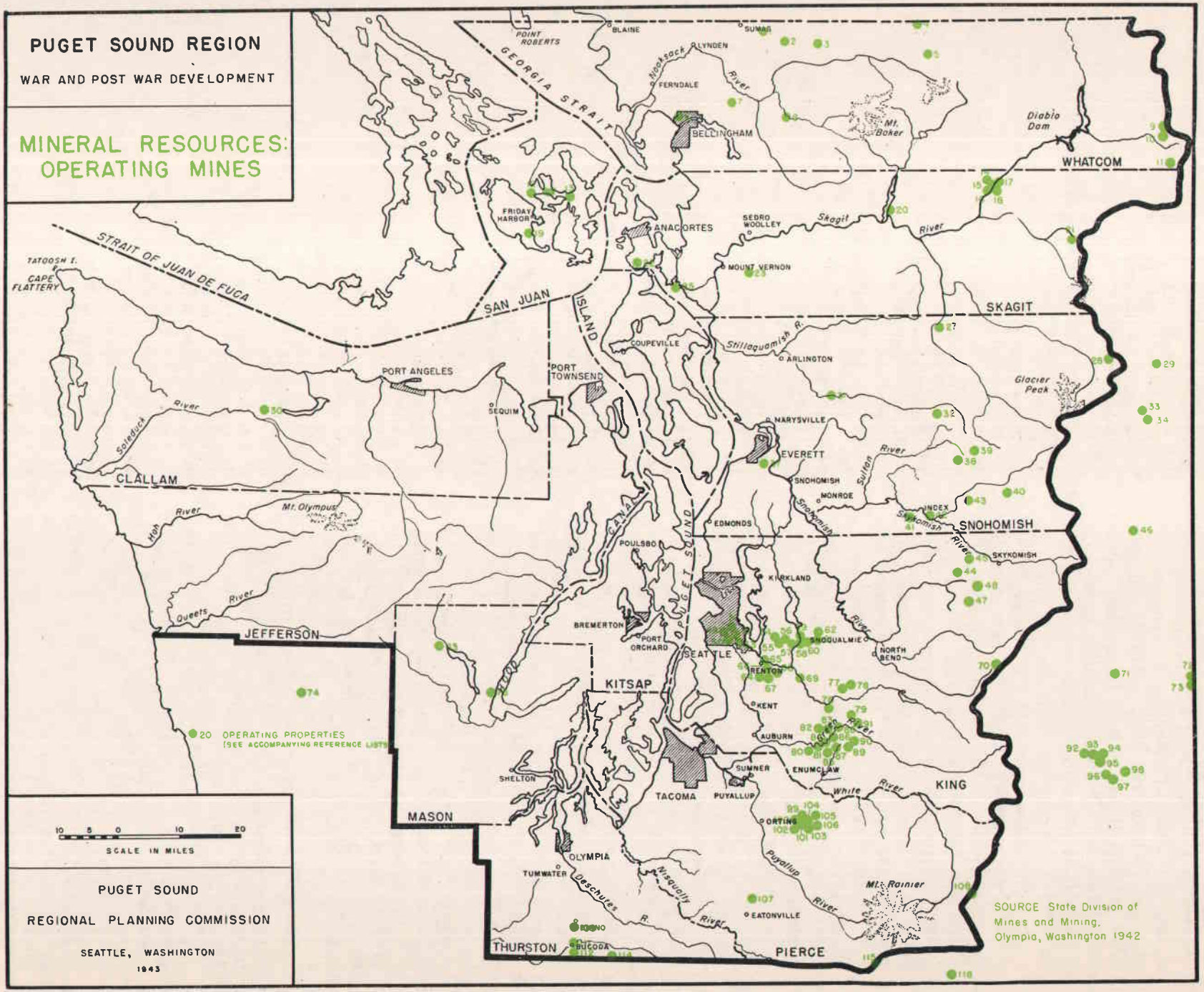

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
MINERAL RESOURCES:
OPERATING MINES
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
Nooksack River
FERNDALE
GEORGIA STRAIT
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
TATOOSH I.
CAPE FLATTERY
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
MARYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
Snoqualmie River
INDEX
Soleduck River
CLALLAM
Mt. Olympus
Hoh River
EDMONDS
POULSBO
SNOHOMISH
SKYKOMISH
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
AUBURN
SUMNER
ENUMCLAW
White River
SHELTON
TACOMA
PUYALLUP
KING
MASON
ORTING
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
THURSTON
PIERCE
20 OPERATING PROPERTIES
(SEE ACCOMPANYING REFERENCE LIST)
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE State Division of
Mines and Mining,
Olympia, Washington 1942

FIGURE 23.

Coal is one of the most important resources of the region and occurs in King, Pierce, Skagit, Thurston, and Whatcom Counties. Lesser amounts, of unproved value, are in Clallam and Snohomish Counties. In the principal fields the coal is in either the Chuckanut or Puget formations, each of Eocene age. (See fig. 22.) These same formations contain high-grade clays, usable for refractory ceramic wares.

Clay suitable for common brick, tile, and ordinary red-fired structural materials is plentiful in the Pleistocene and Recent sedimentary beds that occur throughout most of the region; structural sand and gravel deposits are also abundant in these beds. The area in which these important resources occur is not specifically indicated, as it is too irregular in outline, but it includes most of the land of relatively low elevation adjacent to Puget Sound and also the lower valleys of the principal rivers draining into the sound.

Places where the metallic and nonmetallic resources of the region are being mined or otherwise developed are shown on figure 23 by circles. Numbers adjacent to the circles correspond to those given in numerical order on the reference list of mining operations (table 14). All concerns operating at present or as recently as 1941 are given, together with a few that expect to commence operation in the near future. The only known exceptions are the sand, gravel, and stone operators; many of these are fairly permanent and could be shown, but others are working in temporary pits, and locations are subject to change. Additional information on these operators, giving addresses and products, is included in State Division of Mines and Mining Information Circular No. 8, *Directory of Washington Mining Operations*, by Ward Carithers, 1943.

For further and detailed information on geology, mineral resources, and mining operations reference may be made to the long list of reports given in Bulletin No. 35 of the State Division of Geology, *Bibliography and Index of Geology and Mineral Resources of Washington*, by W. A. G. Bennett, 1939.

TABLE 14.—*Mining Operations (See fig. 23)*

1. Gladding, McBean & Co.
2. The Olympic Portland Cement Co., Ltd.
3. Maple Falls Lime Quarry.
4. Boundary Red Mountain Mine.
5. Silver Tip Mine.
6. Bellingham Coal Mines.
7. West Coast Coal Mines, Inc.
8. Washington Peat Moss Co.
9. Slate Creek Mining Co.
10. Indiana Mine.
11. Azurite Gold Co.
12. Roche Harbor Lime & Cement Co.
13. Manufacturers Mineral Co.
14. Skagit Mineral Products Co., Inc.
15. Skagit Mineral Products Co., Inc.
16. Skagit Mineral Products Co., Inc.
17. Skagit Mineral Products Co., Inc.
18. Skagit Talc, Inc.
19. The Olympic Portland Cement Co., Ltd.
20. Superior Portland Cement, Inc.
21. Benz Affiliated Realty Co.
22. Manganese Mining & Mfg., Inc.
23. Knapp Brick & Tile Co.
24. Northwest Talc & Magnesium Corporation.
25. Manufacturers Mineral Co.
26. Jack, J. A.
27. Pacific Nickel Co.
28. Hanna, M. A., Co.
29. Howe Sound Co.
30. Sunshine Mining Co.
31. Everett Lime Co.
32. Ore Recoveries Corporation.
33. Royal Development Co.
34. Scholze, Joe.
35. Sol Duc Hot Springs.
36. Olympic Hot Springs.
37. Everett Brick Yard.
38. Florence Rae Mine.
39. Utility Mining Co.
40. Garland Mineral Springs.
41. Consumers Lime Co.
42. Manufacturers Mineral Co.
43. Kromona Mines, Inc.
44. Apex Gold Mines, Inc.
45. Northwestern Portland Cement Co.
46. Skagit Mineral Products Co., Inc.
47. Cleopatra Mine.
48. Coney Basin Gold Mines, Inc.
49. Abrahamson Brick Co.
50. Northwest Pottery Co.
51. Builders Brick Co.
52. Seattle Brick & Tile Co.
53. Washington Pottery Co.
54. Gladding, McBean & Co.
55. Strain Coal Co.
56. B. & R. Coal Co.
57. Bianco Coal Mines Co.
58. B. & R. Coal Co.
59. Harris Coal Co.
60. Gladding, McBean & Co.
61. B. & R. Coal Co.
62. Gladding, McBean & Co.
63. Manganese Mining & Mfg., Inc.
64. Spring Brook Mining Co.
65. Spring Glenn Coal Co.
67. Renton Mining Co., Inc.
68. New Lake Young Coal Co.
69. Consolidated Coal Mines, Inc.
70. Goldmeyer Hot Springs
71. Skipper Chrome Mining Co.
72. Pole Pick No. 1 Mine.
73. Blewett Mine (Black Jack).
74. Cook Creek Manganese Mines.
75. Olympic Mines, Inc.
76. Palmer Coking Coal Co.
77. Gladding, McBean & Co.
79. Big Four Coal Co.
80. Smith Bros. Silica Sand Co.
82. Anderson Coal Mines, Inc.
83. Continental Coal Mines, Inc.

84. O'Kay Coal Co.
85. Green River Coal Co.
86. Pacific Coast Coal Co.
87. Franklin Gem Coal Co.
88. Hi-Heat Coal Co.
89. National Coal Co.
90. Carbon Fuel Co.
91. Palmer Coking Coal Co.
92. Jonesville Coal Co.
93. Lake Coal Co.
94. Roslyn-Cascade Coal Co.
95. Northwestern Improvement Co.
96. Northwestern Improvement Co.
97. Northwestern Improvement Co.
98. Cle Elum Coal Co.
99. East Miller Coal Co.
100. Queen Coal Co.
101. Wilkeson Miller Coal Co.
102. Wilkeson Wingate Coal Co.
103. Apex Coal Co.
104. Dependable Wingate Coal Co.
105. Walker Cut Stone Co.
106. Gale Creek Coal Co.
107. Far West Brick, Tile & Clay Co.
108. Silver Creek Gold & Lead Corporation.
109. Western Quarry Co.
110. Stoker Coal Mining Co.
111. Boxer Coal Co.
112. Bucoda Coal Mining Co.
113. Black Prince Coal Co.
114. Majestic Coal & Mining Co.
115. Longmire Springs.
116. Ohanapecosh Hot Springs.
117. Golden Glow Coal Co.
118. Monarch Coal Mining Co.

PART III

3. FORESTS AND FOREST LAND USE

By Puget Sound Regional Planning Commission

Present Status of Forest Resources

The vast forests which the early settlers found were looked upon chiefly as impediments because the trees first had to be cleared from the land before it could be cultivated. These same forests have in a large measure been responsible for the phenomenal growth in population and development of the region. However, the end of the Douglas fir industry on anything like the past scale is in sight, as evidenced by the migration of loggers to the virgin forests of other regions. The scarcity of accessible timber is forcing the independent logger from Puget Sound. In order for the mills to assure themselves of a supply of raw material, they have been forced to buy stumpage and do their own logging as well as contract for logging. Though smaller than formerly, owing to migration and mortality, milling capacity is far in excess of the sustained supply.

As logging has progressed into the mountains, the percentage of Douglas fir, which has been the mainstay of the industry, has decreased, with a consequent increase in the percentage of pulp species. The building of pulp mills several years ago helped to compensate for the decrease in the cut of lumber. There are sufficient quantities of pulp material to maintain the existing plants and several additional ones in perpetuity if our forest land is managed properly. The plywood mills have found great difficulty in obtaining quality logs, and in their efforts to obtain this material, stumpage prices have advanced to unprecedented heights. The establishment of many new plywood plants in other areas during the past 4 or 5 years indicates the trend.

With logging operations retreating toward the rougher topography of the higher mountains, the salvaging of poles and piling become increasingly more difficult and expensive. Past inadequate protection of the cut-over lands in this area has limited the growth, which by now should have produced trees of a size suitable for piling, and consequently the poles and piling stands that are available are in great demand and command a high stumpage price. Piling is particularly in demand during the war, and stands are being cut which are at the period of greatest growth and which normally should not be cut.

There is plenty of wood available for fuel in this area if it could be delivered to the consumer. However, inaccessibility and wasteful logging methods, which leave this material scattered through cut-over areas, together with high logging and transportation costs, largely preclude its use in the centers of population. The practice of broadcast-burning to remove the tremendous fire hazard left after a clear-cut logging operation, unfortunately, destroys much material which would be suitable for fuel.

The region is better suited to conifers than to the hardwoods. (See fig. 24.) However, along some of the river bottoms, alder and maple have flourished, furnishing the raw material for furniture and woodworking plants. This is a minor but nevertheless very important part of the economy, because it involves local remanufacturing.

Over the years there has been a gradual betterment in methods for protection of cut-over lands from fire. This has resulted in large areas of young trees, but these trees will not be of merchantable size for several decades. The drain on trees of merchantable size has been about treble the amount of growth of usable material. The war has called for an increase in the cut and forced many of the more accessible remaining stands of timber on the market. While this overcutting during the war is a necessity, its inevitable effect is to hasten the day when other means must be found to employ the labor which will be displaced with the closing down of wood-using plants. The remaining private timber is owned by a comparatively few companies who will probably wish to use it to extend the life of their own operations. This will result in forcing many of the smaller concerns to withdraw or seek timber in other areas. The annual cut can be expected to decrease materially with closing of these operations.

Forest Protection

The State has been progressive in getting forest protection laws on its statute books. There have been, however, far too many fires, particularly in the early spring and fall when fires do much damage in killing trees too small to be noticed. The public has yet to become educated to the necessity of protecting these small trees and has been for too complacent in its acceptance of disastrous fires as inevitable. With

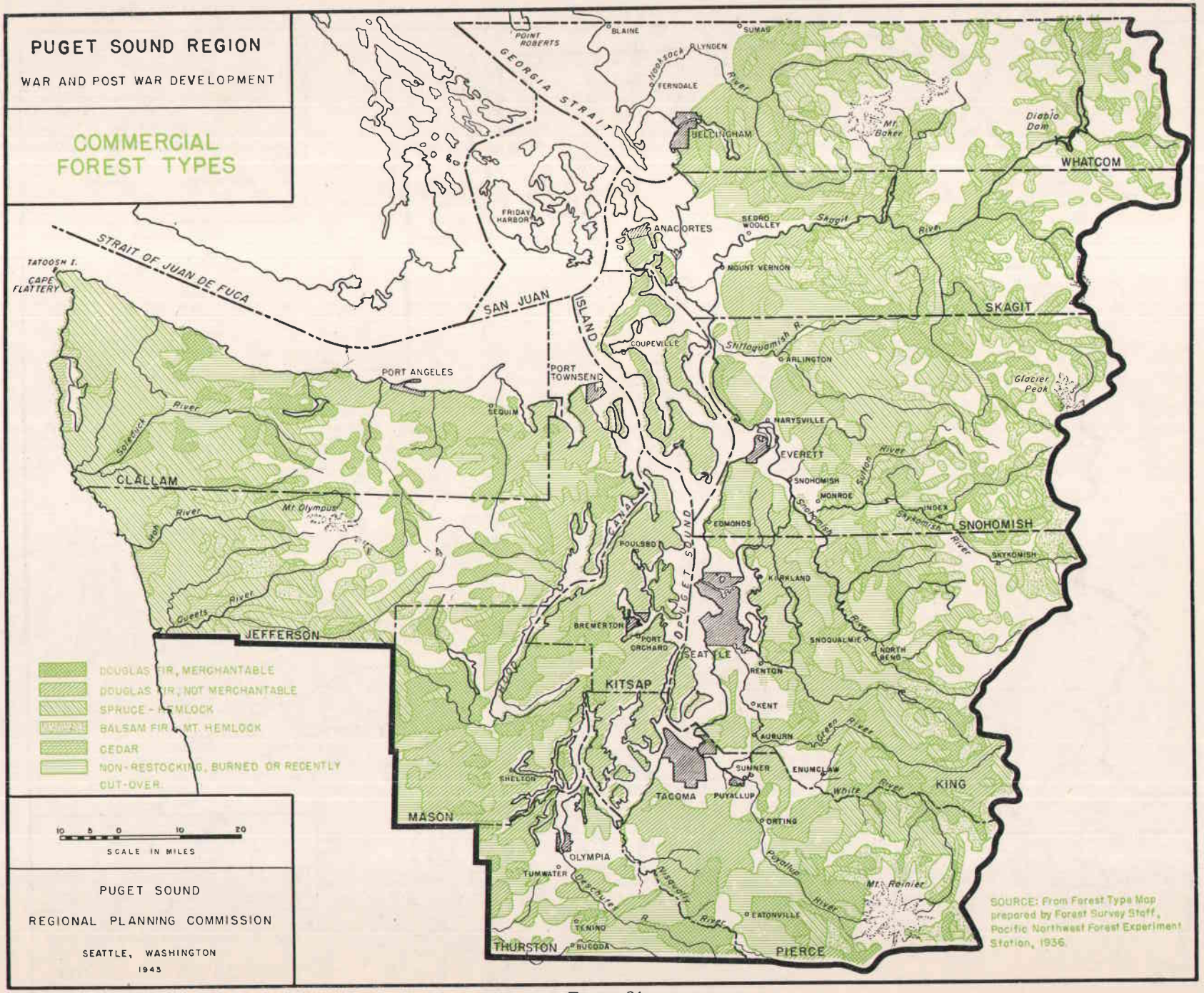

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
COMMERCIAL FOREST TYPES
DOUGLAS FIR, MERCHANTABLE
DOUGLAS FIR, NOT MERCHANTABLE
SPRUCE - HEMLOCK
BALSAM FIR - MT. HEMLOCK
CEDAR
NON-RESTOCKING, BURNED OR RECENTLY CUT-OVER.
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: From Forest Type Map prepared by Forest Survey Staff, Pacific Northwest Forest Experiment Station, 1936.
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN ISLAND
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
PUGET SOUND
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
MOUNT VERNON
COUPEVILLE
PORT ANGELES
PORT TOWNSEND
SEQUIM
ARLINGTON
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
SNOQUALMIE
NORTH BEND
SKYKOMISH
INDEX
KENT
AUBURN
SUMNER
ENUMCLAW
TACOMA
PUYALLUP
ORTING
SHELTON
OLYMPIA
TUMWATER
TENINO
BUCODA
EATONVILLE
TATOOSH I.
CAPE FLATTERY
Mt. Olympus
Mt. Rainier
Mt. Baker
Glacier Peak
Diablo Dam
Nooksack River
Skagit River
Stillaguamish R.
Sol Duc River
Hoh River
Queets River
Quillayute River
Snohomish River
Skykomish River
Snoqualmie River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Sultan River
HOOD CANAL
PUGET SOUND

FIGURE 24.

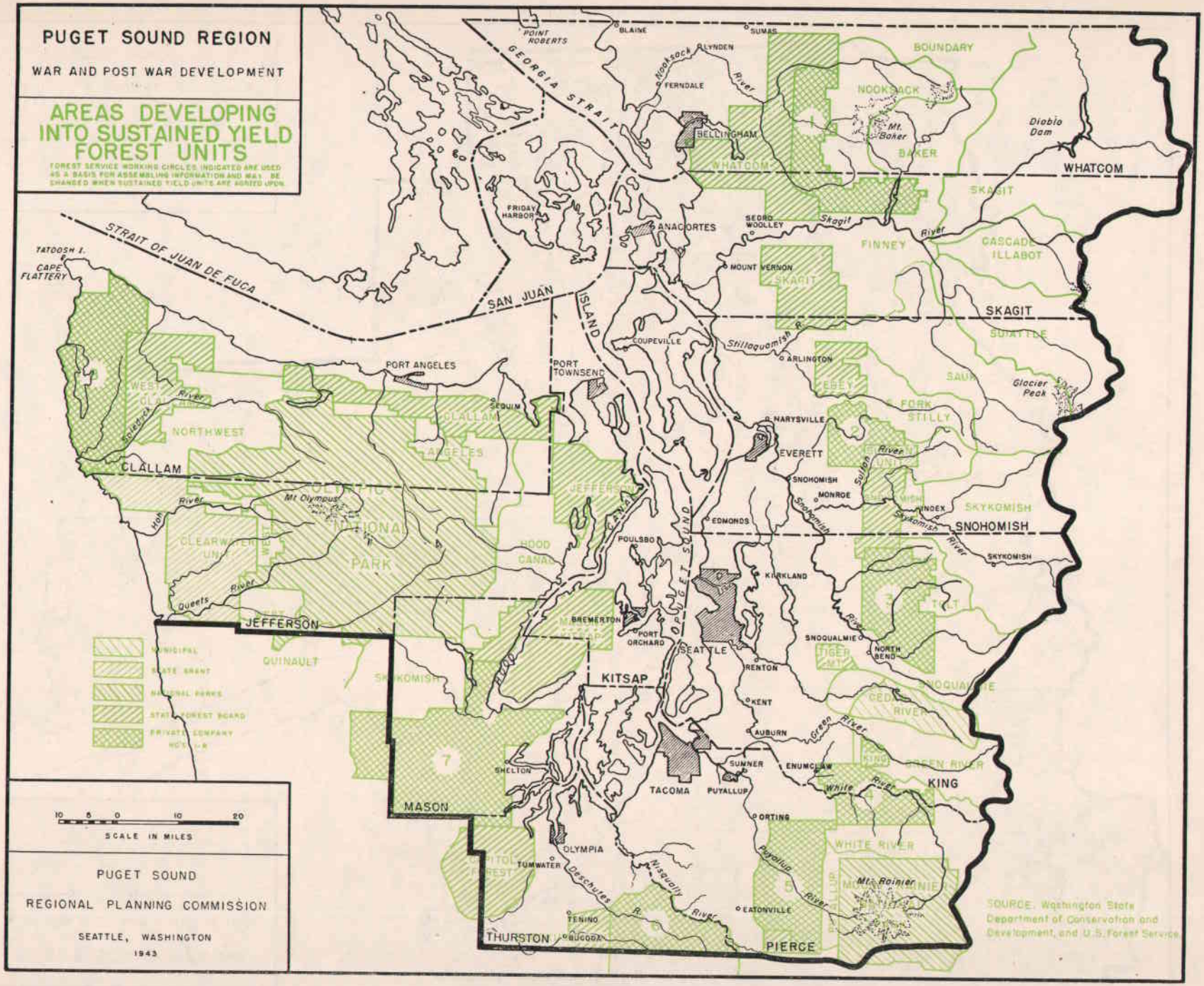

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
AREAS DEVELOPING INTO SUSTAINED YIELD FOREST UNITS
FOREST SERVICE WORKING CIRCLES INDICATED ARE USED AS A BASIS FOR ASSEMBLING INFORMATION AND MAY BE CHANGED WHEN SUSTAINED YIELD UNITS ARE AGREED UPON
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
PUGET SOUND
HOOD CANAL
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
FRIDAY HARBOR
ANACORTES
MOUNT VERNON
COUPEVILLE
PORT ANGELES
PORT TOWNSEND
SEQUIM
ARLINGTON
NARSYSVILLE
EVERETT
SNOHOMISH
MONROE
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
SNOQUALMIE
NORTH BEND
KENT
AUBURN
SUMNER
ENUMCLAW
TACOMA
PUYALLUP
ORTING
SHELTON
OLYMPIA
TUMWATER
TENINO
BUCODA
EATONVILLE
CLALLAM
JEFFERSON
KITSAP
MASON
THURSTON
PIERCE
KING
SNOHOMISH
SKAGIT
WHATCOM
BOUNDARY
NOOKSACK
BAKER
FINNEY
CASCADE ILLABOT
SUIATTLE
SAUK
STILLY
SKYKOMISH
GREEN RIVER
WHITE RIVER
QUINAULT
OLYMPIC NATIONAL PARK
CLEARWATER UNIT
NORTHWEST
Mt. Baker
Diablo Dam
Glacier Peak
Mt Olympus
Mt. Rainier
Nooksack River
Skagit River
Stillaquamish R.
Sultan River
Snohomish River
Skykomish River
Snoqualmie River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Hoh River
Queets River
Quillayute River
Sol Duc River
MUNICIPAL
STATE GRANT
NATIONAL PARKS
STATE FOREST BOARD
PRIVATE COMPANY
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Washington State Department of Conservation and Development, and U.S. Forest Service

FIGURE 25.

strong public support the protection laws could be made more effective, so as to assure necessary forest products for future generations.

Rehabilitation

In this area there are many thousands of acres which have been burned repeatedly and on which there is no chance of establishing a commercial forest in a reasonable time without planting. The State does not have an adequate forest policy covering the management of its lands. Unfortunately, an attempt in the last legislature to establish such a policy of management failed. Through the CCC, the State several years ago established a tree nursery near Olympia capable of growing four or five million trees per year. With the discontinuance of the CCC and the advent of war, it has been impractical to consider extensive planting. However, as a part of the after-the-war work program, the planting of denuded areas should be given high priority. Existing nurseries should get into full production and additional nurseries be established.

Some of the larger timber operators have adopted forest practices which, if carried through, should result in a continuous forest crop on large areas of land. One handicap is the lack of any law allowing public regulation of cutting practices. As a result many of the smaller operators are not giving the growth of a second crop any consideration. Private timber interests have established a tree nursery at Nisqually. This, however, is not a complete answer to the problem since only five or six thousand acres could be planted each year with the trees produced, and these will be required to supply only a few of the major operators. The land cut over each year in western Washington is several times this amount. Strictly speaking there are no private sustained-yield units in operation in the region although as indicated above several operators are taking steps in this direction. The cut on national forest lands is limited to the sustained yield. The State also has a sustained-yield unit in the Sultan and Pilchuck drainages. Private areas where sustained yield should be given consideration have been indicated on figure 25.

Industrial Plans

The future of the forest industry in the Puget Sound region is somewhat uncertain, but changes are inevitable. It is predicted that sawlog production will decline greatly during the next two or three decades. As competition from the virgin forests to the south becomes keener, plants will either move south, or some means will have to be found for cheap transportation of raw materials to Puget Sound plants. Considerable advance has already been made in the remanufacture of low-grade material into high-value material through lamination. Some industries of this type will undoubtedly utilize the younger stands of timber, but until the accessible virgin timber on the West Coast is exhausted, competition from better stocked areas will be extremely difficult to meet and great ingenuity will be needed to utilize and manage the remaining timber resource to the end that the greatest use can be made of local labor.

In 1935 labor received about $9 for every thousand board feet of lumber produced. This has increased to about $12 under war prices. It has been estimated that there are at least 10,000 more employees in the forest products industry in this area than there were ten years ago, principally because of the improvement in general economic conditions, but due also to local remanufacture of additional forest products of which plywood is the most important. Recent estimates of the labor force (January 1943) show 42,000 in direct employment in forestry and the manufacture of wood products. There are, in addition, many other employees indirectly dependent upon the forest industry, serving it with transportation, supplies, etc.

Program

Any program for making the forests of the region continuously productive and thereby assuring to industrial communities a reasonably stable supply of raw material, conflicts with urgent present demands, largely war demands that are difficult to deny. The immediate post-war need is to shift from liquidation to sustained-yield forest management or at least to practices which will insure considerable continued productivity on areas where forest conditions are favorable, without dislocation of labor and commerce. Although the immediate effect of curtailing forest exploitation will be reduced employment, the desirability of such curtailment from a long-time point of view is beyond dispute. Management to insure continued productivity must be instituted on all commercial forest land regardless of ownership. It is highly desirable that sustained-yield plans for all forest areas be formulated and initiated at once, because of the possible effect of such a policy on cutting of public timber, merging of private properties, establishment of new industrial plants, State legislative action, construction of public improvements, etc.

Obviously, stabilization of ownership and other economic readjustments are necessary before sustained-yield management can be generally adopted in the region. All Federal forest land chiefly valuable for commercial timber production should be managed under a uniform policy. All cutting on public land should be on a sustained-yield basis. Considerable forest land now privately owned will pass into public ownership through tax delinquencies. These should be classified promptly as to most suitable use and own-

ership. Forest lands judged suitable for public use and ownership should be transferred to the State forest agency, and those within national forest boundaries and national forest exchange limits should then be transferred to the Forest Service in exchange for Federal lands inside State forest units. Federal, State, and private holdings should be exchanged and consolidated to improve the extremely patchy pattern of forest land ownership now common. Private timberland owners, both operating and nonoperating, should be urged to merge their holdings so as to form properties of a size and compactness that will promote sound financing and efficient management for continuous production.

As a basis for intelligent land-use planning, classification of rural lands should be undertaken immediately by Federal and State agencies, acting jointly. Following this classification, adequate zoning laws should be enacted, and should be effectively administered.

All timber on public forest lands, Federal, State, or county, now reserved or to be reserved exclusively for intensive recreational use should be omitted from sustained-yield calculations and reserved from cutting except for salvage. An urgent phase of the State forest land program is the acquisition of timber strips along main highways. This should be carried out immediately. Whatever the ultimate plan for handling tax-forfeited lands may be, the State should at least insist that such county-owned lands as border highways, are traversed by good fishing streams, or possess other recreational features be transferred from the counties to the State.

Integration of any measures taken for (1) stabilization of forest-land ownership, (2) public acquisition of forest land, or (3) enactment of regulatory legislation would assist in the consummation of the sustained-yield plans.

With an enlarging acreage of cut-over land and a growing use of the forests by the public for recreation, the region is facing an increasingly difficult problem of forest protection. Particularly outside the national forests, efforts must be redoubled to keep losses within reasonable bounds.

Some of the specific steps necessary to advance forest protection are as follows:

1. The wild lands outside public forests should be classified to determine the major areas chiefly valuable for forest purposes and requiring protection. Forest-protective agencies should then confine their efforts to these lands, and other agencies such as rural fire departments should be held responsible for the protection of the intervening agricultural and farm-woodland territory.

2. Following land classification, there should be land-use legislation to prevent attempts to use forest land for agricultural settlement, since such uneconomic use of submarginal land is sure in this region to increase the fire hazard to adjoining forests.

3. In anticipation that the private timberland owners' contribution toward protection will diminish as the area of virgin forests diminishes, the State should assume a greater share in the protection of county and private lands and ultimately have entire jurisdiction over all forest protection outside Federal holdings. State appropriations should therefore be materially increased, to intensify the present protection and law enforcement.

4. Through educational effort and otherwise, better compliance with the forest-protection laws must be brought about and these laws must be more strictly enforced in the lower courts.

Forest research as now carried on by the Forest Service, the forest schools, and industrial organizations is giving beneficial results and should be continued and expanded. The industry itself should make more intensive studies of its industrial problems, either through its trade associations or otherwise.

Expansion of the present forest-research program is needed particularly along the following lines:

1. Silvicultural and economic aspects of selective cutting.
2. Improved methods of slash disposal and of protecting logged-off land, particularly areas selectively cut.
3. Further intensification of the forest survey to develop basic policies and principles for forest-land use and to determine how forestry fits in with other major types of land use.
4. Basis for distinguishing areas chiefly valuable for forest purposes from areas chiefly valuable for agricultural use or pasturage.
5. Relation of forest-land management to floods, erosion, and quantity and regularity of stream flow.
6. Economics of multiple land use, particularly of stock grazing, game management and recreation, in relation to timber production.
7. Economics of private sustained-yield management of forest lands, especially in relation to public finance and taxation.
8. Improvement of logging equipment and methods to meet requirements of good silviculture and protection.
9. Search for new uses for forest products, new markets, and better methods of conversion, with a view to making highest use of each tree.
10. Principles and plans to meet problems of declining communities that result from over-cutting of tributary timber and slacking off of forest and mill activities during the post-war transition period.

All public forest land chiefly valuable for watershed protection should be reserved for that use, though selective and regulated cutting of ripe trees which would otherwise go to waste should be permitted.

Full use of forest land under the principle of multiple use advocated by the Forest Service should be the policy wherever practicable.

The present policy of using sales of national forest timber to encourage the practice of sustained-yield management on private land and refusing to make sales that might add to the established mill capacity or precipitate liquidation of private timber should be continued. All public agencies conducting timber sales should adopt similar policies.

The remarkable expansion of truck logging in the past few years has greatly complicated transportation planning in this region. The requirements of the forest industries should be considered in planning the location and construction of new highways, with special reference to sustained-yield plans. The bulk of the freight traffic on rivers and harbors consists of forest products. Public development of waterways should be integrated with sustained-yield plans.

It would be very advantageous both to the public and to industry if over-production of forest products in this region were controlled by voluntary cooperative action of owners, through such devices as mergers, support of trade associations, and better financing.

Great improvement in manufacturing practice has been made by the lumber industry in the past few years. Further improvement is needed in milling, seasoning, grading and preparation for shipment. The development of marketable products from sawmill waste should be given greater attention. Such waste is now used chiefly as fuel, although some of it has potentialities for higher uses which would give greater returns and more local employment. Many smaller mills do not market sawmill waste even for fuel. Cooperative action is needed to make available to the small mills facilities for converting their waste to salable commoditiees.

The industry should make every effort to reduce the volume of logs and rough lumber shipped out of the region and to increase local remanufacture. Industrial and financial agencies should encourage and support the establishment of local remanufacturing plants for which definite needs and opportunities exist.

534268—43——5

PART III

4. WATER RESOURCES

By Richard G. Tyler [1]

Water resources of any area are of primary importance to its development and prosperity. Water is the one resource without which the area cannot develop. It is only necessary to compare some of the projects of the Bureau of Reclamation, where desert areas have been changed into prosperous agricultural communities, with the dust-bowl area of the mid-west, where the reverse process is in progress, to realize the important relationship between the water supply and prosperous community life. The fact, therefore, that the Puget Sound region holds a unique position in the United States in having a great abundance of water of exceptionally excellent quality (exceeding, in fact, all other comparable areas of the country) is the foundation upon which a sound developmental program can and must be based. Its numerous and excellent harbors are gateways through which increasing quantities of materials of all sorts will pass to and from all parts of the world, and particularly the Pacific rim. The abundant precipitation, aided by a topography yielding an unusually high percentage of run-off, provides the numerous streams with ample, clear, pure water, chilled even in summer by the melting snow and glaciers in the higher mountain areas. Suitable dam sites, magnificent differences in elevation, and well sustained flows provide large blocks of cheap firm power for the expanding population and developing industries clustered around the Sound. Its streams also support an important fisheries industry and make the area's scenic and recreational resources unexcelled in extent, variety and beauty. With a climate that is fairly equable throughout the year, though somewhat moist during part of that period, and a long growing and construction season, the region's possibilities for development of a stable, economic prosperity are unusually bright, if plans for development are well laid.

Water Supplies

The municipal water supplies of the area are, in the main, excellent in quality and ample in quantity. Growth of population and industry, however, is beginning to pollute the streams and approach the capacity of some of the supplies now in use. The need for planning is becoming increasingly apparent if the local streams are to have their purity safeguarded and if setting aside certain favorable streams or tributaries and reserving them for future domestic needs is to be accomplished before they are preempted for less important uses.

Some 60.6 percent of the water used in the Puget Sound basin is from surface sources, while 10.1 percent is from underground supplies (see fig. 26), leaving 29.3 percent unknown (mostly rural). The waterworks systems of 29 out of 36 cities of more than 1,000 population are municipally owned while the remaining 7 are in private control.

The larger supplies include those of Bellingham, Everett, Seattle, Tacoma, Olympia, and Bremerton. Of these, Tacoma has a surface supply supplemented by a well supply from the deep gravel and sand formations of the South Tacoma Prairie; the Olympia supply comes from ground-water sources, while the other cities mentioned have surface supplies. Everett has an exceptionally high water consumption of 1,760 gallons per capita daily, of which 1,490 gallons per capita daily is industrial water used by pulp and paper industries. Detailed data on the water supplies of all cities and towns having populations greater than 1,000 are given in table 15.

The demand that has been placed on supplies of some of the smaller communities by the influx of war workers, or the construction or expansion of army and navy camps and of war industries, has necessitated augmenting the supplies of Kirkland, Bremerton, Poulsbo, Fort Lewis, and Oak Harbor. Seattle has filed on the Tolt River for 1,250 cubic feet per second for future needs, should these arise.

For the more distant future, certain streams should be reserved for domestic use. The South Fork of the Nooksack River should be reserved for additions to the Bellingham supply and to those of other communities in its immediate vicinity. Before being discharged into the Skagit sewage should be given complete treatment and chlorinated. The lower reaches of this river are now badly polluted, though used after treatment for public water supplies by Anacortes, LaConner, Burlington, and Mount Vernon. Arlington uses filtered

[1] Professor of Sanitary Engineering, University of Washington, and Chairman, Committee on Sanitation and Public Health, Puget Sound Regional Planning Commission.

TABLE 15.—*Puget Sound basin water supply data, cities and towns with population of 1,000 or more*

Name	County	Population 1940 or estimated	Incorporated	Ownership	Source	Delivery	Million gallons per day capacity	Treatment
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
American Lake	Pierce	3,429	N		Government supply		0.5	
Anacortes	Skagit	5,875	Y	M	Skagit River, Lake Whistle	P	3.5	F–C
Arlington	Snohomish	1,160	Y	P	Stillaguamish River	P	.5	F–C
Auburn	King	4,211	Y	M	Springs	G	2.5	
Bellevue	King	1,114		M	Lake Washington	P		
Bellingham	Whatcom	29,314	Y	M	Lake Whatcom and Lake Padden	P–G	20	A–C
Black Diamond	King	1,054	N	P	Springs	G	.3	
Blaine	Whatcom	1,524	Y	M	Wells	G	.3	
Bremerton	Kitsap	15,134	Y	M	Anderson Creek, Gorst Creek	P–G	6.5	C
Buckley	Pierce	1,170	Y	M	Springs, South Prairie Creek	G		
Burien	King	1,057		P	Wells	P	.432	
Burlington	Skagit	1,632	Y	P	Skagit River, wells	P	.35	C
Clear Lake	Skagit	1,019	N	P	Silligan Creek	G		
Edmonds	Snohomish	1,288	Y	M	Wells		.5	
Enumclaw	King	2,627	Y	M	Springs	G	.65	
Everett	Snohomish	30,224	Y	M	Sultan River	G	62	S–C
Kent	King	2,586	Y	M	Springs	G		
Kirkland	King	2,084	Y	M	Springs	P–G	.7	
Lynden	Whatcom	1,696	Y	M	Nooksack River	P	1	C–F
Marysville	Snohomish	1,748	Y	M	Springs	G	.5	C
Monroe	Snohomish	1,590	Y	M	Springs, wells	G	2	C
Mount Vernon	Skagit	4,278	Y	P	Skagit	P	1.8	F–C
Mukilteo	Snohomish	1,041	N	M	Sultan River via Everett	G		C
Olympia	Thurston	13,254	Y	M	Wells	P	8	A–C
Orting	Pierce	1,211	Y	M	Springs	G	.257	
Parkland	Pierce	2,368	N	M	Green River via Tacoma	G		C
Pinehurst	Snohomish	1,668	N	M	Springs	P		
Port Angeles	Clallam	9,409	Y	M	Morse Creek, Ennis Creek	P	11	C
Port Orchard	Kitsap	1,566	Y	M	Wells	P	.26	
Port Townsend	Jefferson	4,683	Y	M	Quilcene River	G	17	C
Puyallup	Pierce	7,889	Y	M	Springs	G	6	
Renton	King	4,488	Y	M	Springs	G	1	
Seattle	King	368,302	Y	M	Cedar River	G	115	A–CS
Sedro Woolley	Skagit	2,954	Y	P	Nookachamp River	G	.50	C
Shelton	Mason	3,707	Y	M	Springs		20	
Snohomish	Snohomish	2,794	Y	M	Pilchuck River	G	1.25	C
Sumner	Pierce	2,140	Y	M	Springs	G	2.5	
Tacoma	Pierce	109,408	Y	M	Green River, wells	G	83.8	C

NOTES

Column 4: Y=Yes; N=No.
Column 5: P=Private; M=Municipal.
Column 7: P=Pumped; G=Gravity.
Column 9: F=Filtered; C=Chlorinated; A–C=Ammonia-chlorine sterilization; S=Sedimentation.

Source: National Resources Planning Board.

water from the Stillaguamish River, while Lynden filters its supply from the Nooksack.

The Tolt, Cedar, and Green Rivers likewise should be reserved and their drainage areas protected from pollution. All towns along these streams not already provided with modern sewage disposal plants should be so supplied. In locating new industrial plants that may be established after the war, special precautions should be taken to prevent undue contamination of streams or of existing surface and ground-water supplies. Thus should their present purity be safeguarded for posterity.

Flood Control

Rivers tributary to Puget Sound are, in general, short, with steep profiles in the upper reaches and flatter profiles as they approach tidewater. The valleys, except in the delta areas, are narrow, with but little agricultural bottom lands. The discharges are flashy and of short duration, the flood-flow being many times greater than the average flow. Many of these rivers have their sources in glaciers or are fed by melting snows from the higher altitudes.

Several conditions make it difficult to control floods. The narrow bottom areas make for high cost per acre of land protected by dikes. This does not apply to the delta lands, many of these areas having been successfully diked. Most rivers run through the great mantle of glacial material laid down during the ice age, making it difficult to find suitable foundations for storage dams. Dams located on the upper reaches where the rivers have cut through this glacial mantle control such a small proportion of the watershed that their cost is not justified by the resulting benefits in flood control, although in some cases it is possible to combine such storage with the development of hydroelectric energy. Diversion is seldom feasible, as it would only reduce the damage in one basin at the expense of another into which the diversion is made.

A feasible method of reducing flood damages that should be given serious consideration in any comprehensive plan of improvement is the removal from the flood plain of all buildings and structures not essential to the operations of farms or industry. This method is practiced to a greater or less extent at the present time, a good example being the Pilchuck River in Snohomish County, where farm buildings and roads have been located along the sides of the valley above the flood plain, and the only structures subject to damage are the fences.

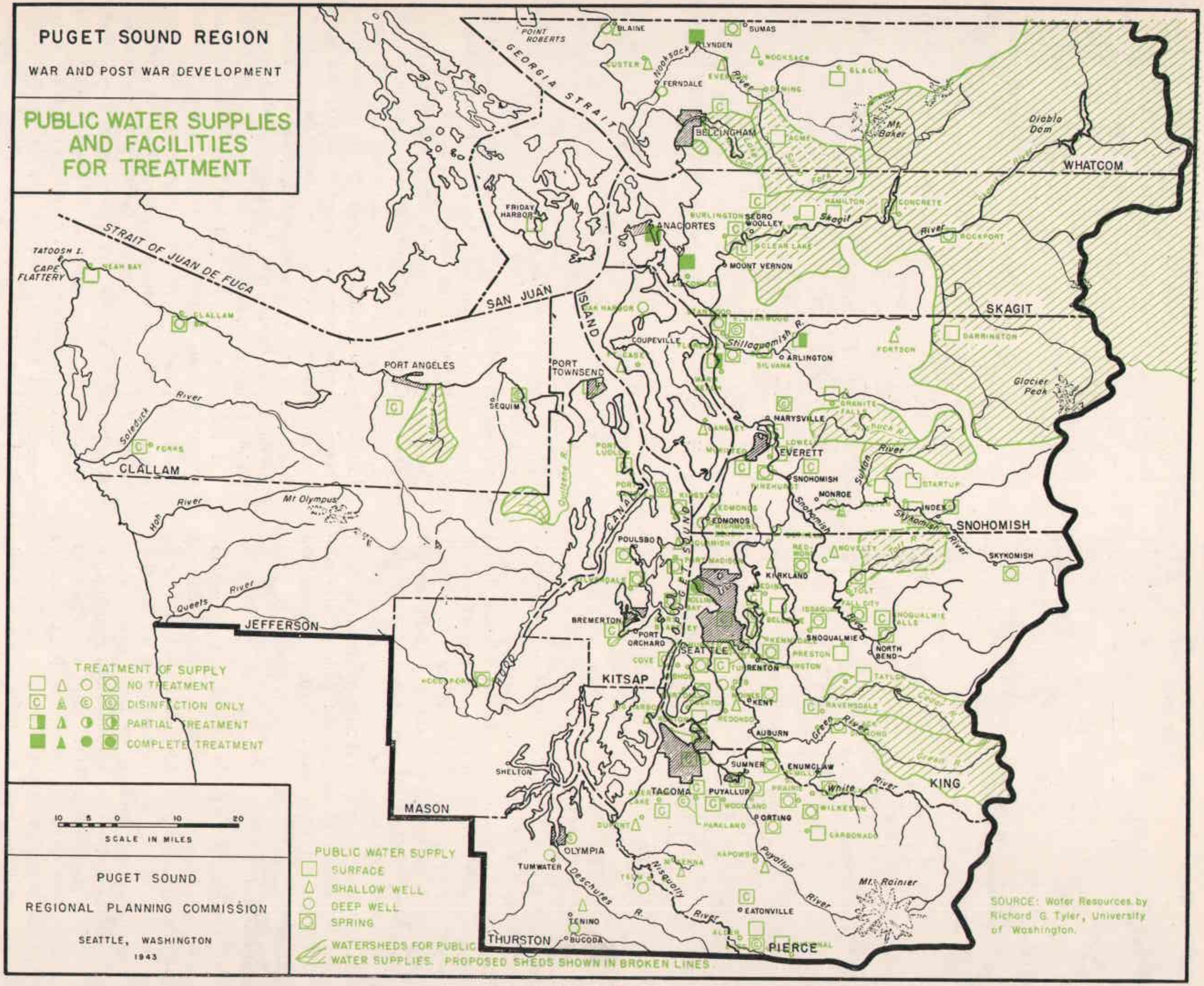

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
PUBLIC WATER SUPPLIES AND FACILITIES FOR TREATMENT
TREATMENT OF SUPPLY
NO TREATMENT
DISINFECTION ONLY
PARTIAL TREATMENT
COMPLETE TREATMENT
PUBLIC WATER SUPPLY
SURFACE
SHALLOW WELL
DEEP WELL
SPRING
WATERSHEDS FOR PUBLIC WATER SUPPLIES. PROPOSED SHEDS SHOWN IN BROKEN LINES
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Water Resources by Richard G. Tyler, University of Washington.
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
BELLINGHAM
ANACORTES
MOUNT VERNON
EVERETT
SEATTLE
TACOMA
OLYMPIA
BREMERTON
PORT ANGELES
PORT TOWNSEND
SHELTON
Mt. Rainier
Mt Olympus
Mt. Baker
Glacier Peak
Diablo Dam

FIGURE 26.

No comprehensive plan for flood control of the region can be set up. Detailed study of each stream is necessary. What can or should be done on one river has no relation to what can or should be done on any other stream tributary to Puget Sound.

The more important rivers that are tributary to Puget Sound are the Skokomish, Nisqually, Puyallup, Duwamish-Green, Cedar, Sammamish, Snohomish, Stillaguamish, Skagit, and Nooksack. Areas along all of these, as well as along other lessor streams, are subject to inundation by flood waters. (See fig. 27.)

The flood damage on the Skokomish is limited to the lower nine miles of the valley. In this case, there is some possibility of reducing damage by storage of flood waters in the power reservoir contemplated by the City of Tacoma on the South Fork. It is for determination whether power or flood control will give the greater returns.

Except for a few isolated places, damages on the Nisqually are in the area downstream from the Northern Pacific Railway crossing. Diking appears to offer the best method of reducing damages.

Two projects for controlling floods on the Puyallup have been adopted and when completed will give adequate, if not complete, protection to that valley. One is the dam at Mud Mountain on White River, a tributary to the Puyallup, which is completed except for the control works, and the other project is channel improvement in the lower 3 miles of the Puyallup at Tacoma.

Flood control on the Duwamish-Green River is under study by the War Department. A report on flood control has been submitted to the Board of Engineers for Rivers and Harbors, but has been returned to the District for further study and coordination with possible irrigation in the valley.

A report on the Snohomish River has been completed but not submitted to Congress.

The work accomplished by the WPA and Army Engineers on the Stillaguamish gives reasonable protection so long as it is properly maintained. One of the requirements when the work was done by the United States was that local interests would maintain and operate the works.

The War Department has investigated flood conditions on the Nooksack and submitted a report thereon. The report has not been published, but may be inspected at the office of the district engineer at Seattle.

The flood problems on the Skagit are still under investigation by the War Department. The Ross Dam is now being constructed to a higher level by the City of Seattle Light Department. After its completion the upper 15-foot depth will be reserved for flood storage when needed to prevent channel overflow downstream. Projects for Skagit River flood control receiving consideration by the Army Engineers include the Avon cut-off and the possibilities for a power dam on the Sauk which would aid in minimizing floods from that fork of the Skagit. The existing Skagit dams offer no protection from floods originating on the Sauk, which are about equal in size but timed differently from those of the Skagit proper.

Navigation

Puget Sound has good navigable depths throughout. The only shoals are at the mouths of the tributary rivers. Federal improvements have consisted of dredging channels so that small boats and log-tows could avoid rough seas or swift currents, and dredging in the tide flats adjacent to cities to provide berthing spaces for oceangoing vessels. (See fig. 28.) Cut-off channels have been provided by the waterway connecting Port Townsend Bay with Oak Bay (project 2 on fig. 28) to avoid the rough weather at Marrowstone Point, and by Swinomish Slough, to avoid the swift currents of Deception Pass and the rough water of Rosario Strait. Dredging to provide for deep-water terminals has been done at Olympia, Tacoma, Seattle, Everett, and Bellingham (projects 4, 5, 6, 8, and 9, on fig. 28). To provide additional harbor area and space for terminal facilities at Seattle, a canal with locks was constructed connecting Puget Sound with Lakes Union and Washington (project 7, fig. 28). Working under a general appropriation, the Army Engineers operate a snag boat to clear the navigable channels of Puget Sound and tributary waters of snags and other obstructions.

During the early days of settlement, the rivers tributary to Puget Sound served as a means of transportation to the back country. Head of navigation on the various rivers is shown on figure 28. With the advent of the railways and highways, these rivers have, in general, been abandoned as a means of transportation. The only rivers now navigated are the Snohomish and Skagit. The Snohomish is navigated to a few miles above the city of Snohomish. The traffic consists of limerock to the paper mill at Lowell, logs from the upper river and from outside sources to the lumber mills, and lightering of lumber from the mills to vessels in Everett harbor. Navigation on the Skagit River consists of freight boats operating between Seattle and Mount Vernon and the towing of log rafts from upriver points, the head of navigation being at Marblemount, 78 miles above the mouth.

The cities adjacent to Puget Sound handle a large amount of both coastwise and overseas traffic. This traffic has greatly increased by reason of the war. The difficulty experienced in handling it lies in a lack of terminal facilities, and not in the navigable conditions of the entrance channels or waterways.

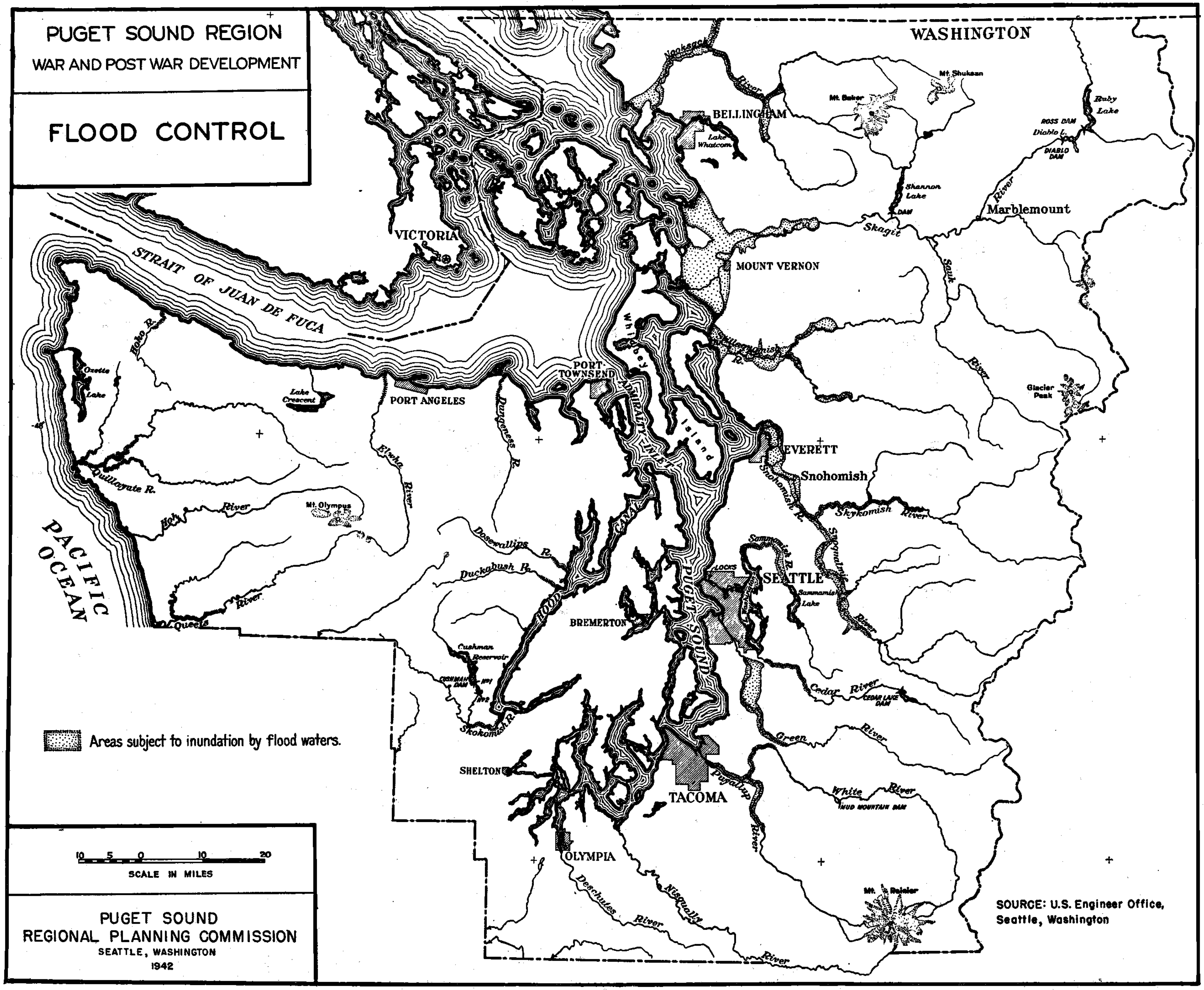

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
FLOOD CONTROL
Areas subject to inundation by flood waters.
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1942
SOURCE: U.S. Engineer Office, Seattle, Washington
WASHINGTON
BELLINGHAM
Lake Whatcom
Mt. Baker
Mt. Shuksan
Ruby Lake
ROSS DAM
Diablo L.
DIABLO DAM
Shannon Lake
Marblemount
Skagit
MOUNT VERNON
VICTORIA
STRAIT OF JUAN DE FUCA
PORT TOWNSEND
PORT ANGELES
Lake Crescent
Ozette Lake
Hoko R.
Quillayute R.
Hoh
Mt. Olympus
Elwha River
Dungeness R.
ADMIRALTY INLET
Whidbey Island
Glacier Peak
EVERETT
Snohomish
Skykomish River
Dosewallips R.
Duckabush R.
HOOD CANAL
BREMERTON
PUGET SOUND
LOCKS
SEATTLE
Sammamish Lake
Cushman Reservoir
CUSHMAN DAM
Skokomish R.
SHELTON
Cedar River
CEDAR LAKE DAM
Green River
White River
MUD MOUNTAIN DAM
TACOMA
Puyallup River
OLYMPIA
Deschutes River
Nisqually River
Mt. Rainier
PACIFIC OCEAN
Queets River

FIGURE 27.

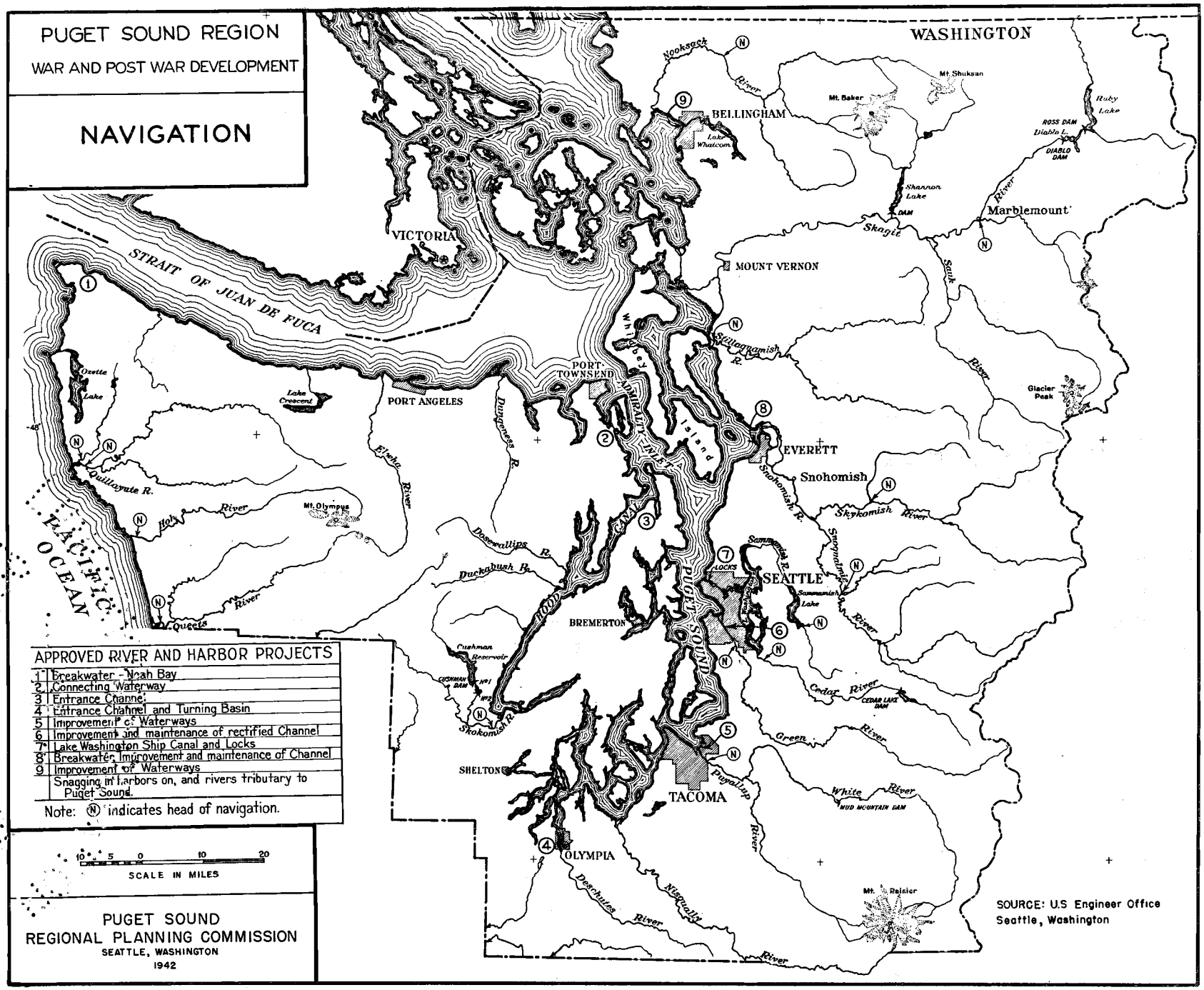

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
NAVIGATION
WASHINGTON
VICTORIA
STRAIT OF JUAN DE FUCA
BELLINGHAM
Lake Whatcom
Nooksack River
Mt. Baker
Mt. Shuksan
Ruby Lake
ROSS DAM
Diablo L.
DIABLO DAM
Shannon Lake
DAM
Marblemount
Skagit River
Sauk River
MOUNT VERNON
Stillaguamish R.
Glacier Peak
PORT TOWNSEND
Whidbey Island
ADMIRALTY INLET
EVERETT
Snohomish
Snohomish R.
Skykomish River
Snoqualmie River
Sammamish R.
Sammamish Lake
LOCKS
SEATTLE
PUGET SOUND
HOOD CANAL
BREMERTON
Cushman Reservoir
CUSHMAN DAM #1
CUSHMAN DAM #2
Skokomish R.
Cedar River
CEDAR LAKE DAM
Green River
White River
MUD MOUNTAIN DAM
Puyallup River
SHELTON
TACOMA
OLYMPIA
Deschutes River
Nisqually River
Mt. Rainier
PORT ANGELES
Lake Crescent
Ozette Lake
Quillayute R.
Hoh River
Mt. Olympus
Elwha River
Dungeness R.
Dosewallips R.
Duckabush R.
Queets River
PACIFIC OCEAN
APPROVED RIVER AND HARBOR PROJECTS
1 Breakwater - Neah Bay
2 Connecting Waterway
3 Entrance Channel
4 Entrance Channel and Turning Basin
5 Improvement of Waterways
6 Improvement and maintenance of rectified Channel
7 Lake Washington Ship Canal and Locks
8 Breakwater, Improvement and maintenance of Channel
9 Improvement of Waterways
Snagging in harbors on, and rivers tributary to Puget Sound.
Note: (N) indicates head of navigation.
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1942
SOURCE: U.S Engineer Office
Seattle, Washington

FIGURE 28.

Olympia, Tacoma, Seattle, Everett, and Bellingham have adequate rail and highway connections. Airports are located near each of these cities.

No general plan has been developed for improving navigation on Puget Sound, as none is required. The Sound can, without improvement, accommodate the largest vessel now built or contemplated.

Power Resources

Maps presented in this report (see figs. 29 to 31 inclusive) show the present developed sources of supply of electric energy. Another (fig. 32) indicates the major transmission line networks covering not only the Puget Sound area but the State of Washington and the Pacific Northwest as a whole.

Numerous surveys have been made by the War Department as to the resources capable of development on individual streams for the combined purposes of power, flood control and navigation. Potential sources of energy and water supply in the State of Washington as a whole have been well catalogued by the Geological Survey of the Department of the Interior in cooperation with the State Department of Conservation and Development and other agencies. Private interests and municipal agencies have carried on extensive surveys looking toward programs of power development.

Nineteen existing hydroelectric developments (see fig. 29) have a generating capacity totaling 590,900 kilowatts, including four developments of less than 5,000 kilowatts, five ranging in size from 9,000 to 24,000 kilowatts, three of about 30,000 kilowatts each, five of about 60,000 kilowatts each, and one of 120,000 kilowatts. In addition, one site has been developed by a dam creating a storage reservoir, utilizing generators installed at a reservoir downstream. Installation of generators ultimately will be made at the upper site. Power from these developments is made available in the region by the transmission systems of the Puget Sound Power & Light Co., city of Seattle, city of Tacoma, city of Centralia, and the Bonneville Power Administration.

These developments are located on 11 streams, the potential development of which totals an additional estimated 1,131,000 kilowatt generating capacity. Steam generation available on the systems of the cities of Seattle and Tacoma and the Puget Sound Power & Light Company totals 170,000 kilowatts, and there is available in mills which can be connected to the systems an additional 120,450 kilowatts. (See fig. 31.)

Streams in the Puget Sound area are adaptable to important multipurpose development for the production of electrical power, domestic and commercial water supply and, in some instances, irrigation, flood control, and navigation. The development of the region is made more feasible through the coordination of these multipurpose uses. The relative cost of development and transmission of power, and the load growth of the area will regulate future development of these streams.

The Puget Sound region which includes the western slope of the Cascades is joined on the east by the Columbia Basin in which are three major developments, Grand Coulee, Bonneville, and Rock Island, located on the Columbia River. (See fig. 30.) Rock Island has an installed capacity of 80,000 kilowatts and by the end of this year installations at Grand Coulee and Bonneville will amount to 690,000 kilowatts and 518,400 kilowatts, respectively. The plants at Grand Coulee and at Bonneville are Federal developments and are tied into the 115 and 230 kilovolt major network of the Bonneville Power Administration. (See fig. 32.) This network lies almost entirely within the State of Washington and makes Columbia River power available in the Puget Sound region as well as in the eastern and central Washington and northern Oregon areas. It also makes possible the interconnected operation of all the electric utilities in Washington and northern Oregon, together with those in Idaho, Utah, and Montana on a scale not heretofore possible.

The Rock Island plant is a part of the system of the Puget Sound Power & Light Co. and a portion of this plant's capacity is used to serve the region through that system, which is the major distribution agency outside of the cities of Seattle, Tacoma, and Centralia. The city of Tacoma supplies its own area and many small communities in its vicinity. The city of Seattle and the Puget Sound Co. both serve in the Seattle area, and the city of Centralia serves within its own municipal limits. In some counties, public utility districts have been organized to distribute power.

Prior to the development of the Columbia River at the three plants above named, there existed numerous industries which were large users of electric power aside from the lumber and pulp mills which, in general, generate their own power. These industries included several cement plants, a copper smelter and refinery, a sodium silicate works and several electrochemical companies making caustic soda and chlorine. Since the advent of additional large blocks of low-cost electric power, more plants for the electrothermal manufacture of calcium carbide and ferrochrome, large electrolytic units for the manufacture of aluminum ingots from purified alumina, and a small electrolytic manganese industry have come into the area.

The development of the Columbia River has resulted in the establishment of similar industries elsewhere throughout the Pacific Northwest, and it is to be expected that additional industries dependent on power will be established in the Puget Sound area as a result of future development of the Columbia and the streams

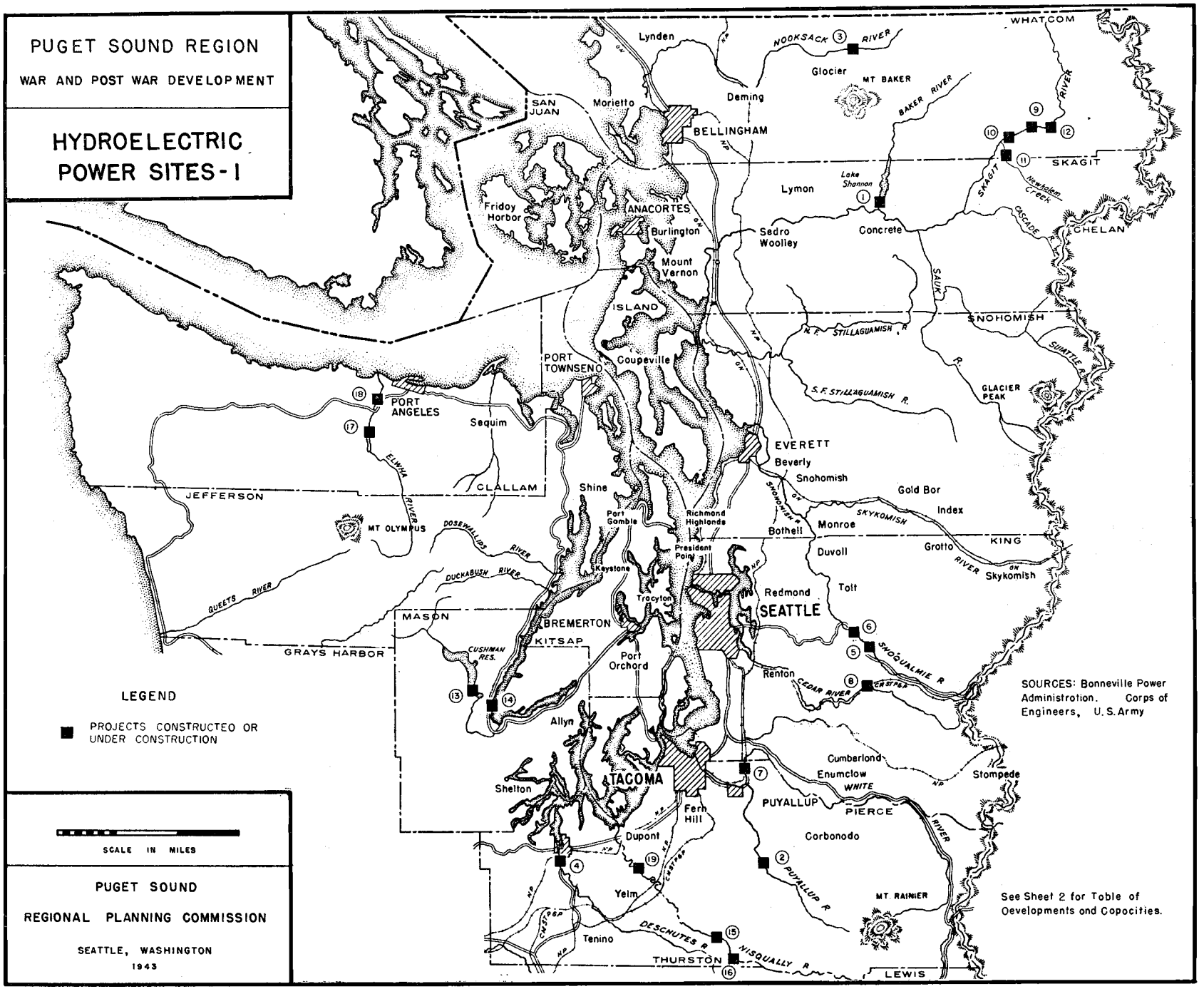
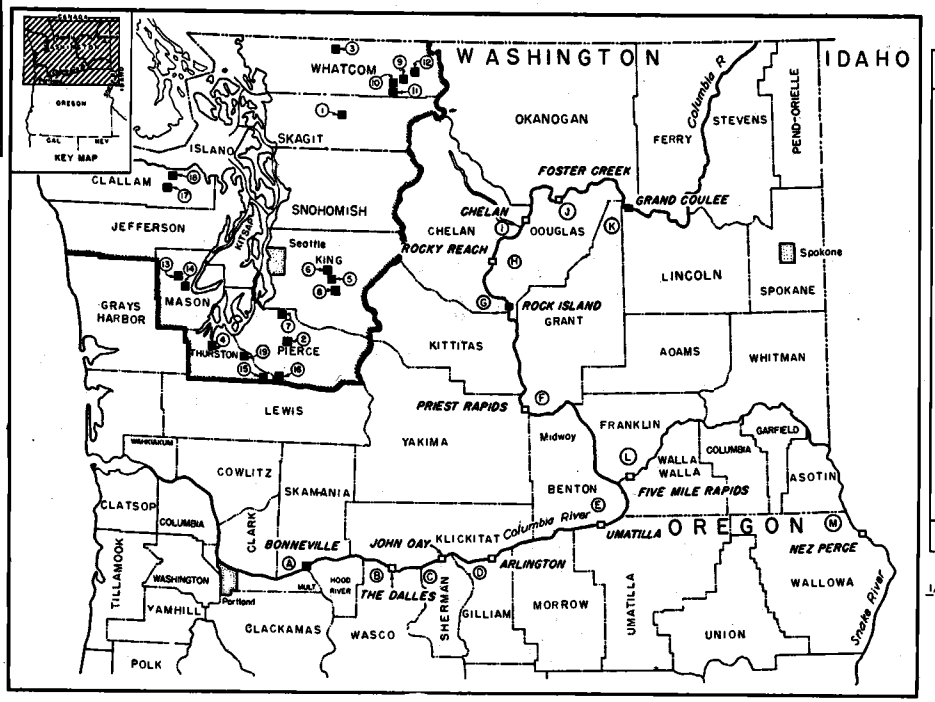

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
HYDROELECTRIC POWER SITES - I
LEGEND
PROJECTS CONSTRUCTED OR UNDER CONSTRUCTION
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCES: Bonneville Power Administration. Corps of Engineers, U.S. Army
See Sheet 2 for Table of Developments and Capacities.
WHATCOM
SKAGIT
CHELAN
SNOHOMISH
KING
PIERCE
LEWIS
THURSTON
MASON
KITSAP
GRAYS HARBOR
JEFFERSON
CLALLAM
ISLAND
SAN JUAN
Lynden
Nooksack River
Glacier
Mt Baker
Deming
Baker River
Morietta
BELLINGHAM
Lake Shannon
Lyman
Sedro Woolley
Concrete
Skagit
Newhalem Creek
Cascade R.
Friday Harbor
ANACORTES
Burlington
Mount Vernon
Sauk
N.F. Stillaguamish R.
Coupeville
PORT TOWNSEND
S.F. Stillaguamish R.
Glacier Peak
Suiattle R.
PORT ANGELES
Sequim
EVERETT
Beverly
Snohomish
Gold Bar
Index
Elwha River
Shine
Port Gamble
Richmond Highlands
Bothell
Monroe
Skykomish
Mt Olympus
Dosewallips River
President Point
Duvoll
Grotto
Duchabush River
Keystone
Tracyton
Redmond
Tolt
Skykomish
Queets River
BREMERTON
SEATTLE
Cushman Res.
Port Orchard
Renton
Snoqualmie R.
Cedar River
Allyn
Cumberland
Enumclaw
Stompede
Shelton
TACOMA
White River
Puyallup
Fern Hill
Corbonodo
Dupont
Puyallup R.
Mt Rainier
Yelm
Deschutes R.
Tenino
Nisqually R.

FIGURE 29.

PUGET SOUND REGION
(AND COLUMBIA RIVER DEVELOPMENTS)
WAR AND POST WAR DEVELOPMENT

HYDROELECTRIC POWER SITES - 2



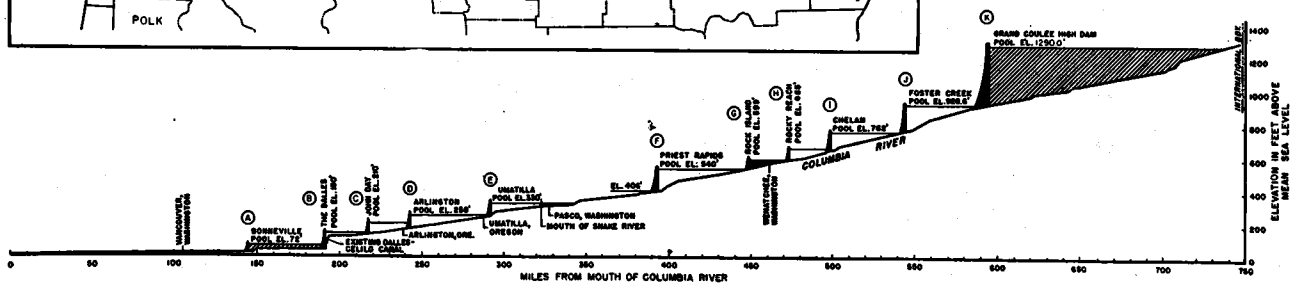
NAME OF PROJECT	NAME PLATE RATING IN KW 1/
HYDROELECTRIC DEVELOPMENTS EXISTING OR UNDER CONSTRUCTION	
PUGET SOUND POWER & LIGHT COMPANY	
1. Baker River	31,200
2. Electron	23,000
3. Nooksack	1,500
4. Olympia	1,750
5. Snoqualmie No. 1	11,300
6. Snoqualmie No. 2	9,000
7. White River	62,000
SEATTLE MUNICIPAL SYSTEM	
8. Cedar Falls	30,000
9. Diablo	120,000
10. Gorge	74,400
11. Newhalem	2,000
12. Ruby	
TACOMA MUNICIPAL SYSTEM	
13. Cushman No. 1	36,000
14. Cushman No. 2	54,000
15. Nisqually (LaGronde)	64,000
16. Alder	50,000
CROWN ZELLERBACH CORPORATION	
17. Glines Canyon	12,000
18. Elwha	12,000
CITY OF CENTRALIA	
19. YELM	4,400
TOTAL	598,550

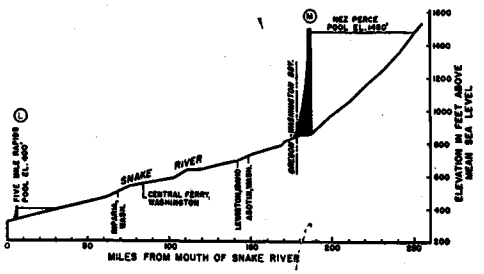
Potential development of these projects 1,131,000 kw

1/ In some cases generating capacity will exceed name plate ratings.

SOURCES:
Bonneville Power Administration
Corps of Engineers, U. S. Army

COLUMBIA RIVER DEVELOPMENT:





LEGEND

PROFILE MAP

■ PROJECTS CONSTRUCTED OR UNDER CONSTRUCTION

□ UNDEVELOPED SITES

Installed capacities of Umatilla, Priest Rapids and Foster Creek are revised to agree with the joint U.S. Army—B.P.A. report of Feb 1942
If Nez Perce storage is created the installed capacity at Five Mile Rapids can be increased from 90,000 kw to 210,000 kw.

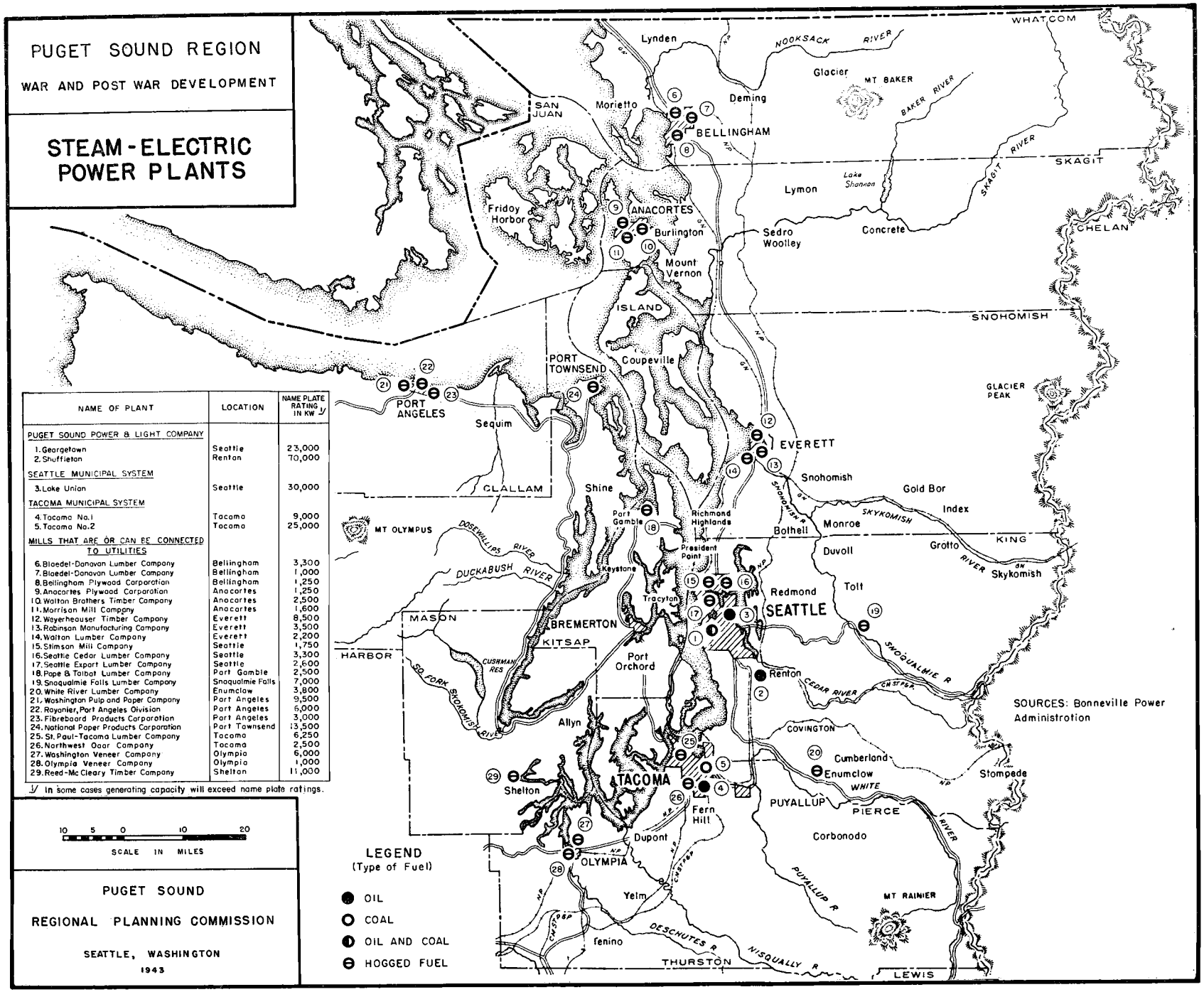
NO	NAME OF PROJECT	INSTALLED CAPACITY PRESENT KW	INSTALLED CAPACITY ULTIMATE KW
	COLUMBIA RIVER		
A	Bonneville	302,400	518,400
B	The Dalles	—	658,000
C	John Day	—	480,000
D	Arlington	—	400,000
E	Umatilla	—	630,000
F	Priest Rapids	—	540,000
G	Rock Island	60,000	220,000
H	Rocky Reach	—	270,000
I	Chelan	—	408,000
J	Foster Creek	—	600,000
K	Grand Coulee	324,000	1,944,000
	SNAKE RIVER		
L	Five Mile Rapids (alone)	—	90,000
M	Nez Perce	—	1,000,000

Installed capacity is equal to name plate rating.

10.5 0 10 20 30 40 50 60 70
SCALE IN MILES

PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 30.



NAME OF PLANT	LOCATION	NAME PLATE RATING IN KW 1/
PUGET SOUND POWER & LIGHT COMPANY		
1. Georgetown	Seattle	23,000
2. Shuffleton	Renton	70,000
SEATTLE MUNICIPAL SYSTEM		
3. Lake Union	Seattle	30,000
TACOMA MUNICIPAL SYSTEM		
4. Tacoma No. 1	Tacoma	9,000
5. Tacoma No. 2	Tacoma	25,000
MILLS THAT ARE OR CAN BE CONNECTED TO UTILITIES		
6. Bloedel-Donavan Lumber Company	Bellingham	3,300
7. Bloedel-Donavan Lumber Company	Bellingham	1,000
8. Bellingham Plywood Corporation	Bellingham	1,250
9. Anacortes Plywood Corporation	Anacortes	1,250
10. Walton Brothers Timber Company	Anacortes	2,500
11. Morrison Mill Company	Anacortes	1,600
12. Weyerhaeuser Timber Company	Everett	8,500
13. Robinson Manufacturing Company	Everett	3,500
14. Walton Lumber Company	Everett	2,200
15. Stimson Mill Company	Seattle	1,750
16. Seattle Cedar Lumber Company	Seattle	3,300
17. Seattle Export Lumber Company	Seattle	2,600
18. Pope & Talbot Lumber Company	Port Gamble	2,500
19. Snoqualmie Falls Lumber Company	Snoqualmie Falls	7,000
20. White River Lumber Company	Enumclaw	3,800
21. Washington Pulp and Paper Company	Port Angeles	9,500
22. Rayonier, Port Angeles Division	Port Angeles	6,000
23. Fibreboard Products Corporation	Port Angeles	3,000
24. National Paper Products Corporation	Port Townsend	13,500
25. St. Paul-Tacoma Lumber Company	Tacoma	6,250
26. Northwest Door Company	Tacoma	2,500
27. Washington Veneer Company	Olympia	6,000
28. Olympia Veneer Company	Olympia	1,000
29. Reed-Mc Cleary Timber Company	Shelton	11,000

1/ In some cases generating capacity will exceed name plate ratings.

FIGURE 31.

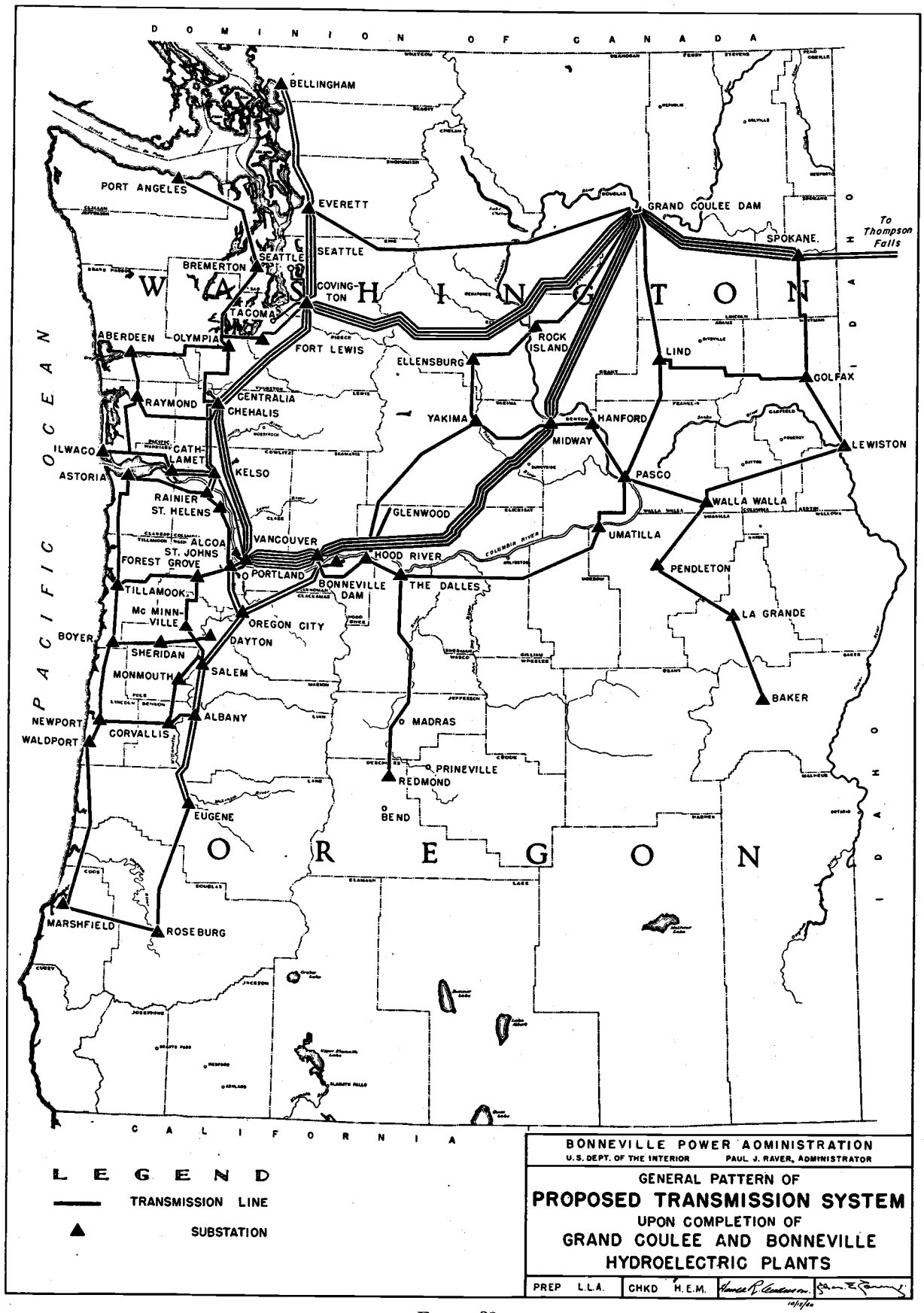

D O M I N I O N O F C A N A D A
BELLINGHAM
PORT ANGELES
EVERETT
SEATTLE
BREMERTON
COVING-TON
TACOMA
GRAND COULEE DAM
To Thompson Falls
SPOKANE
W A S H I N G T O N
ABERDEEN
OLYMPIA
FORT LEWIS
ROCK ISLAND
LIND
COLFAX
ELLENSBURG
CENTRALIA
RAYMOND
CHEHALIS
YAKIMA
HANFORD
MIDWAY
LEWISTON
ILWACO
CATH-LAMET
ASTORIA
KELSO
PASCO
RAINIER
ST. HELENS
WALLA WALLA
GLENWOOD
UMATILLA
ALCOA
ST. JOHNS
FOREST GROVE
VANCOUVER
HOOD RIVER
PENDLETON
PORTLAND
BONNEVILLE DAM
THE DALLES
TILLAMOOK
Mc MINN-VILLE
OREGON CITY
LA GRANDE
BOYER
DAYTON
SHERIDAN
SALEM
MONMOUTH
BAKER
NEWPORT
ALBANY
MADRAS
WALDPORT
CORVALLIS
PRINEVILLE
REDMOND
EUGENE
BEND
O R E G O N
MARSHFIELD
ROSEBURG
P A C I F I C O C E A N
C A L I F O R N I A
I D A H O
L E G E N D
TRANSMISSION LINE
SUBSTATION
BONNEVILLE POWER ADMINISTRATION
U.S. DEPT. OF THE INTERIOR
PAUL J. RAVER, ADMINISTRATOR
GENERAL PATTERN OF
PROPOSED TRANSMISSION SYSTEM
UPON COMPLETION OF
GRAND COULEE AND BONNEVILLE
HYDROELECTRIC PLANTS
PREP L.L.A.
CHKD H.E.M.

FIGURE 32.

adjacent to the load area. Full development of the Columbia (see fig. 32), can make available in the Pacific Northwest 6,668,000 kilowatts. Here also, as stated with regard to Puget Sound streams, the relative cost of generation and transmission will govern.

The extent to which these needs for power might develop cannot be estimated as regards industries since electrometallurgy with its two branches of electrothermal and electrolytic reduction is still in its infancy and may be applied not only to minerals from surrounding territory which can be economically treated in the Puget Sound area but also to the undeveloped mineral resources of the Northwest and North Pacific, including Alaska. As the science of electrometallurgy develops, many of the older methods of treating ores will be modified. In some instances, the application of electricity will completely revolutionize the method of recovery.

The lumber industry, also a large user of power as indicated by the steam generating plants listed (see fig. 31), is, with its associated pulp industries, facing a program of complete utilization of its raw materials and by-products. These developments also involve chemical and mechanical processes which are dependent on cheap and abundant power.

Manufacturing as such, resulting from the present increase in available manpower in this area, the presence of large supplies of basic materials, the availability of power, and the opening of new local and world markets, presents another field of development which cannot be closely estimated.

There is also a very considerable possibility of increase in the use of power for domestic and commercial purposes. Figure 33 shows the residential sales of electric energy in various communities in the area, the maximum being 2,435 kilowatt-hours per customer per year in Tacoma and 2,190 kilowatt-hours in Seattle. The effect of increasing levels of domestic consumption from a 2,000 to a possible 5,000 kilowatt-hours average per customer per year would be an increase of about 215,000 kilowatts in peak loads. A still further possibility of increase in consumption exists in the development of irrigation for agricultural lands (see irrigation proposals in Part III, Section 1, Agriculture and Agricultural Land Use and fig. 20), the effect of which would approximate in the rural areas an increase in load similar to that resulting in the urban areas of Seattle and Tacoma from increased domestic use.

As a whole, the Puget Sound region may be said to be entering a period of scientific and material expansion based on the increased industrial, domestic, and commercial use of hydroelectric power.

The conclusions reached as a result of studies of the power situation are three, namely:

1. The construction of additional hydroelectric projects should be kept well ahead of any increase in loads on the systems serving the area. The late J. D. Ross, who was head of the Seattle Light Department and the Bonneville Administration, often expressed it by stating that "you can't sell power until you have it."

2. Determination of sources of power from which will be met the needs arising from normal load growth on the one hand, and new-type, large, industrial demands on the other, should be guided by advantageous, multipurpose use of these power sources and the relative cost of generation and transmission.

3. Availability of such supplies of power as are anticipated from development of the Columbia River and Puget Sound streams will stimulate tremendous advances in the extent and nature of the region's industries.

Sewage and Stream Pollution

The war has greatly increased stream pollution in the Puget Sound basin. The influx of large numbers of war workers with their families has overtaxed the sanitary facilities of many communities and necessitated the construction of additional sewers and disposal plants. Where adequate plants have been built, stream pollution has not increased, but in some cases this has not been done or the construction of the plant was delayed so long that sewage flowed into rivers, lakes, and tidal waters, increasing the pollution which already existed.

In the main, however, the construction of sewers and sewage disposal plants has progressed, both during the depression and the defense, and, later, the war period, till at present there are very many situations that have been greatly improved. Table 16 and figure 34 give detailed information concerning these sanitary facilities and indicate the large number of communities now served by sewers and the increasing number being served by disposal plants.

In the main, the many Army and Navy camps, training fields, hospitals, etc., which have been constructed, have been furnished with adequate sewerage facilities. Sudden enlargement of many of these has necessitated the expansion of facilities, and delays have caused unsanitary conditions of varying degrees of seriousness. Similarly, the construction or expansion of war plants has necessitated the construction of sewerage and disposal facilities, most of which have been completed. Further expansion of plants, population, and military establishments will undoubtedly occur as the war continues, though a slowing down of the rate of expansion is indicated at present.

Figure 35 shows what additional facilities are still needed. Pollutional conditions of streams and tidal waters are also shown. The most serious pollutional problems now existing are in the lower Skagit and Snohomish Rivers. The former is the more serious since several towns and cities take their water supplies from

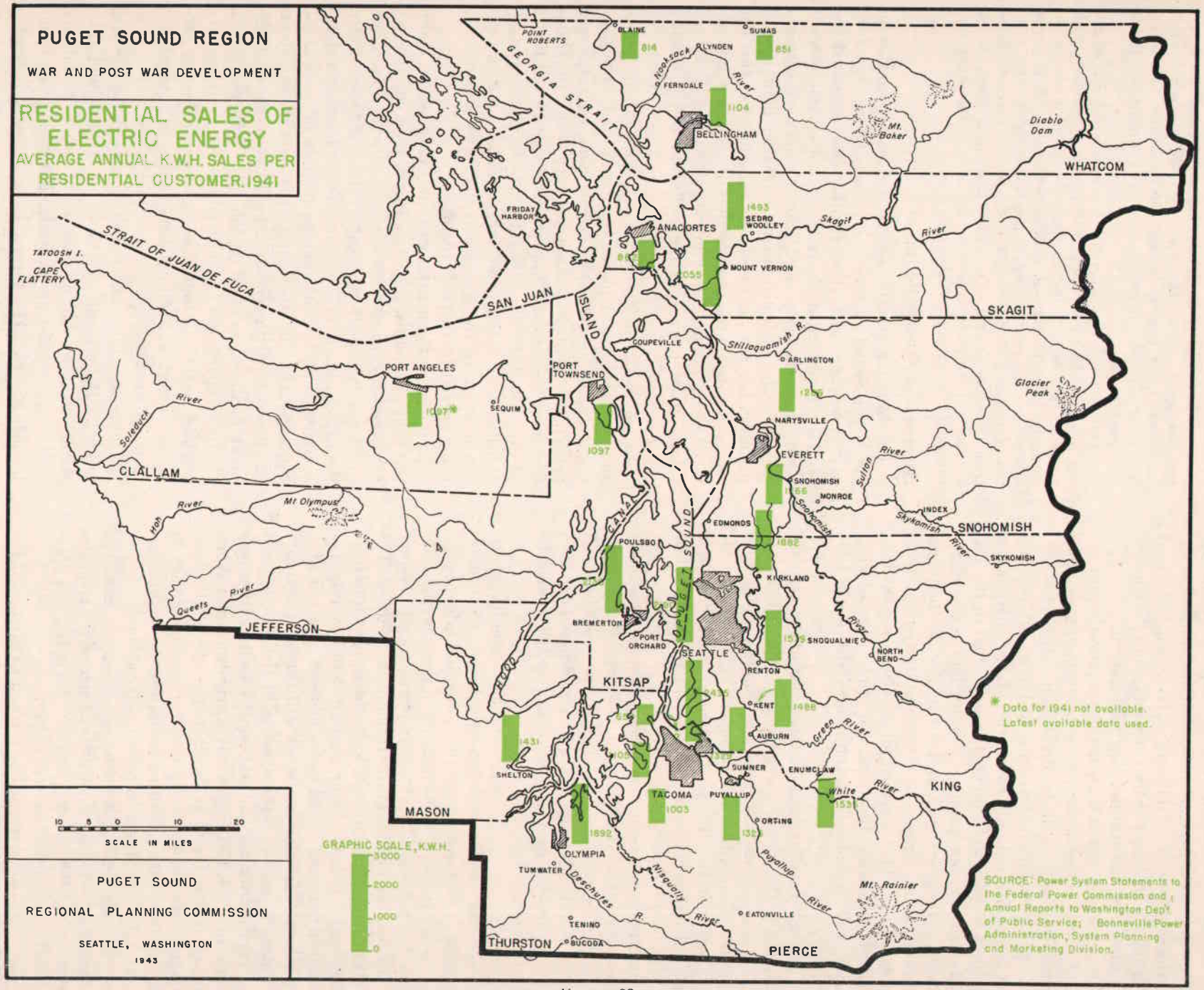

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
RESIDENTIAL SALES OF ELECTRIC ENERGY
AVERAGE ANNUAL K.W.H. SALES PER RESIDENTIAL CUSTOMER, 1941
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
POINT ROBERTS
BLAINE
814
SUMAS
651
FERNDALE
1104
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
1493
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
1655
SKAGIT
TATOOSH I.
CAPE FLATTERY
COUPEVILLE
Stillaguamish R.
ARLINGTON
PORT ANGELES
1097*
SEQUIM
PORT TOWNSEND
1097
Glacier Peak
MARYSVILLE
EVERETT
Sultan River
Soleduck River
CLALLAM
SNOHOMISH
66
MONROE
INDEX
Skykomish River
Hoh River
Mt Olympus
EDMONDS
1882
POULSBO
SKYKOMISH
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
1488
AUBURN
Green River
1431
SHELTON
SUMNER
ENUMCLAW
White River
KING
TACOMA
1003
PUYALLUP
PORTING
132
1892
OLYMPIA
MASON
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
TENINO
EATONVILLE
BUCODA
THURSTON
PIERCE
* Data for 1941 not available. Latest available data used.
SOURCE: Power System Statements to the Federal Power Commission and Annual Reports to Washington Dept. of Public Service; Bonneville Power Administration, System Planning and Marketing Division.
10 5 0 10 20
SCALE IN MILES
GRAPHIC SCALE, K.W.H.
3000
2000
1000
0
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 33.

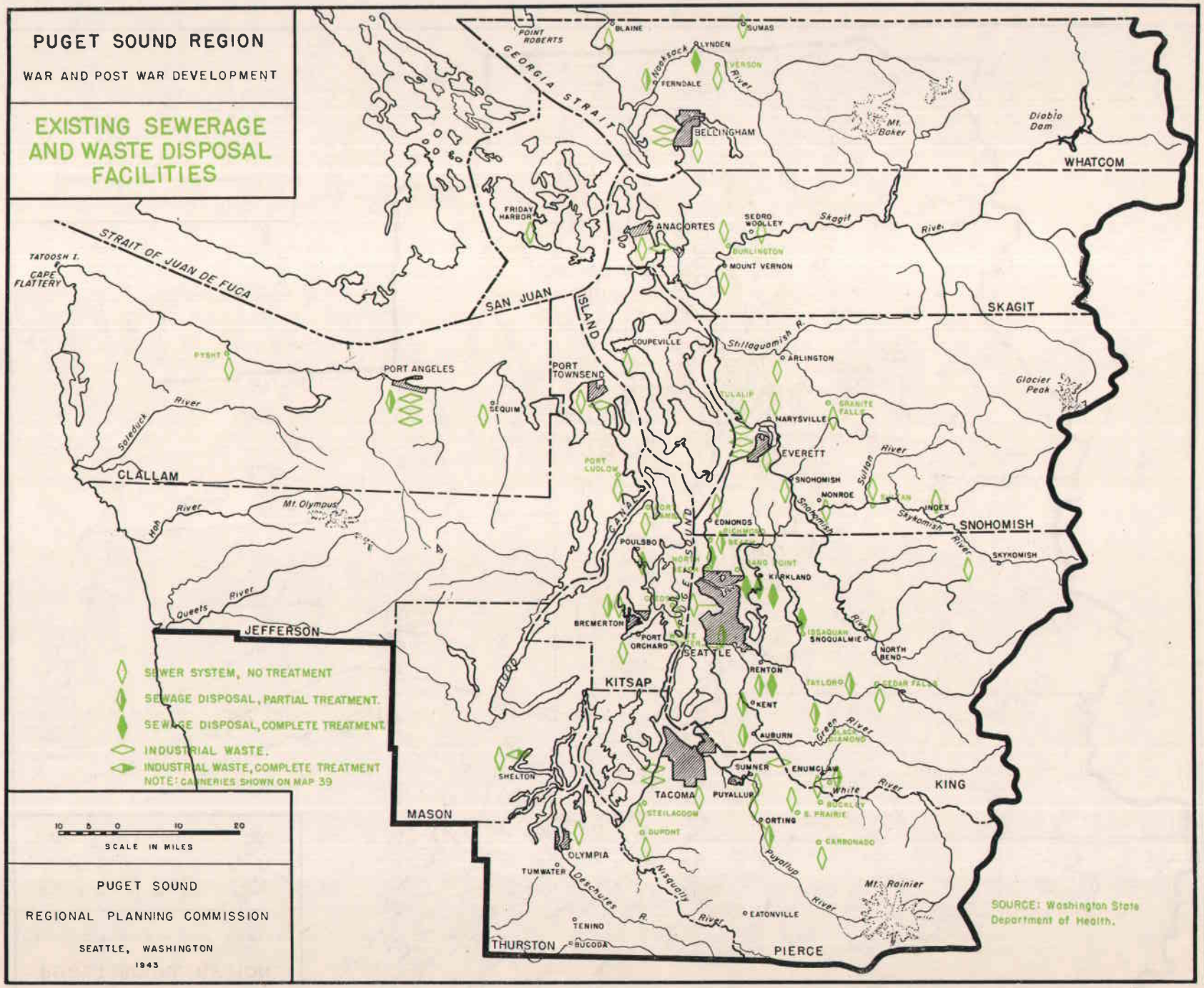

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
EXISTING SEWERAGE AND WASTE DISPOSAL FACILITIES
SEWER SYSTEM, NO TREATMENT
SEWAGE DISPOSAL, PARTIAL TREATMENT.
SEWAGE DISPOSAL, COMPLETE TREATMENT.
INDUSTRIAL WASTE.
INDUSTRIAL WASTE, COMPLETE TREATMENT
NOTE: CANNERIES SHOWN ON MAP 39
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Washington State Department of Health.
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
WHATCOM
SKAGIT
SNOHOMISH
KING
KITSAP
MASON
JEFFERSON
CLALLAM
THURSTON
PIERCE
BLAINE
POINT ROBERTS
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
Nooksack River
Mt. Baker
Diablo Dam
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
BURLINGTON
MOUNT VERNON
Skagit River
TATOOSH I.
CAPE FLATTERY
PORT ANGELES
SEQUIM
PORT TOWNSEND
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
MARYSVILLE
EVERETT
GRANITE FALLS
Sultan River
SNOHOMISH
MONROE
INDEX
Snoqualmie
Skykomish
SKYKOMISH
Soleduck River
Hoh River
Mt. Olympus
Queets River
PORT LUDLOW
EDMONDS
POULSBO
KIRKLAND
BREMERTON
PORT ORCHARD
SEATTLE
ISSAQUAH
SNOQUALMIE
NORTH BEND
RENTON
TAYLORS
CEDAR FALLS
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
SHELTON
TACOMA
PUYALLUP
BUCKLEY
S. PRAIRIE
ORTING
STEILACOOM
DUPONT
CARBONADO
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
TENINO
EATONVILLE
BUCODA

FIGURE 34.

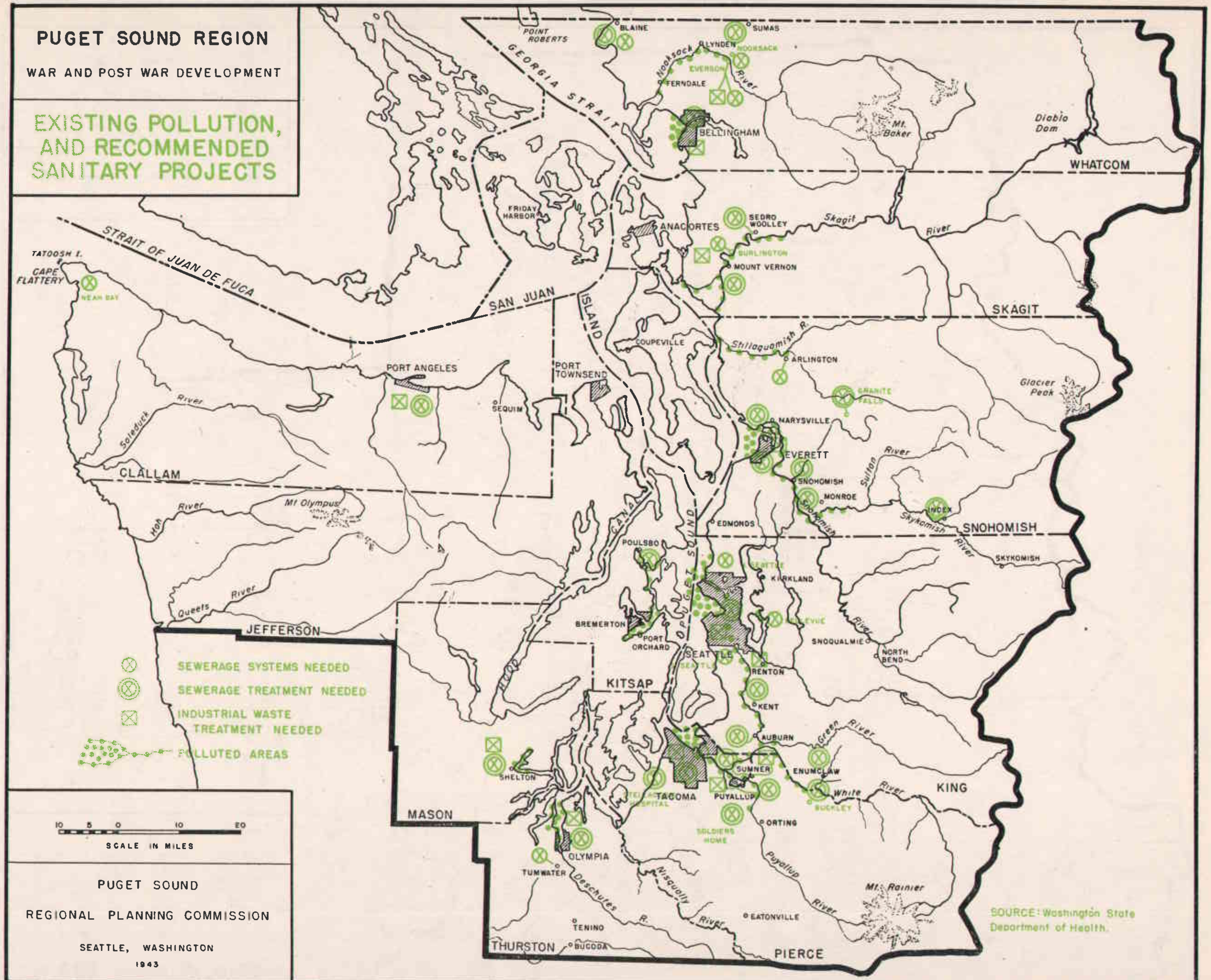

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
EXISTING POLLUTION, AND RECOMMENDED SANITARY PROJECTS
SEWERAGE SYSTEMS NEEDED
SEWERAGE TREATMENT NEEDED
INDUSTRIAL WASTE TREATMENT NEEDED
POLLUTED AREAS
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Washington State Department of Health.
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
SAN JUAN
ISLAND
PUGET SOUND
HOOD CANAL
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
TATOOSH I.
CAPE FLATTERY
NEAH BAY
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
NOOKSACK
EVERSON
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
BURLINGTON
MOUNT VERNON
Skagit River
COUPEVILLE
Stillaguamish R.
ARLINGTON
GRANITE FALLS
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
Soleduck River
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
Sultan River
INDEX
Skykomish River
SKYKOMISH
Mt Olympus
Hoh River
Queets River
EDMONDS
POULSBO
KIRKLAND
BREMERTON
PORT ORCHARD
SEATTLE
BELLEVUE
SNOQUALMIE
NORTH BEND
RENTON
KENT
AUBURN
Green River
ENUMCLAW
White River
BUCKLEY
SUMNER
PUYALLUP
TACOMA
SOLDIERS HOME
ORTING
SHELTON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
BUCODA

FIGURE 35.

the Skagit. While the Snohomish is equally polluted with the sewage from towns from Monroe to the river's mouth, the problem there is less serious since the water is not used for domestic purposes. Pulp and paper wastes and those from canneries and food processing plants cause local pollution problems, the most serious of which are in the harbors of Bellingham, Everett and Tacoma. River flow into these harbors has helped to flush out the wastes, and tidal exchanges of sea water have assisted in minimizing these problems. Sewage resulting from the greatly increased population tributary to Lake Washington is, for the most part, adequately treated in modern disposal plants. Delays encountered in constructing some plants, however, have caused increasing pollution of the lake, thereby jeopardizing the important recreational value of its beaches.

Obviously all nonmilitary sanitary problems must await the end of the war before sewers or disposal plants can be constructed to solve them. It would be useful, however, to have plans for such works prepared and ready to be presented immediately after the war ends, as it is highly probable that opportunities will be available for constructing some of them as works projects during the transition from war to peacetime activities. In this program should be included sewers and disposal plants for all towns and cities located on any of the streams or lakes of the Puget Sound basin. In King County, for example, all communities on Lake Washington and the tributaries of the Snohomish River system should be included in such a list of projects. The improvements most needed for early construction are shown in figure 35.

With the close of the war, it is highly probable that the region will experience an industrial expansion, necessarily bringing with it various waste disposal problems which must be given adequate consideration. The area is strategically well situated for almost unlimited industrial expansion since the large amounts of oxygen brought in by the enormous tidal exchanges in Puget Sound can oxidize all of the industrial or domestic wastes discharged therein. The problem will be one of adequate dispersion of such wastes through the waters of the Sound and the avoidance of local nuisances at sewer outlets. In the main, the discharge of such wastes at depths of 30 feet or more at low tide stages, with comminution of the solids and chlorination so as to protect bathing beaches and prevent the contaminating of shellfish, should be adequate disposal procedures. The rivers of the region, as compared with streams elsewhere, also have well-sustained flows throughout the year, and are sufficiently short that the wastes which they receive quickly reach the ample diluting waters of the Sound. Thus their pollutional problems are greatly minimized. Ample sources of pure and abundant water supplies, coupled with the capacity of Puget Sound to handle all wastes that will probably ever be produced in its drainage area, provided they are adequately dispersed throughout its waters without the production of local nuisances, should aid materially in the much desired industrial development of the region.

Table 16 gives sewerage data for all communities having organized sewer systems serving a population of 100 or more. Absence of sewage treatment is indicated by dashes in the spaces for such data. Following the municipal tabulation available data for institutional, war, industrial and other semipublic systems are given. Only systems serving 100 or more residential population, and entirely separate from any municipal system, are included. While a number of excellent plants have been constructed during 1941 and 1942 to serve Army and Naval Establishments, these, for obvious reasons, have been omitted from this tabulation.

TABLE 16.—*Sewerage data, Puget Sound* [1]

Community	Population		Type of sewer	Ownership of system	Sewage-treatment plant					Discharge to—(watercourse or other location)
					Date built	Design for—		Population served	Treatment	
	1940	Served by sewers				Average flow (million gallons per day)	Population			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Anacortes	5,875	(2,950)	C	M						Puget Sound.
Arlington	1,460	150	S	M						Stillaguamish River.
Auburn	4,211	(3,320)	SC	M	1924			(3,320)	CsE	Green River.
Bellingham	[2] (29,314)	25,000	SC	M						Puget Sound.
Black Diamond	1,418	200	S	P				200	Cs	Green River.
Blaine	1,524	(1,110)	S	M						Puget Sound.
Bremerton	[2] (27,000)	(29,200)	CS	M						Do.
Bremerton Housing Projects		7,560	S	M	U. C.	0.80	7,560	7,560	Sc	Washington Narrows and Sinclair Inlet.

See footnotes at end of table.

TABLE 16.—*Sewerage data, Puget Sound*—Continued

Community	Population		Type of sewer	Ownership of system	Sewage-treatment plant					Discharge to—(watercourse or other location)
						Design for—				
	1940	Served by sewers			Date built	Average flow (million gallons per day)	Population	Population served	Treatment	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Buckley	1,170	1,100	S	M						White River.
Burlington	1,632	150	C	M						Skagit River.
Carbonado	(600)	600	S	P						Carbonado River.
Cedar Falls	(200)	200	C	M						Cowlitz River.
Coupeville	325	(165)	C	M						Puget Sound.
Creosote	625	625	S	P						Do.
Du Pont	526	500	S	P						Do.
East Park (Bremerton)		[3] 1,960	S	M	1941	.2	1,960	1,960	Sc	Washington Narrows and Sinclair Inlet—30 feet m. l. l. w.
Eatonville	996	(109)	S	P				109	Cs	Musbell River.
Edmonds	1,288	(276)	C	M						Puget Sound.
Enumclaw	2,627	(2,520)	S	M				[4] 2,000	Cs	Newaukum Creek and White River.
Everett	[2] (31,735)	(28,300)	C	M						Puget Sound and Snohomish River.
Everson	292	75	S	M						Nooksack River.
Ferndale	717	600	S	M				225	CsEgc Bo.	Do.
Fircrest	486	700	C	M						Leach Creek, tributary to Chambers Creek.
Friday Harbor	658	400	C	M						Puget Sound.
Granite Falls	683	678	S	M						Pilchuck River.
Index	217	(172)	S	M						Skykomish River.
Issaquah	812	725	S	M	1940	.25 +I. W. .025	1,500 +I. W. 1,500	725 +I. W.	ShCm FtrhCm. EDpctBo.	Issaquah Creek.
Kent	2,586	(2,340)	C	M				(2,340)	Cs	Green River.
Kirkland	(4,000)	U. C.	S	M	U. C.	.4	4,000	U. C.	ScCm AaCm. EDcb. Bco.	Lake Washington.
Kitsap County, S. D. No. 1	1,232	[5] 1,200	CS	M	1941	1.3	13,000	[6] 2,632	Sc	Sinclair Inlet.
LaConner	624	(228)	S	M						Swinomish Slough.
Lynden	1,696	(1,280)	S	M	1937	.3	2,000	(1,280)	ShCm FtrEc. gDchsBo.	Nooksack River.
Marysville	1,748	1,660	S	M						Snohomish River.
Monroe	1,590	1,260	C	M						Snohomish River and Woods Creek.
Mount Vernon	4,278	(3,220)	C	M						Skagit.
North Beach (S. D.)	(3,000)	3,000	C	M	1942		3,000	3,000	ScCi EBo.	Puget Sound.
Olympia	[2] (14,580)	(14,900)	C	M						Do.
Orting	1,211	(1,095)	C	M	1940	.20 .15	1,600	[4] 1,000	Ci	Carbon River and Puyallup River.
Port Angeles	9,409	(8,050)	C	M						Strait of Juan de Fuca.
Port Gamble	575	500	C	P						Puget Sound.
Port Ludlow	(300)	200	S	P						Do.
Port Townsend	4,683	(2,810)	SC	M						Do.
Port Orchard	1,566	(1,500)	S	P						Sinclair Inlet-Puget Sound. 30 feet below m. l. l. w.
Poulsbo	639	(328)	S	M	1935			(328)	CsE	Liberty Bay-Puget Sound.
Puyallup	7,889	(6,670)	C	M				700	Cs	Puyallup River and Clark Creek.
Renton	4,488	(4,320)	S	M	1923			[4] (4,320)	CsE	Black River and Lake Washington.
					U. C.	2.0	20,000	U. C.	ScCmFtrh CmEgcDeshBo.	Lake Washington.
Richmond Beach	(2,500)	2,250	C	M	1942	.25	2,250	2,250	ScE	Puget Sound at 30 feet below m. l. l. w.
Seattle	[7] (441,650)	(310,200)	C	M						Puget Sound.
		32,000	C	M	1939	8.0	32,000	23,000	GmDmED fmbstBc.	Do.
Sedro Woolley	2,954	(2,390)	C	M				2,200	Cs	Skagit River.
Sequim	676	(506)	C	M						Strait of Juan de Fuca.
Shelton	3,707	(3,360)	S	M						Puget Sound.
Skykomish	479	200	S	P						South Fork Skykomish River.
Snohomish	2,794	(2,180)	C	M						Snohomish and Pilchuck Rivers.
Snoqualmie	775	(619)	C	M				(619)	Cs	Snoqualmie River.
South Prairie	226	(200)	S	M						South Prairie Creek.
Steilacoom	832	(800)	C	M						Puget Sound.
Sultan	961	(445)	C	M						Skykomish and Sultan Rivers.
Sumas	650	500	C	M						Sumas.
Sumner	2,140	(1,740)	C	M						Puyallup River.
Tacoma	[2] (125,819)	(75,500)	C	M						Puget Sound.
Taylor	(319)	(100)	S	M				80	Cs	Issaquah Creek.
Tulalip	1,046	500	S	[8]						Puget Sound.
Vail	175	175	S	P					CsIs	Land.
West Park (Bremerton)		[3] 1,960	S	M						Sinclair Inlet through Bremerton outfall.
White Center housing project		2,800	S	M	1942	1.5	15,000	2,800	Sc	Puget Sound 30 feet below m. l. l. w.

See footnotes at end of table.

TABLE 16.—*Sewerage data, Puget Sound*—Continued

INSTITUTIONAL, MILITARY, AND OTHER SEMIPUBLIC SYSTEMS

Community	Population		Type of sewer	Ownership of system	Sewage-treatment plant					Discharge to—(watercourse or other location)
						Design for—				
	1940	Served by sewers			Date built	Average flow (million gallons per day)	Population	Population served	Treatment	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Buckley State Custodial School			S	M	1940	0.216	3,000	(500)	ShCiFs	White River.
Lewis County T. B. Hospital			S	M	U. C.	.03	100		ScCm(AmCm)EcDpfBo.	Ditch.
Renton Boeing Co.	(1,000EP)	(1,000EP)	S	P	1942	.28	7,000EP	1,000EP	ScCmF2trhCmEcgDmpftBo.	Lake Washington.
Sand Point Housing	(1,000)	(1,000)	S	M	1941	.10	1,000	1,000	ScCm(AmCm)EcDpfBc.	Lake Washington.
Whatcom County Hospital	300	300	S	M	1941	.03	300	300	SmCiFtrCpEBo.	Unnamed.

[1] Explanatory notes and keys to symbols:

Column 1: S. D.=Sanitary or sewer district.

Column 2: Census figures where available; estimated figures enclosed in parentheses.

Column 3: Engineer's or superintendent's figures where available; estimated figures enclosed in parentheses.

Column 4: S=Separate; C=Combined.

Column 5: M=Public; P=Private.

Column 6: Date when plant placed in service; U. C.=Under construction.

Column 8: Rated capacity of plant in terms of population. Where the design included specific allowance for industrial waste (denoted by I. W.), the human population allowance is given first, followed by the industrial waste population equivalent. EP denotes design population of industrial plants on basis of equivalent municipal population.

Column 9: Human population contributing sewage to the plant. Where industrial waste constitutes an important part of the plant load, and the approximate loading from this source is available, the industrial waste population equivalent is given, as in column 8.

Column 10. Treatment units are denoted by letter symbols. Capitalized letters denote major treatment units; lower case letters denote characteristics of the major units which they follow. In general, sewage treatment units are noted in the order of sewage flow with sludge treatment unit symbols following thereafter. Combination units, performing more than one function in a single structure, are denoted by enclosing the appropriate symbols in parentheses. Where chlorination forms a part of the treatment, this has been noted only one time at each such plant whether or not dosage may be or is practiced at more than one point in the treatment process.

Treatment or device	*Symbol*
Screens	S
bar, or other coarse type, hand cleaned	Sh
comminutor	Sc
Grit chambers	G
with continuous removal mechanism	Gm
Grease removal or skimming tanks	O
Settling tanks	C
plain, hopper bottom	Cp
septic tank	Cs
two-story tank	Ci
mechanically equipped	Cm
Intermittent sand filters	Fs
Trickling filters	Ft
with fixed nozzles	Ftn
with rotary distributors	Ftr
high rate	Fth
two stage	F2
Other sewage filters	F
Sewage application to land	I
with cropping	Ic
sub-surface application	Is
Activated sludge aeration	A
diffused air aeration	Aa
Chlorination	E
chlorine gas	Eg
with contact tank	Ec
Separate sludge digesters	D
with stirring or concentrating mechanism	Dm
unheated	Dp
gas used in engines, heat as byproduct	De
gas storage, in digester or separate holder	Ds
Sludge beds	B
open	Bo
glass covered	Bc

Column 11: m. l. l. w., mean low low water.

[2] Population adjusted to July 1, 1942, by Division of Vital Statistics, Washington State Department of Health.

[3] Sewerage system constructed 1941—War Housing project.

[4] 2 plants.

[5] Sewer system constructed in 1941.

[6] Includes south unit of West Park housing project.

[7] Population adjusted to Dec. 31, 1942, by Division of Vital Statistics, Washington State Department of Health.

[8] U. S. I. S.

Source: State Department of Health.

Fisheries [2]

The size of the fisheries is shown by figure 36, which indicates the weight and value of fish landed exclusively in the Puget Sound region.

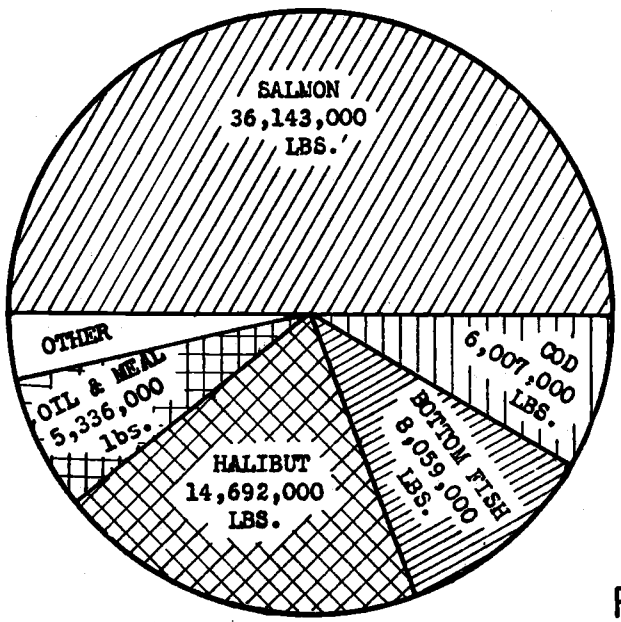
The fishing fleet and processing plants, wholesale dealers, and others engaged in the fisheries are scattered along the shores of Puget Sound; consequently each community sees only a relatively small part of the total fisheries of the region. Figure 36 shows the fisheries at their present production level. It is expected, however, that by the proper planning and construction of improvement projects, the value of the fisheries may be increased by some $3,000,000 annually, by the increased production of 12,000,000 pounds of salmon alone.

The value of the cod and bottom fisheries has good possibility of being increased through the improvement of marketing conditions, heightening the economic importance of these species. These two fisheries now are approximately equal in poundage to the valuable halibut fishery but in value are much less. (See fig. 36.)

Figure 37 indicates various projects which might be undertaken in the post-war period to increase the production of salmon. In addition to these projects it is expected that proper planning will go forward on other

[2] This section prepared by Washington State Department of Fisheries.

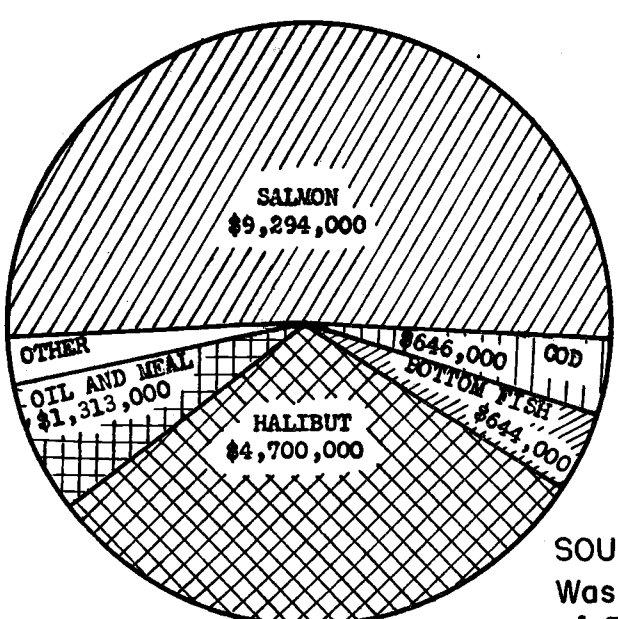
TOTAL COMMERCIAL PRODUCTION 72,928,000 lbs.



'OTHER' INCLUDES

	LBS.
SHELLFISH	752,000
CRAB	854,000
OYSTER	780,000
MISC.	305,000

VALUE BASED ON WHOLESALE $17,265,000



'OTHER' INCLUDES

SHELLFISH	$ 73,000
CRAB	136,000
OYSTERS	410,000
MISC.	49,000

FISH LOADINGS IN PUGET SOUND 1942

SOURCE:
Washington State Department of Fisheries.

FIGURE 36.

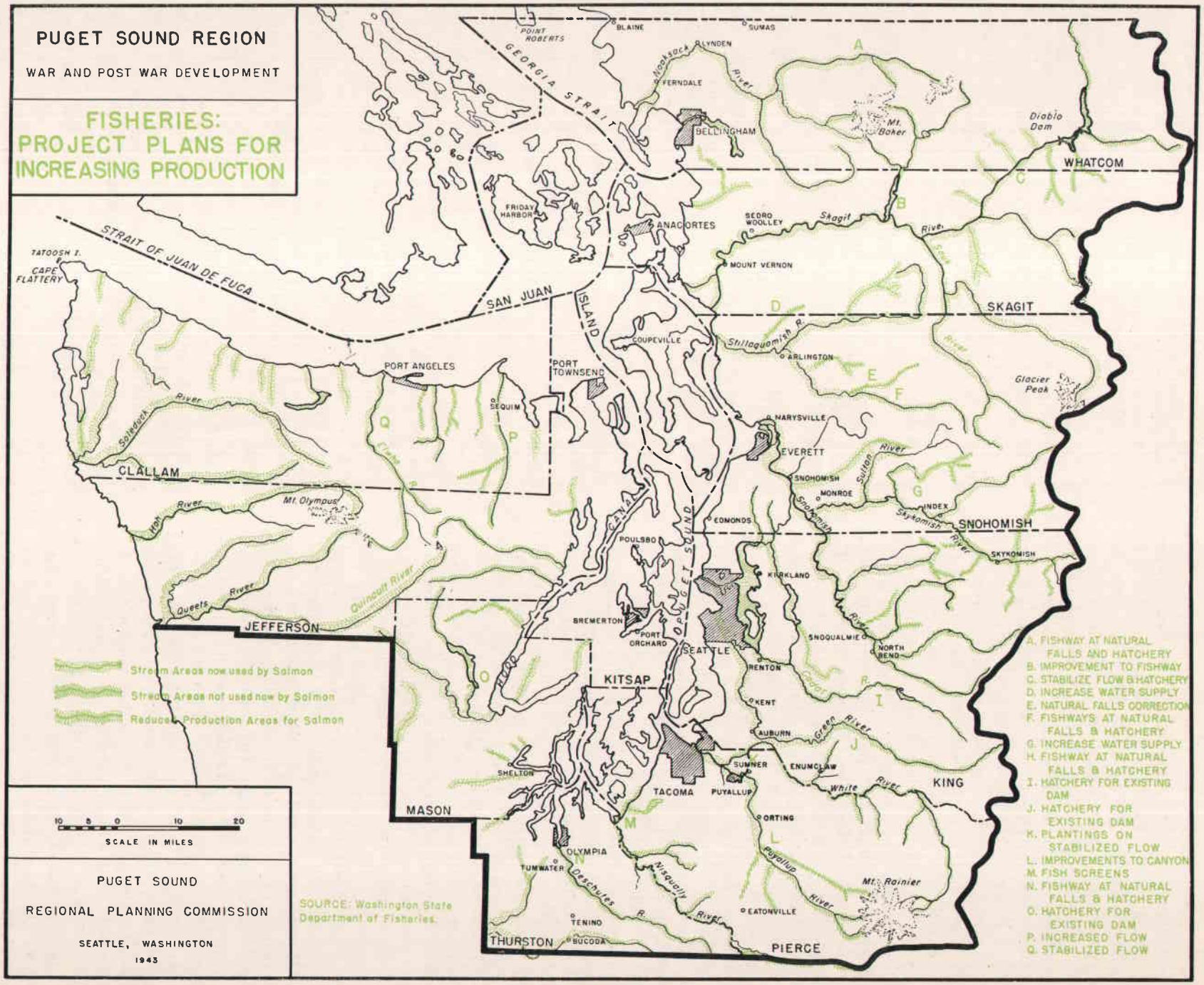

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
FISHERIES:
PROJECT PLANS FOR
INCREASING PRODUCTION
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
Nooksack River
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
STRAIT OF JUAN DE FUCA
TATOOSH I.
CAPE FLATTERY
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
Soleduck River
CLALLAM
MARYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
INDEX
Skykomish River
SNOHOMISH
SKYKOMISH
Hoh River
Mt. Olympus
EDMONDS
POULSBO
HOOD CANAL
PUGET SOUND
KIRKLAND
Queets River
Quinault River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
Green River
KENT
AUBURN
SHELTON
SUMNER
ENUMCLAW
White River
KING
TACOMA
PUYALLUP
ORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
BUCODA
THURSTON
PIERCE
Stream Areas now used by Salmon
Stream Areas not used now by Salmon
Reduced Production Areas for Salmon
A. FISHWAY AT NATURAL FALLS AND HATCHERY
B. IMPROVEMENT TO FISHWAY
C. STABILIZE FLOW & HATCHERY
D. INCREASE WATER SUPPLY
E. NATURAL FALLS CORRECTION
F. FISHWAYS AT NATURAL FALLS & HATCHERY
G. INCREASE WATER SUPPLY
H. FISHWAY AT NATURAL FALLS & HATCHERY
I. HATCHERY FOR EXISTING DAM
J. HATCHERY FOR EXISTING DAM
K. PLANTINGS ON STABILIZED FLOW
L. IMPROVEMENTS TO CANYON
M. FISH SCREENS
N. FISHWAY AT NATURAL FALLS & HATCHERY
O. HATCHERY FOR EXISTING DAM
P. INCREASED FLOW
Q. STABILIZED FLOW
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Washington State Department of Fisheries.

FIGURE 37.

multiple-use projects in order not to decrease the present supply of salmon.

The increases will be accomplished by the construction of new rearing stations, the building up of streams that have been depleted by unplanned water uses, and the opening up of new areas not now utilized by salmon. This last project, insofar as is known, has not been undertaken in other regions, but it is proved by Washington State Department of Fisheries biological work in connection with hatcheries that silver salmon can be transplanted into new areas and such runs will become self-sustaining through natural propagation. As the production of salmon is based upon spawning space and stream flow, increased production can be attained by utilizing more area. The careful planning of projects designed with this object will, of course, become a part of the present fisheries program. The expanded use of hatcheries by the introduction of rearing will now make it possible to sustain, in all streams adjacent to such plants, natural runs of maximum proportions. The introduction of migrant fish into such streams has made possible increased runs amounting to as much as 500 percent of the original stocks. In this manner depleted streams and streams of lessened production can be brought back into full utilization from the fishery standpoint.

Improvements now pending in the Fraser River system, the completion of which is but a matter of time, will materially increase the productive fisheries wealth of Puget Sound, as the sockeye salmon catch of this system, in accordance with a treaty provision which will go into effect in 1946, is to be divided equally between fishermen of the United States and Canada. The expansion of this fishery makes possible a very bright outlook for the northern district of the region and alone should insure a great increase in the commercial fleets and number of persons employed in the fishery.

The fishing industry as a whole is in a unique position in that it produces a high-quality protein food, rich in vitamins, and has always found a ready market for all fish that can be produced. War food needs at present require expansion in the fisheries. Projects that may be inaugurated at this time to make possible production increases will have a lasting effect on increased production. Increased demands for certain of the species are bringing better prices to the fishermen. Such benefits probably will carry forward into the post-war period, building up the economic but not the food importance of these species. Owing to the stable character of the fisheries, persons now engaged, or who may become engaged, in the industry will be assured of employment in the post-war period.

The following statistics demonstrate the present and potential importance of the Puget Sound fisheries:

Commercial fishery licenses issued in 1942		8,687
Salmon taken for personal use in salt water, average annual take:		
Number of chinooks		122,000
Number of silvers		200,000
Total		322,000
Present value of commercial fisheries		$17,265,000
Sport-fishing value of salmon in salt water		2,139,000
Total present value		19,404,000
Expected added value (by management and habitat correction):		
Salmon	3,000,000	
Other	200,000	
		3,200,000
Total projected value		22,604,000

Irrigation

Until a few years ago it was generally believed that there was such an abundance of rainfall in the region that irrigation was unnecessary. During recent years, however, farmers on the fertile valley lands have found that irrigation through the dry summer months adds materially to their productivity. Ever-increasing numbers of farms are being irrigated, therefore. The present location and size of irrigated areas is indicated by figure 38, while the extent of use of such supplemental irrigation in relation to the region's agriculture as a whole is shown in figures 17 and 20. Figure 20 also shows irrigation development proposals, which are listed by counties in table 11.

Oregon west of the Cascades has had a longer experience with summer irrigation than has the Puget Sound area. There, supplemental irrigation jumped the potato yield from 122 to 222 bushels per acre. Beans increased from 12 to 19 bushels; corn, kale, and beets increased their yield 50 percent. Washington State College has increased pasture-grass production from 206 pounds, dry weight, to 839 pounds, by irrigating during the single month of August. Crops such as peas are inferior if they have insufficient water while maturing. It is apparent, therefore, that production can be increased from 50 to 100 percent in the Puget Sound basin by supplemental irrigation.

Figures 3 and 4 show the very low precipitation during the growing season. A study of precipitation data for Seattle over a 60-year period shows an average of 2.81 inches of rainfall per month. The 7 months of April through October have a precipitation of less than 2.00 inches per month, while the 2 months of July and August average 0.63 and 0.70 inches, respectively. Hay crops and garden produce require from 12 to 36 inches depth of water during the growing season. Obviously, therefore, irrigation would be very helpful during the

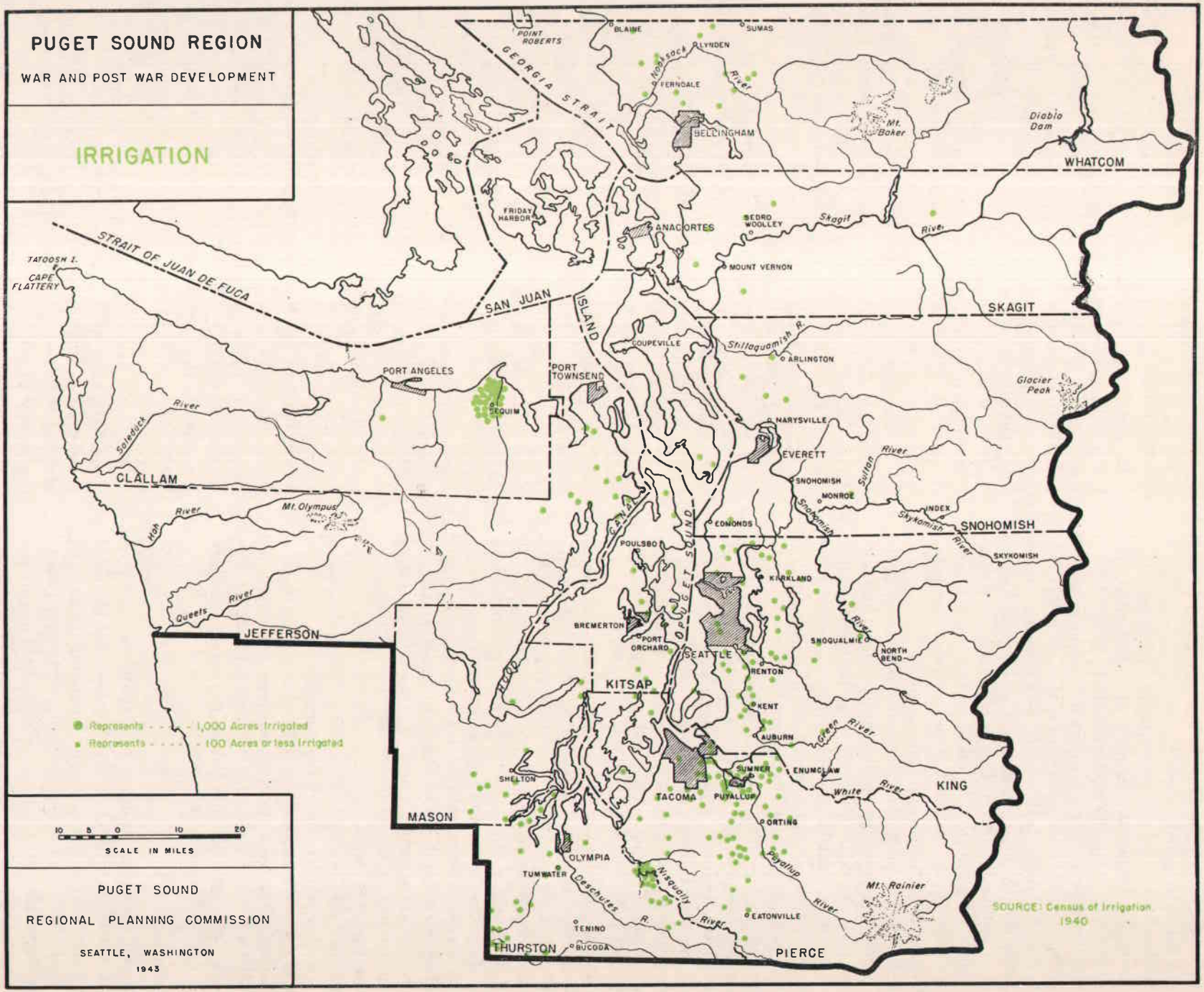

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
IRRIGATION
POINT ROBERTS
BLAINE
SUMAS
GEORGIA STRAIT
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
STRAIT OF JUAN DE FUCA
TATOOSH I.
CAPE FLATTERY
SAN JUAN ISLAND
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
MARYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
Snohomish River
INDEX
Skykomish River
SNOHOMISH
SKYKONISH
Soleduck River
CLALLAM
Mt. Olympus
Hoh River
EDMONDS
POULSBO
KITSAP
KIRKLAND
BREMERTON
PORT ORCHARD
SEATTLE
RENTON
SNOQUALMIE
NORTH BEND
Queets River
JEFFERSON
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
KING
SHELTON
TACOMA
PUYALLUP
PORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
BUCODA
THURSTON
PIERCE
Represents 1,000 Acres Irrigated
Represents 100 Acres or less Irrigated
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Census of Irrigation 1940

FIGURE 38.

dry summer months, and the increasing number of local farms being irrigated bears this out.

Studies have recently been started as to the best source of water for irrigation. Snohomish and Skagit Counties have been trying to arrange a study by the United States Geological Survey of their ground-water resources, but funds are not yet available. Present irrigation is for individual farms. For these the use of wells is usually most feasible. The need to use the present minimum stream flow during summer months for conserving fish runs would favor the use of ground water rather than stream flow for irrigation purposes.

During 1942 the Bureau of Reclamation had a reconnaissance field examination made of many areas in the basin which offered prospects for irrigation development. All available data were assembled and studied. Projects were ranked in order of priority as being worthy of further study. In an office memorandum it was recommended that the following two areas be given early consideration: (1) A 15,000-acre boot-shaped area extending south from Renton along both sides of the highway, railroad, and rivers to Sumner, thence west to Tacoma; and (2) a smaller area extending southeasterly for a distance of some 12 miles from Sumner and Puyallup along, and on both sides of, the Puyallup River.

Land classification surveys completed for both areas indicate that the physical characteristics and quality of the land are such that irrigation appears feasible. Field and questionnaire surveys have been made to shed light on the desires of the local people regarding irrigation development. The results of these studies indicate that farmers in Area 1 are much more interested in such development than are those in Area 2. A preliminary economic study of Area 1 to determine the feasibility of the project recommended that a detailed study be made. The completion date of this study is set for June 30, 1943, and it should be completed before other similar studies are started.

It is reported that the Army Engineers and Bureau of Reclamation are at present studying a dam site on the Green River, for multiple-use flood control and irrigation. It is probable that the completion of this study will be delayed until after the war.

Recreation

Income from tourists has grown rapidly during recent years, until just before the war it had become the third most important source of income for the city of Seattle. This is indicative of the economic importance of recreational facilities to the region. Recreational uses of the water resources of the area should obviously be conserved and developed as an important part of a general program for attracting tourists again after the war, as well as for the health, recreation, and welfare of our local people.

Water recreational resources are discussed in Part III, section 10, under "Recreational Facilities."

In order to conserve and develop further the water recreational facilities of this area, it is necessary to control stream pollution. It is not enough to prevent additional pollution of streams and beaches, but existing pollution must be eliminated or reduced to safe limits. It should be kept in mind, also, that the bringing in of new or additional industries presents numerous waste-disposal problems that must be carefully considered so that the pollution of stream and tidal waters will not be increased.

Bathing, fishing, and the gathering of shellfish may be seriously curtailed unless both municipal and industrial wastes are adequately treated before their discharge into the waters of the region. State and local health departments should receive the necessary financial, legislative, and popular support to guarantee proper and adequate supervision of the people's interest in conserving water recreational values.

The problems of flood control and power development in many industries also affect recreational facilities. At times the snagging of channels in legitimate flood-control work has damaged sand and gravel bars that were important spawning areas for salmon. Dams which are not provided with fish ladders or other equipment for passing migrating fish upstream may cut off large areas of productive streams and tributaries and materially reduce the annual catch of fish. These matters are discussed in more detail elsewhere in this report and are mentioned here only to stress the necessity of establishing controls and effective inspections for safeguarding water recreational facilities. These matters are now being given consideration by the agencies involved, and present indications promise their effective control.

Consolidated Plan for Water Resources

This basin is so large and its problems so complex that no attempt is made to summarize those problems on a single map. Detailed data and recommendations are given in the various subsections and illustrated in figures already presented. Only a summary is given here.

Water problems.—In an area that has grown in the short span of a single lifetime from a few scattered pioneer settlements to one of the most important war production centers of the country, it is to be expected that many problems of varying degrees of acuteness have developed with respect to a resource of such primary importance as water. Some of the more important of these problems have to do with public water

supplies, pollution abatement, flood control, fisheries, water power, navigation, recreation, erosion control, and irrigation.

Public water supplies.—The water supplies of the basin are, in the main, excellent in quality and ample in quantity. Growing pollution from sewage and industrial wastes should be checked in order to retain these supplies in their natural purity. Increasing population and industrial development, which will probably continue after the war, will require the expansion of some existing supplies that are at present adequate. Steps should be taken now to reserve certain streams for domestic water use where that use is of such importance as to require priority over other possible uses. The South Fork of the Nooksack River, the Tolt, Cedar, and Green Rivers, and a few minor streams, should be so reserved. The Skagit River is also an important source of domestic water supplies, and its purity should be restored by eliminating existing pollution.

Pollution.—The lower Skagit River is being badly polluted with sewage from the cities located along its course. While its water is filtered before being used for domestic purposes, this is not an adequate safeguard for the health and safety of the valley's population. Sewage now being discharged into the Skagit should be treated in suitable disposal plants before being permitted to enter the river. Communities at present unsewered should be served with sewers and disposal plants to prevent their polluted underdrainage from contaminating the stream. Similarly, existing pollution in the Snohomish and Lake Washington drainage areas should be eliminated by the construction of necessary disposal plants. Methods for treating certain industrial wastes being produced in the area, such as those from canneries and pulp and paper plants, should be worked out so that the oxygen demand from these wastes will be reduced to reasonable values. Figure 35 shows the areas most seriously polluted and the disposal plants most badly needed.

Flood control.—Practically all of the rivers in the Puget Sound Basin are subject to floods. With the exception of the Mud Mountain Dam and the permanent bank revetment work that has been done on the Puyallup River, no permanent solutions of local flood-control problems have been achieved. Necessary channel improvements on the Puyallup River through Tacoma will be carried out at the end of the war along the lines of plans already completed by the Army Engineers. The next problem of major importance should be the construction of the Avon cut-off. Methods for financing this project have not been satisfactorily completed because of the inability of the local interests to meet the amounts allocated to them by the report of the Army Engineers. It will be necessary for the Federal Government to bear a still larger share of the total expense if this project is to be built. It will require the construction of this project along with the completion of the Ross Dam and the construction in the future of a proposed dam on the Sauk, to give adequate flood protection to the rich delta region of the Skagit River.

Reports by the Army Engineers on many of the other streams have not yet been published. Definite recommendations will be included in these reports and should be included in the plan for flood control for these streams.

Fisheries.—The unproductive sections of the streams of the basin, as shown on figure 37, are caused by natural or artificial obstructions such as dams, rapids, waterfalls, etc. No general plan for passing fish at these obstructions can be given, as each obstruction will require individual treatment. Appropriate projects would add materially to the production of sport and commercial fish. Expansion of the use of hatcheries for rearing will reestablish fish runs now depleted.

Water power.—The war has hastened the rate of development of Grand Coulee, Bonneville, and Skagit power ahead of that originally planned. While only the last-named project is located in this basin, all are interconnected, and power from these, the cities of Tacoma and Centralia, and the Puget Sound Power & Light Co. is being utilized in various parts of the region. While possible power developments exist on almost every stream in the area, further expansion should be dictated by economic considerations and the realization that the availability of large blocks of excess, cheap power encourages its broader use, to the advantage of the people of the area. This availability of cheap power should play a major role in the industrial development of the region after the war, while public ownership of the major projects should guarantee a maximum of public benefit accruing therefrom.

Navigation.—Expanded water-borne commerce will be primarily coastwise and foreign rather than local in character. Terminal facilities constitute the greatest need, and plans for a better coordination of all transport facilities at the various ports of the area should be worked out. Maximum efficiency demands rapid loading of entire cargoes at a single port, which dictates the character of transportation, handling, storage, and housing facilities required. The plans to develop more adequate harbor and terminal facilities at Everett should be given full consideration and all possible aid.

Recreation.—An increased benefit from the water resources' recreational advantages would result from improvement in fish runs; the construction of additional safe salt-water moorings for small boats, as at Shilshoal Bay; the provision of easier access to many of the lakes

and streams of this area; and the protection of bathing from sewage pollution. The future of water recreation is thus seen to be intimately associated with other parts of the program of water resource utilization.

Erosion control.—The mountains are moving down the many streams of the area to the sound. Bank erosion, the undercutting of overhanging bluffs, and the cutting away of farms, or the covering of them with sand, gravel, and glacial till, are examples of the damage done by erosion. The silting up of harbors and river mouths is a serious aspect of this problem, while the building up of the fertile delta areas of the Skagit and Snohomish Rivers represents a contribution to the agricultural resources. The ravages of erosion have hitherto been given patchwork treatment, but scientific study by the United States Soil Conservation Service should result in a plan for a more constructive and permanent solution of the problem.

Irrigation.—A beginning has been made toward studying the possibilities for irrigation of the fertile valley lands of the area and an increasing number of farms are being irrigated each year. (See fig. 38.) The need of maintaining minimum summer stream flows indicates ground water as the most logical source of supply. This would be favored by a general availability of power for pumping and may also be required by the spotty character of the arable land. A study of ground-water resources is urgently needed. Possibilities of irrigation use of flood-control dams should be further investigated also.

Basic data needed.—More comprehensive information is needed about the flow of streams in the State. Stream-flow records are vital to the proper allocation, development, and use of the region's waters, but there is a deficiency of this basic data, particularly for the smaller streams. An expansion of the present stream-gaging facilities and programs is recommended as an essential part of the program of Puget Sound water resource development.

PART III

5. INDUSTRY

By Grant I. Butterbaugh [1]

Manufacturing

Industrial activity in the Puget Sound region can rightly be said to be chiefly manufacturing based upon the extractive industries. Basically, the region derives its wealth from its natural resources and a large portion of the population is dependent upon lumbering, agriculture, mining, and fishing for its livelihood. The value of manufactured products as reported in the last census, and in every census since that of 1880, far exceeds the value of production by all of the major extractive industries. The reason for this preeminence of manufacturing in an important raw material producing region is that the manufacturing plants are able to draw most of their raw material from the nearby surrounding territory. Also, the location of plants close to salt water permits easy access to the ports of the world as well as to the markets of southern and eastern United States by low-cost transportation.

Although the value added to production by manufacturing or the value of production at any time cannot be stated with great accuracy because the products of one establishment are often the raw materials of another, census statistics give an idea of the importance of the forest industries. The following tabulation gives the value of production from forest industries in the State in 1939:

Lumber and timber	$151,821,000
Planing mills	17,333,000
Paper and pulp	71,249,000
Plywood	17,907,000
Furniture, household (plain)	4,220,000
Wood preserving	4,342,000
Wooden boxes	2,776,000
Total	269,648,000

In 1939 the value of production from agricultural industries is shown in the Census of Manufactures for Washington to be in the neighborhood of $152,000,000 as follows:

Flour (grain, food preparations, feed)	$36,634,000
Meat packing, wholesale	26,125,000
Canning (vegetables, fruit, fish)	24,950,000
Baking, macaroni, biscuits	$19,791,000
Dairy products, canned milk	19,386,000
Malt liquors and wines	10,281,000
Food preparations, preserved, pickled, and frozen	8,890,000
Ice cream	3,491,000
Candy	2,650,000
Total	152,198,000

These summaries of the value of production from forest and agricultural industries are not comparable for the reason that the item "Lumber and timber" includes logging as well as the manufacture of lumber, whereas the value of agricultural production, which amounted to approximately $131,000,000 in 1939, is not included in the total representing the contribution of agriculture to the economy of the State.

As shown in table 17, manufacturing (including lumber products and agricultural products) is about 1½ times the value of production of the four major extractive industries of the State.

TABLE 17.—*Value of production by major industries, State of Washington, 1860 to 1940*

[000 omitted]

Census	Lumbering [1]	Agriculture	Mining	Fishing	Manufacturing [2]
1860	$1,173	$157		$64	$1,405
1870	1,924	[3] 2,112	$109	290	2,851
1880	1,735	4,213	526	[4] 181	3,250
1889	15,068	13,675	2,998	1,108	41,768
1899	30,286	29,618	5,394	2,995	70,831
1909	89,155	78,927	15,484	3,513	220,746
1919	231,444	227,212	18,268	[5] 5,589	809,623
1929	286,085	197,745	22,435	[6] 5,470	795,562
1939	169,153	130,849	31,590	[7] 5,088	636,650

[1] Includes planing mill products.
[2] Includes lumber products.
[3] Includes betterments and additions to stock.
[4] Includes seal fisheries.
[5] For fiscal year ending Mar. 31, 1920; includes food and shellfish handled fresh, and preserved other than canned; also byproducts.
[6] For fiscal year ending Mar. 31, 1930; same products as in note 5.
[7] For fiscal year ending Mar. 31, 1939, same products as in note 5.

Source: United States Census Reports of Agriculture, Mines and Quarries, Fishing, and Manufacturers; also State of Washington, Department of Fisheries, Annual Bulletins.

Table 18 shows the major industries of Washington ranked according to value of production in the year 1939. This table shows the overwhelming importance of the logging-lumbering and paper-pulp industries, and the secondary importance of the food and manufacturing group.

[1] Associate Professor, Economics and Business, University of Washington.

TABLE 18.—*Value of production of Washington manufactures, 1939*

Products	Value of production Census of 1940 for year 1939
	Thousands of dollars
Sawmills and logging	$151,821
Paper and pulp	71,249
Flour and grain, food preparations and feed	36,634
Meat packing, wholesale	26,125
Canning, vegetables, fruit, fish	24,950
Publishing, printing, lithographing	22,335
Baking, macaroni, biscuits	19,791
Dairy products, canned milk	19,386
Plywood	17,907
Planing mill products	17,333
Forging, machine shop products and repairs	12,878
Paper boxes and paper products	11,326
Chemicals and allied products	10,555
Malt liquors and wines	10,281
Tin cans and tinware	10,033
Machinery, not electrical	8,993
Food preparations, preserved, pickled, and frozen	8,890
Cement	8,421
Clothing and apparel	7,679
Furniture, plain and upholstered, mattresses, and bed springs	6,752
Shipbuilding and repairs	6,381
Wood preserving	4,342
Ice cream	3,491
Concrete products	3,007
Wooden boxes	2,776
Candy	2,650
Airplanes [1]	----------

[1] Value withheld to avoid disclosing the operations of single plants.

Source: United States Bureau of the Census, Sixteenth Census of the United States: 1940; Census of Manufactures, 1939—State Summary: Washington, p. 2.

The Puget Sound region is the chief industrial section of Washington in peacetime as well as in wartime. Table 19 shows the value of manufactured products and the number of establishments engaged in manufacturing in the region as compared with the totals for the State. In the years preceding the outbreak of World War II the region contained approximately 66 percent of the manufacturing establishments and accounted for about the same percentage in value of production.

TABLE 19.—*Value of manufactured products and number of establishments in the Puget Sound region and Washington, 1919 to 1939*

Year	Number of establishments			Value of production [1]		
	Puget Sound region	Washington	Percent, Puget Sound region to Washington	Puget Sound region	Washington	Percent, Puget Sound region to Washington
				Thousands of dollars	*Thousands of dollars*	
1919	2,874	4,819	59.6	591,563	809,623	73.1
1929	2,391	3,648	65.5	546,245	795,562	68.7
1931	1,933	2,897	66.7	286,193	418,922	68.3
1933	1,527	2,307	66.2	221,016	331,225	66.7
1935	1,859	2,840	65.5	316,639	470,125	67.4
1937	1,961	3,057	64.1	441,011	675,640	65.3
1939	2,133	3,240	65.8	420,501	636,650	66.0

[1] The value of manufactured products includes lumber products.

Source: United States Census of Manufacturing.

In 1939 about 63 percent of the wage earners engaged in manufacturing in Washington were employed in plants located in the Puget Sound region. Their wages amounted to almost 64 percent of the wages of employees of manufacturing establishments in Washington. Table 20 shows manufacturing data by counties.

TABLE 20.—*Number of manufacturing establishments, wage earners, wages paid and value of product in Puget Sound area, 1939*

	Number of establishments	Wage earners	Wages paid	Value of product
			Thousands of dollars	*Thousands of dollars*
Clallam	45	1,714	2,247	14,360
Island	7	22	16	122
Jefferson [1]	25	667	----------	----------
King	1,216	24,252	33,954	173,038
Kitsap	38	932	1,320	5,459
Mason	35	1,509	2,145	8,772
Pierce	323	12,601	16,754	129,188
San Juan	8	129	116	948
Skagit	95	2,515	2,760	17,919
Snohomish	178	7,028	9,698	39,301
Thurston	52	2,553	3,495	15,438
Whatcom	111	2,571	3,200	15,957
Total	2,133	56,493	[2] 75,706	[2] 420,501
State total	3,240	90,324	118,326	636,650

[1] Figures not shown are withheld to avoid disclosing the operations of single plants.
[2] Partial totals: Jefferson County not included.

Source: United States Census of Manufactures.

The great concentration of manufacturing in the Seattle-Tacoma industrial area is clearly evident in the following tabulation derived from the 1939 Census of Manufactures.

Cities and counties	Number of establishments	Percent region total	Percent State total
Seattle	1,083	51	33
Tacoma	253	12	8
Seattle and Tacoma combined	1,336	63	41
King County	1,216	57	38
Pierce County	323	15	10
King and Pierce Counties	1,539	72	48
Total for region	2,133	100	66
Total for State	3,240	----------	100

In table 21 is shown the location of various types of manufacturing plants in the counties of the Puget Sound region as of 1939. It will be observed that the food group was in the lead, closely followed by lumber, furniture, and paper when considered as a forest-products group. Location of food-products manufacturing establishments is shown in figure 39 and of wood-products plants in figure 40.

TABLE 21.—*Number and location, by counties, of various types of manufacturing plants in the Puget Sound region, 1939*

Type	Counties														
	Clallam	Island	Jefferson	King	Kitsap	Mason	Pierce	San Juan	Skagit	Snohomish	Thurston	Whatcom	Puget Sound region	Washington
Food	11	4	6	314	15	9	92	7	33	51	16	45	603	1,033
Textile mill and other fiber manufacturing				13			2				1		16	18
Apparel				88			5						93	97
Lumber and timber basic products	24	2	15	80	14	22	59		48	85	26	38	413	748
Furniture and finished lumber products				79	1		29			5	1	3	118	143
Paper and allied products	5		3	16		1	6		1	4		2	38	55
Printing, publishing and allied products	2	1	1	183	6	1	39		5	15	3	9	265	391
Chemicals and allied products				59			13			3		1	76	98
Products of petroleum and coal				1			1						2	4
Rubber products				4									4	4
Leather and allied products				16			2						18	23
Stone, clay and glass products	1			41	1	1	14	1	3	4	1	3	70	103
Iron and steel products, excluding machinery				73			13		2	5	2	4	99	113
Nonferrous metals and allied products	1			50			9					1	61	72
Electrical machinery				17			2						19	22
Machinery, excluding electrical	1			85		1	15		3	3	2	2	112	163
Automobiles and equipment				13			1						14	18
Transportation equipment, except automobiles				27	1		9			3		2	42	46
Miscellaneous				57			12					1	70	84
Total	45	7	25	1,216	38	35	323	8	95	178	52	111	2,133	3,240

Source: U. S. Census of Manufactures,

Lumbering

From early days the lumbering industry has been of first rate importance in the State. In the past Washington has been the leading lumber producing area of the United States, but today it ranks second to Oregon. In 1934, the United States Forest Service estimated the standing timber of Washington as follows:

Section:	*Board feet, log scale*
Western Washington	245,255,046,000
Eastern Washington	35,246,000,000
Total	280,501,046,000

Of the western Washington total, between 50 and 60 percent was estimated to be standing in the 12 counties of the Puget Sound region, but according to the Washington State Planning Council only 60 percent of the acreage, containing about 50 percent of the merchantable timber of the State, was actually in private hands in 1933. About 40 percent of the acreage and 50 percent of the merchantable timber was on national forest and other Federal lands, Indian lands, or land owned by the State and political subdivisions thereof.

The amount of standing timber in the various counties of the Puget Sound region and the dates at which the estimates were made are shown in table 22.

TABLE 22.—*Standing timber in the Puget Sound region, by counties*

County	Date of estimate	Board feet log scale (000,000 omitted)
Clallam	1939	24,296
Island	1933	133
Jefferson	1933	24,896
King	1941	16,383
Kitsap	1940	315
Mason	1940	6,472
Pierce	1938	14,292
San Juan	1933	27
Skagit	1933	12,567
Snohomish	1938	15,518
Thurston	1939	1,377
Whatcom	1938	9,330

Source: Pacific Northwest Forest and Range Experiment Station, U. S. Department of Agriculture.

Lumber production has fluctuated with the changing current of business activity and the swing of the building construction cycle. A high point of production was reached in the years 1928 and 1929, after which there was a marked decline to 1932, followed by generally increasing production after that date. Table 23 shows the amount of lumber produced in western Washington and the entire State from early pioneer days to the present time.

TABLE 23.—*Lumber production, State of Washington and western Washington, selected years 1869–1939*

[In thousands of board feet]

Year	State total	Western Washington	Year	State total	Western Washington
1869	128,743		1929	7,302,100	6,739,000
1879	160,176		1930	5,502,100	4,967,700
1889	1,064,000		1932	2,260,700	1,973,900
1899	1,429,000		1934	3,064,300	2,686,900
1909	3,863,000		1936	4,571,744	4,051,200
1919	4,961,000		1938	3,348,567	2,884,900
1928	7,305,000	6,700,700	1939	4,244,001	3,689,500

Source: U. S. Census Reports, U. S. Forest Service Reports, and West Coast Lumbermen's Association Bulletin.

Paper and Wood Pulp

In connection with lumber products it is necessary to point out that the manufacture of paper and wood pulp ranked as the second most important manufacturing industry of the State at the time of the last census. No great significance was attached to this industry until the census of 1920 when 6 paper and pulp mills reported products valued at over $10,500,000 and placed this industry in the list of leading producers. The number of mills in Washington grew from 3 in 1914 to 23 in 1942. In 1942 there were 16 paper and pulp mills located in the region. Although it is not possible to state the value of production of Puget Sound region paper and

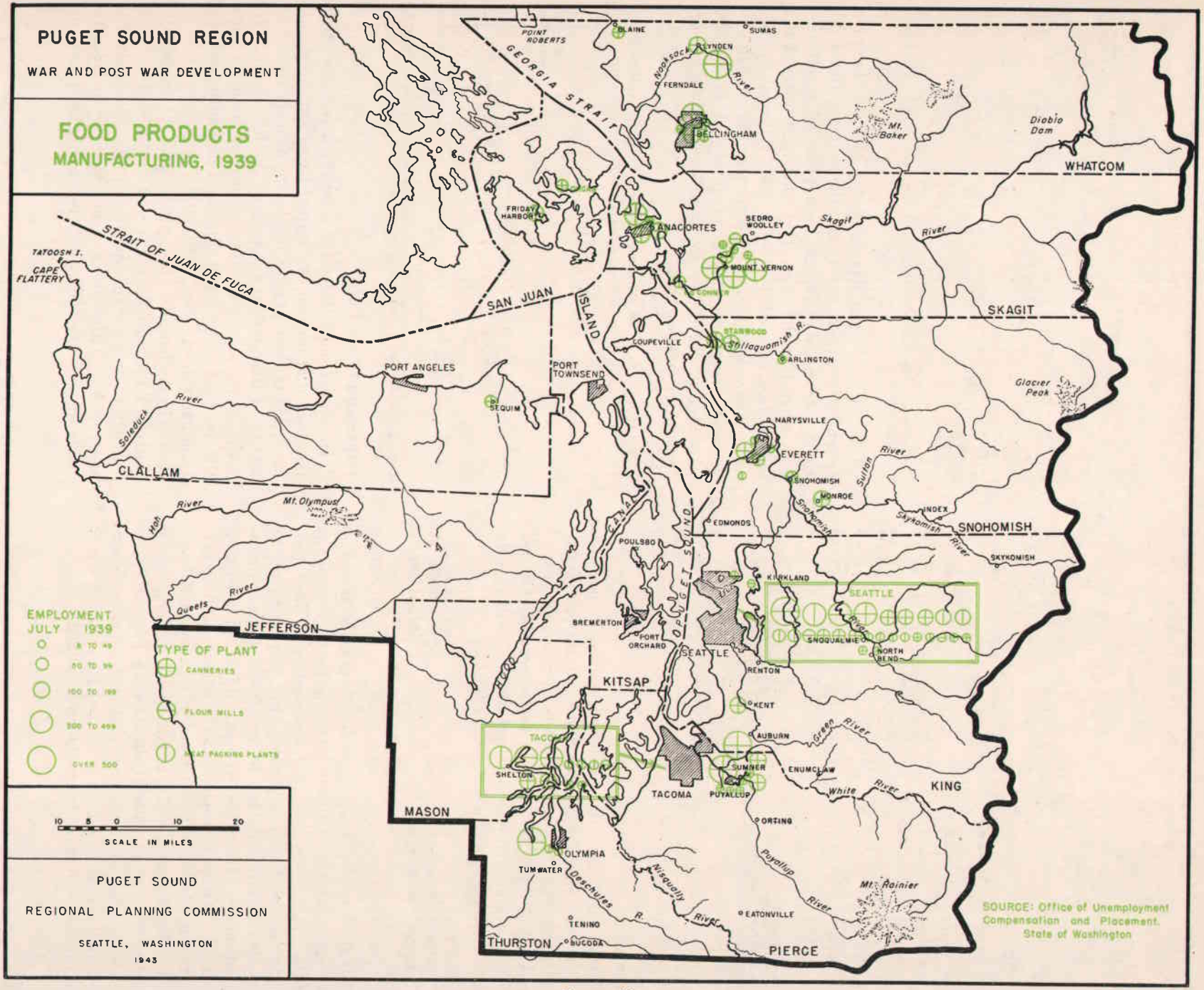

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
FOOD PRODUCTS
MANUFACTURING, 1939
EMPLOYMENT
JULY 1939
TYPE OF PLANT
CANNERIES
FLOUR MILLS
MEAT PACKING PLANTS
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Office of Unemployment Compensation and Placement, State of Washington
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
PUGET SOUND
BELLINGHAM
ANACORTES
MOUNT VERNON
ARLINGTON
EVERETT
MARYSVILLE
SNOHOMISH
MONROE
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
KENT
AUBURN
SUMNER
PUYALLUP
TACOMA
OLYMPIA
TUMWATER
SHELTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
COUPEVILLE
FRIDAY HARBOR
BLAINE
POINT ROBERTS
SUMAS
LYNDEN
FERNDALE
SEDRO WOOLLEY
STANWOOD
NORTH BEND
SNOQUALMIE
INDEX
SKYKOMISH
ENUMCLAW
ORTING
EATONVILLE
TENINO
SUCCOA
TATOOSH I.
CAPE FLATTERY
Mt. Olympus
Mt. Baker
Mt. Rainier
Glacier Peak
Diablo Dam
Skagit River
Stillaguamish R.
Sultan River
Snohomish River
Skykomish River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Hoh River
Quaets River
Soleduck River
Nooksack River

FIGURE 39.

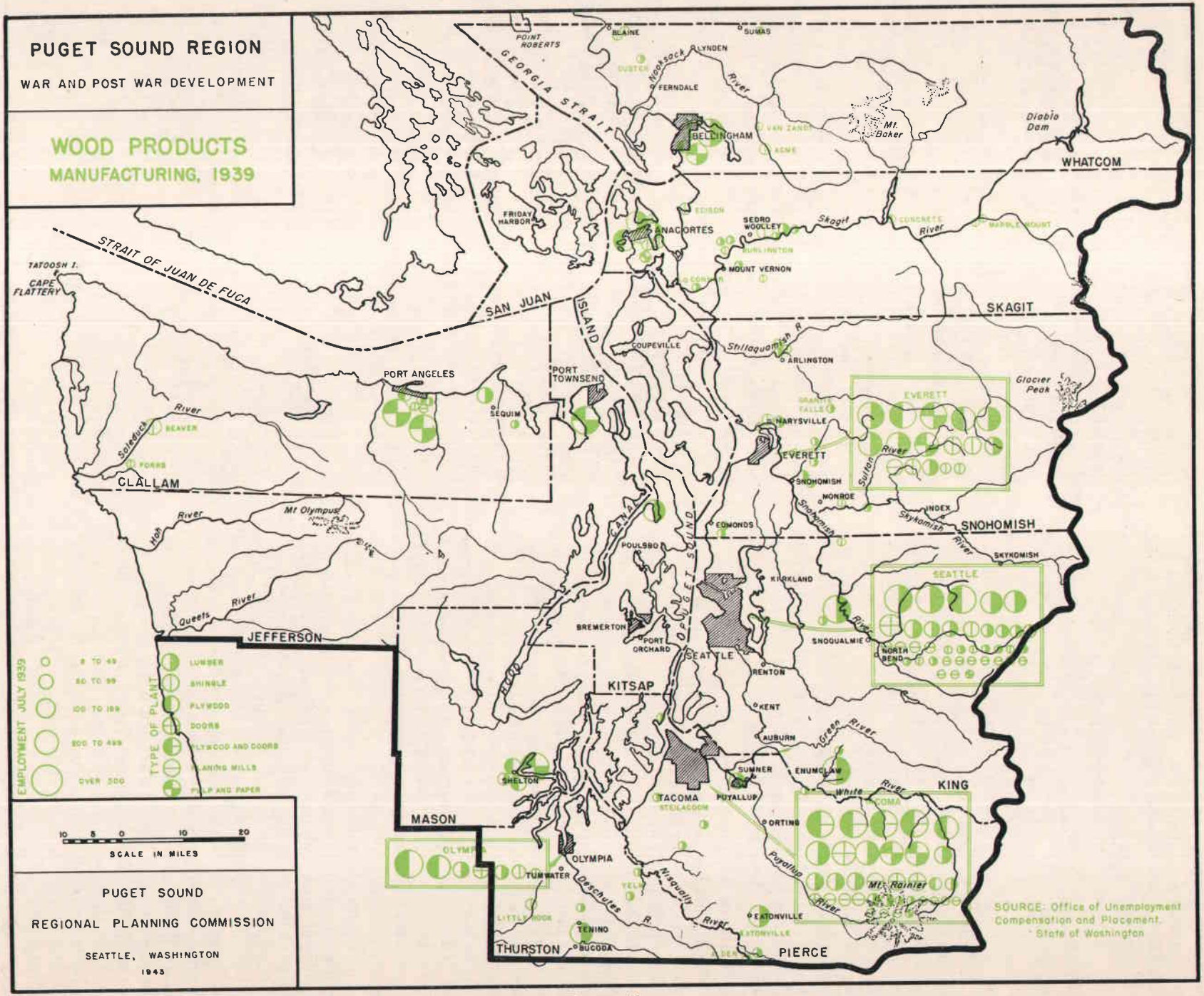

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
WOOD PRODUCTS
MANUFACTURING, 1939
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
MOUNT VERNON
Skagit River
SKAGIT
TATOOSH I.
CAPE FLATTERY
COUPEVILLE
Stillaguamish R
ARLINGTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
Glacier Peak
EVERETT
MARYSVILLE
Sultan River
SNOHOMISH
MONROE
Snohomish River
INDEX
Skykomish River
SKYKOMISH
Sol Duc River
BEAVER
FORKS
CLALLAM
Mt Olympus
Hoh River
Queets River
EDMONDS
POULSBO
PUGET SOUND
KIRKLAND
SEATTLE
BREMERTON
PORT ORCHARD
SNOQUALMIE
NORTH BEND
RENTON
JEFFERSON
KITSAP
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
KING
SHELTON
TACOMA
STEILACOOM
PUYALLUP
ORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
LITTLE ROCK
TENINO
BUCODA
EATONVILLE
THURSTON
PIERCE
EMPLOYMENT JULY 1939
8 TO 49
50 TO 99
100 TO 199
200 TO 499
OVER 500
TYPE OF PLANT
LUMBER
SHINGLE
PLYWOOD
DOORS
PLYWOOD AND DOORS
PLANING MILLS
PULP AND PAPER
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Office of Unemployment Compensation and Placement, State of Washington

FIGURE 40.

pulp mills apart from those of the rest of Washington, the following tabulation derived from the Census of Manufactures shows the growth of the industry for the entire State:

Value of paper and wood pulp production

Year:	Thousands of dollars	Year:	Thousands of dollars
1919	10,653	1933	40,657
1925	14,684	1935	53,225
1929	47,094	1937	85,460
1931	44,288	1939	71,249

In 1929 the value of paper and pulp products was 16.4 percent of the value of lumber products, including planing mill products; in 1939 it had increased to 42.1 percent. Stated another way, the value of production of paper and pulp products in 1929 was 13.5 percent of the value of all forest products including paper and pulp, wood preserving, furniture, planing mill, and plywood products. By 1939 the paper and pulp industry in Washington had increased the value of production to 26.4 percent of all forest products.

Agriculture

Puget Sound is not primarily an agricultural region, but agriculture is an important secondary industry. It consists principally of dairying, poultry raising, and the cultivation of berries, vegetables, bulbs, and various types of nursery stock. The average size of farms, based on acres improved, has decreased from about 42.5 acres in 1889 to approximately 10.8 acres in 1939, while the average size of farms in the balance of the State increased in the same period from 118.3 acres to 124.3 acres. Table 2, which appears in the section on agriculture, shows the number of farms, acreage, average size of farms and proportion of land area in farms in 1940. Decrease in the size of farms over the past 40 years is due to the development of types of farms which require but small acreage.

The region is notably a center of the dairying industry and large condenseries have been built to utilize the surplus of milk not used in immediate consumption. The principal dairy regions are concentrated in the belts of 40 to 60 or more inches of annual rainfall. (See fig. 19.) The abundant pasturage of dairy farms located mainly on river bottoms gives them a pasture-carrying capacity exceeding that of the nonirrigated areas in eastern Washington. Although summer rainfall is low over much of this area, the bottom lands receive moisture from the surrounding upland areas and plant growth is thus sustained. The humid climate is conducive to the production of high quality dairy products, and the dairy industry has become a specialized business.

Egg and poultry production is also centered in the region. Natural climate advantages and the presence of a very strong cooperative association have combined to influence the location of the industry. Low land values, optimum climatic conditions, and the advantage of being able to start with limited capital are some of the factors which have contributed to the rapid expansion of this industry in the period from 1920 to 1930. Poultry farms cluster around large cities; in addition to the upper Puget Sound region, the Winlock district in Lewis County is prominent for egg production. (See fig. 17.)

Small fruit and berries are grown for commercial purposes in the region. Pierce County is the center of raspberry and blackberry production, while Thurston, Pierce, and King Counties are most important in strawberry culture. (See fig. 19.) All the small fruits attain some degree of commercial importance, particularly in the areas of from 30 to 60 inches of rainfall per year. This includes the Puget Sound region and the agricultural land to the south between Olympia and Vancouver. Berry farms in this region, benefiting from intensive cultivation and the combination of ideal climatic and soil conditions, produce heavy yields which are either disposed of in the city markets or utilized by canneries.

Small scattered areas make use of natural advantages in producing specialty crops, such as flower bulbs (around Puyallup, Sumner, and Bellingham), garden seeds, ginseng, head lettuce, green peas, holly, and hothouse rhubarb.

The value of farm production by counties, together with the number of farms reporting, is shown in table 24 for the years 1939 and 1929. In 1939 the region produced 27.0 percent of the value of farm products of Washington while in 1929 it accounted for 26.1 percent.

TABLE 24.—*Value of farm products and number of farms reporting, by counties of the Puget Sound region, 1939 and 1929*

County	Number of farms reporting		Value of production (thousands of dollars)	
	1939	1929	1939	1929
Clallam	1,194	707	1,122	1,554
Island	1,016	860	1,280	1,790
Jefferson	495	268	466	541
King	5,592	4,305	7,611	10,919
Kitsap	2,052	1,444	1,608	2,308
Mason	748	424	411	654
Pierce	5,411	4,387	5,783	8,519
San Juan	473	454	498	809
Skagit	3,137	2,602	4,140	5,816
Snohomish	5,992	4,093	4,851	7,718
Thurston	2,744	1,887	1,891	2,472
Whatcom	4,558	4,121	5,713	8,573
Puget Sound region	33,412	25,552	35,374	51,673
Washington	79,161	67,225	130,849	197,745

Source: Bureau of the Census.

Mining

Mining ranks next to agriculture and ahead of fishing among the industries of the region. The value of products of the mines and quarries of Washington (see table

25) increased at a rather rapid rate up to 1909 or 1910, but after 1910 the growth was relatively slow, and from 1931 to 1935, inclusive, the value of production of the mining industry was less than it was in 1909.

TABLE 25.—*Value of production of mines and quarries, State of Washington, 1908 to 1940*

[In millions of dollars]

Year	Value	Year	Value	Year	Value
1908	11.61	1919	18.27	1930	20.08
1909	15.48	1920	26.68	1931	14.80
1910	16.81	1921	17.61	1932	12.82
1911	15.87	1922	19.73	1933	9.39
1912	15.35	1923	22.17	1934	12.94
1913	17.58	1924	21.16	1935	13.69
1914	13.83	1925	22.38	1936	22.92
1915	11.46	1926	21.26	1937	26.66
1916	14.52	1927	21.97	1938	21.17
1917	18.58	1928	22.12	1939	31.59
1918	21.00	1929	22.44	1940	34.58

Source: U. S. Minerals Yearbook.

Coal production increased from 5,374 tons in 1860 to 2,418,034 in 1900 in the State. The expansion of production reached a peak in the war years 1917–18 when more than 4 million tons were mined annually. In 1940 the region produced 52 percent of the coal mined in the State, or about 1,017,646 tons (see table 26), while Kittitas County, which is adjacent to the region on the east side of the Cascade Mountains, produced the other 48 percent, making a total of 1,675,592 tons for the State.

TABLE 26.—*Coal production in tons for Puget Sound region counties and State, 1939 to 1942*

County	1939	1940	1941	1942
Cowlitz	258			
King	619,427	602,622	645,650	622,840
Lewis	35,687	39,780	37,374	53,240
Pierce	39,696	40,867	23,606	27,607
Thurston	36,179	33,622	39,576	80,180
Whatcom	236,806	185,165	190,139	233,779
Total for Puget Sound	968,053	902,056	936,345	1,017,646
Kittitas	728,084	771,536	940,485	953,539
Total for Washington	1,696,137	1,673,592	1,876,830	1,971,185

Source: Annual Report of Coal Mines, State of Washington.

The region plays a minor part in the production of gold, silver, copper, lead, and zinc. In the year 1920 this region was producing roughly 19 percent of the total value of these metals mined in Washington. In 1940 the 22 such mines located in the region yielded only $52,090, or less than three-quarters of 1 percent of the total State production of $7,018,812. The metal mines of the region were distributed in 1940 as follows:

County	Number of mines	Value of production
Clallam	3	$280
King	3	1,575
Snohomish	11	38,046
Whatcom	5	12,189
Total for region	22	52,090
Total for State	83	7,018,812

534268—43——7

Fishing

Among the extractive industries, fishing follows lumbering, agriculture, and mining in importance. Table 27 shows the value of production of fisheries in the State since 1919.

TABLE 27.—*Value of production of fisheries, State of Washington, 1918 to 1938* [1]

[In thousands of dollars]

Year	Total output	Canned fish	Balance	Year	Total output	Canned fish	Balance
1918	$13,855	$8,370	$5,485	1929	$17,290	$9,968	$7,322
1919	18,201	12,956	5,245	1930	13,103	7,633	5,470
1920	10,120	4,531	5,589	1931	10,590	5,768	4,822
1921	9,807	5,898	3,909	1932	5,572	2,308	3,264
1922	9,014	5,025	3,962	1933	10,774	5,776	4,998
1923	12,897	7,381	5,516	1934	10,404	4,899	5,505
1924	10,381	5,215	5,166	1935	11,264	4,911	6,353
1925	15,312	10,159	5,153	1936	9,113	2,975	6,138
1926	10,684	5,258	5,426	1937	13,656	5,869	7,787
1927	17,113	10,256	6,857	1938	11,465	4,106	7,359
1928	12,006	5,899	6,107				

[1] Reports discontinued in 1939.

Source: Washington, State Department of Fisheries, forty-sixth to forty-ninth annual reports, Olympia: State Printing Plant, 1939, p. 111.

The development of the fishing industry in the region is not significantly different from the development of fishing for the State as a whole, as very little fish other than salmon is landed at Washington ports outside Puget Sound. It will be noted in table 27 that the value of canned fish in recent years has been less than 50 percent of the value of all fish products. A wide variety of fish is obtained in commercial quantities but the principal species landed at Seattle are halibut, salmon, pilchard, albacore tuna, sole, clams, and crabs. Seattle has for some years been the leader in halibut, landings averaging about 20.5 million pounds per year over the 10 years 1931–40. Most of the halibut landed at Seattle is caught off the coast of Washington. Through the port of Seattle passes the bulk of the Alaskan canned salmon pack, which varies between five and eight million cases (48 pounds to the case) per year.

The salmon pack for the region and for the State is shown in table 28. These data indicate in a measure the uncertainty in the salmon-packing industry due to variations in the runs and catches of salmon from year to year.

TABLE 28.—*Salmon pack for the Puget Sound region* [1] *and for the State of Washington, based on 48-pound cases*

[000 omitted]

Year	Puget Sound region	Washington	Year	Puget Sound region	Washington
1928	330	496	1936	123	210
1929	1,140	1,275	1937	445	551
1930	586	718	1938	160	211
1931	954	1,058	1939	391	466
1932	265	381	1940	116	215
1933	775	853	1941	336	491
1934	507	594	1942	276	372
1935	519	612			

[1] Data cover season from May 1 to Nov. 20; Puget Sound data do not include imported fish from British Columbia canned in Washington.

Source: State of Washington, Department of Fisheries, *Annual Bulletins* Nos. 35 to 42, inclusive, for years 1935 to 1942.

PART III

6. COMMERCE

A. PATTERN OF COMMERCIAL ACTIVITY

By Grant I. Butterbaugh [1]

Retail Trade

The most recent available data covering the principal commercial activities of the region are reported in the Census of Business taken in 1940 as a part of the Sixteenth Census of the United States. Data covering retail trade and service establishments are presented in this report by means of maps; details are given by tables for these and for wholesale trade as to the number of establishments, value of business transacted, number of active proprietors of unincorporated businesses, number of employees on the average for the year, and the amount of pay rolls, by counties. The data cover the year 1939.

Figure 41 shows the number of retail establishments and their total sales by counties and indicates average unit sales. Approximately 60 percent of the retail stores of Washington were in the region and accounted for 61 percent of the sales reported.

Retail trade employment and pay rolls by counties are shown by table 29. Approximately 60 percent of the active proprietors of unincorporated businesses and 63 percent of the employees in retail trade establishments in Washington were in the Puget Sound region. These employees received approximately 65 percent of the wages paid to retail trade employees in Washington.

TABLE 29.—*Employment and pay roll of retail establishments in the Puget Sound region by counties, 1939*

County	Active proprietors of unincorporated businesses	Number of employees (average for year)[1]	Total pay roll[1]
Clallam	293	557	$644,000
Island	90	50	41,000
Jefferson	132	181	171,000
King	7,686	26,302	31,379,000
Kitsap	585	1,195	1,365,000
Mason	170	245	280,000
Pierce	2,514	6,599	7,634,000
San Juan	54	46	31,000
Skagit	660	959	1,016,000
Snohomish	1,258	2,651	2,910,000
Thurston	505	1,262	1,510,000
Whatcom	873	2,099	2,301,000
Total	14,820	42,146	49,282,000

[1] Includes paid executives of corporations but not the number and compensation of proprietors of unincorporated businesses.

Source: Sixteenth Census of the United States: 1940, *Census of Business.*

[1] Associate Professor, Business and Economics, University of Washington.

Service Establishments

The distribution by counties of service establishments such as barber shops, laundries, gasoline service stations, repair shops of all kinds, etc., is shown on figure 42, which also shows total and average unit receipts of such establishments in each county.

Approximately 65 percent of the service establishments of the State were located in the region in 1939; they did about 69 percent of the service establishment business of Washington.

Table 30 shows the number of employees and the total pay roll of service establishments, by counties. It will be observed that 65 percent of the active proprietors of unincorporated service businesses, and about 73.5 percent of the employees were in establishments located in this region. These employees received 73.5 percent of the pay roll of those working in such businesses in Washington.

TABLE 30.—*Employment and pay roll of service establishments in the Puget Sound area by counties, 1939*

County	Active proprietors of unincorporated businesses	Number of employees (average for year)[1]	Total pay roll[1]
Clallam	105	74	$81,000
Island	28	6	1,000
Jefferson	43	33	34,000
King	3,099	11,341	9,618,000
Kitsap	170	176	182,000
Mason	59	34	34,000
Pierce	1,044	1,319	1,548,000
San Juan	12	2	2,000
Skagit	232	195	128,000
Snohomish	476	417	421,000
Thurston	210	217	260,000
Whatcom	291	397	292,000
Total	6,669	14,207	12,601,000

[1] Employees and pay roll include paid executives of corporations but not the number and compensation of proprietors of unincorporated businesses.

Source: Sixteenth Census of the United States: 1940, *Census of Business.*

Wholesale Trade

Table 31 gives the number of wholesale establishments, their total sales and employment by counties. These wholesale establishments represented 61 percent of the number in the State and accounted for 73 percent of the business done by such companies in Washington. Companies in the region employed 64.5 percent of all Washington wholesale employees, 61.5 percent of the active proprietors of unincorporated business, and paid

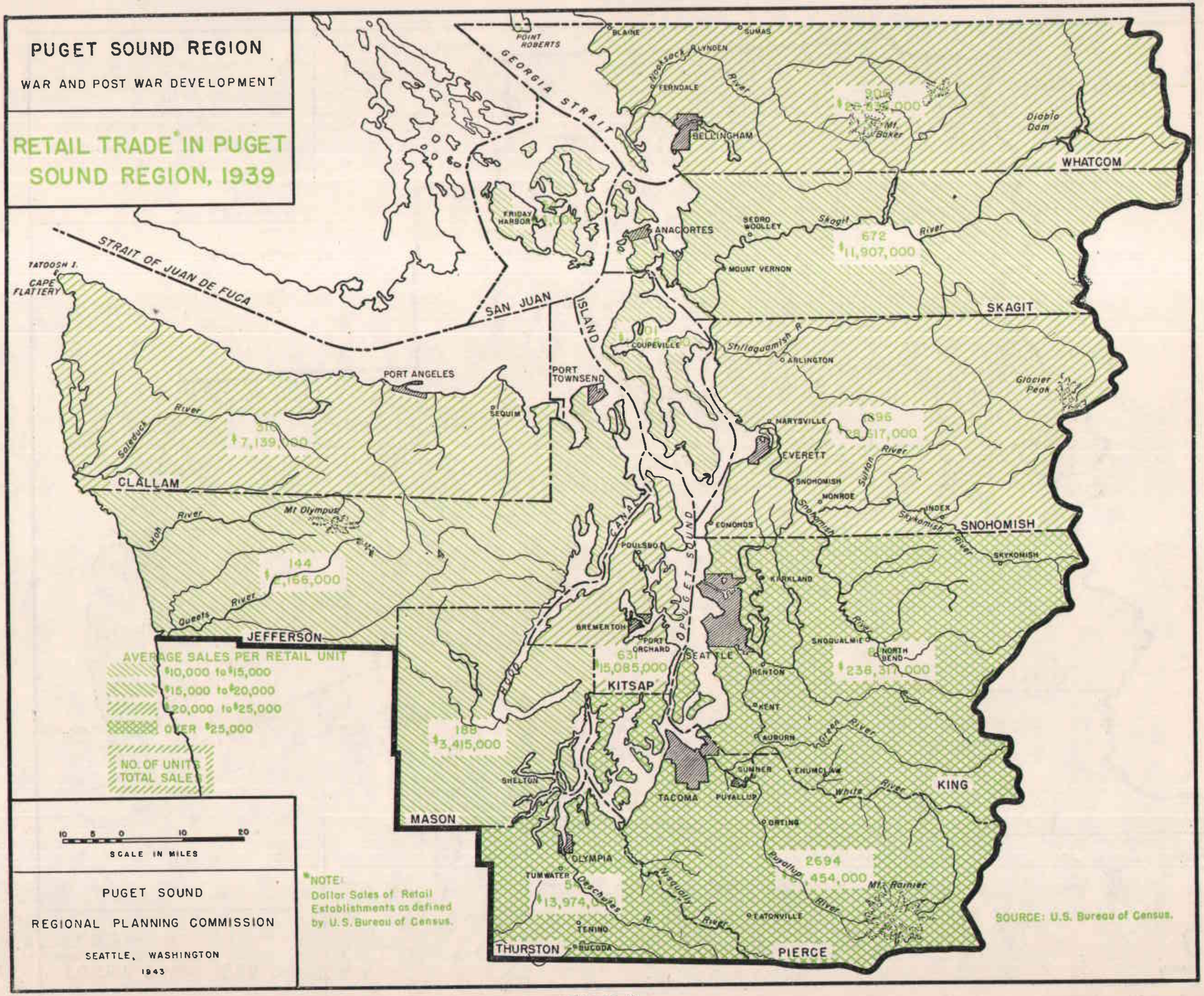

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
RETAIL TRADE* IN PUGET SOUND REGION, 1939
AVERAGE SALES PER RETAIL UNIT
$10,000 to $15,000
$15,000 to $20,000
$20,000 to $25,000
OVER $25,000
NO. OF UNITS
TOTAL SALES
*NOTE:
Dollar Sales of Retail Establishments as defined by U.S. Bureau of Census.
SOURCE: U.S. Bureau of Census.
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
PUGET SOUND
672
$11,907,000
144
631
$15,085,000
188
$3,415,000
2694
BELLINGHAM
ANACORTES
MOUNT VERNON
EVERETT
SEATTLE
TACOMA
OLYMPIA
BREMERTON
PORT ANGELES
PORT TOWNSEND
SHELTON
PUYALLUP
Mt. Rainier
Mt Olympus
Mt. Baker
Glacier Peak

FIGURE 41.

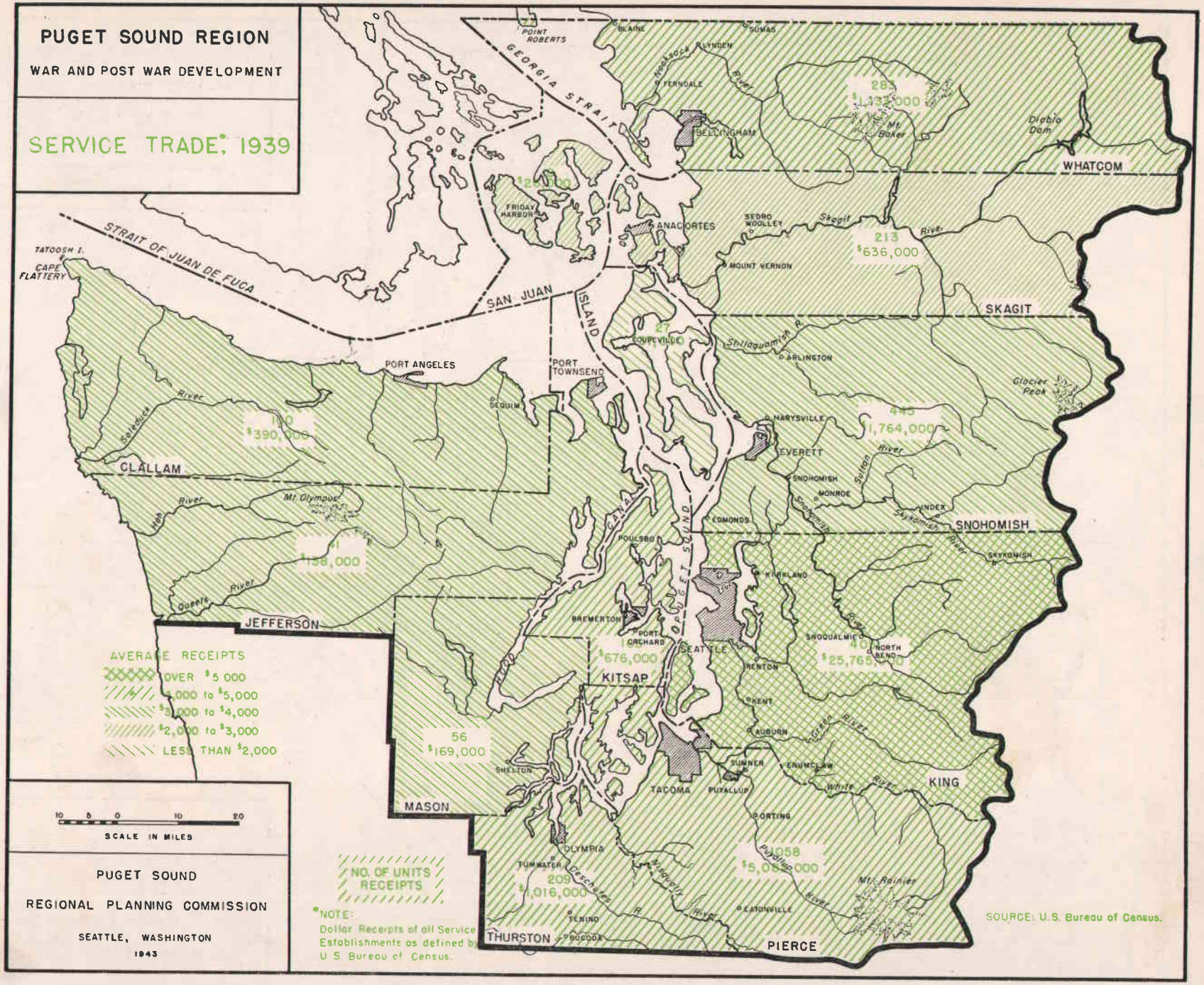

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
SERVICE TRADE,* 1939
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
PUGET SOUND
CANAL
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
Nooksack River
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
213
$636,000
SKAGIT
TATOOSH I.
CAPE FLATTERY
COUPEVILLE
Stillaguamish R.
ARLINGTON
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
MARYSVILLE
EVERETT
Sultan River
SNOHOMISH
MONROE
Snoqualmie
INDEX
Skykomish River
SNOHOMISH
EDMONDS
POULSBO
KIRKLAND
SKYKOMISH
Soleduck River
CLALLAM
Hoh River
Mt. Olympus
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
RENTON
SNOQUALMIE
NORTH BEND
KITSAP
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
White River
KING
SHELTON
TACOMA
PUYALLUP
SORTING
MASON
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Mt. Rainier
TENINO
PEUCOCK
EATONVILLE
THURSTON
PIERCE
AVERAGE RECEIPTS
OVER $5 000
$4,000 to $5,000
$3,000 to $4,000
$2,000 to $3,000
LESS THAN $2,000
NO. OF UNITS
RECEIPTS
SCALE IN MILES
10 5 0 10 20
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
*NOTE:
Dollar Receipts of all Service Establishments as defined by U. S. Bureau of Census.
SOURCE: U.S. Bureau of Census.

FIGURE 42.

TABLE 31.—*Sales and employment in wholesale trade in the Puget Sound area by counties, 1939*

County	Number of establishments	Sales	Employment	
			Active proprietors of unincorporated businesses	Employees
		Thousands of dollars		
Clallam	31	2,868	14	113
Island	7	243	4	11
Jefferson	7	373	4	9
King	1,571	458,070	786	13,732
Kitsap	41	4,370	23	179
Mason	8	461	4	18
Pierce	240	63,124	119	2,217
San Juan	8	233	7	6
Skagit	74	6,232	53	321
Snohomish	81	9,939	44	470
Thurston	36	3,915	18	166
Whatcom	77	9,892	47	421
Total	2,181	559,720	1,123	17,663

Source: Sixteenth Census of the United States: 1940, *Census of Business.*

out over 74 percent of the total State pay roll of wholesale establishments.

It is evident from the above statistics that the commercial activity of Washington is highly concentrated in the Puget Sound region and that the companies engaged in retail trade, wholesale trade, and the performance of services of various kinds in the region pay higher wages proportionately than like companies in the rest of the State.

Within the region cash income appears to be greater in the industrial counties. This is borne out by reports of income tax returns. Figure 43 shows income tax returns per thousand persons for the year 1941. King County with 107 returns per thousand population had the highest proportion of returns in the area. Thurston County reported but 80 returns per thousand population.

B. THE TRADE POSITION OF THE REGION

By James C. Rettie [2] and James E. Maxwell [3]

Inshipments and Outshipments

Figures on the value of the products shipped each year from Puget Sound to the rest of the world and on the value of products received from outside the region for local consumption are not available. The Puget Sound ports, however, handle the bulk of the water-borne commerce between the State of Washington and other territory. The region derives benefit not only from the goods which it produces and consumes but also from those which are handled in transit. The figures for total water-borne commerce of the State have very considerable significance for the Puget Sound region.

In the 3 years prior to the outbreak of war in Europe (1937, 1938, 1939) the total value of outbound and inbound water shipments averaged $610,000,000 per year. Of this total $322,000,000 represents the value of outshipments and $288,000,000 the value of inshipments.

Average domestic water shipments and receipts for the 3 years were very close to a parity:

Shipments	$243,000,000
Receipts	254,000,000

The value of foreign exports for the three years, however, averaged approximately twice the value of imports:

Exports	$80,000,000
Imports	35,000,000

Composition of the Trade

The general composition of this trade is of considerable interest. Of the total outshipments to domestic markets, the distribution by commodity groups was approximately as follows:

Products of agriculture	$13,000,000
Animals and products	9,000,000
Products of mines	1,000,000
Products of forests	64,000,000
Manufactures and miscellaneous	156,000,000

A large proportion of the manufactures, of course, consisted of goods in transit.

In the foreign export picture the composition was about thus:

Products of agriculture	$15,000,000
Animals and products	3,000,000
Products of mines	1,000,000
Forest products	8,000,000
Manufactures and miscellaneous	53,000,000

The incoming shipments from domestic sources were composed as here shown:

Products of agriculture	$2,500,000
Animals and products	9,500,000
Products of mines	15,000,000
Forest products	31,000,000
Manufactures and miscellaneous	195,000,000

The overwhelming predominance of manufactures is noteworthy.

The foreign imports were composed as follows:

Agricultural products	$6,000,000
Animals and products	7,000,000
Mine products	1,000,000
Forest products	7,000,000
Manufactures and miscellaneous	14,000,000

[2] National Resources Planning Board, Region X, Alaska.
[3] National Resources Planning Board, Region IX, Pacific Northwest.

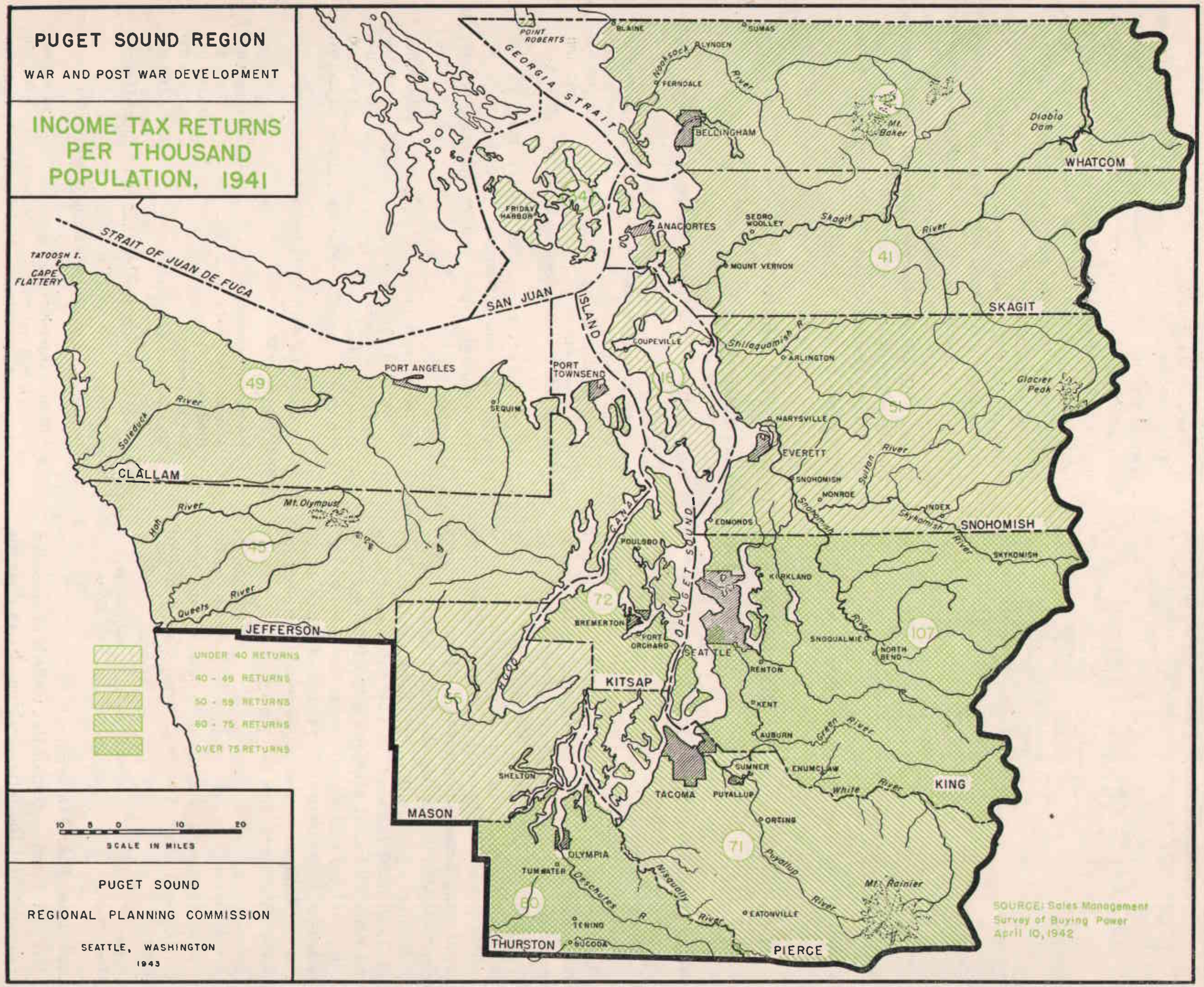

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
INCOME TAX RETURNS PER THOUSAND POPULATION, 1941
UNDER 40 RETURNS
40 - 49 RETURNS
50 - 59 RETURNS
60 - 75 RETURNS
OVER 75 RETURNS
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Sales Management Survey of Buying Power April 10, 1942
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN
ISLAND
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
PUGET SOUND
BELLINGHAM
ANACORTES
MOUNT VERNON
EVERETT
SEATTLE
TACOMA
OLYMPIA
BREMERTON
PORT ANGELES
PORT TOWNSEND
41
49
51
72
107
71
60

FIGURE 43.

Of the total outshipments by water, less than 19 percent were destined for the foreign market. This very poor showing in foreign trade is in dramatic contrast with that of British Columbia which has about the same type of products to sell. Over 80 percent of the British Columbia shipments go to markets outside of Canada. With a revival of world trade and the suspension of the kind of economic warfare that was going on during the 1930's it should be possible for Washington to recover at least a part of the trade which was lost. It appears that better trade relations between the United States and other countries would greatly benefit Washington and the Puget Sound region.

Trade With Alaska

Puget Sound ports, for many years, have had the lion's share of the Alaska trade. Outshipments consist chiefly of food, clothing, and all sorts of material and supplies used by the Alaska fisheries and mines. Inshipments are made up largely of canned salmon and fresh fish, gold bullion and concentrates. The total value of this trade during the period 1930–41 amounted to $950,000,000. About 40 percent consisted of the shipments to Alaska and 60 percent of receipts from there.

Some perspective on the importance of this trade can be obtained by comparing it with the 1930–41 United States trade with some of the foreign countries.

Alaska	$950,000,000
Norway and Sweden	949,000,000
Australia	683,000,000
Soviet Russia	638,000,000
Central America	813,000,000
China	1,197,000,000

In our trade with all these countries only that with China exceeded the trade with Alaska. All this was accomplished while Alaska had a population of only 72,000 persons, half of them natives. Future development of the Territory should bring a corresponding growth in this trade.

PART III

7. TRANSPORTATION AND COMMUNICATION

By Transportation Committee, Puget Sound Regional Planning Commission

Highways

The present main highways of the region follow the north and south valleys on both sides of the sound, with a loop around the Olympic Peninsula. The system was built principally for commercial use, connecting the peninsula and the valley cities. Within the last decade the east-west highway over the Snoqualmie Pass has been made into a fine route open the year round. This highway, together with that by way of Stevens Pass farther to the north, for many years has afforded the chief route east for motor vehicles from the entire State, except in the extreme south, where roads along the Columbia River carry heavy traffic. It has long been realized that more mountain pass routes built to be kept open the year round would be necessary. Now the need is more urgent than ever.

The region has taken pride in its outstanding highway system, paid for as built, and including the longest four-lane streamlined highway in the United States, extending from Tumwater to Everett via Tacoma and Seattle. In recent years there has been added the longest floating highway or bridge in the world across the navigation channel of Lake Washington, more than a mile long and unique in construction design. This bridge is a part of the Seattle-to-New York East-West highway over Snoqualmie Pass.

The region will ultimately contain an important link in an international highway connecting the United States, Canada, and Alaska via the short and scenic "A" or western route recommended by the International Highway Commission. It is to be hoped that rights-of-way can be surveyed and plans completed for construction of all-purpose routes to Alaska after the war.

The Puget Sound region with its waterways, lakes, mountains, and valleys, presents difficult highway engineering problems. Its highways must in the future, as in the past, serve three main needs related to income-producing industries:

1. Roads for the forest industry, dependent now more than ever on highways to remove logs and to provide fire protection. These heavy-duty roads serve to connect forests and timber-product plants with the railroads and waterways. The same roads in many instances can serve the mineral areas, some of which are just being opened up in connection with electro-metallurgical developments.

2. Roads for the recreational tourist business, in dollar value the third largest in this area. This business, too, is in its infancy in size and extent, not only for local people but in respect to other tourist centers of the Nation. Scenic highways have to be considered apart from forest industry use and purely commercial traffic, since these recreational drives have a value of their own in providing access to national forests and parks, ocean beach, sea, and mountain view areas.

3. All-purpose commercial roads. To be of maximum usefulness to this type of traffic, the system now in use needs improvements in alinement, roadbeds, and bridges.

Heavy convoys of motor freight have demonstrated the necessity of bypassing residential areas in cities. Of late there has been evidenced a need for heavy traffic routes bypassing whole cities. In the cases of Everett, Seattle, Tacoma, and Olympia, separate freight routes are being planned for the future, connecting these industrial centers.

Road construction can make a large contribution toward providing employment in the post-war period. Therefore, an attempt has been made to visualize all the important highway facilities which will be needed in the near future.

Figure 44 illustrates the main State highway system in the Puget Sound region and proposed additions to provide alternate routes, scenic highways, and mine-to-market roads. If these proposed highways are built, the north half of western Washington will be connected adequately with the east side of the State, as it is not at present, and additional valuable mining and tourist areas will be made accessible.

The roads designated on figure 44 cover practically all of the main routes that would be desirable for commercial or scenic purposes. Highways and highway needs off the main system are not shown. Counties are developing their own programs for rural roads, while cities are preparing plans to meet urban highway problems, all under adequate laws as to administration, etc. While many of the roads and sections of the roads of the main system shown on figure 44 may not be completed for many years, it is well to give them consideration in any plan extending over a long period of years, to the end that all may be properly integrated in the system. Plans which are prepared now will be ready

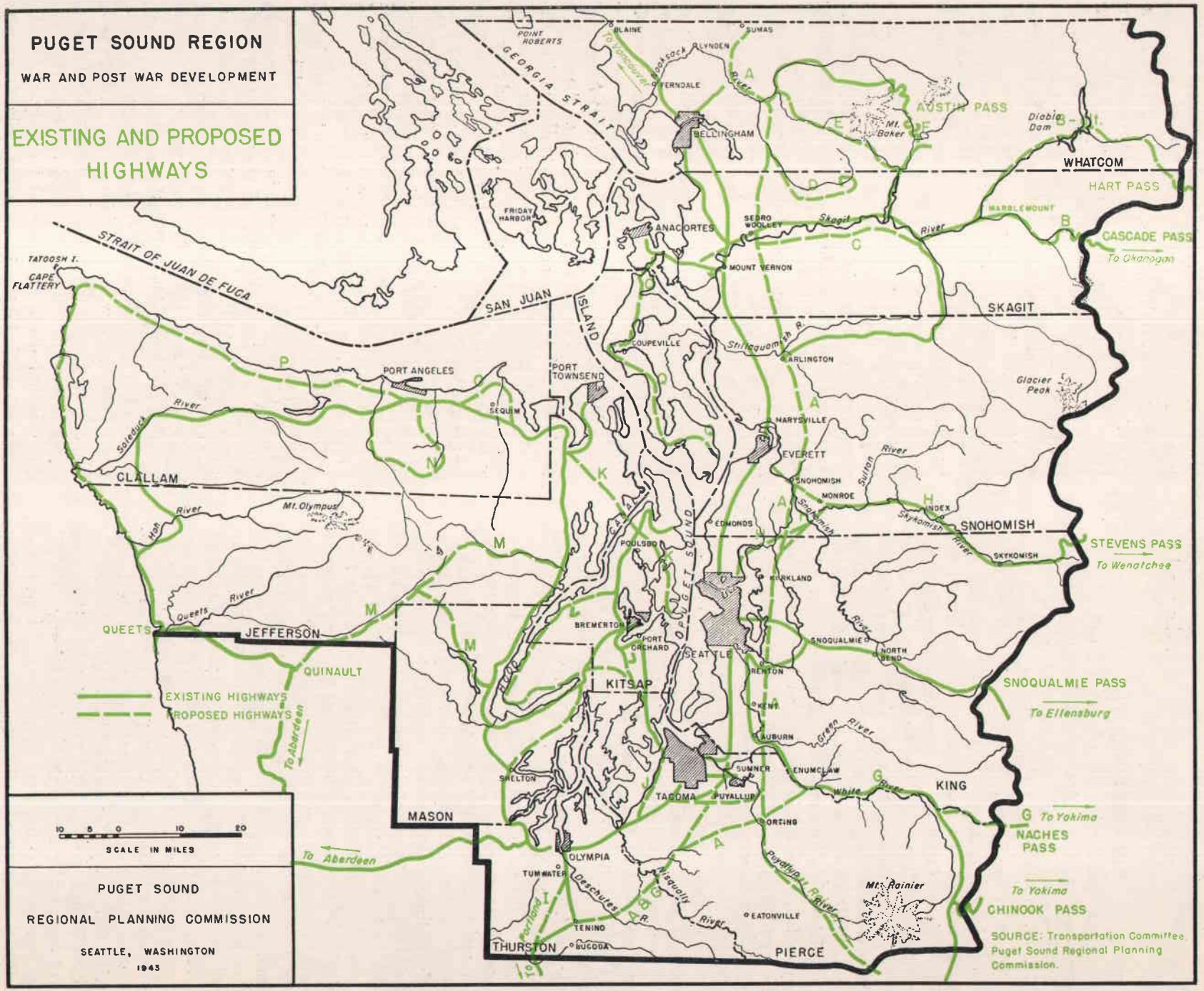

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
EXISTING AND PROPOSED HIGHWAYS
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
FRIDAY HARBOR
ANACORTES
TATOOSH I.
CAPE FLATTERY
PORT ANGELES
PORT TOWNSEND
COUPEVILLE
SEQUIM
MOUNT VERNON
ARLINGTON
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
EDMONDS
POULSBO
BREMERTON
PORT ORCHARD
SEATTLE
KIRKLAND
RENTON
SNOQUALMIE
NORTH BEND
SKYKOMISH
KENT
AUBURN
SUMNER
ENUMCLAW
PUYALLUP
TACOMA
SHELTON
ORTING
OLYMPIA
TUMWATER
TENINO
EATONVILLE
MUCKOA
Mt. Baker
Diablo Dam
AUSTIN PASS
WHATCOM
HART PASS
CASCADE PASS
To Okanogan
SKAGIT
Glacier Peak
STEVENS PASS
To Wenatchee
SNOHOMISH
SNOQUALMIE PASS
To Ellensburg
KING
To Yakima
NACHES PASS
To Yakima
CHINOOK PASS
Mt. Rainier
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
QUEETS
QUINAULT
To Aberdeen
To Aberdeen
To Vancouver
Skagit River
Stillaguamish R.
Sultan River
Skykomish River
Snoqualmie River
Green River
White River
Puyallup River
Nisqually River
Deschutes River
Hoh River
Queets River
Soleduck River
EXISTING HIGHWAYS
PROPOSED HIGHWAYS
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Transportation Committee Puget Sound Regional Planning Commission.

FIGURE 44.

for use immediately after the war or in some future emergency period, when useful construction projects are required to furnish employment.

Description of Proposed Projects

An interregional highway (designated as "A" on fig. 44) connecting the Southwest Washington and Columbia River area with the Puget Sound region will be part of an international highway between the United States and Canada, and a vital link in the inevitable Seattle-Alaska highway. As a regional route this proposed road will bypass the heavy traffic of Fort Lewis and the cities of Olympia, Tacoma, Seattle, and Everett, and preserve the present Pacific highway for the normal traffic originating in these cities. Recognized and acute bottlenecks at Seattle and Everett will be avoided. Commerce and agriculture will thus be saved appreciable time and expense and the cities involved will be helped in solving their ever-increasing traffic problems. Highway "A" could be realized by stage construction because many short sections which would suffice for present requirements are already in existence.

This highway, also referred to as the East Pacific Highway, is proposed for wartime or post-war construction, from the general vicinity of the northerly boundary of the Fort Lewis Military Reservation, north to the United States-Canada boundary at or near Sumas. Generally this route will strike eastward from near South Tacoma and enter an inland valley at or near Puyallup or Sumner, continuing thence north through Renton and east of Lake Washington to Bothell or Woodinville, thence in a well-defined valley through Snohomish, Arlington, Sedro Woolley, and ending at Sumas on the international boundary. This intraregional link in the highway system has many advantages both in peace and in war. It bypasses all the concentrations of traffic in the major cities on the shores of Puget Sound, yet it is near enough to these cities to be immediately useful. It provides an additional or alternate route for military movement from Fort Lewis to the most vulnerable portions of Puget Sound and for interconnection between the parent cantonment and its many subsidiary defense units to the north, without the necessity of passing through Tacoma, Seattle, or Everett. This highway provides natural protection for military transport, being removed from the open coastal plain upon which the present north-south highways are constructed, and having on the west, for most of its length, a protecting ridge of varying heights up to 2,000 feet. It is from 6 to 15 miles inland from the Pacific highway, now the only north-south highway above Seattle capable of handling present-day traffic. It opens up to normal commerce a vast agricultural area and many industrial sites heretofore undeveloped by reason of inadequate highway facilities. This proposed highway will become a logical link in the future highway to Alaska.

The Cascade Highway ("B" on fig. 44) is to be an inter-regional road between Puget Sound and the great Inland Empire to the east. In the central third of the State there are three highways crossing the Cascade Mountains; in the south third there is one road in use and a second projected; in the north 85 miles of the State there is none. Thus from a great area, the Methow-Okanogan Valleys and north-central Washington, separated now from access to Puget Sound by a 23-mile highway gap, travel must be by a U-shaped route some 250 miles to arrive at closest tidewater. Highway "B" is one of the earliest mountain crossings projected by the State, having been surveyed and mapped by the State Highway Commission in 1895 and designated as the "Cascade Wagon Road." Beginning in 1924 the State Highway Department spent a considerable sum on this road, completing about 12 miles of it to a very good standard, from Marblemount easterly to a point roughly 12 miles from the summit of the Cascades. Likewise, on the eastern slope, an appreciable mileage has been constructed from Winthrop, from Twisp and from Stehekin at the head of Lake Chelan, westerly toward the summit. In fact it is now possible to drive an automobile from Winthrop to a point 5 miles west of the summit on the route marked "B-Alternate" on figure 44. The approximate length of the existing gap in the prime route shown is 41½ miles, and on the alternate route 23 miles. In addition to the value of connecting the two great regions, the proposed road will bisect two mineral areas which for many years have been retarded in development by lack of transportation. Those areas are the Thunder Creek mining district north of Cascade Pass and the Cascade mining district south of the pass. Some very fine samples of lead galena, silver, copper, and small amounts of gold have been produced in these districts.

The Sauk Valley road ("C" on fig. 44) is an intraregional project of more than local interest. The area traversed is popular with recreation seekers from the large cities to the south of Skagit County. It is also a project looking to the greater development of agriculture and the more facile management and protection of a large forest area, both private and public. The road parallels the south side of the Skagit River for about 30 miles to the confluence of that river with the Sauk. There it connects with an existing road up the Sauk River Valley to Darrington, in Snohomish County, thence down the Stillaguamish River to Arlington, thus completing a loop tied in with highway "A." The construction of this road will relieve Skagit County of delays and, at periods of extreme high and low water, of total stoppage of traffic caused by inoperability

of the six ferries now in use along the Skagit River. There is no bridge for the entire length of this projected road, and the operation of these six ferries has become a most irritating and expensive burden on the public and on the county.

The Twin Sisters Mineral Development road ("D" on fig. 44) would leave the International Highway in the vicinity of Saxon, in Whatcom County, and follow generally the South Fork of the Nooksack River to large mineralized areas. For a considerable distance this road could follow an abandoned railroad grade. A single-lane truck road with suitable turn-outs would suffice for the initial project. The principal deposits in this area consist of chromite, and the field is said to be among the most promising in the State. Approximate length of the road is 17 miles.

The Mazama Park Recreational road ("E" on fig. 44) would be a view road of unsurpassable grandeur and a unit of the Mount Baker loop highway. It would begin in the vicinity of Sulphur Creek ranger station on the Concrete-Baker Lake road and run generally northwest through Baker Pass (elevation 4,000 feet) along the foot of Deming Glacier (a live glacier) and thence down the Middle Fork of the Nooksack River to a connection with the present Mount Baker highway somewhat east of Deming, in Whatcom County. Unlike most recreational roads, this project would actually climb over a shoulder of the mountain, with no intervening chasms. The summit is readily accessible from Mazama Park. Approximate length is 25 miles.

The Austin Pass–Baker Lake Recreational road ("F" on fig. 44) is to close a relatively short gap between existing roads already constructed by State and Federal agencies. From Baker Lake (elevation 700 feet), the route would follow up Shuksan Creek and Swift Creek, between Mount Baker and Mount Shuksan, only 10 miles apart at their summits and respectively 11,000 and 9,000 feet in elevation, to Austin Pass (elevation 4,600). Glaciers, hot springs, mineral springs, waterfalls, cascades, lakes abound on all sides, and winter sports are enjoyed much later than on any other mountain in the State. The closing of this gap would complete a larger Mount Baker loop highway than that previously mentioned. Approximate length is 13 miles.

In addition to the benefits already listed for each of these projects, there are subsidiary phases of usefulness not to be underestimated. For example: Project "A" will provide a means of separating military from civilian traffic in the event of evacuation or other necessary activities. Projects "A," "C," and, to a limited extent, "D" will tend to develop heretofore retarded or inaccessible agricultural areas, principally dairy country. Project "B" opens up for protection and development a vast national forest area and provides access for recreational enjoyment to a large region of spectacular beauty.

Plans to construct a Naches Pass highway ("G" on fig. 44) as a vital means of handling an anticipated sharp increase in freight traffic over the Cascades after the war are being studied. The State Highway Advisory Commission predicts that population increase in the Puget Sound area eventually will necessitate importation of a large percentage of the area's foodstuffs from east of the mountains (this idea is developed in Part III, Section 13, Analysis of War and Post-War Population Needs, in this report). A traffic survey shows that the proposed highway, being 36 miles shorter than the next shortest all-year route between Puget Sound and the producing areas east of the Cascades, would save the public an estimated $288,266 a year. The total cost is estimated at $11,054,612. Largest cost item of the highway, approximately $6,000,000, would be a tunnel 9,770 feet in length, crossing the crest under the southerly edge of Pyramid peak, emerging near the north fork of the Little Naches River.

Parts of the proposed Puget Sound road system will provide a better connection ("H" on fig. 44) from Stevens Pass to Seattle and an improvement to highway 99 south of Olympia ("I" on fig. 44). From Tacoma over a new Narrows Bridge, route "J" will connect with the Olympic Peninsula and Bremerton. Utilizing a ferry link, route "K" will save many hours in travel between Seattle and Port Angeles. Hood Canal, famous tourist summer resort area, needs Mount Olympus view route "L." The road on the west side of the canal does not at present give a mountain view. Routes for highways marked "M" and "N" will open up mining areas, ski bowls, and scenic areas now known and used to a limited extent. The route "M" through the Olympic Mountains may not at first be a master highway but it will serve to give access by "jeeps" and horses to the national park now largely without use, and to furnish a better means of fire protection. Routes "O" and "P" are the only proposed roads to give views of the Pacific Ocean. These routes could be used now by foot patrols, but a "jeep" route at least should immediately follow the war. The road "Q" through Whidby Island is not a new proposal.

Figure 45 shows highway traffic flow as of 1940 on the existing regional system. Some increases have occurred since 1940.

City Traffic Projects

Improvements and new construction of the terminal facilities for railroads, ports, highways, bypasses, and grade separation of freight routes and passenger routes, are recommended for the cities of Olympia, Tacoma, Seattle and Everett. One project is a valley-level

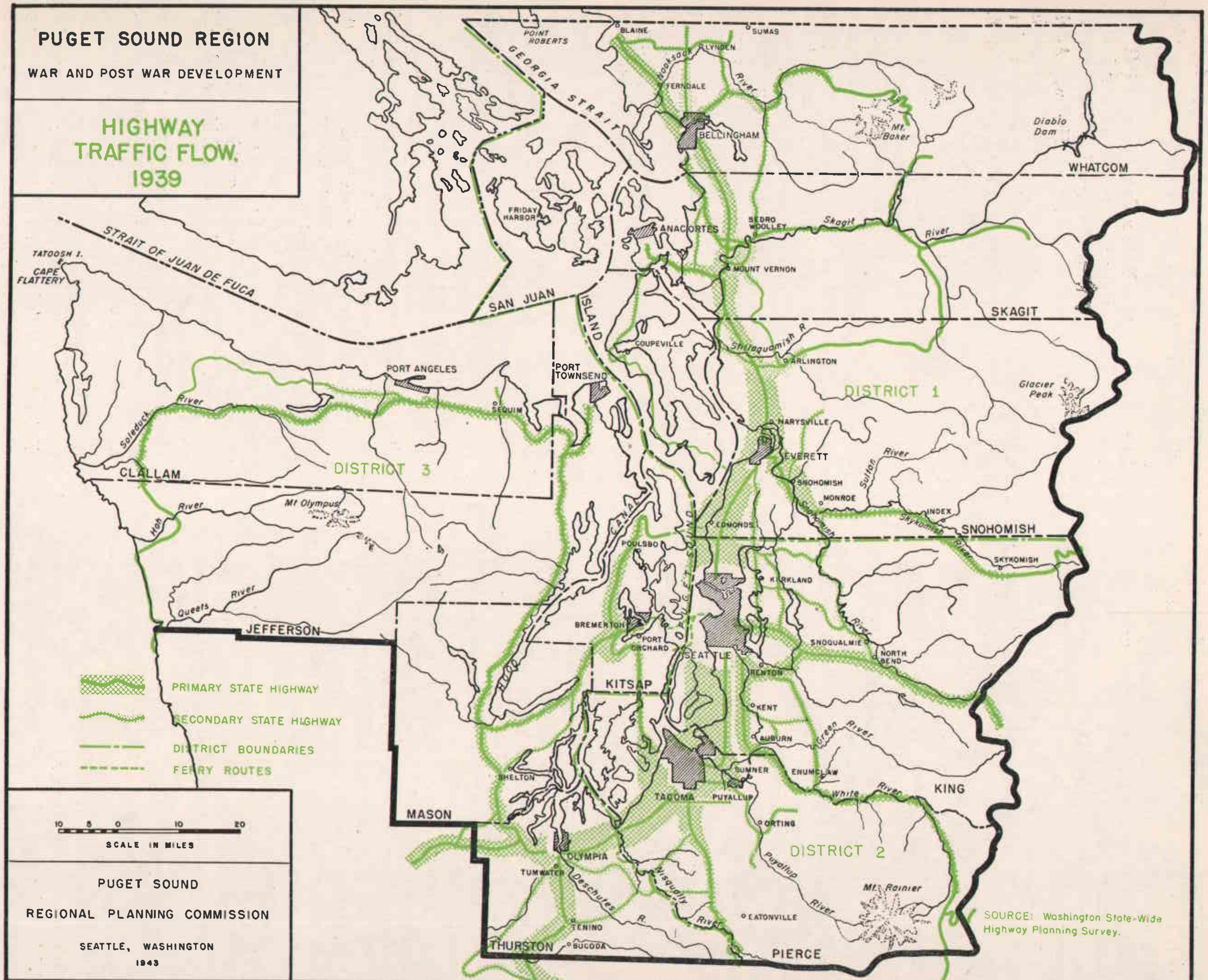

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
HIGHWAY
TRAFFIC FLOW.
1939
PRIMARY STATE HIGHWAY
SECONDARY STATE HIGHWAY
DISTRICT BOUNDARIES
FERRY ROUTES
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Washington State-Wide
Highway Planning Survey.
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
BELLINGHAM
Mt. Baker
Diablo Dam
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SKAGIT
SAN JUAN
ISLAND
TATOOSH I.
CAPE FLATTERY
COUPEVILLE
Stillaguamish R
ARLINGTON
DISTRICT 1
Glacier Peak
PORT ANGELES
PORT TOWNSEND
SEQUIM
Soleduck River
MARYSVILLE
EVERETT
DISTRICT 3
CLALLAM
SNOHOMISH
MONROE
Sultan River
INDEX
Skykomish River
SNOHOMISH
Mt Olympus
Hoh River
EDMONDS
POULSBO
SKYKOMISH
KIRKLAND
Queets River
JEFFERSON
BREMERTON
PORT ORCHARD
SEATTLE
SNOQUALMIE
NORTH BEND
RENTON
KITSAP
KENT
AUBURN
Green River
SUMNER
ENUMCLAW
SHELTON
TACOMA
PUYALLUP
White River
KING
MASON
ORTING
DISTRICT 2
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
EATONVILLE
TENINO
THURSTON
BUCODA
PIERCE

FIGURE 45.

freight highway from Tacoma to Seattle (see fig. 46), with Highway 99 passing over this freight route near Duwamish. This freight route would connect the Tacoma and Seattle industrial and railroad centers, ports and truck freight terminals, water front to water front. The Snoqualmie Pass highway should pass under Beacon Hill in Seattle and continue as an overhead viaduct to connect with the viaduct along Seattle's water front. The latter (see insert in fig. 46), passing over railroads, freight trackage, and switching tracks to the wharfs, should run from Spokane Street to north of Stewart Street then be depressed from Wall Street to Aurora Avenue. The Spokane Street viaduct should be completed from west Seattle to Beacon Hill over all intersecting railroads and industrial approaches. These proposed improvements affect the whole Puget Sound region, as railroads and highway traffic have competed for clearance of movement with consequent delay both to through State freight and passengers and to freight movement from railroads to ships. Other Puget Sound ports, such as Everett, Bremerton, Olympia, Bellingham, Port Angeles, Port Townsend, and Anacortes, have need for similar plans before congestion increases their problems.

Financing and Coordination

A 6-year planned highway construction program for the State logically contemplates spending millions of dollars for highway purposes in the Puget Sound region. The coast cities also have a problem in connection with handling industrial and port freight, with railroad traffic and needed highway separations which should be planned as a part of the State highway system. The Puget Sound region, because of its preponderance of population and important industrial demands, must have a considerable share of State highway funds. Total highway expenditures—State, county and local—in the region could well amount in 6 years to about $147,500,000, drawn from gasoline funds.

Railroads

Railroads are adequate except for needed electric connections between Shelton to Bremerton and between Shelton to Quilcene. (See fig. 47.) The region would benefit also from construction of proposed rail lines, for which surveys have already been completed, which would provide a trunk rail line from Seattle, via Vancouver and Prince George, British Columbia, to Alaska.

Duplication of rail service in the Puget Sound area has been a subject for criticism during past years, but the war has emphasized the need for all the available trackage. In the future even closer consolidation and cooperation must prevail if railroads are to compete successfully with trucks and airplanes for freight and passenger business.

Only streamlined trackage and equipment well maintained and soundly financed, can keep the railroad business active and profitable. The railroads have access to scenic routes not paralleled by highways through the mountains and along streams and seashore, and they can offer travel comforts and ease not matched by the automobile.

All the Puget Sound cities have railroad terminal facilities sufficient in quantity, but in Seattle, Tacoma, Everett, and Bellingham these facilities, including freight yards and access sidings to wharves, docks, and manufacturing areas, need plans for new construction and better lay-outs. The proposed construction improvements would facilitate faster handling of freight and passengers. Electrification of all Puget Sound railroads is recommended for careful consideration. This would make for cleanliness and, as the population increases, fast electric passenger service will probably be needed. Railroads are as essential to the region as shipping facilities, airports, and highways. They deserve public support and consideration in effective planning as an integral part of the transportation system.

Ports and Terminals

Proposed port facility expansions are especially needed in Everett, Seattle, and Tacoma, as this expansion is part of a plan for enlarged industrial areas. Figure 46 shows proposals for expanding ports and providing necessary connecting facilities at Everett, Seattle, Bremerton, and Tacoma. Similar expansion is required at Olympia and at the northern Puget Sound ports of Bellingham, Port Angeles, Port Townsend, and Anacortes. Everett needs to develop use of its shallow tide lands and control the silting-in of the present harbor. Both Everett and Tacoma have possible seaplane freight terminal sites which can be protected from flotsam.

If industrial population in this area should be doubled in connection with the development of available power, these industrial sites planned in combination with air, water, railroad, and highway transportation must be provided. The construction can be started and built by stages as needed. None of the proposed plans needs completion in its entirety before a partial use begins.

Air Transportation

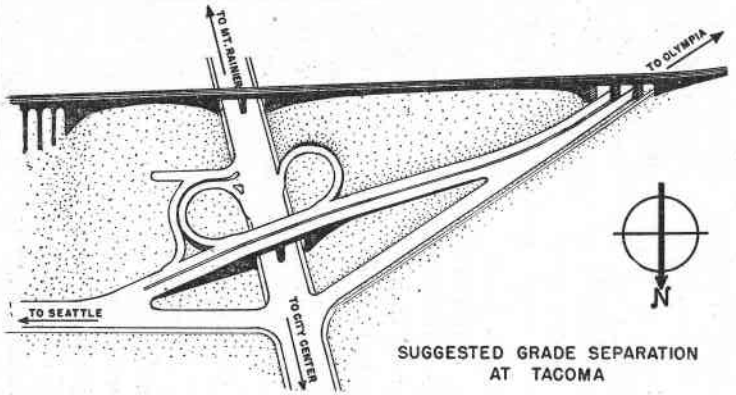
America's fastest growing industry today is that of aviation and the airplane. The tremendous air forces now determining so largely the course of the war are likewise constructing in large measure the transportation foundation of the future peace. Aviation is upsetting our sense of direction, revamping our maps, and changing our entire concept of the world. Distance to the far corners of the earth is no longer thought of in

PUGET SOUND REGION

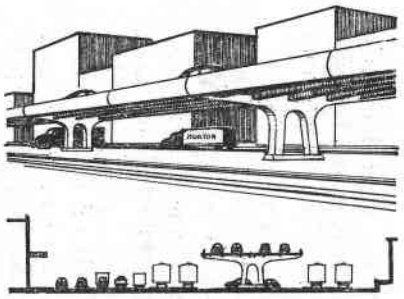
WAR AND POST WAR DEVELOPMENT

PORT TERMINALS AND HIGHWAY ROUTES TO SERVE LOWER PUGET SOUND AREA

SOURCE: Cities, Ports; State Highway Department; Puget Sound Regional Planning Commission.



SUGGESTED GRADE SEPARATION AT TACOMA



SUGGESTED ELEVATED HIGHWAY ON SEATTLE WATERFRONT

PASSENGER CAR HIGHWAYS

TRUCK ROUTES

COMBINATION HIGHWAYS

INDUSTRIAL AREAS

CITY LIMITS

5 0 5 10

SCALE IN MILES

PUGET SOUND

REGIONAL PLANNING COMMISSION

SEATTLE, WASHINGTON

1943

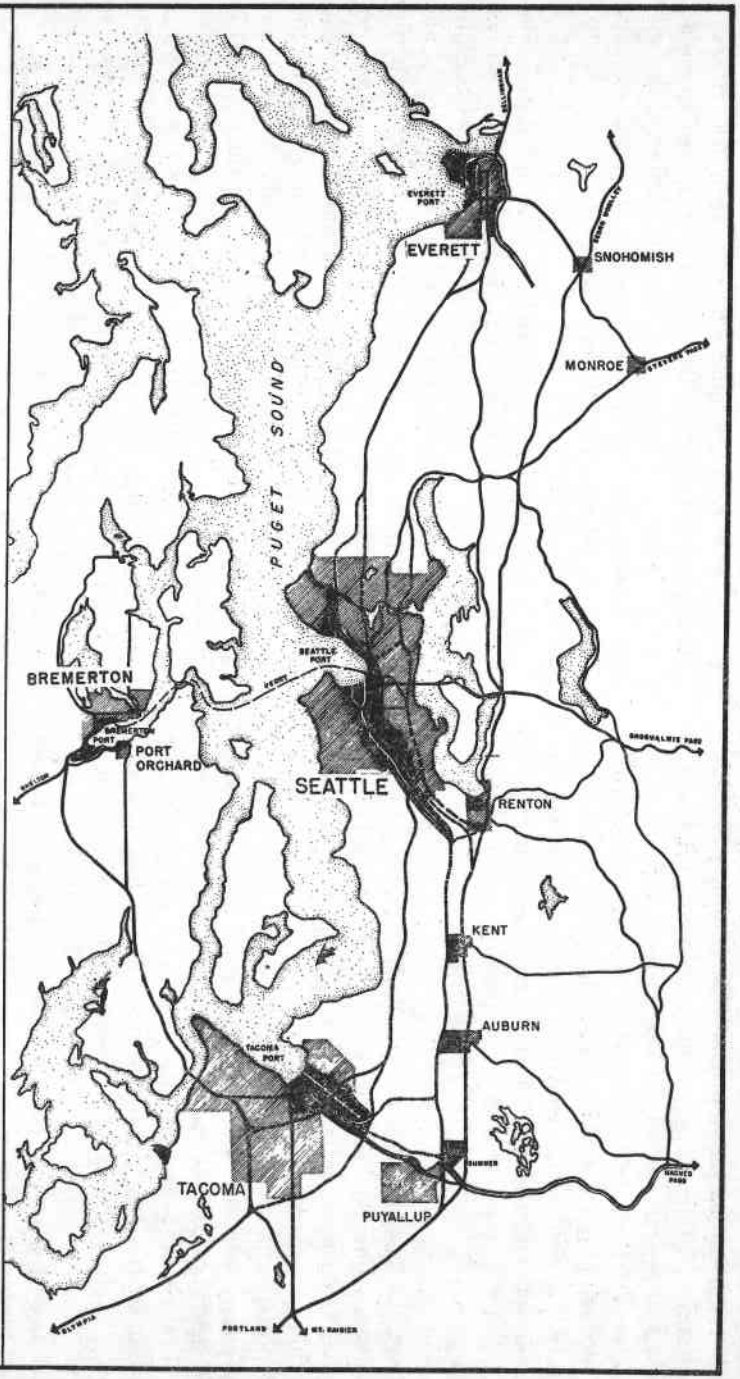


FIGURE 46.

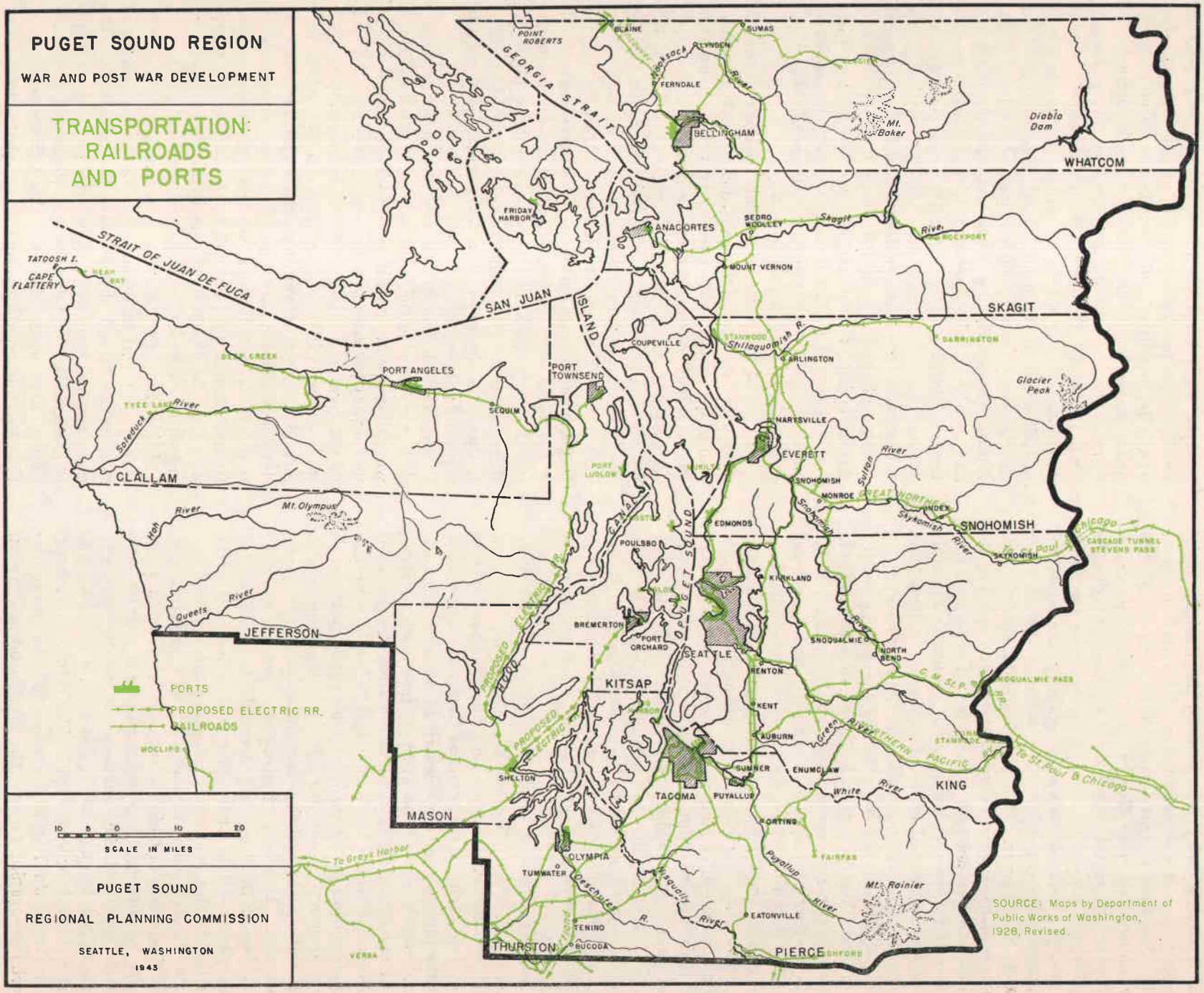

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
TRANSPORTATION:
RAILROADS
AND PORTS
PORTS
PROPOSED ELECTRIC RR.
RAILROADS
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Maps by Department of Public Works of Washington, 1928, Revised.
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
KITSAP
JEFFERSON
CLALLAM
MASON
THURSTON
BELLINGHAM
ANACORTES
MOUNT VERNON
EVERETT
SEATTLE
TACOMA
OLYMPIA
PORT ANGELES
PORT TOWNSEND
BREMERTON
PUGET SOUND

FIGURE 47.

miles but reckoned in hours and minutes. Today we are a country living next door to the world. Aerial navigation has diminished the globe until today it takes less time to travel from New York to Moscow by plane than from New York to Miami by train. Likewise, air travel at 300 miles an hour puts Seattle within 40 hours of the most distant spot on the globe.

Being produced today in quantity are standard transport planes that can carry 6-ton cargoes at about 200 miles an hour. It is not fantastic, therefore, to foresee planes that will carry 100 tons at a speed of 400 miles an hour; such are on the way. It is possible that post-war commercial aircraft will be able to maintain express schedules of 300 miles an hour on long runs. Most of such long runs will be in the northern half of the globe, which has 90 percent of the world's population and therefore provides most of the traffic in passengers, mail, express, and light freight.

New Arctic routes have already been developed farther than the public, for military reasons, has been allowed to know and more new routes are physically feasible. De-icing and other problems in the operation of planes in subfreezing weather are solved or are well on their way to solution. Airports have been built, and more can be built, near summer limits of water navigation where they can be supplied cheaply by boat. The sudden awakening to the potentialities of Alaska and its strategic importance has likewise awakened us to the fact that the shortest routes to Europe lead over the pole.

A great expansion of air transport has been experienced in the Pacific Northwest, as elsewhere, during the past decade. Air services and facilities have become very important in the regional transportation scheme. At the present time the demands of national defense—involving the rapid transit of personnel and material—are emphasizing the need and stimulating the growth of air transportation. In some respects, however, normal expansion has been retarded, owing partly to the military demands upon aircraft and upon personnel, materials, and facilities for their construction and operation. In the post-emergency period, with the lessening of these military demands, it is anticipated that there will be still stronger emphasis upon the further development of air transportation.

Building capacity, construction, and operating personnel will be available for renewed technical and economic advancement, reconstruction and retraining in the air transportation industry. A considerable program of public, quasipublic, and private improvements may be looked for in this field. The future of air transportation in the Pacific Northwest may be affected by special geographic factors: the long distances between centers of population and position with respect to northern routes—to British Columbia and Alaska and to Asia. The Puget Sound region has become one of the greatest producing centers in the air industry. With the concurrent regional development of light-metal industries, it should be possible to continue, and to readjust to new needs, industrial activity in the aircraft field. Air transportation in this region, as elsewhere, owes much to Federal support in various forms, including aid in the provision of navigation facilities such as beacons, radio ranges, marker stations, traffic-control systems, radio stations, and lighting equipment, as well as in such improvements of airports and landing fields as clearing and grading, runways, taxiways, and aprons.

Figure 48 illustrates the location of main airways in the Puget Sound region, south down the coast, north to Alaska and the Orient, and east over Snoqualmie Pass. For reasons of military security, only approximate locations are given. Almost all airfields in the recommended system are now developed.

In view of the strategic location of Puget Sound on the northwest shore of the United States and with relation to the great circle routes which will open up after the war, it is perhaps one of the most advantageously situated regions in the United States. (See fig. 49.) Seattle is much closer to China via the Arctic than by the present around-the-earth route. In view of its proximity to both the Orient and northern Europe, the Puget Sound region will be at an important crossroads of the world when the opening up of great new international airways occurs. The region should be planning, therefore, to take its proper place in this world picture. It should be equipped with the necessary airports and airport facilities.

Already under construction by the Civil Aeronautics Administration is the Seattle-Tacoma Airport which, when developed to its ultimate possibilities, will accommodate any probable development in aviation. In view of the great potentialities of air travel, however, one such airport will not be enough. It is obvious that several airports of various sizes and types must be developed. There are more potential economies in terminal operations than in line haul operations. Besides permitting planes to land and take off, terminals must be designed to permit efficient loading and unloading of freight and passengers.

Aside from commercial airports, it is not inconceivable that it will be necessary to develop a system of satellite fields and shuttle lines to accommodate the many tourists who, with the possible post-war development of smaller aircraft, will avail themselves of the unlimited advantages which the Puget Sound region offers for hunting, fishing, and many other types of recreation. Such a system should be worked out through

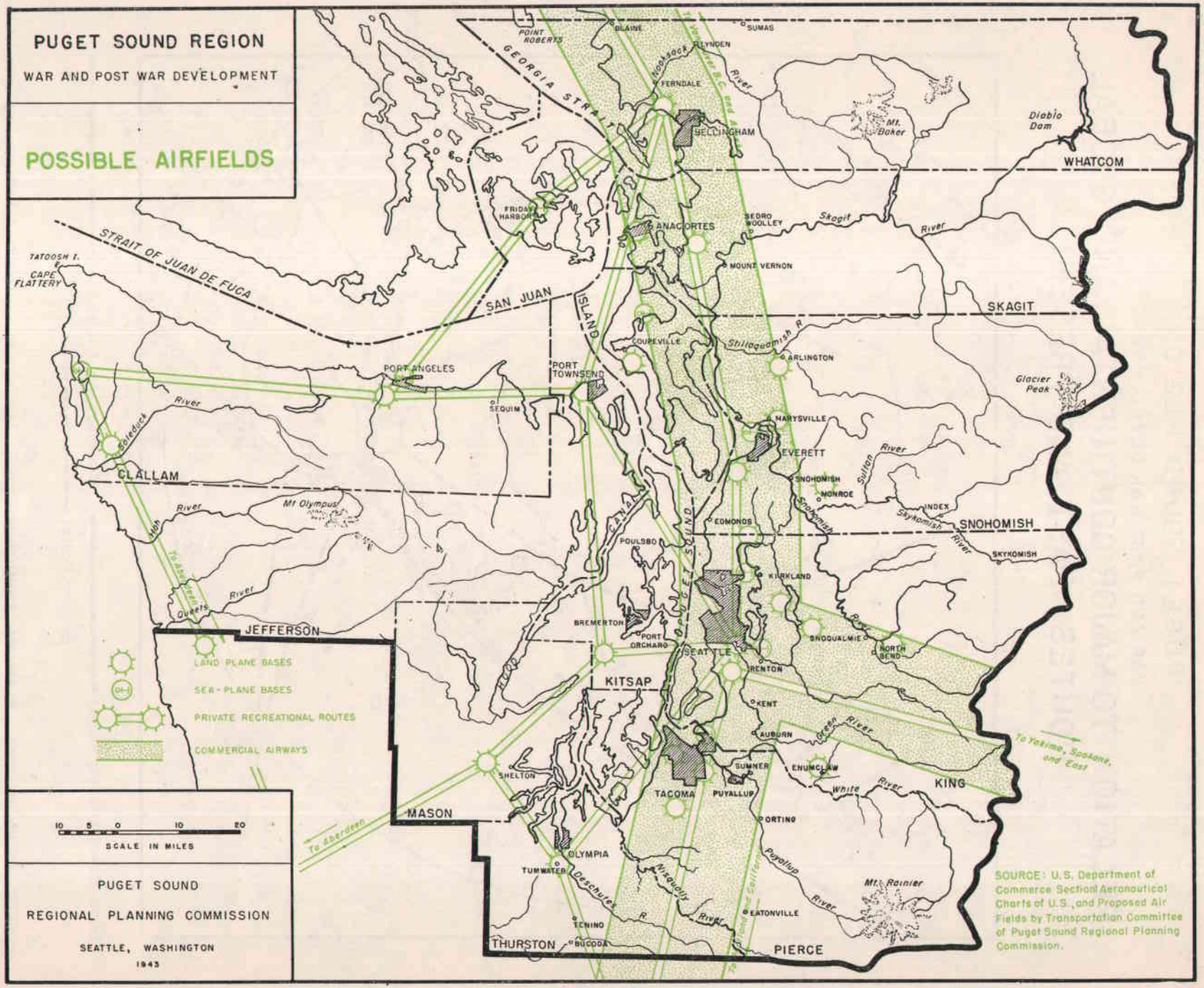


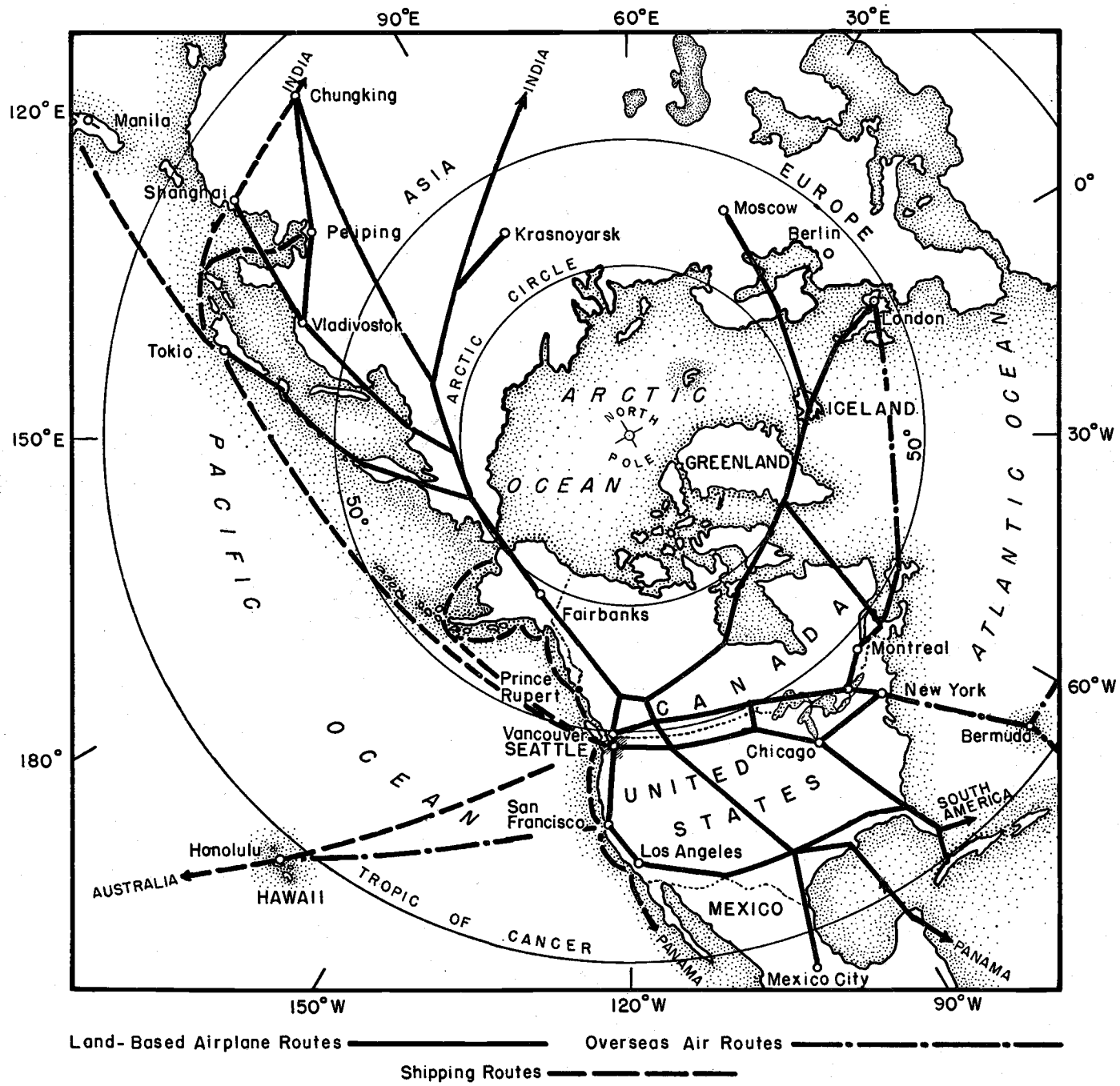
FIGURE 48.

534208—43——8

PUGET SOUND REGION

WAR AND POST WAR DEVELOPMENT

RELATION TO MAJOR CONTINENTAL AND GLOBAL ROUTES, PAST AND PRESENT



PUGET SOUND REGIONAL PLANNING COMMISSION SEATTLE, WASHINGTON 1943

FIGUBE 49.

the close collaboration of Federal and local agencies, which should also give consideration to the problem of how such a system of airports can be made paying investments rather than costly obligations.

Private flying is so much to be expected that airports are planned and mostly completed to make possible a recreational flying loop around the Olympic Peninsula for quick fishing and hunting trips and to give access to summer homes. It is presumed, too, that industrial and mining developments on the Peninsula north of Mount Olympus will create more travel—air travel where time is an element. The plane is not stopped by the waters of Puget Sound, and for only a few days of the year need private flyers be grounded by fog. Their pleasure travel does not interfere with commercial airways.

It is not too soon to develop practical aviation plans and to pursue them energetically. The aeronautical possibilities of the region are limited only by the amount of foresight and intelligent planning its citizens are willing to expend.

Communications

Communications in the region have, in the main, been adequate, although some areas have not been served by telephone because of insufficient population. Telephone service in most urban areas has been at a ratio of better than one telephone to every four people. Telephone lines extend along all main highways, reaching all community centers. The war has now changed the situation. Expansion and new installations needed in most areas represent about a 20-percent increase over the region as a whole. Recently constructed population centers containing some 50,000 homes are practically without telephone service because of wartime shortages of equipment. This creates a field of post-war work for more people than were engaged prior to 1940.

Radio and telegraph service interconnected with phone service will not require so great an expansion. The service has proved quite adequate.

Conclusions

Transportation offers one of the larger and more promising fields for the development and internal improvement of the region and for fruitful activity in the post-emergency period. Improved facilities and equipment and a better coordination of means of transportation should bring about many economies and many improvements in service and convenience. Potential works include: improvements and additions to transportation lines—waterways, railways, highways, and airways; modernization of line equipment; and improvements to individual and joint terminal facilities and equipment. Existing facilities are the product of haphazard growth. They need to be better integrated and linked for a more efficient interchange of freight and passengers. Many of these improvements should look toward the more rational use of each kind of transport. At the end of the intensive war effort, it is likely that the time will be ripe for many transportation improvements. Generally, it may be anticipated that (1) no wide expansion will occur in railroad construction, but that extensive improvements and reorganizations will be in order; (2) extensive modernization of trunk highways and city highways will be programmed; (3) owing largely to expanded basic industry, continued inland navigation improvement in waterways equipment and terminals will be a profitable undertaking; and (4) a sharp turn toward expansion and improvement of commercial air equipment, lines and terminals will take place with the slackening of military aviation needs. The availability of new metal industries, including the significant light metal plants, and the large new capacity for building aircraft, ships, and boats may well be important factors in the modernization of transportation equipment of various kinds. The wide availability of low-cost power may have important effects on some forms of transportation and transportation industry. Planning of joint transportation, transit, and terminal reconstruction projects for cities and metropolitan areas should be especially fruitful. A program of pipe-line construction may be a transportation development of the more distant future.

The rivers and harbors of Puget Sound have been a major factor in the development of the region up to the present. With the new trend in establishment of basic industries in the region, new influences should be felt. The region's harbors and its major streams undoubtedly should exercise strong influences upon the distribution of new industries; and, reciprocally, the establishment of a number of heavy industries should have material effect upon the traffic and general development of waterways and ports. Among inland waterways, Puget Sound should play a particularly important part. Among projects for future consideration is the proposal for a Columbia River-Grays Harbor-Puget Sound inland waterway. Construction of this major inland water link between Puget Sound, the Columbia River, and the interior basin would seem to depend primarily upon the further development of heavy industries in both areas and the need of low-cost interchange of large volumes of bulk materials. Continuing improvements are required for the maintenance of channels at various ports on deep water and also at various smaller coastal harbors.

PART III

8. URBAN PROBLEMS

A. COMMUNITIES AND FACILITIES

By Joshua H. Vogel[1]

The Puget Sound Pattern of Communities

The region is a single planning unit, with which the Puget Sound Regional Planning Commission is concerned in its capacity as a nonadministrative coordinating planning agency. The authority for administering the laws, for operating and constructing the public utilities and facilities, and for the taxing, collecting, and spending of public funds is held by 746 different agencies. Among these agencies in the 12 counties are 72 incorporated cities and towns, 12 housing authorities, 1 soil conservation district, and numerous port, utility, drainage, diking, fire protection, and school districts.

The areas of these agencies overlap, with consequent variation in tax rates and in the quality of service and other facilities. Resulting bottlenecks and deficiencies are aggravated by lack of authority to solve certain problems and to allocate wisely the use of available resources. Because the pattern of government is so intricate, the problem of providing public facilities is complicated even in ordinary times, but it became immensely more complicated when, within 2 years, the population of the region increased from 58 percent of the State's population to 62 percent, a change which has added a quarter of a million people to a population which was slightly less than a million.

Prior to the war, programs had been started to simplify school organization and to provide better school building facilities. Plans were in process of completion by governmental units providing for other facilities, such as sewage treatment plants, to prevent further known stream pollution affecting health and commercial fisheries. Because of the growth of population in metropolitan areas between 1930 and 1940, the problem of financing needed school building programs and of paying for water, sewers, roads, and fire protection had already increased to some extent. Evidence had appeared of need for some authority to exercise police powers in the rapidly expanding metropolitan areas in King, Pierce, Snohomish, and Kitsap Counties, especially to regulate sanitation and to provide controls such as are embodied in building and zoning codes. The same problems in lesser degree appeared in other cities and towns.

Local planning agencies existing prior to 1940 had explored methods of meeting problems involved in providing public facilities. King County and its planning commission had attacked problems adjacent to Seattle. Olympia and its planning commission had dealt with problems of the State's capital city. Planning commissions recently created have become very active and efficient in planning and obtaining through legislation the necessary authority for their governmental units.

Within the region there are now eight county and 16 city planning commissions. Three counties and eight cities have zoning regulations. All counties have trailer-camp regulations. Two counties have building code permit systems. Three airports are protected by zoning regulations. These planning commissions and legal controls are doing a great deal to provide guidance for the plans for future public facilities.

Legal machinery still needs to be simplified to provide more satisfactory methods for financing public improvements. In five cities and four counties intensive local surveys are under way to prepare detailed designs, working drawings, and specifications for letting contracts for necessary public facilities and housing for post-war industries.

Because of increasing problems in connection with public facilities, planning activities have been accelerated during the past three years. More planning commissions no doubt will be formed in the future. In the meantime, participation by local interests in activities of the Puget Sound Regional Planning Commission serves the planning purpose until local surveys can be finished and local participation warrants organization of local planning commissions, which should make their own studies of needs and plans for public facilities.

Effect of War

The population maps and statistics included in this report indicate and explain the recent urbanization of the region. Since this trend has not been confined

[1] Planning Consultant, Association of Washington Cities.

entirely within incorporated city limits, it has presented difficult problems.

County government has been forced by legislative enabling acts, some enacted only in 1943, to exercise the same functions as city government. The 1943 State legislature finally found it necessary to give county commissioners more explicit police powers.

Population increases in metropolitan areas adjacent to Tacoma, Seattle (including Renton and Kirkland), Everett, Bremerton, and Port Orchard have created an urgent need for water, sewers, treatment plants, fire protection, police protection, building and zoning code controls, license controls, transportation, sanitation, health and trailer camp regulations, garbage disposal, facilities for recreation, education, libraries and hospitalization and new housing.

Within city boundaries the effects of war on population, while equally disturbing, have been more easily planned for, because of existing legal powers of city officials and legal methods already set up for financing construction projects. Bremerton, a city of 15,134 population, has become a metropolitan area of some 70,000 people. Other cities have grown as follows:

Port Orchard, from 1,566 to over 40,000 in the area; Tacoma, from 109,408 to over 150,000 in the area; Renton, from 4,488 to over 20,000 in the area; Kirkland, from 2,084 to over 12,500 in the area; Seattle, from 368,302 to over 520,000 in the area.

Population increases within corporate limits only are shown by table 32, as estimated by the State Census Board, established by the 1943 State legislature.

TABLE 32.—*Estimated population Mar. 15, 1943, incorporated and chartered cities and towns with 3 percent increase or more since 1940 census, Puget Sound region*

City or town	Population			City or town	Population		
	Apr. 1, 1940	Mar. 15, 1943	Increase		Apr. 1, 1940	Mar. 15, 1943	Increase
Anacortes	5,875	7,200	1,325	Port Angeles	9,409	10,000	591
Auburn	4,211	5,000	789	Port Orchard	1,566	4,000	2,434
Bremerton	15,134	46,000	30,866	Port Townsend	4,683	7,500	2,817
Buckley	1,170	1,300	130	Poulsbo	639	1,860	1,221
Burlington	1,632	1,700	68	Puyallup	7,889	8,800	911
Coupeville	325	387	62	Redmond	530	596	66
Eatonville	996	1,173	177	Renton	4,488	6,175	1,687
Edmonds	1,288	1,500	212	Roy	261	301	40
Enumclaw	2,627	2,725	98	Ruston	739	770	31
Everett	30,224	35,000	4,776	Seattle	368,302	480,000	111,698
Fir Crest	486	700	214	Sedro Woolley	2,944	3,100	156
Issaquah	812	900	88	Sequim	676	725	49
Kent	2,586	2,900	314	Shelton	3,707	4,150	443
Kirkland	2,084	3,250	1,166	Snohomish	3,794	2,880	86
Marysville	1,748	1,850	102	Snoqualmie	775	1,000	225
Milton	671	1,100	429	South Prairie	226	244	18
Mount Vernon	4,278	4,500	222	Steilacoom	832	875	43
North Bend	646	700	54	Sumner	2,140	2,300	160
Oak Harbor	376	1,200	824	Tacoma	109,408	136,000	26,592
Olympia	13,254	15,500	2,246	Tukwila	521	724	203
Orting	1,211	1,345	134	Tumwater	955	1,000	45
Pacific	357	500	143	Wilkeson	369	416	47

Total increase inside corporate city limits—194,002.

Source: State Census Board.

The sudden increase in population immediately accentuated the weaknesses in the functions and the plans of cities and counties. The physical pattern of the communities and fringes around them was shown to be inadequate. While much has already been done to provide housing and necessary public facilities, much still remains to be done.

Most of the private and public housing constructed recently must be removed eventually, because of its temporary nature or its location in respect to the future needs of industrial centers. Some of the best residential areas in our cities from the standpoint of view, air, and transportation, are covered with old structures too densely situated without sufficient open spaces and too unattractive in design.

Program and Activities

With sudden influx of population many new public facilities had to be located, planned, and financed. More than 35,000 housing units, public and private, were constructed. Schools, hospitals, fire stations, water and sewer projects, recreational units, and access roads were built. Many of these fortunately are part of permanent community plans as a result of surveys and the coordination afforded by planning programs. The advance work done by city, county, and state planning agencies suddenly bore fruit, but the emergency emphasized instances in which there had been insufficient planning.

At the end of the war, public facilities will have been overbuilt in Renton, Kirkland, Port Orchard, and Bremerton unless industries can be held in these communities or in the areas nearby, to create employment for the expanded labor force. However, studies show some basis for the belief that where public and private housing has been built hastily of war type designs, the streets and the underground facilities, the schools and public structures such as recreational and hospital buildings will not have been built at a loss in most cases.

Replatting the housing sites with larger single-family lots and rebuilding the housing for individual or group ownership will be one method by which private industry can take the lead after the war if proper legislation is enacted. With this rehabilitation of war-blighted areas should be included a rebuilding of pre-war obsolescence areas. In the metropolitan semirural areas much private shack construction will be replaced by modern homes if financial aid is given to the private owners. This type of aid can well include provisions for rural farm houses. With urban housing is included semirural housing because the metropolitan areas which have grown so in population during this war period will embrace agricultural lands, both lowland and upland, suitable for dairy, berry, bulb and truck growing and even some cattle farms. These homes, within

20 miles of manufacturing plants, now are occupied by industrial workers and can continue to be so occupied after the war. The public facilities provided because of the war can still serve. New construction can replace old.

In the case of schools in Kitsap County, it was planned that the old pre-war school buildings should be removed and the new buildings remain in use. All are used now and apparently will need to be used longer than the contemplated life of the buildings. Because of consolidation of school districts the new buildings will serve when transportation difficulties are removed and the need for the use of the obsolete school buildings has passed.

Critical conditions still exist in respect to some public facilities, which will have to be cared for after the war. Among these are: delayed maintenance, replacement and repairs, as well as new construction needed for the transportation system (highway, water, rail and airway); school buildings and reorganization; water supplies; sewers and plants; hospitals and clinics; libraries; recreational facilities; parks and playgrounds and housing. It is urgent that these improvements be planned for construction in relation to replanned cities, based upon rational living standards providing physical conditions conducive to family life, health and happiness.

The Puget Sound area plan and the plans of constituent communities are now concerned with (1) problems created and adjustments made necessary as a result of the war, (2) problems and adjustments of the transition period, and (3) problems of adjustment to a long-term peacetime economy.

Well-conceived public facility projects for communities must be engineered now. Reserve funds must be built up in accordance with enabling acts passed by the State legislature for cities and counties. A partial list has been made in detail and will be revised continually to include the other needed community facilities.

Effective planning, programming, and budgeting for these projects will prepare them for war development if such is found necessary now. But, most important, such preparation will have them ready to strengthen the economy during the transition period.

B. A PROGRESSIVE PLAN: THE TACOMA PROJECT

By Marvin R. Schafer[2]

Problem and Objective

In cities where war and war-related industries have increasingly dominated economic life, post-war readjustments could well prove catastrophic. It is believed, however, that the full impact of such a crisis can be avoided or its effect minimized, in a city which will study its future, develop plans with direct public support and take action consistent with those plans. Tacoma, under the leadership of her mayor and a research committee on urban problems, and with the assistance of the National Resources Planning Board, has made a promising start in this direction in the form of a progressive community planning project.

The organization and progress of the study has demanded a comprehensive examination of the resources of the Columbia River basin and the Puget Sound region to determine:

1. The power and irrigation resources, both potential and developed.
2. Other natural resources such as coal, lumber, metals and minerals, which could be economically processed.
3. The transportation facilities available and those needed for future development.
4. A consideration of the current agricultural resources and possibilities for their increased efficiency.

[2] Professor of Sociology, College of Puget Sound.

Concurrent with this examination was the consideration of the possible effect of the development of such potential resources on the future of Tacoma. Tacomans, knowing this, could either (1) let the Columbia River developments take their course, accepting the changes forced upon the city as they came but not seeking or preparing for them, or (2) realize responsibility for the ordered future development and industrialization of the area and plan for the exploitation of the city's unique combination of advantages. If the latter is realized, Tacoma should organize to utilize effectively all of the city's resources. The city should anticipate providing a comfortable place to live as well as to earn an adequate living.

Elements of the Plan

Study of the possible expanding needs of the city revealed that it will require:

1. Industrial areas, with proper water, land, and air facilities for freight transport and transportation of personnel to and from work.
2. A commercial district adequately "insulated" and provided with ample approaches and depots for goods and people, flexible enough in size so that it can adjust to "city center" trends.
3. Organization of neighborhood shopping and service centers so planned that they are "insulated" from the residential areas, on which they could well have a deteriorating effect.

4. An over-all highway plan to provide high-speed transportation between all of the units within the city and for passenger and truck traffic to and from other areas.

5. Adequate supply of power and water together with sanitary sewage disposal.

6. Adequate parks utilizing the superb locations and views of the locality, with provision for recreational and educational services.

7. Health services, general and institutional.

Plans for the location of some of these elements are illustrated by figure 50, one of many maps prepared in connection with the progressive study.

Results

From study and action along the lines indicated above, the following results may be enumerated.

1. Certain conclusions as to minimum and maximum estimates of population and the factors upon which those predictions are contingent have been stated.

2. A study has been made of the development shedule for the energizing of the potential power resources, utilizing not only the Columbia River but also the power resources of the Tacoma municipal utilities.

3. Forest resources have been examined, the result of the implication of a declining stand of old growth and an expanding second growth which will furnish a "crop" for lumber, veneer, pulp, and plastics.

4. An inventory has been made of the metallurgical, fuel, and chemical resources which Tacoma could economically develop.

5. The potential agricultural and other food resources of Tacoma have been carefully examined. The size of the food base Tacoma can safely plan to use for the development of its industrial population has been determined.

Present study is concerned with determining the working ratio of power to labor in the industries to be fostered and the number of men that such industries will require. This is to be coordinated with the natural limitations placed upon an economically sound expansion of population by the agricultural resources of the area. These in turn have been coordinated with the necessary transportation facilities required to handle economically the flow of food, raw materials and processed goods. The results of these studies will assist in answering the question as to whether there will be a low or a high ratio established between power used and labor required, and in turn will determine the type of industry to develop. At present it would appear that:

1. The available agricultural lands, producing at present rates (plus irrigated land to be developed in the Grand Coulee irrigation area) would provide for a much larger population for Tacoma but also place a definite limit on expansion if it is to be basically sound.

2. The utilization of the power resources available to Tacoma would multiply the population several times.

3. In the accessible environs of the metropolitan area are adequate raw materials to provide for expansion in the fields of metallurgy, lumber and its byproducts, chemurgy and sea-borne transportation justifying the population predictions, which are regarded as reasonably conservative.

The specific details of the over-all city study have included:

1. Break-down of the city into its natural units.

2. Detailed study of the functional and ecological units of the city and its environs.

3. Forecast of direction and character of the expansion in the light of factors affecting and limiting population growth.

4. Over-all city plan giving due consideration to soil, contours, and present "natural areas" of the city.

5. Details to implement the plan providing specifically for the city center, shopping center, neighborhood centers, interaction between the city and its environs.

6. Study of the effect of this development on special institutions, i. e., churches, schools, libraries, hospitals, etc.

The refinements of the plan are in process of development. The Committee feels that through the information it has so far disseminated the community is gradually beginning to realize that it can control the slumbering industrial giant which its energized power sites will awaken to produce for its own and the Nation's welfare.

Ahead lies the need for not only the refinement of a program well begun but the active and enthusiastic participation of those necessarily involved in its fulfillment. So the second aim of the study is to energize latent human resources now largely dormant and to materialize plans and specifications for the city now on the threshold of an industrial expansion which can certainly dwarf the past development. Here is an area where those with convictions, confidence, and faith can find the resources to build a city sound in its economic base, secure in its economic future, and affording its growing population living space in a beautiful setting as well as industrial opportunity to challenge its best ability.

PUGET SOUND REGION

WAR AND POST WAR DEVELOPMENT

A PROGRESSIVE URBAN PLAN: TACOMA LONG RANGE PLAN

SOURCE: Tacoma Urban Planning Study.

URBAN RESIDENTIAL AREAS ARE DIVIDED INTO QUIET RESIDENTIAL "ISLANDS" BOUNDED BY TRAFFIC ARTERIES. EACH "ISLAND" IS AN INTEGRATED COMMUNITY WITH ITS ELEMENTARY SCHOOL, BRANCH LIBRARY, COMMUNITY CENTER, NEIGHBORHOOD PLAYGROUND.

HOMESTEADS AND OTHER LARGE RESIDENTIAL PLOTS RANGING FROM 1/2 TO 1 ACRE.

COMMERCIAL AREAS ARE SPACED TO MEET ACTUAL NEEDS FROM SMALL NEIGHBORHOOD SHOPPING CENTERS TO THE LARGE CITY CENTER. PROVIDING SHOPPING "CENTERS" AVOIDS UNFORTUNATE "SHOESTRING" COMMERCIAL DEVELOPMENT ALONG TRAFFIC ARTERIES.

INDUSTRIAL AREAS. THE LARGE "TIDE FLATS" AREA AFFORDS AMPLE LAND AND GOOD RAIL, WATER, TRUCKING AND AIRPORT CONNECTIONS, AND WORKERS WOULD LIVE ON HEIGHTS NEARBY. SMALL SOUTH TACOMA AREA IS FOR INDUSTRIES WITHOUT WATER CONNECTIONS.

FREIGHT DISTRIBUTION CENTER WITH RAIL, WATER AND HIGHWAY CONNECTIONS.

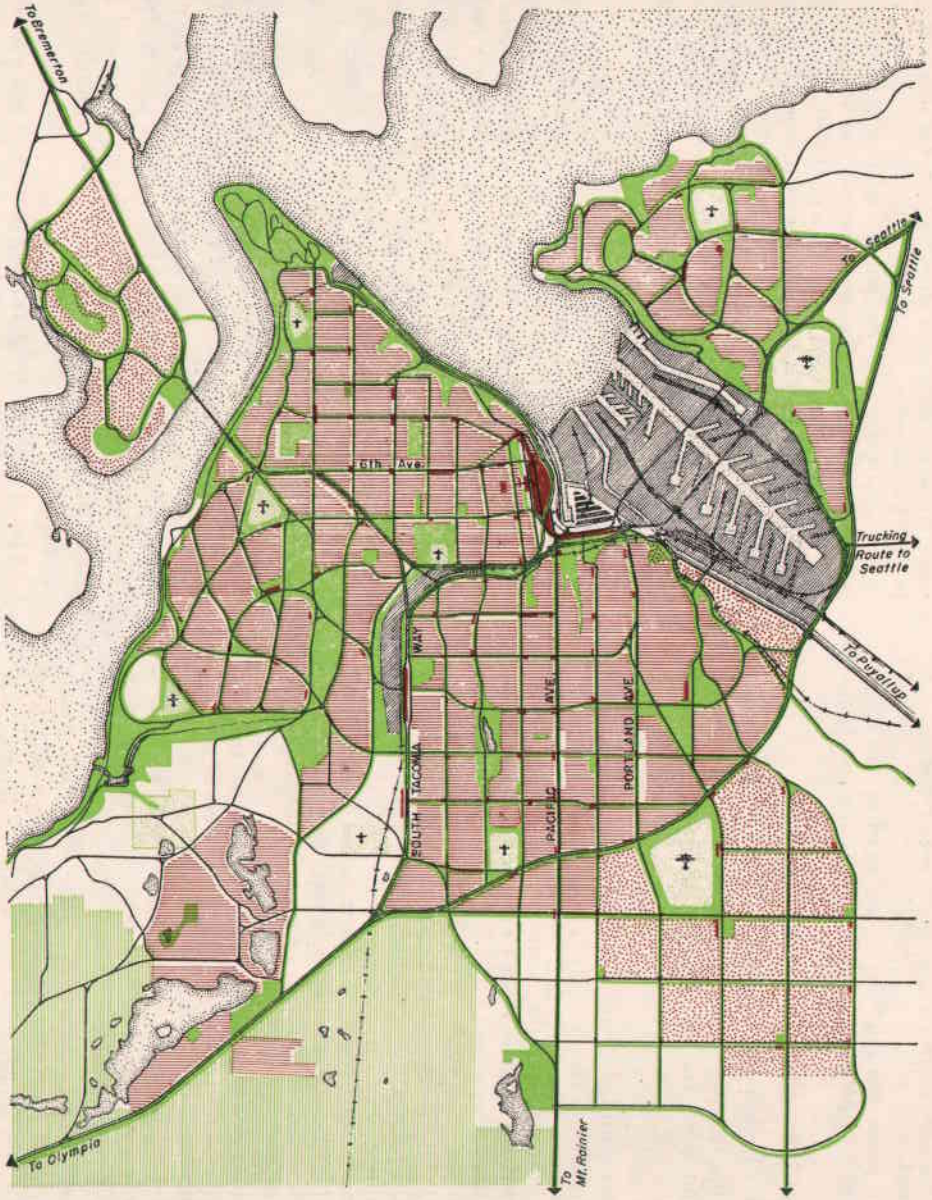
RECREATION AREAS, PARKWAYS, PARKED STREETS, STEEP AREAS, GULCHES AND GREEN BELTS SEPARATING INDUSTRIAL, COMMERCIAL AND RESIDENTIAL USES. RECREATION AREAS ARE EVENLY DISTRIBUTED.

MILITARY RESERVATIONS.

AIRPORTS. SEPARATE LARGE AIRPORTS FOR PASSENGERS AND FREIGHT. SEVERAL SMALL AIRPORTS STRATEGICALLY LOCATED FOR RESIDENTIAL AREA USE.

LOCAL TRAFFIC ARTERIES.

SUPER HIGHWAYS. DEVELOPED WHERE POSSIBLE AS "FREEWAYS"



PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943

FIGURE 50.

PART III

9. HOUSING

By Ellis Ash [1]

Status of Housing

Tables 33 to 36 and figure 51 show statistically and graphically the Puget Sound housing situation as it existed in 1940.

TABLE 33.—*Number of dwelling units by counties, and by population, Puget Sound region, April 1940*

County	Number of dwelling units			
	Total	Urban	Nonfarm	Farm
Clallam	6,916	3,022	2,479	1,415
Island	2,861	0	1,620	1,241
Jefferson	2,963	1,276	1,026	661
King	183,151	139,469	36,561	7,121
Kitsap	16,803	5,184	8,163	3,456
Mason	4,663	1,204	2,410	1,049
Pierce	59,372	40,715	11,808	6,849
San Juan	1,295	0	607	688
Skagit	11,835	4,469	3,714	3,652
Snohomish	30,239	11,278	11,703	7,258
Thurston	12,980	4,556	5,092	3,332
Whatcom	20,599	10,246	4,962	5,391
Total	353,677	221,419	90,145	42,113

Source: 1940 Census, Housing, Second Series.

Post-War Implications

As with other factors, it is necessary to relate post-war implications of housing to general developments in the region resulting from war activities. The tremendous impact of war requirements has brought about, as a concomitant of large-scale in-migration, critical housing needs beyond the ability of the pre-war housing inventory to absorb. The development of war housing, however, to meet such needs does not necessarily mean that post-war development in the region can be insured as a result of having adequate housing developed during the wartime period. This is due essentially to the following factors:

1. No additional housing construction of any kind has been permitted in those areas which have not required in-migration to satisfy critical labor needs of wartime activities. This means that many localities are progressively adding to the backlog of housing demand from the general public, resulting from natural obsolescence, inability to make improvements due to priority regulations, and increased appreciation of housing standards.

2. The major portion of war housing is of temporary character and, as required by statutory limitations, must be removed at the conclusion of the war. It cannot be looked to as a source of housing to maintain the present war-expanded population.

3. Even in those localities which have been provided with war housing, there has been no possibility of counteracting the progressively developing needs relating to natural obsolescence and the other factors mentioned under paragraph 1 above.

4. The location of much of the war housing has been guided by considerations other than those basic to the planning of peacetime balanced economy and, for this reason, is not adapted to probable needs of the population as we embark into the post-war era.

It is obvious that technological refinements relating to housing will be of extreme importance to this field of activity after the war. Architectural considerations in

TABLE 34.—*Number of dwelling units by adequacy and selected facilities, Puget Sound region, April 1940*

Item	All counties	Clallam	Island	Jefferson	King	Kitsap	Mason	Pierce	San Juan	Skagit	Snohomish	Thurston	Whatcom
All dwelling units in county	353,677	6,916	2,861	2,963	183,151	16,803	4,663	59,372	1,295	11,835	30,239	12,980	20,599
State of repair and plumbing:													
Not needing major repairs	294,699	5,619	2,003	2,168	157,491	15,292	4,218	49,884	734	8,684	21,250	11,636	15,720
With private bath and private flush toilet	218,673	3,465	834	1,304	125,490	10,137	1,993	38,039	350	5,333	14,238	6,893	10,597
Without bath and private flush toilet	76,026	2,154	1,169	864	32,001	5,155	2,225	11,845	384	3,351	7,012	4,743	5,123
Needing major repairs	37,922	969	702	661	12,235	901	273	6,838	532	2,061	7,889	839	4,022
With private bath and private flush toilet	16,651	385	74	123	6,548	316	87	3,381	125	631	3,085	190	1,706
Without bath and private flush toilet	21,325	584	628	538	5,687	585	186	3,457	407	1,430	4,804	649	2,316
No report	21,056	328	156	134	13,425	610	172	2,650	29	1,090	1,100	505	857
Running water in dwelling unit:													
Number	303,252	5,430	1,803	2,121	166,153	13,393	3,115	52,073	749	8,825	23,547	9,460	16,583
Percent	86.9	79.6	63.8	73.0	92.1	80.7	67.6	88.5	59.0	75.6	78.8	73.8	81.4
Electric lighting:													
Number	322,794	5,508	2,179	2,237	175,714	15,275	3,612	56,206	776	10,360	27,327	4,438	19,162
Percent	92.9	81.2	77.3	77.2	97.9	92.2	78.4	95.8	61.1	89.2	91.6	98.9	94.3
Percent of dwelling units substandard	34.3	47.4	69.2	53.9	26.1	37.4	55.6	32.9	72.4	50.4	51.1	44.7	46.3

Source: 1940 Census, Housing, Second Series.

[1] Housing Representative, National Housing Agency.

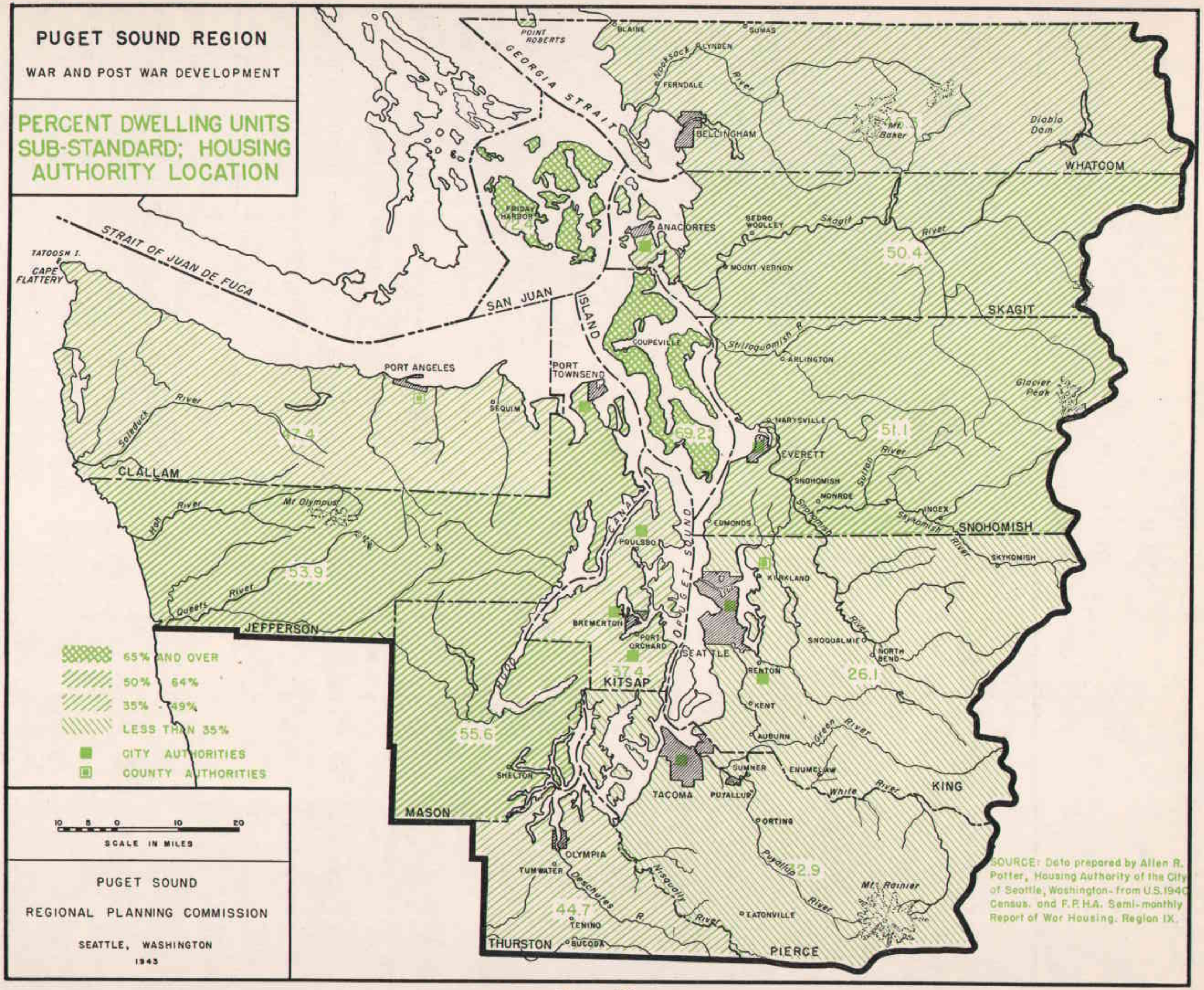

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
PERCENT DWELLING UNITS SUB-STANDARD; HOUSING AUTHORITY LOCATION
65% AND OVER
50% - 64%
35% - 49%
LESS THAN 35%
CITY AUTHORITIES
COUNTY AUTHORITIES
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Data prepared by Allen R. Potter, Housing Authority of the City of Seattle, Washington - from U.S. 1940 Census, and F.P.H.A. Semi-monthly Report of War Housing, Region IX.
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
PUGET SOUND
WHATCOM
SKAGIT
SAN JUAN
ISLAND
SNOHOMISH
CLALLAM
JEFFERSON
KITSAP
MASON
KING
PIERCE
THURSTON
BELLINGHAM
ANACORTES
PORT ANGELES
PORT TOWNSEND
EVERETT
SEATTLE
BREMERTON
PORT ORCHARD
RENTON
KIRKLAND
TACOMA
PUYALLUP
OLYMPIA
SHELTON
72.4
50.4
69.2
51.1
53.9
37.4
26.1
55.6
44.7

FIGURE 51.

TABLE 35.—*Number of occupied dwelling units, by race of household, Puget Sound area, April 1940*

County	Number occupied dwelling units				Percent Negro and other nonwhite
	Total	White	Negro	Other nonwhite	
Clallam	6,488	6,278	11	199	3.2
Island	2,018	2,006	2	10	.6
Jefferson	2,556	2,531	2	23	1.0
King	169,125	164,092	1,557	3,476	3.0
Kitsap	13,992	13,754	47	191	1.7
Mason	3,616	3,535	0	81	2.2
Pierce	54,711	53,845	263	603	1.6
San Juan	1,035	1,001	0	34	3.3
Skagit	11,098	10,977	4	117	1.1
Snohomish	27,426	27,195	64	167	.8
Thurston	11,584	11,485	18	81	.9
Whatcom	18,481	18,288	16	177	1.0
Total	322,130	314,987	1,984	5,159	2.2

Source: 1940 Census Housing, Second Series.

TABLE 36.—*Number of occupied dwelling units by tenure, Puget Sound area, April 1940*

County	Population 1940		Occupied dwelling units			Vacant dwelling units		Percent home owned
	Total	Per occupied dwelling unit	Total occupied	Owner-occupied	Tenant-occupied	For sale or rent	Not for sale or rent	
Clallam	21,848	3.37	6,488	3,971	2,517	257	171	61.2
Island	6,098	3.02	2,018	1,466	552	399	444	72.6
Jefferson	8,918	3.49	2,556	1,544	1,012	274	133	60.4
King	504,980	2.99	169,125	86,069	83,056	11,009	3,017	50.9
Kitsap	44,387	3.17	13,992	8,863	5,129	1,549	1,262	63.3
Mason	11,603	3.21	3,616	2,196	1,420	496	551	60.7
Pierce	182,081	3.33	54,711	33,191	21,520	3,461	1,200	60.7
San Juan	3,157	3.05	1,035	628	407	151	109	60.7
Skagit	37,650	3.39	11,098	7,416	3,682	470	267	66.8
Snohomish	88,750	3.24	27,426	17,868	9,558	2,132	681	65.1
Thurston	37,285	3.22	11,584	7,242	4,342	1,019	377	62.5
Whatcom	60,355	3.27	18,481	12,260	6,221	1,652	466	66.3
Total	1,007,112	3.13	322,130	182,714	139,416	22,869	8,678	56.8

Source: 1940 Census, Housing, Second Series.

this region have always emphasized individuality, employing the use of local building materials with the ideal of a house and garden uppermost in the promotion of new home construction. All of these factors serve to pave the way psychologically for the introduction of improved technological considerations if the natural inertia of the building fraternity is reduced, adequate facilities and arrangements developed for a mutual participation of public and private capital, and, of most importance, a planned set of principles promulgated for acceptance by the region and integrated with an overall conception of desirable planning considerations.

As a measure of the volume of war housing that has been provided and as an indication of the extent of the problem of disposition which faces us in the post-war period, table 37 is provided. This table shows the amount of war housing by type of construction for all localities in the region.

TABLE 37.—*War housing programmed to May 1943 for Puget Sound localities*

Locality	Public					Private		
	New family construction	New dormitory construction	Conversion		Trailers	New family construction	Conversion	
			Family	Dormitory			Family	Dormitory
Anacortes	155		50			20		
Bainbridge	[1] 12							
Bremerton	[2] 11,980	2,615			300	555		
Everett	[3] 925		350			150		
Keyport	[1] 300					7		
Oak Harbor [4]	225	45			100			
Port Angeles	[1] 40					5		
Port Townsend	60		35			12	15	10
Seattle [5]	10,967	274	1,200	500		6,711		
Tacoma [6]	3,294	1,026	700	210		1,881		
Wilkeson	30					10		
Total	27,988	3,960	2,335	710	400	9,351	15	10

[1] All units permanent construction.
[2] 1,280 of these units are permanent.
[3] 85 of these units are permanent.
[4] The private priority quota shown for Anacortes is also available to Oak Harbor. 100 of the new public family units are permanent.
[5] The Seattle program also covers Renton and Kirkland. 4,418 of the new public family units are permanent. The total public family units also includes 690 low-rent FPHA aided permanent units constructed prior to the war.
[6] The Tacoma program also covers Fort Lewis. 1,150 of the new public family units are permanent.

Source: National Housing Agency.

Of immediate importance to planning possibilities affecting housing in the region are the following necessary conditions:

1. Amendment of the Lanham Act to permit the utilization of such permanent war housing as is economically feasible to meet needs of low-income families in the localities in which they are located. Under the present provisions of the Lanham Act, none of this housing can be so utilized.

2. The adoption of a clearly developed policy of expediting the disposition of temporary war housing with a minimum of hardship for the communities involved and their respective populations.

3. An acceptance of the necessity for eliminating blighted urban and rural areas through the demolition of substandard dwellings and concurrent provision of facilities for the dispossessed population.

4. The development of a satisfactory national policy which will permit a maximum of Federal assistance to both publicly financed and insured-loan privately financed home construction.

5. The continued integration of the potential ideal housing pattern with over-all planning considerations for the region.

6. The constant stimulation and development of strong local housing authorities to the end of their assuming local responsibility for meeting housing needs through the participation of private enterprise and complementary publicly financed dwellings for those low-income persons unable to secure satisfactory standard housing through the efforts of private enterprise.

7. Cooperation with all attempts effectively to guarantee such legislative provisions as are necessary to the fulfillment of the above on both the Federal and local levels.

PART III

10. RECREATIONAL FACILITIES

By Resources Committee, Puget Sound Regional Planning Commission [1]

Recreational facilities now exist in the Puget Sound region on a scale sufficient not only to provide for all the needs of the local population but to furnish national playgrounds for millions of visitors annually. The region is blessed with outstanding attractions which serve the nation as well as the people of the region itself.

Recreation ranks sufficiently high as a producer of income for the regional economy to be classed as an industry. Despite the considerable industrial expansion now under way to meet war needs, the great recreational values of the Puget Sound country are being preserved to serve as a source of income and enjoyment after the war.

Only in recreational facilities of the neighborhood playground type in urban, suburban, and isolated rural areas is there a deficiency. Adequate library facilities are also lacking in some of the same areas.

A general over-all description of available recreational facilities, together with an enumeration of those still needed, follows.

Recreation in National Forests

Within national forests readily reached by people of the region, 659 forest camps comprise an area of 3,767 acres. Figure 52 shows the proximity of national forests and national parks to the populated centers of the region, while figure 53 shows the location of public forest camps and other accommodations. Camp facilities are limited mainly to stoves, fireplaces, tables, toilets, water systems, and other improvements designed for use by large numbers of people but conforming to forest surroundings. Facilities available are summarized in table 38.

Nearly a million acres in two large tracts in the region have been set aside as primitive areas: the North Cascade, and the Olympic. (See fig. 53.) Other designated recreation areas in the national forests are Glacier Peak recreation area, 233,600 acres, and Mount Baker recreation area, 74,859, acres. The North Fork Nooksack natural area, 1,495 acres, is set aside to preserve representative species of forest growth.

[1] Source of information. Washington State Planning Council, A Study of Parks, Parkways, and Recreational Areas, 1941.

TABLE 38.—*Summary of forest service camps, facilities, and attendance in the national forests of Puget Sound area, 1937*

Item	National forest			Total
	Mount Baker	Olympic	Snoqualmie	
Number of camps	23	19	28	70
Average distance to supplies	9	7	5	----
Number of camps with trailer space	16	12	9	----
Total trailer space	54	37	43	----
Number of camps with fishing	21	16	25	----
Number of camps with boating	0	4	2	----
Number of camps with hunting	10	4	21	----
Number of camps with swimming	0	5	0	----
Number of camps with winter sports	0	2	0	----
Number of camps with stoves	20	17	27	----
Total number of stoves	258	178	362	----
Number of camps with fireplaces	0	0	3	----
Number of camps with tables	23	17	27	----
Total number of tables	323	204	465	----
Number of camps with water	21	18	28	----
Number of community kitchens	7	6	6	----
Number of camps with toilets	23	19	28	----
Total number of toilets	84	69	116	----
Number of campers	18,203	19,500	92,010	129,713
Number of picknickers	56,135	29,200	95,915	181,250
Number of hotel and resort guests	33,375	46,700	9,650	89,725
Number of summer home residents and guests	150	1,200	15,700	17,050
Total attendance	107,863	96,600	213,275	417,738

Source: United States Forest Service.

An outstanding development in the Snoqualmie National Forest is a trail system with numerous camps. Similar but probably less intensive developments, particularly in the high mountainous country, may be found in other national forests.

Within the forests are 180 tracts which have been surveyed into lots for summer homes. In all, these tracts total approximately 2,600 acres. Also there are a limited number of resort areas operated by individuals or associations under special use permits to serve the normal needs of the traveling public.

Although transportation systems in the national forests are primarily for fire control purposes, many of the fishing streams, lakes and hunting grounds have been made accessible by roads and trails, except during extreme dry weather when areas of high fire hazard may be closed to public use as a fire protection measure. Roads are not constructed within primitive areas.

The Cascade Crest trail, which traverses the Cascade Mountains from the Canadian line to the Columbia River on or as near the summit as practicable, provides 530 miles of foot and horse trails with numerous side trips and alternate routes through the Mount Baker,

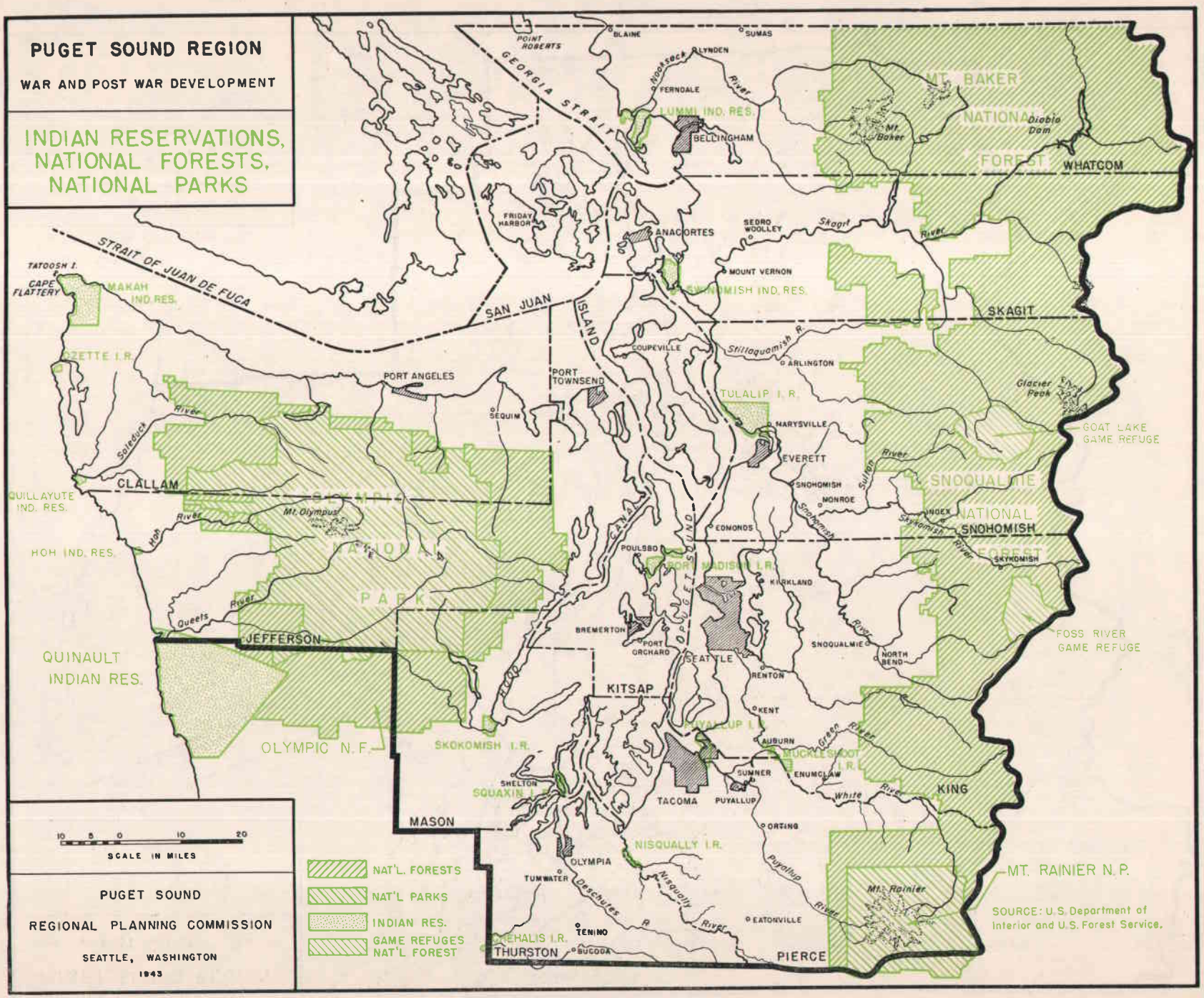

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
INDIAN RESERVATIONS, NATIONAL FORESTS, NATIONAL PARKS
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
POINT ROBERTS
BLAINE
SUMAS
LYNDEN
FERNDALE
LUMMI IND. RES.
BELLINGHAM
MT. BAKER NATIONAL FOREST
Diablo Dam
Mt. Baker
WHATCOM
FRIDAY HARBOR
ANACORTES
SEDRO WOOLLEY
Skagit River
MOUNT VERNON
SWINOMISH IND. RES.
SKAGIT
TATOOSH I.
CAPE FLATTERY
MAKAH IND. RES.
OZETTE I.R.
COUPEVILLE
Stillaguamish R.
ARLINGTON
PORT ANGELES
PORT TOWNSEND
SEQUIM
TULALIP I. R.
Glacier Peak
MARYSVILLE
GOAT LAKE GAME REFUGE
Sol Duc River
EVERETT
Sultan River
SNOQUALMIE NATIONAL FOREST
SNOHOMISH
MONROE
Snohomish River
INDEX
Skykomish River
SKYKOMISH
CLALLAM
QUILLAYUTE IND. RES.
HOH IND. RES.
Mt. Olympus
High River
EDMONDS
POULSBO
PORT MADISON I.R.
KIRKLAND
Queets River
BREMERTON
PORT ORCHARD
SEATTLE
RENTON
SNOQUALMIE
NORTH BEND
FOSS RIVER GAME REFUGE
JEFFERSON
QUINAULT INDIAN RES.
KITSAP
KENT
AUBURN
Green River
OLYMPIC N.F.
SKOKOMISH I.R.
SHELTON
SUMNER
ENUMCLAW
TACOMA
PUYALLUP
White River
KING
MASON
ORTING
NISQUALLY I.R.
OLYMPIA
TUMWATER
Deschutes R.
Nisqually River
Puyallup River
Mt. Rainier
MT. RAINIER N.P.
EATONVILLE
TENINO
CHEHALIS I.R.
THURSTON
BUCODA
PIERCE
10 5 0 10 20
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
NAT'L. FORESTS
NAT'L PARKS
INDIAN RES.
GAME REFUGES
NAT'L FOREST
SOURCE: U.S. Department of Interior and U.S. Forest Service.

FIGURE 52.

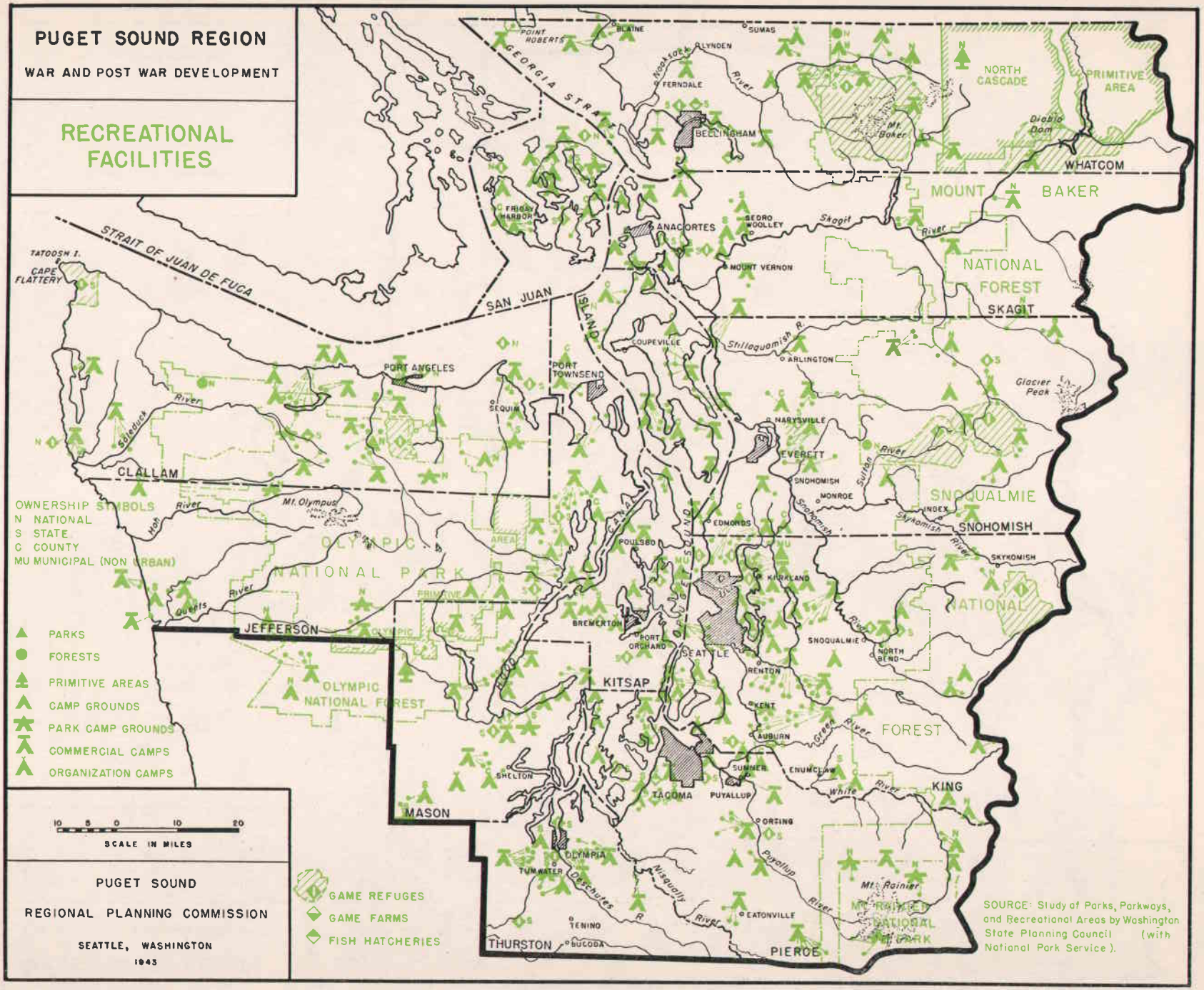

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
RECREATIONAL FACILITIES
OWNERSHIP SYMBOLS
N NATIONAL
S STATE
C COUNTY
MU MUNICIPAL (NON URBAN)
PARKS
FORESTS
PRIMITIVE AREAS
CAMP GROUNDS
PARK CAMP GROUNDS
COMMERCIAL CAMPS
ORGANIZATION CAMPS
GAME REFUGES
GAME FARMS
FISH HATCHERIES
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: Study of Parks, Parkways, and Recreational Areas by Washington State Planning Council (with National Park Service).
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
SAN JUAN ISLAND
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
THURSTON
MASON
KITSAP
JEFFERSON
CLALLAM
MOUNT BAKER NATIONAL FOREST
NORTH CASCADE PRIMITIVE AREA
OLYMPIC NATIONAL PARK
OLYMPIC NATIONAL FOREST
SNOQUALMIE NATIONAL FOREST
MT. RAINIER NATIONAL PARK
BELLINGHAM
ANACORTES
MOUNT VERNON
ARLINGTON
EVERETT
SEATTLE
TACOMA
OLYMPIA
PORT ANGELES
PORT TOWNSEND
BREMERTON
KIRKLAND
RENTON
AUBURN
PUYALLUP
SHELTON
EDMONDS

FIGURE 53.

TABLE 39.—*Washington State parks, Puget Sound region, 1940 data*

No.	Name of park	Classification [1]	Developed	Area, acres	County	Location	Attendance
304	Bay View	P	Yes	14	Skagit	8 miles west of Mount Vernon	
306	Bogachiel	P	No	120	Clallam	8 miles south of Forks	
307	Bridle Trail	P	Yes	480	King	1 mile east of Kirkland	
308	Clearwater	P	No	10	Jefferson	Sec. 19, T. 24, N. R. 12 W	
310	Deception Pass	P	Yes	1,986	Island, Skagit	18 miles west of Mount Vernon	69,076
311	Des Moines	W	Yes	1	King	1 mile north of Des Moines	
312	Donovan	W	No	3	Skagit	5 miles west of Sedro Woolley	
314	Edmonds	P	No	2	Snohomish	West side of Edmonds	
317	Illahee	P	Yes	13	Kitsap	3 miles north of Bremerton	
321	Larrabee	P	Yes	1,220	Whatcom	8 miles south of Bellingham	33,100
324	Mahler	P	No	30	King	2 miles west of Enumclaw	
326	Millersylvania	P	Yes	760	Thurston	10 miles south of Olympia	71,000
327	Moran	P-WL	Yes	5,035	San Juan	Orcas Island	10,245
329	Ocean View	P	No	136	Jefferson	25 miles south of Forks	
334	Rigney	P	No	2	Pierce	1 mile south of Tacoma	
339	Saltwater	P	Yes	92	King	17 miles south of Seattle	
340	Sam Hill Memorial	P	Yes	5	Whatcom	U. S.-Canadian boundary, Blaine	
341	Sammamish	W	No	5	King	5 miles east of Redmond	
342	Schafer	P	Yes	14	Mason	13 miles north of Montesano	16,000
343	Sequim Bay	P	Yes	85	Clallam	20 miles east of Port Angeles	43,610
346	Twanoh	P	Yes	167	Mason	24 miles west of Bremerton	76,900
347	Vashon	W	No	5	King	Vashon Island	
349	Women's Federation [2]	P	No	62	King	12 miles north of North Bend	

[1] Symbols for classification: P=parks; WL=wildlife; W=waysides.
[2] Replaced by purchase of 233 acres of timber along Naches Highway.

Source: Washington State Planning Council.

Chelan, Wenatchee, Snoqualmie, and Columbia National Forests.

For permanent preservation for scenic and recreational purposes there has been created the Mather Memorial Parkway, a half mile strip on each side of the Naches Highway throughout its entire length of 47 miles within the Snoqualmie National Forest. Particular care is being taken to preserve the roadside cover in its native state.

State-Owned Recreational Areas

The region has a number of State parks, of which possibly the most outstanding are Deception Pass, Moran, and Twanoh. Accurate attendance count has never been kept on all the developed State parks. Figures for 1940 for the most popular are shown in table 39 along with other State park information. The location of State recreation facilities is shown on figure 53.

From an analysis of the complete data secured on 10 of the parks, Saturday and Sunday use is generally slightly more than total weekday use. More general weekday use is made of parks located near population centers. This suggests the great desirability of parks being easily accessible, a consideration which should be taken into account in future planning.

County-Owned Recreational Areas

Eight counties have acquired 59 park areas which have been developed or for which development plans are under way. King County heads the list with 36 areas, not all of which have been developed. The number of parks reported by other counties is: Island, 8; Jefferson, 6; San Juan and Snohomish, 3 each; Clallam, Kitsap and Mason, 1 each. (See fig. 53 for locations.)

The 1937 Legislature gave stimulus to the county park plan by authorizing counties to acquire areas by purchase, donation, gift, or dedication which might be used for camping, scenic-view, recreation sites, and parks for public use and enjoyment.

Metropolitan and Municipal Nonurban Parks

Point Defiance park, a 640-acre plot located within the city of Tacoma on a heavily wooded peninsula jutting into the protected waters of Puget Sound, is the outstanding metropolitan park of the State. The park has wide tourist as well as local appeal and yearly attendance figures crowd the half million mark. The Seattle Park Board maintains two noteworthy municipal nonurban water-front parks, Carkeek and O. O. Denny, only a few miles from Seattle. (See fig. 53.) Another area, the secondary use of which is recreation, is the site of Seattle's city light hydroelectric power development which lies 150 miles northeast of Seattle on the Skagit River in the primitive northern Cascades. Round trip 2-day excursions from Seattle for 750 persons at a time are featured with all accommodations furnished at cost.

Semipublic, Private, and Commercial Areas

The region has many outstanding vacation resorts operating on a high standard of service. (See fig. 53.) The comparative ease with which a resort of some form may be started, however, has been responsible for many low-standard, poorly operated establishments.

The best opportunities for expansion in the commercial field seem to be largely through satisfactory improvement and normal development of existing facilities. To eliminate any unfair advantages of public versus private enterprise, a coordinated development program among all public and private agencies is strongly urged.

Wildlife Resources

The region's wildlife includes game, birds, and fish of many varieties. Some conception of the economic importance of wildlife is afforded by a study conducted by the State game department, which estimates that $28,500,000 were spent in the State in connection with hunting and fishing in 1936. That these sports are enjoyed by an increasingly large number of persons is indicated by the fact that 219,168 hunting and fishing licenses were sold during 1939, an increase of 89,544 over 1933. A large number of persons enjoy merely observing wildlife in its natural habitat.

Despite earlier uncontrolled exploitation and the encroachments resulting from human habitation, the region still possesses substantial wildlife resources due at least in part to the rehabilitation work of public agencies. Most of the native species of big game, birds, and fish are still present in varying numbers and several from other regions have been introduced. Game refuges, game farms, and fish hatcheries are shown on figures 52 and 53.

Winter Sports Facilities

Although there had been some earlier devotees, the sport of skiing really began to attract general public interest about 1930 and from that year its progress has been most rapid. By 1939 the Pacific Northwestern Ski Association contained about 30 ski clubs. In addition there are a large number of small unaffiliated groups. In 1923 the skiing public could be counted in hundreds; in 1939 a conservative estimate would place the number of persons who ski at 100,000.

Mount Rainier National Park is one of the Nation's outstanding winter sports areas. Unlimited ski terrain in and above Paradise Valley on the south side of Mount Rainier and good runs in Cayuse Pass, located in the northwest corner of the park, now attract nearly 100,000 skiers during winter months. As many as 8,000 have attended during a single day. Tipsoo Lake, at Chinook Pass, is used by a few skiers.

Deer Park, located 23 miles from Port Angeles in the Olympic National Park, furnishes skiing for residents of Port Angeles, Port Townsend, and the northern part of the Olympic Peninsula. During the 1937–38 season its attendance was approximately 5,500.

At Mount Baker snow conditions are excellent and complete facilities and accommodations, including a ski-tow, make it one of the best winter sports areas in the State. The total 1937–38 season attendance was about 42,000, with a peak day of 5,000. Approximately 2,000 out-of-State skiers visit this area during the season.

The national forests along the Cascade Range offer unlimited opportunities for winter sports development. Under the Forest Service 31 areas have been opened for skiing with the necessary facilities. Each of 10 areas serves more than 5,000 persons during a season. Snoqualmie Pass and Stampede Pass on the Sunset Highway are intensively used because of their accessibility and complete facilities. Silver Springs, which serves the Enumclaw district, and the scenic area located near the west entrance of the Great Northern Railway tunnel, are used to a certain extent. The Snoqualmie Ski Bowl, at Hyak on the eastern slope of the Cascades, is well developed for intensive use by large crowds. Stevens Pass has been improved and a fine lodge built.

Winter sports have developed so suddenly and extensively that their popularity has far outstripped all facilities. Public agencies have been unable to provide sufficient personnel properly to supervise the vast throngs visiting these areas. The intense concentration of great numbers of people on limited winter playgrounds has created new administrative problems because agencies heretofore have been organized to administer recreational areas for summer use only.

The most pressing needs include cleared slopes, easily accessible from highways, where novices may practice, and steep, clear slopes and jumps for the more experienced skiers. Down-hill trails must be cleared and widened and all trails properly marked. Public comfort stations, shelters, warming-huts, and first-aid stations should be provided. Ski patrols should be organized and properly equipped to care for injured persons.

Water Recreational Opportunities

In Puget Sound, with its 2,000 miles of forest-bordered shore line, the region has one of the world's greatest natural landlocked harbors. The steep gravel beaches are ideal for picnicking, bathing, and clam digging. Across the Strait of Juan de Fuca lie the 172 scenic San Juan Islands and to the north stretches the famous Inside Passage to Alaska. The climate is so mild that boats are kept in commission all winter and regattas are held on New Year's Day.

Nine active yacht clubs account for only a small proportion of the fleet of pleasure craft constantly cruising these waters. Almost half of these are outboard craft, and 3,000 are rental boats used chiefly for salt water sport fishing. Some of the finest seagoing sail and power yachts are registered and in addition many out-of-state craft are always present. During the summer months public carrier ships are used by great numbers of people for week-end cruises into Canadian waters.

Another water recreation is sport fishing. Recent years have seen a tremendous increase in its popularity. The sport is enjoyed the year round, but the climax of the season is on Labor Day when the finals of the

salmon derbies are held and substantial prizes are awarded for the biggest fish caught.

In addition to the recreation provided, the direct employment due to pleasure boating and sport fishing is a distinct economic factor. Boats, sails, marine engines and supplies, maintenance and docking facilities, fishing tackle, outdoor clothing, and other equipment must all be purchased and maintained. No reliable figures are available to show the economic importance of water sports activities but it is known that the amount of money which enters the channels of trade as a result is considerable.

Swimming is an important recreation for the young and active. It deserves special consideration, especially in its relation to the population pattern. Some municipalities are noted for their provision of public beaches or pools adequately patrolled. Unfortunately, many ideally located natural bathing spots are made unfit for use through contamination by sewage or mine or industrial wastes. Some corrective steps are being taken and it is hoped that the State department of health will press its corrective program, especially near urban centers.

Possibilities for development of water-sports facilities are almost unlimited. The State parks committee could assist this enterprise by providing needed dockage at vantage points in State parks such as that at Deception Pass. The State still retains title to about 1,500 miles of tide and shoreland and it is recommended that the State land commissioner consult with the State parks committee on the advisability of setting aside additional water front for public use.

Other Sports

Approximately 1,400 persons hold membership in organized outing clubs in the region. Most of the groups participate in mountain climbing, hiking, and skiing. Cabins are maintained in the mountains for use by members. The Cascade Trail is used extensively in their activities.

Attendance figures show that about 400,000 golfers played on the 13 Seattle courses alone during 1938. This was approximately the total population of the city and immediate suburbs not served by other golf courses and indicates the presence of about 8,000 weekly players in the area.

Potential Areas

In order adequately to meet increasing needs for additional park facilities and to insure the preservation of additional prominent scenic areas and historic sites, action should be taken to add to the State parks system such areas as Ozette Lake and adjacent land extending to the ocean, including a heavily timbered strip extending northward along the coast for approximately 40 miles. The Cascade Mountains, in which there are already recreational areas of outstanding State and National importance, should be given close study to determine the best land uses of the various subregions. Possibly recreation is the chief use in certain remaining portions not now so designated.

Parkways and Scenic Highways

The most highly developed motorway for recreational travel is the parkway, which may be defined as an elongated landscaped park traversed by a paved motorway, the primary use of which is recreation. The parkway type of motorway may be properly applied to all zones of unusual natural beauty and supplemented with such artificial landscaping as the surroundings justify. The parkway may also be applied to excellent advantage between large cities on such stretches as those between Everett, Seattle, and Tacoma, where traffic volume and opportunities for pleasure driving suggest this type of treatment.

Since outdoor recreation in Washington is largely dependent upon highway transportation, highway and recreational development should be closely coordinated. Roadside development programs should be expanded to include areas of scientific interest, scenic vistas, and picnic spots with convenience facilities erected for general public use.

One of the region's most valuable and easily destructible natural resources consists of stretches of timber bordering its highways. Both economic and esthetic interests dictate that roadside timber be preserved wherever possible. Today throughout western Washington, roadside stands all too rapidly are falling before the axe and fire. Timbered stretches along highways passing through national forests are being preserved, as are those in national parks. Most of the existing timbered stretches needing and worthy of protection are in private ownership. Interest, carrying charges and taxes operate to encourage liquidation of forest holdings, particularly the more accessible timber along the roads, which, by virtue of its location, usually is assessed at higher values. Public ownership of most of the suitable forested stretches is imperative if these are to be preserved. The first step in such a program calls for a detailed survey of all highways in the region for the purpose of locating: (1) All stands of virgin timber, (2) scattered groups of trees valuable as scenic assets, and (3) logged-off areas on which reforestation should be encouraged. Ownership maps should be prepared of such locations, together with legal descriptions of sections or fractions thereof recommended for purchase. Special attention should be given the following areas: (1) The Naches highway east of Enumclaw and

534268—43——9

adjacent to the western boundary of Snoqualmie National Forest; (2) the loop drive on the Olympic Peninsula; (3) Stevens Pass highway. Counties with forested and cut-over lands acquired through tax delinquency and adjoining highways should retain ownership until studies indicate whether they are more valuable for roadside borders than for other purposes.

In the lay-out and construction of new highways first consideration should be given to their scenic and recreational possibilities. In making locations of scenic highways special consideration should be given to blending the road with natural topography and to connecting parks and scenic points. They should be amply protected from undesirable encroachments by means of highway zoning and wide rights-of-way.

Urban Facilities

Greater areas in open spaces and more parks and playfields are needed in all the cities of Puget Sound. In some of the cities, it is true, it is not quantity that is lacking but advantageous location in respect to the density of population. New areas for recreation should be located after determination of need, following carefully prepared city plans.

Areas are needed adjacent to industrial plants for noonday relaxation and other purposes. Areas are needed likewise in the shopping centers. Every family in the residential districts needs within short walking distance an open park with play spots for small children besides the regulation playfield for school children and adults. The region is blessed with outstanding week-end recreational spots, but the spaces open daily are not up to the average. Even the cities with the best recreational facilities still have barren spots. An analysis of Seattle's recreational facilities portrays a typical condition common as well to smaller cities. Even where facilities are provided, there is insufficient supervision, personnel and organized activities. This is a field in which many more persons should be employed as trained supervisors, landscape architects, assistants, and maintenance employees.

While no national norm can be established, the mean average ratio of park and playground to total city area in 16 selected cities in 3.98 percent, varying widely from 0.45 percent to 13.07 percent. A city having a population comparable to Seattle has 7.78 percent of its total area in parks and playfields. Seattle has 4.7 percent of its total area in these open spaces, less than half of an accepted standard of 10 percent. In the 16 cities mentioned, there is a variation from 0.68 acres of park per 100 population to almost 1 acre per 100. Seattle has 0.479 acres per 100 population, or 1 acre for each 231 people. By contrast, 1 city in the State, not in this area, has an acre for each 50 persons.

Seattle parks are even less adequate when locations are studied in respect to habitation and population density. Of 5 of the largest parks which total 915.72 acres, 4 are concentrated in but 2 districts. One district has 46 people to an acre of park and some have over 1,000 per acre. There are 25 mile-square sections with no parks and over 100,000 persons. Seattle's 5 large parks include half of the total park acreage of the city and the distribution of the remaining parks is such that approximately one-third of the city and one-fifth of the population have no park within walking distance. If the city's population doubles by filling up the present vacant property, park ratios will be such that Seattle will have only one-fourth as much park area as is considered desirable. In varying degrees this is the problem of all the cities in the area. It is recommended that city plans, housing developments, industrial developments, and urban rehabilitation take park locations into account, because considerations such as property valuation, cost of city government, decentralization and congestion warrant heavy expenditures in providing recreational facilities as a health-wealth balance.

Library Facilities

Public library facilities located as shown on figure 54 indicate a distribution not entirely commensurate with population needs. Recent State laws make possible the establishment of rural as well as city libraries, financed locally. Even a small percent of the money now spent on commercialized amusements and cheap reading matter would suffice to provide a much-needed library system over the whole area. Existing libraries report an almost universal demand for more new books, better circulation methods, and larger central library book reserves.

It is recommended that at least $25,000 annually be spent for public library expansion in the region. As space is usually available to some degree, most of this money should be spent for equipment and books.

Conclusions

Preservation and development of the region's outstanding scenic and recreational resources is today's pressing responsibility. To meet this challenge it is recommended:

1. That in the development of areas set aside for recreational, historic, scenic, or scientific values, care be taken to exclude uses which would jeopardize these values.

2. That the State legislature divide the region into three State park areas, each of which shall have a district committee to aid the State parks committee and its supervisor in the development of State parks within its area, to procure enlargement of park areas where this is deemed advisable, to foster local use of the parks in each area, and to make recommendations to the State parks committee and its supervisor for needed

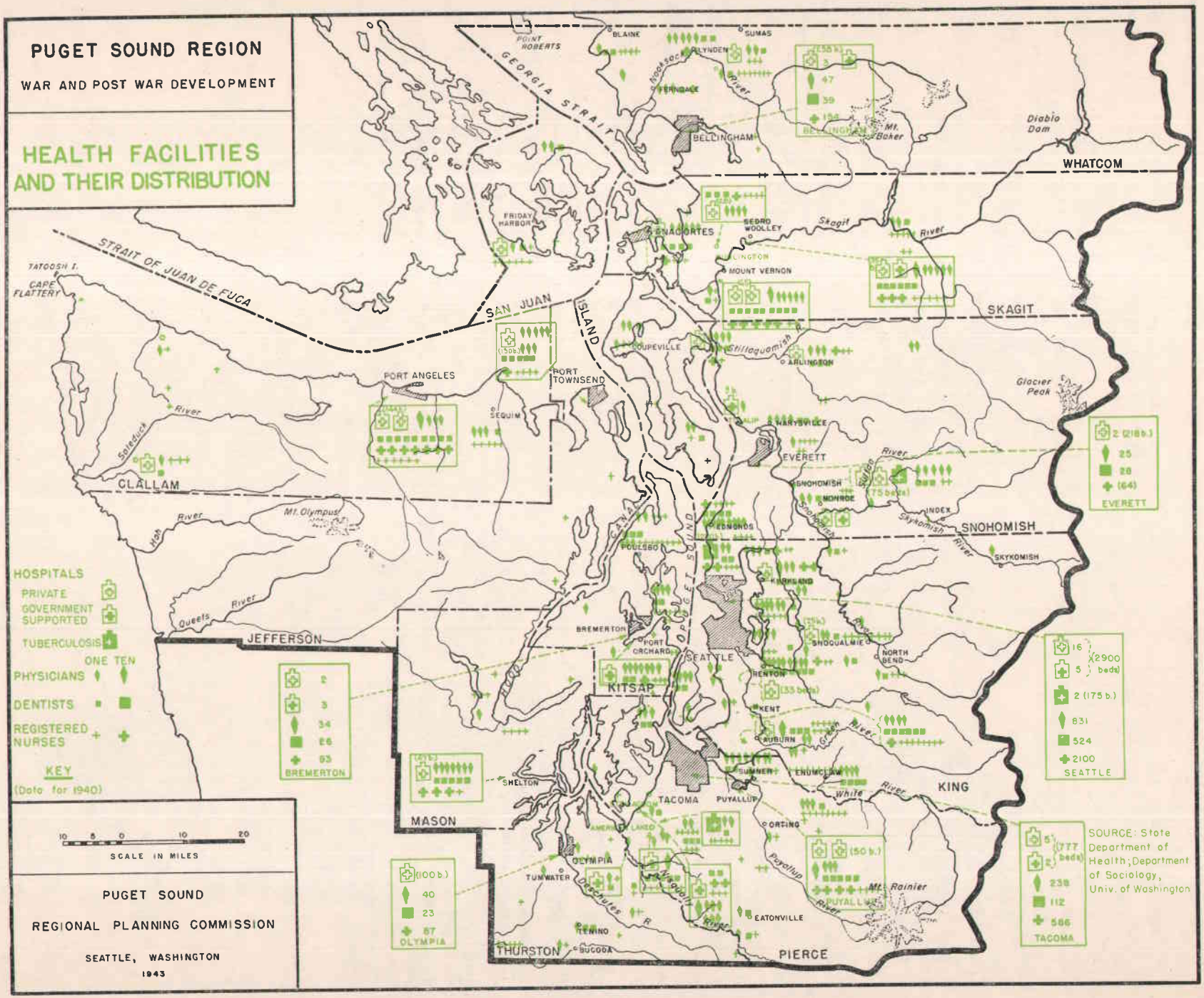

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
HEALTH FACILITIES AND THEIR DISTRIBUTION
HOSPITALS
PRIVATE
GOVERNMENT SUPPORTED
TUBERCULOSIS
ONE TEN
PHYSICIANS
DENTISTS
REGISTERED NURSES
KEY
(Data for 1940)
SCALE IN MILES
PUGET SOUND
REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCE: State Department of Health; Department of Sociology, Univ. of Washington
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
MASON
THURSTON
KITSAP
JEFFERSON
CLALLAM
SAN JUAN ISLAND
STRAIT OF JUAN DE FUCA
GEORGIA STRAIT
PUGET SOUND
BELLINGHAM
EVERETT
SEATTLE
TACOMA
OLYMPIA
BREMERTON
PORT ANGELES
PORT TOWNSEND
MOUNT VERNON
ANACORTES
Mt. Baker
Diablo Dam
Glacier Peak
Mt. Olympus
Mt. Rainier

FIGURE 54.

improvements and the judicious local expenditure of funds allotted to that area. Proposed park district division of the Puget Sound area is as follows:

	Counties	Area (square miles)	Population 1940
District 1:			
8 State parks	Clallam	1,726	21,848
	Jefferson	1,747	8,918
	Mason	930	11,603
	Thurston	709	37,285
Total		5,112	79,654
District 2:			
7 State parks	San Juan	178	3,157
	Island	208	6,098
	Whatcom	2,082	60,355
	Skagit	1,774	37,650
	Snohomish	2,664	88,754
Total		6,906	196,014
District 3:			
10 State parks	King	2,111	504,980
	Pierce	1,701	182,081
	Kitsap	371	44,387
Total		4,183	731,448

3. That there be continued and expanded support of State parks by public funds.

4. That the State expand its program for the training of leaders for organized camping activities and foster the establishment of youth camps, giving special consideration to sites easily accessible to centers of population.

5. That the Federal Government cooperate in the State's organized camping program by training personnel and providing organized camp facilities where needed on Federal camp land, with particular attention to providing facilities for inexpensive winter sports.

6. That a youth camping agency be established under the State department of education to coordinate plans of all agencies concerned with human resources.

7. That the State health department make inspection of organized camps and enforce laws pertaining to health and sanitation, preparing for each camp a rating sheet, based upon proper laws of health and sanitation, available to the public.

8. That public agencies in their development programs cooperate with private operators who are rendering a worthy public service so that public developments will not jeopardize private investments.

9. That in constructing new roads and in improving existing roads the State highway department take into account the needs of bicyclists and pedestrians.

10. That public agencies administering winter sports areas make every effort to secure sufficient funds for adequate shelters, sanitation facilities, and additional ski courses, including practice courses and instructors for beginners.

11. That the State parks committee give greater consideration to facilities for pleasure boating in all State parks offering opportunities therefor and make a thorough survey of the shorelands of Puget Sound to locate, acquire, and develop desirable sites with facilities for pleasure boating.

12. That the State department of health, having in mind the place of industry in the State's economy, urgently prosecute its program for the elimination of pollution in fresh water and tidal areas used for recreational purposes.

13. That the State parks committee study the approximately 1,500 miles of tide and shorelands, title to which is now held by the State, with a view to furnishing adequate bathing facilities close to urban centers.

14. That further study be made of the problem of protective highway districts and legislation be prepared which will permit establishing such districts.

15. That further study be made to determine location and ownership of roadside timber and lands suitable for reforestation which are desirable for acquisition and preservation, and that State, Federal, county and private agencies promote necessary legislation acquiring desirable roadside forest lands in public ownership for preservation through purchase, exchange, condemnation, or gift.

16. That the State highway department's policy of establishing turn-outs and markers at points of historic and scenic interest be expanded as rapidly as feasible.

17. That the highway department in its future planning give attention to the development of parkways and scenic highways along Puget Sound, the Olympic Peninsula and Naches Pass.

18. That priority be given to the acquisition of potential areas which will round out a well-balanced system of State parks.

19. That the State parks committee give special attention to supplying facilities for the recreational and cultural needs of sparsely settled communities.

20. That the cities and the counties develop in the more populated areas, facilities carefully located, planned, and supervised adequately to meet the recreational and cultural requirements of their people.

PART III

11. MEDICAL AND PUBLIC HEALTH SERVICES

By Public Health Committee, Puget Sound Regional Planning Commission [1]

Distribution

The distribution of hospitals, physicians, nurses, and dentists closely follows population density. (See fig. 55.) This leaves some incorporated towns and the thinly populated districts of the Olympic Peninsula and the Cascades without adequate medical services.

The hospitals are concentrated even more heavily in the north and south belt, leaving additional areas without adequate hospitalization facilities, though they have physicians and a population warranting such service. National surveys show that where hospitals are at a distance they tend not to be used by families of low income, even when cases urgently require hospitalization.

Among the 15 incorporated towns without doctors, eight have registered nurses or are within five miles of towns having doctors. Five towns, three of which have only nurses, are more than five miles from a town which has a doctor. All are in Skagit and Snohomish Counties.

Table 40 indicates the uneven distribution of medical and hospital facilities. These were the conditions as of 1940, prior to changes caused by the war. Since 1940 there has occurred a marked decrease in the number of physicians and nurses and a very great increase in population, which has magnified the shortage of medical and hospital facilities. After the war the region should provide an attractive field for employment for a greater number of the medical and health profession. The people have been accustomed to better than average medical services. Continuing prior standards, the increase in population will demand an increase in hospital facilities and in the number of medical practitioners, nurses, dentists, public health officers, public health nurses, sanitarians, and bacteriologists.

Physicians

Since the beginning of the war, the number of physicians in the region has decreased to about 1,000.

[1] Sources used in the preparation of this section include the following: Hospital statistics, *Journal of the American Medical Association*, March 28, 1942, Vol. 118, No. 13; dentists, State Department of Licenses; physicians, State Department of Licenses, and *Public Health Reports*, Vol. 57, No. 37, 44, 47; public health personnel, Washington State Department of Health; nurses, Washington State Nurses Association, Inc.

TABLE 40.—*Medical and hospital facilities, Puget Sound region, 1940*

County	Population 1940	Number of physicians	Population per physician	Hospital beds [1]	Tuberculosis beds	General beds per 1,000 population	Registered nurses general practitioners 1940	Population per registered nurse
Clallam	21,848	18	1,214	172	0	7.87	90	243
Island	6,098	3	2,033	0	0	0	9	678
Jefferson	8,918	8	1,115	130	0	14.5	20	446
King	504,980	909	555	2,914	775	5.77	2,245	225
Kitsap	44,387	50	888	203	0	4.57	130	341
Mason	11,603	8	1,450	47	0	4.05	41	283
Pierce	[2] 179,398	275	652	827	281	4.69	704	255
San Juan	3,157	3	1,052	0	0	0	7	451
Skagit	[3] 35,600	29	1,227	152	0	4.27	121	294
Snohomish	88,754	79	1,123	436	59	4.91	251	354
Thurston	37,285	45	828	100	0	2.86	102	365
Whatcom	60,355	59	1,023	258	0	4.22	193	313
1940 total	1,002,383	1,486	675	5,239	1,115	5.22	3,913	256

[1] Army, Navy, and Marine hospitals, and State mental hospitals are not included.
[2] 2,683 mental cases not included.
[3] 2,050 mental cases not included.

Sources: State Department of Licenses, Washington State Department of Health, *Journal, American Medical Association*, and Washington State Nurses Association, Inc.

If the 1940 ratio of 1 doctor to each 675 persons or 148 per 100,000 population is maintained, some 1,850 physicians would be required, an increase of 850. This need very likely will become greater rather than less, as the population is still increasing and will probably not be reduced, although there may be a shifting of population within the area.

A comparison with ratios of population per physician existing elsewhere in the United States indicates the Puget Sound region's position in this regard. Standards based upon the 1938 national distribution of medical forces indicate that 1 physician to 613 people, or 163 physicians to 100,000 population, was the highest rate in the United States on an area basis. Local surveys show that prior to 1940 there was 1 physician to 555 people in King County or 180 physicians to 100,000 people. A 1938 national survey showed:

> In Southern States, 1 physician to 1,063 population, or 94 physicians to 100,000 population; Central States, 1 physician to 770 population or 130 physicians to 100,000 population; Northeastern states, 1 physician to 613 population or 163 physicians to 100,000 population; Western States, 1 physician to 689 population or 145 physicians to 100,000 population.

National surveys indicate that physicians do not necessarily follow the greatest density of population or the areas where people have the highest incomes.

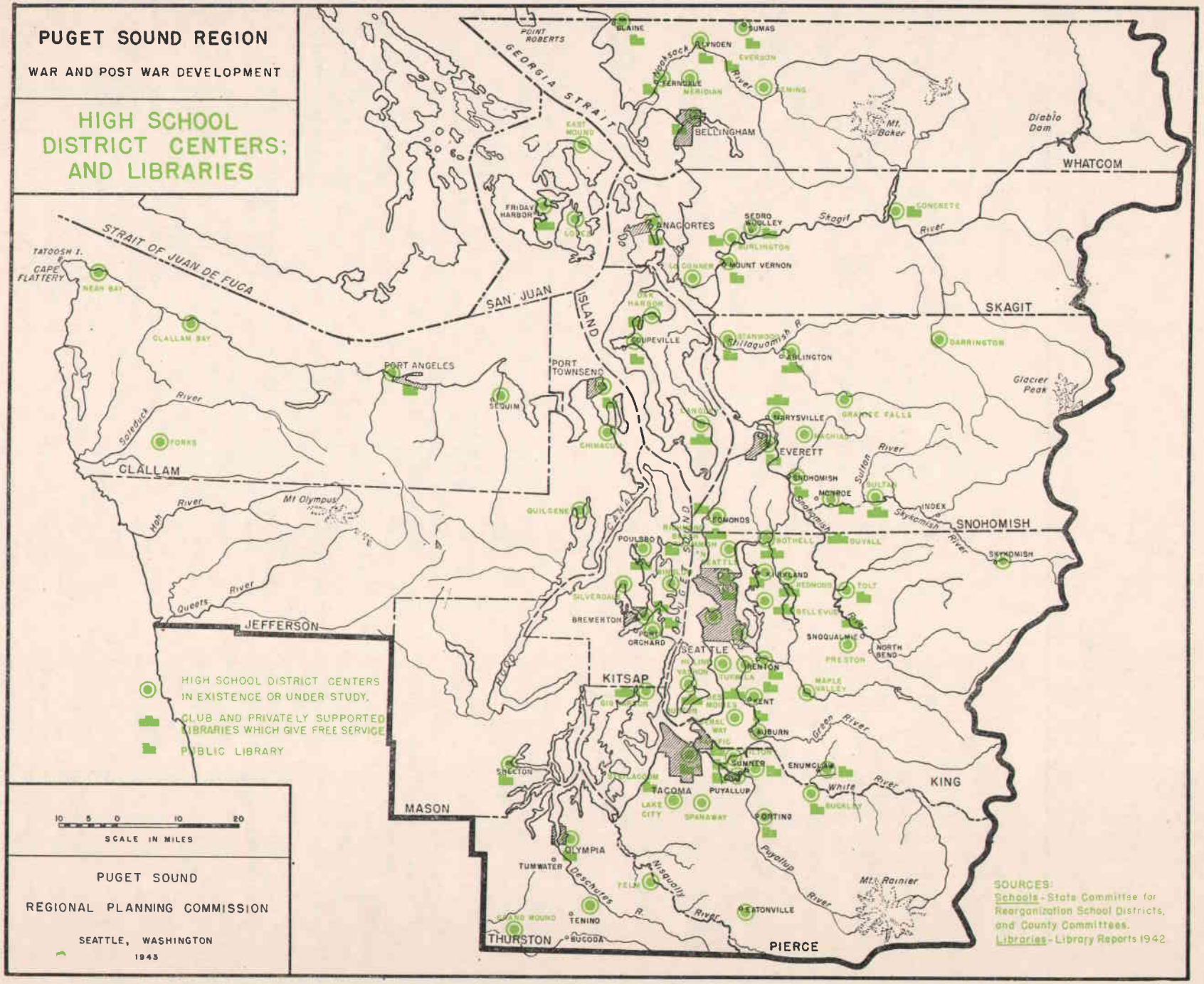

PUGET SOUND REGION
WAR AND POST WAR DEVELOPMENT
HIGH SCHOOL DISTRICT CENTERS AND LIBRARIES
HIGH SCHOOL DISTRICT CENTERS IN EXISTENCE OR UNDER STUDY.
CLUB AND PRIVATELY SUPPORTED LIBRARIES WHICH GIVE FREE SERVICE
PUBLIC LIBRARY
10 5 0 10 20
SCALE IN MILES
PUGET SOUND REGIONAL PLANNING COMMISSION
SEATTLE, WASHINGTON
1943
SOURCES:
Schools - State Committee for Reorganization School Districts, and County Committees.
Libraries - Library Reports 1942
WHATCOM
SKAGIT
SNOHOMISH
KING
PIERCE
KITSAP
MASON
THURSTON
JEFFERSON
CLALLAM
SAN JUAN ISLAND
GEORGIA STRAIT
STRAIT OF JUAN DE FUCA
BELLINGHAM
EVERETT
SEATTLE
TACOMA
OLYMPIA
PORT ANGELES
PORT TOWNSEND
MOUNT VERNON
ANACORTES
BREMERTON
PUYALLUP
Mt. Baker
Diablo Dam
Glacier Peak
Mt. Rainier
Mt Olympus
Skagit River
Sultan River
Snohomish River
Green River
White River
Puyallup River
Nisqually River
Deschutes R.
Hoh River
Queets River
Soleduck River

FIGURE 55.

They tend to locate near training centers and good hospital facilities. They also are attracted to areas having good roads.

Nurses

The Washington State Nurses Association, Inc., found in a survey made for this report that the distribution of nurses is poor (see fig. 55) and is not always related to the needs of the community. Employment of nurses depends upon number and activity of hospitals, doctors, and public health agencies in a given area. Industries have been an increasing factor in the employment of nurses, using them in increasing numbers. Good salaries and living conditions play a part in attracting nurses from less favorable areas. Nurses tend to be more mobile than doctors and dentists, and as many are married, their availability is influenced by their husband's place of employment, his salary, and the prospects of raising a family.

There were in the Puget Sound region in 1940 a total of 3,913 registered nurses. Among these are 143 public health nurses, distributed as follows:

Clallam and Jefferson Counties	7
San Juan County	1
Island County	1
Whatcom County	9
Skagit County	3
Snohomish County	9
King County	59
Pierce County	35
Mason and Thurston Counties	8
Kitsap County	11

According to American Medical Association standards, the region should have 5,000 nurses for its present estimated population of 1,250,000.

Hospitals

Using a 1940 population figure of 1,002,383 (which excludes patients in the two State institutions for the insane) the number of hospital beds (exclusive of those in Army, Navy, and Marine hospitals) for each 1,000 of the civilian population was 5.22; i. e., 5,239 beds total. The present population, conservatively estimated, is 1,250,000. This population would normally require, at a rate of 5 beds per 1,000, a total of 6,250 beds. Hospitals now under construction or planned will provide 540 more beds, making a total of 5,779 beds. There is thus a need for building hospitals having 471 beds. As 100 of the existing beds are in obsolete buildings, 571 are needed to bring hospital facilities up to 5 beds per 1,000, approximately the standard that prevailed in 1940.

If we follow the hospital standards proposed by the American Medical Association, the number of beds required would be as follows:

Required for special cases

Contagious diseases	0.5 beds per 1,000 population.
Children's diseases	0.5 beds per 1,000 population.
Maternity cases	0.45 beds per 1,000 population.
Total	1.45 beds per 1,000 population.
Tuberculosis	3 times number of annual deaths (for the Puget Sound region this would mean about 1,200 beds).

Required for general cases

Normal	3.75 beds per 1,000 population.
For peak loads	1.25 beds per 1,000 population.
Total	5.00 beds per 1,000 population.

If Kitsap County has 140,000 population it would thus need a total of: 70 beds, contagious bases; 70 beds, children's cases; 63 beds, maternity cases; 17 beds, tuberculous cases, estimated; 700 beds, general cases; 920 total beds.

There are now (1943) 343 beds in the county; there is needed therefore, according to these standards, an additional 577 beds.

For a population of 1,250,000 in the region there should be 8,062 hospital beds for general, contagious, children's, and maternity cases, and, in addition, 1,200 tuberculosis sanatorium beds. Any additional tuberculosis sanitorium facilities should include one large central institution in the Puget Sound area equipped for occupational therapy and rehabilitation work, which small scattered canatoria can ill afford to finance.

Dentists

Distribution of dentists follows quite closely that of hospitals and physicians. (See fig. 55.) There were 891 dentists in this area in 1940, distributed as follows:

Clallam County	11
Island County	2
Jefferson County	5
King County	561
Kitsap County	34
Mason County	5
Pierce County	129
San Juan County	2
Skagit County	24
Snohomish County	46
Thurston County	26
Whatcom County	46

Public Health Personnel

Full-time public health officers in the region are located only in the following places: Clallam and Kitsap Counties, Pierce County and city of Tacoma, King County and city of Seattle, Snohomish, Mason, and Thurston Counties.

Public health officials recommend 1 public health nurse for each 5,000 population; thus for 1,250,000 population, 250 nurses are needed. This standard would require an addition of 110 nurses to the present 140.

More public health officers, sanitarians, and bacteriologists are needed, at least 1 to every 20,000 popula-

tion. Thus this personnel in the aggregate at the present time is at least 50 short.

Various departments of the State government, with local cooperation in some instances, are responsible for the following public health activities and services rendered in the Puget Sound region.

1. *For general medical care of the needy.*—Promote local programs; supervise and provide consultation service for local organizations; distribute and administer financial grants-in-aid through general relief funds to local units for general home, office and hospital care; maintain special facilities for medical care of migratory laborers; furnish medical examination, physical restoration and artificial appliances in vocational rehabilitation services.

2. *For services for crippled children.*—Conduct promotional and educational programs regarding prevention and treatment of crippling conditions; supervise and provide consultation service to local organizations; distribute and administer financial grants-in-aid for hospital care through subsidy to local hospitals or contracts with local hospitals on a per diem or individual care basis; for convalescent home care, operate a direct service program of diagnostic and treatment clinics; provide nursing service for case-finding and follow-up; provide braces and other orthopedic appliances, post-hospital treatment (physical therapy), and render some additional service not covered in these classifications.

3. *For cancer service.*—Conduct or participate in educational programs for early diagnosis.

4. *For the prevention and care of blindness.*—Promulgate and enforce State laws, rules and regulations concerning routine use of prophylactic in eyes of new-born; finance individual ophthalmological examinations or eye treatment service to the needy; hospitalize, at State expense, indigent patients needing eye operations or treatment, including trachoma cases; make special studies to determine causes of blindness; operate or subsidize sight-saving classes.

Medical Insurance

In some counties medical and hospitalization insurance systems are in operation. This service is given in one instance by a "County Medical Board" consisting of all county physicians, who have incorporated on a more or less experimental basis to work in an area largely rural in character.

Many industries have medical insurance systems for workers only. There is a public demand for complete medical and hospitalization insurance systems to cover the entire family. Conditions of the community, the medical facilities, type of industry, and other considerations warrant an individual study to form the best local programs. Medical services, including dentistry, should be available to the whole population, paid for by them during their earning capacity periods. If necessary because of local difficulties, a subsidy might be provided from general funds, as lack of medical facilities eventually costs the public more than a preventative system. In the county referred to above, the local people and their physicians have with open minds attempted to finance and develop a system of their own choosing. This method of collaboration between the medical profession and the public in working out medical problems is a desirable one for other areas.

In conclusion, it is recommended that medical and health personnel and facilities be increased to at least the pre-war standards or better. It is also recommended that the professions be advised of the opportunity for service and employment in the Puget Sound region.

PART III

12. EDUCATION

By State Committee for Reorganization of School Districts

The Reorganization of School Districts

The act under which a school district reorganization program is now being carried forward in the State of Washington was passed by the 1941 legislature. Legislative action in this field is an outgrowth of recommendations contained in the Washington State Planning Council's report on *A Survey of the Common School System of Washington*, published in September 1938. This report recommended reorganization of school districts as the first step in the direction of further equalization of educational opportunity in the State. It also recommended for adoption by the legislature a plan for securing the necessary reorganization. This recommended plan became the basis of the 1941 act.

Summary of Planning Council's Findings

School districts have been formed in a haphazard manner throughout the State's history. There is little evidence of careful planning for sound district organization. Moreover, there has been, and still is, a pronounced tendency to perpetuate original or pioneer districts formed years ago to meet primitive conditions that have disappeared in most sections of the State as a result of improvements in highways and in the means of transportation, and for other reasons.

The foregoing facts, together with the marked contrasts in physiographic features and the resultant inequality in the distribution of taxable wealth and in population density, have resulted in:

1. Wide variations in the ability of local districts to support schools, accompanied by inequalities in the educational opportunities of children and in the tax rates of local districts. There has been, for many pupils, a rich and varied educational program, including numerous special services of public education and wholly satisfactory teaching, library, shop, laboratory, and health and recreation facilities and services; and for many other pupils, a rudimentary educational program with a decided dearth of many essential and special facilities and services. There have also been thousands of pupils housed in attractive, safe, sanitary, well-lighted and properly heated buildings; and other thousands spending their school days in buildings unfit for pupil habitation—the latter condition resulting from the inability of poor districts to provide replacement housing. In addition, many low valuation districts have been compelled to make annual tax levies (regular and excess combined) of more than 25 mills to provide meager revenue, while a considerable number of wealthy districts secure adequate revenue on a levy of less than 5 mills.

2. The presence of many small districts in which costs are high and school facilities and services unsatisfactory, as is illustrated by the following:

(*a*) One hundred and seventy-five districts that do not operate any school; 133 districts with an average daily attendance of from 1 to 5 pupils; 185 districts with from 6 to 9 pupils; a total of 758 districts with no school or with an average daily attendance of fewer than 20 pupils.

(*b*) A cost of from $2 to $2.25 per pupil-day in one-room districts adjacent to a small city district, with a cost of $0.64 per pupil-day in the city district.

(*c*) In one rather densely populated western Washington county, which is traversed by a network of good roads, two-thirds of the school buildings in the 45 small elementary school districts heated by stoves installed in the classrooms; the common drinking cup and the washpan in use in one-third of the buildings; outdoor privies (many of them very unsanitary) in 18 of the districts; and library facilities and resources either poor or nonexistent in 42 of the 45 districts.

3. Excessive costs for pupil transportation due to:

(*a*) The operation of buses by small districts to serve their own limited territory only and in so doing traversing each other's territory without picking up students, a practice that prevails because highways are laid out to serve an area and not to serve school districts with narrow territorial limits. Operation of one transportation system throughout an area by a single enlarged school district would result in economies.

(*b*) District boundaries located on roads, thus placing in different districts the pupils residing on opposite sides of a road and thereby requiring that buses of both districts travel over the same road to serve their resident pupils.

(*c*) Students transported past or near one high school building en route to another high school 10 to 15 miles beyond.

4. Oppressive and discriminatory requirements under which opportunities for high school education have been extended to pupils residing in non-high school districts—requirements under which (*a*) the high school in every high school district must admit all residents of non-high school districts who are properly qualified for admission to high school, and (*b*) the entire burden for providing buildings, grounds, equipment, etc., for high school students is imposed on the taxpayers residing in the high school districts.

If educational opportunities and local school district tax rates are to be further equalized, school funds expended wisely, and school services improved in large areas in Washington, the legislature must provide a means for simplifying and furthering the school district reorganization process.

Progress

County school district reorganization planning committees have been formed in all counties in the region. Reorganization plans are in various stages of completion. Many of them have already been put into effect in the manner prescribed by the reorganization act; many others are nearly ready for elections to be called; still others are almost ready for submission to the state planning committee provided for in the reorganization act.

Among the counties in which partial or complete school-district reorganization was effected between the passage of the act and May 1943, are:

1. Kitsap County, site of the Puget Sound Navy Yard and of other Federal reservations—entire county has been reorganized; 50 school districts are now comprised in 5 new districts.
2. King—area south and east of Seattle that has been affected by expansion of aircraft plants, the shipyards, and other war industries. Thus far five new districts have been formed comprising the territory of 29 old districts. Other reorganization plans are being worked out.
3. Pierce—area adjacent to Fort Lewis Military Reservation and to McChord Field Air Base. Two new districts have replaced 18 old districts. Plans for the formation of other new districts are nearing completion.
4. Whatcom—the entire county. 46 school districts are now comprised in 7 new districts.
5. Island—completely reorganized. Three school districts now comprise the entire area of the county.
6. Skagit—38 old school districts have been replaced by 2 new districts; plans for the reorganization of the remainder of the county are nearing completion.
7. Thurston—3 new districts have been established from 16 old districts; plans are under way for remainder of county.
8. Snohomish—plans are under way.
9. Clallam—plans are nearing completion.
10. Jefferson—plans are under way.
11. San Juan—plans are nearing completion.

Most of the school district reorganization effected to date (May 1943) has resulted in the establishment of new school districts, each of which comprises the entire service area of a high school, that is, the high school district and its tributary non-high-school districts.

Results of School District Reorganization

The results of school district reorganization may be summarized as follows:

1. A reduction in the number of unnecessary small elementary schools (mainly one-room schools), accompanied by an increase in the number and size of graded elementary schools operated at points in the new districts which offer maximum convenience for pupils and make for economies in transportation.
2. A reduction in the per capita cost of education as a result of the elimination of:

(*a*) Small schools with a low per-teacher ratio (in many instances, the pupils from several small schools have been absorbed in larger graded elementary schools without additions to teaching staff, to building facilities, or to transportation equipment, thus effecting a saving roughly comparable to the cost of operating these small schools).

(*b*) Such duplications in bus routes as were revealed by the planning council study already reported herein.

(*c*) Subsidies from State funds to "minimum attendance" districts.

3. The equalization of taxpayers' burdens for school support through the elimination of excess levies heretofore paid by taxpayers in poor districts.
4. The extension of responsibility for providing high school buildings, grounds, and equipment to residents of non-high school districts who have heretofore enjoyed the use of such facilities without sharing the cost thereof.
5. Improved educational opportunities for pupils through:

(*a*) An increase in the number of pupils enjoying the advantages of graded schools in which the number of grades assigned to each teacher is limited and such special facilities and services as libraries, health education, luncheons, visual aids, music education, vocational preparation, the teaching of handicapped children, and the like are available.

(*b*) More effective utilization of the services of teachers in that the graded school system permits of their assignment to the grades or to the fields of work for which they have received special preparation in institutions for higher education.

Building Construction [1]

New school building construction is being planned for the reorganized school districts. Because of district reorganization, it has now been found possible to set up financial budgets, including necessary expenditures for new school buildings, and still stay within constitutional tax limits. An additional advantage lies in the fact that since district boundaries are clearly established, it is possible to plan with certainty. The logically planned high school service area gives a better tax base and makes possible the proper locating of the various school facilities to meet the pupil attendance densities, and to conform to a planned transportation system.

The school building program which has been proposed includes buildings for the various grades from elementary through junior college, and in some cases, special facilities such as vocational schools.

The estimated cost of school building construction for the region, including State educational institutions, is $30,350,000. For common school building construction alone, this represents the equivalent of a 5-mill annual tax levy for a 5-year period, based upon 1942 assessed valuation; for construction at State educational institutions, a 3-mill levy for the 5-year period, based upon the State valuation.

This program is recommended as necessary quickly to bring to fruition the full benefits of reorganization plans. Figure 55 illustrates the high school service centers which are under consideration. This construc-

[1] This section prepared by Puget Sound Regional Planning Commission.

tion program could well repeat itself after the 5-year period if there has been evidenced, by that time, greater needs because of an increase in population not at present contemplated.

Furthermore, adequate present and post-war planning should include definite preparation for the establishment of sound and continuing State-wide policies and practices in the field of common school building finance, design, and construction. Casual studies of past and current policies and procedures point to the need for authoritative studies in this field to the end that past mistakes may be obviated. Basically, the problems of the school plant are as continuing as the school system itself. All future planning for school plants must be properly related to the orderly progress of curricular improvements and extensions. Otherwise, plants designed in the light of current educational concepts will have to be scrapped to meet the demands of a new day or will stand as barriers to educational progress.

PART III

13. ANALYSIS OF WAR AND POST-WAR POPULATION NEEDS

By Paul R. Fossum [1]

Complementary Regions

Those who live in the Washington area of the Pacific Northwest divide it into two parts, the east and the west. To the meteorologist they are the dry and the wet. To the citizen they are the agricultural and industrial sections, which the Cascade Range divides. This natural division of the area is of the utmost importance to the region as a whole. The resources of timber and minerals of the west can be processed in a cool working climate almost ideal in type. The food to feed the working force in the west can be produced in the eastern section, where the fertile land irrigated by mountain water during an almost cloudless growing season produces heavy and constant yields for man and beast. Thus the east and the west sides tend to be complementary, and the development and prosperity of the one depends to a high degree upon the development and prosperity of the other. There has only remained the energizing of hydroelectric-power sites to drive the wheels of industry on tidewater in the western section, giving employment to men whose demand for food can bring about that agricultural expansion on the east side which the available water and the fertile soil can support. The development of the Pacific Northwest as a powerful section of the American industrial organization thus seems to turn on two factors: First, the energizing of the hydroelectric power sites on its streams; and second, the irrigation of its fertile arable lands. The population which its industries can support and the type of industry which will appear seem to depend upon the supply of food which the region is able to produce. Table 41 shows a population estimate based upon this factor.

To those who have watched the rise of modern industry it has been most apparent that neither power nor minerals alone are capable of generating a large industrial population. Industries do appear, however, where power, minerals, and food can be economically combined to support a skilled population. The Puget Sound region is by nature separated from the large food-producing areas of the continent, from the Mississippi Valley by both distance and the eastern Rocky Mountain barrier and from California by distance and the southern Siskiyou Mountains. Geographically it has every characteristic of an economic unit. As such its industrial activities are limited both by the high cost of transporting food for its population from outside the area and by the agricultural productivity of its own meager share of arable land (less than 10 percent of its area).

TABLE 41.—*Power and agricultural land resources and population, Pacific Northwest*

Hydroelectric power, 1941 [1]		Agricultural land		Population	
Installed horsepower	Undeveloped horsepower	Used for crops, 1939 [2]	Potential, 1942 [3]	Census, 1940	Possible; land limit only
2,573,000	23,056,000	10,526,859	6,034,908	3,564,874	[4] 7,019,794

[1] U. S. Statistical Abstract, 1941, p. 446.
[2] Census figures.
[3] National Resources Planning Board, *Development of Resources and of Economic Opportunity in the Pacific Northwest.*
[4] This figure includes the 1940 census of 3,564,874 and adds 3,445,920. The latter figure is secured by allowing 4.254 acres per person for land to drain and clear and 1.067 acres per person for land to be irrigated. The acres per person are national averages for unirrigated land and regional averages for irrigated land in 1930. They differ from the Army Engineers' report, which uses 3.26 and 1.21, respectively. These ratios vary from census to census.

Power Resources

The tremendous hydroelectric-power resources available to the region challenge the industrialist to put them to work. On the basis of power alone the Puget Sound region could support a very large population, as is shown by table 42.

The energizing of the Columbia River would provide power for an estimated 4,757,000 additional people in the Puget Sound region, allowing an average domestic power consumption of 5,000 kilowatt-hours per year at the close of the development.[2] This is

[1] Chairman, The Mayor's Research Committee on Urban Problems, Tacoma; Visiting Lecturer in Economics, College of Puget Sound.

[2] We compute the population possibilities on the power base as follows: The total power produced is divided into three parts: Industrial, commercial, domestic. It has been found that the largest possible income from a power system and therefore its most economical use can be derived by following a marketing policy which will approach an equal division of the power among these three fields. We assume this policy to be followed. We assume that the Tacoma 1941 average of 3.25 persons per domestic billing will be maintained. We recognize that these ratios may change, but we have no better figures at present. In computing the Puget Sound population we assume that the present population ratios between the Puget Sound area and the metropolitan districts of Portland and Spokane will remain the same, i. e., 55.8 percent, 34.2 percent, and 10 percent, respectively. We assume that since electric power is very fluid the population will attract it in that same ratio.

TABLE 42.—*Various population estimates for an industrialized Puget Sound region,*[1] *power base*

Estimate base	Annual production of prime power (kilowatt-hours)	If average annual residential billing, (kilowatt-hours), were—	Possible population increase	Estimated population limits (1940 census added to foregoing)
1. All available hydroelectric power sites in the Pacific Northwest energized	80,000,000	5,000	9,611,000	10,728,000
2. All available hydroelectric power sites in the Pacific Northwest energized	80,000,000	8,000	6,105,000	7,222,000
1. Columbia River hydroelectric power only	41,000,000	5,000	4,883,000	6,000,000
2. Columbia River hydroelectric power only	41,000,000	8,000	3,158,000	4,275,000

[1] These figures based on Pacific Northwest population going 10 percent to the Spokane area, 34.2 percent to the Portland area, and 55.8 percent to the Puget Sound area. Distribution of electric power, ⅛ to industry, ⅓ to commercial, ⅓ to domestic. 3.25 persons per domestic billing.

twice the average domestic billing for energy in 1941 in the city of Tacoma, where domestic rates are exceedingly low. Even if the average domestic power consumption should rise during the development period to 8,000 kilowatt-hours per annum, the Columbia River project on its completion would provide power for an additional 3,198,000 (a figure 1,559,000 less than the foregoing). The potential power of the entire Northwest could raise the total Puget Sound population at the close of the development period to 10,728,000 on the basis of a 5,000-kilowatt-hour average domestic consumption, or 7,222,000 at 8,000 kilowatt-hours.[3]

Thus, on the basis of hydroelectric power alone, the population of the region could reasonably expand almost tenfold. If the domestic power consumption were lower than these calculations allow, it would be quite possible to provide power and employment for an even larger group. Since hydroelectric power can be secured in so great volume, it in itself is not a limiting factor. Since the area can provide all the necessary energy the people can economically use, the population will tend to be limited by other factors.

[3] If we use horsepower per worker as an index it would appear that the Puget Sound share of the power from the Columbia River would provide 923,253 workers with 6.42 horsepower each (the 1940 average) at the completion of the project in 1980. If, however, we project the United States curve for horsepower per worker from 1919–39 to 1980, that curve indicates 12.40 horsepower per worker in 1980. Using this latter figure, the Columbia would provide almost twice the present power per worker for 461,627 workers. The division of power in this computation would allow for a 100-percent increase in average domestic and commercial billings during the four decades under consideration, an increase that seems possible. These latter figures for workers compare favorably with the figures for both the agricultural and industrial bases mentioned above. If we fit a parabola to the 1869–1939 power per worker curve, the 1980 figure of power per worker would be approximately 16.0 horsepower. The basic census figures we have used indicate three distinct periods, 1869–99; 1899–1919; 1919–39, with $y=112.5+1.34x$; $y=94.5+4.48x$; $y=-416.79+15.18x$, respectively. We think these curves indicate the ease with which higher forms of power have been utilized. Thus the steam-power period saw the adoption and use of power at a lower rate, slope 1.34, than the next or electrical period, with slope 4.48, or the present internal-combustion plus electrical period, with slope 15.18. It would seem that as power becomes cheaper to install we use more per worker. Thus the figure of 12.4 horsepower per worker may be conservative. Yet we feel that this is very high and use it in spite of the fact that 8.5 horsepower may be more likely, because the higher one (12.4 horsepower per worker) gives us a lower population estimate, one more in line with the food base.

Food

The amount of food produced within a reasonable or economical distance of the industrial centers, therefore, would come to have an important bearing upon the number within the area. Food is a dominating factor in the attraction and retention of a population in this area for several reasons. First, it appears that good housing is relatively cheap and therefore easy to acquire, due to the presence of an ample volume of good building materials. Second, fuel costs are relatively low both because of large quantities of wood fuel and also because California oil can come by water. In this moderate climate both these fuels have been able in normal times to undersell and eventually to close many of the coal mines in the Puget Sound area. Finally, the mild climate requires no great supply of clothing. The availability of food, then, seems to be the most variable factor. If an ample supply of food is assured over the long period, the industrial activity of the area will be able to retain its required personnel or to attract additional labor.

The ease with which Americans now move from place to place and the greater ease with which they are likely to be able to move in the future is very likely to make them extremely sensitive to variations in real living costs. Since the largest single expense in the budget of the workingman is food, that item can be the deciding factor. Any large increase in food costs would tend to increase living costs which would eventually be reflected in wage rates. Increases in wage rates without commensurate increases in efficiency tend to increase the price of the product, which, in turn, will tend to reduce demand to the point where the marginal plants will be forced to close and thereby reduce the demand for labor. Thus the lack of food would tend to limit the industrial activity of the area. Overexpansion on the basis of too great a volume of imported supplies can lead to capital and population losses where the available local agricultural food supplies are limited by natural factors and the population in or near the outside source of food is free to increase to absorb its own area's surplus.

It would appear that the agricultural lands of western Washington are indeed limited. In 1940 the population of all the 19 western Washington counties totaled 1,216,579. There is cultivated agricultural land west of the Cascades totaling 858,000 acres. If we assume the United States 1930 average of 3.26 acres per person, the

figure used by the Army Engineers,[4] this would mean that approximately 78 percent of the people in these counties are supported by agricultural products brought in from the outside. Basing our conclusions on these western county figures, we may say that approximately 78 percent of the agricultural products consumed in the Puget Sound area are imported. Statistics on the volume of intrastate trade do not exist, yet it may be assumed that a great part of these supplies come in from the irrigated areas east of the mountains. According to a recent survey of potential agricultural land, it would appear that there are in the same 19 counties some 500,000 acres available. At 3.26 acres per person, these would provide for 153,374 more persons. Even though all the land now available or now under cultivation were cultivated at the national average of efficiency, the Puget Sound region would still be a deficit food area. It is necessary, then, to look to areas outside for further food supplies. The agricultural productivity of these neighboring areas may indicate the limit to which the Puget Sound population may expand.

The same survey indicated that within the entire Pacific Northwest there are available 6,034,908 acres of potential agricultural land of the irrigable and nonirrigable classes on which development is feasible. If we assume the 1940 ratio of 1.067 acres per person in the irrigated areas of the United States and 3.26 acres of nonirrigated land per person, this potential agricultural land can support a population of 3,454,920 and make possible an increase of the Puget Sound population to 3,105,695 at that time when all the agricultural land of the Pacific Northwest has been put under cultivation, provided the metropolitan and Puget Sound population ratios remain the same. (See table 43.)

Thus, even though domestic rates would permit 8,000 kilowatt-hours per domestic billing per annum, the Puget Sound share of the Columbia River power would provide industrial, commercial, and domestic energy for a population one and one-third million greater than the available agricultural land could support with food. Further increases in the volume of hydroelectric power would only tend to emphasize the discrepancy between food and industrial power.

The energizing of the power sites on the Columbia, however, will also provide water for the 1,500,000-acre Grand Coulee irrigation project, which is capable of, and so located that it can provide, agricultural production for an additional 851,534 of population in the Puget Sound region. This number, together with the 153,374 which can be supported by the potential agricultural lands in the western countries, can raise the population of Puget Sound to 2,182,260 at the time when the Grand Coulee project is completed. Food and power from the Columbia, then, can almost double the population of the Puget Sound region during the 40-year period of its proposed development.[5]

Additional food may be derived from several immediate local sources. Chief among these is the improvement of agricultural practices which will increase the efficiency of the available soil, such as mountain pastures, cut-over-land pastures, and the introduction of Brown Swiss and other mountain-ranging cattle to increase the volume of dairy products; the extensive encouragement of research both in agriculture and marine life to find and to establish new foods and methods of production; the encouragement of all types of fisheries to increase the fish-products volume from its 1941 position of 16 percent of the Pacific coast and Alaska

TABLE 43.—*Various population estimates for an industrialized Puget Sound region, agricultural land base*[1]

Estimate base	Potential agricultural land	Possible population increase	Estimated population limits (1940 Census added)
1. All class A, A1, and B, B1 land in Pacific Northwest[2]	6,034,908	1,928,341	3,105,695
2. Grand Coulee irrigation project[3]	1,519,000	851,534	2,182,260
Potential arable land west of the Cascades[4]: Classes A and B only	500,000	153,374	

[1] These figures based on population going 10 percent to the Spokane area, 34.2 percent to the Portland area, and 55.8 percent to the Puget Sound area, where the distribution of electric power is ⅓ to industry, ⅓ to commercial, ⅓ to domestic. 3.25 persons per domestic billing.
[2] *Development of Resources and Economic Opportunity in the Pacific Northwest*, National Resources Planning Board, Portland, July 1941.
[3] 1.21 acres per person. 10 percent to Spokane, 187,000 allowed for the Grand Coulee irrigated area, at 8 acres per person.
[4] 3.26 acres per person. Army Engineers ratio.

[4] These ratios vary from time to time, as is indicated by the table printed below. We are chiefly interested in land used for crops, since that indicates a sort of forecast of annual demand. It will be noted that Pacific Northwest ratios run consistently higher. This may be due to dry-land farming or to extensive activities indicating the possibility of greater efficiency as the population demand increases. It can be said that these ratios fell directly with the fall in living standards.

Pacific Northwest population and cropland

Year	Population[1]	Land used for crops				Crop land harvested			
		Acres	Acres per person		Percent United States to Northwest	Acres	Acres per person		Percent United States to Northwest
			Northwest	United States			Northwest	United States	
1929	[2] 3,182,962	11,412,527	3.59	3.03	84.4	10,890,930	3.42	2.93	85.7
1934	[3] 3,373,918	10,994,785	3.26	2.83	86.8	10,178,795	3.02	2.32	76.8
1939	[4] 3,564,874	10,526,859	2.95	2.60	88.1	10,498,561	2.94	2.44	83.0

[1] Washington, Oregon, Idaho, 17 western Montana counties.
[2] 1930.
[3] Estimated.
[4] 1940.

[5] Population studies made by the Army Engineers calculated on the basis of industrial development in New York and New England from 1830–1930, when prorated according to the ratios we have used for the three districts under consideration, indicate a possible increase of 1,001,787 for the Puget Sound region. Since the New England-New York area possessed ample food supplies either locally or from the Middle West, the industrial population could expand as the market demanded their products. If we assume that such is also the case in this region, up to that point where agricultural land is available, it is not surprising that our figures and the calculations of the Army Engineers' run so close together.

catch to many times that amount; and finally the protection of all marine and aquatic life from any type of sewage or industrial pollution which will reduce the food supply and thereby directly reduce industrial activity. The population of the region can increase over and above the maximum land-limit estimates made here in direct proportion to the region's success in these fields of food conservation, research, and sanitation.

With the Cascade Range lying directly between the ideal industrial area and the agricultural section of the Northwest, the problem of food transportation is indeed important. No reasonable expense should be spared to develop ample and economical truck and passenger highways, both east-west and north-south. Few curves and low levels should be sought on every route, since the lower the cost of farm produce to the consumer the higher the standard of living he can maintain and the easier it will be to hold and encourage the industrial population. Furthermore, any reductions in the costs of transport will be reflected not only in reduced costs to consumers but also in increased prices to producers. Thus both agriculture and industry are encouraged to produce through the establishment of an efficient highway system.

Industrial Opportunities

Given the food, the power, and the population, what are the possibilities for industrial development? The old-growth timber is being rapidly reduced. At present rates soon very little will be left. The great timbers of the Northwest will have passed with those who felled them. The continuing demands for lumber, however, promote greater activity in the forest-products field. Industries to be introduced will not compete to displace the established activities but, because of the additional hydroelectric power and the population the new agricultural areas can support, will have added to them those industries for which the timber operations have cleared the way, built the roads, and uncovered the resources. Thus timber has functioned, as it has always functioned, as the pioneer industry of an area. It has cleared the land and prospected the area for those who are now to come to develop further the region's various resources.

Looking at Puget Sound as a whole, the resources of this area seem to divide its activities into two groups. True, these groups are in many respects interdependent, yet in many ways they are independent. The metals and the chemicals, the coal, the minerals and the forest products, transportation, and the "back haul" industries—all these are a related part and all are distinct in the industrial pattern of the district. Behind them all lie the hydroelectric-power resources of the area and the population its food can support. The ratio of power to population in this area is so high and the delivered power so cheap that each worker can have a large volume at his disposal. The industries such a relationship will develop can therefore tend to the electrolytical, the electro-chemical, and the electro-thermal industries. Copper, aluminum, chrome, and manganese can be reduced and refined here. Lead and zinc ores provide ample resources for those industries, while the lime, iron ores, and coal provide a place for electric steels and iron in the area's activities.

In addition to the metals, the plastics are a field whose ingredients this area does, or is able to, provide. Electric power is by far the most important single factor in the production of ammonia and the other necessary nitrogen products which are basic over a large section of the plastic field. These products, together with acetylene, ethyl alcohol, and cellulose, are the materials required for the entire series of cellulose plastics.

The vinyls are a second series of resins of increasing industrial importance for which this area possesses all the ingredients. Acetylene and hydrochloric acid, both products of Tacoma industry, play the dominant role in this section of the plastic field. We may add to these two the polystyrene and nylon resins which can be made from coal derivatives.

With cellulose from the forests, the necessary chemicals from the coal- and salt-reduction plants, together with sulfur from the iron pyrites of the Howe Sound district, the hydroelectric power of the area is actually in a position to provide the plastics for an expanding variety of industrial activities. To these must be added what industries the incoming cargo space may provide with cheaply transported raw materials. Silk from the Far East, cotton from the Gulf ports, wool from Australia, can be spun and woven to advantage in this humid cool climate with the power that is so cheap and so plentiful. Other "back haul" industries are bound to appear as the region trades its own products for those of other areas.

Conclusions

Thus it may be said that the industrial integration which may follow the introduction of Columbia River power seems more or less dependent upon an increased food supply. This supply can be increased, first, through agricultural and marine research, and second, through the provision for a highly efficient highway and transport system geared effectively into the industrial organization. Then power, food, highways, and an effective population provided with proper markets should be able to generate a most prosperous economy for this area, whose scenic and mineral resources can have a profound effect upon the product of its industry and its people.

PART IV

DIRECTION OF POST-WAR READJUSTMENTS, RECONSTRUCTION, AND DEVELOPMENT

	Page
1. Review of Major Economic Functions—By N. H. Engle.	139
2. Summary of Post-War Problems of the Puget Sound Region—By N. H. Engle.	141
3. Public and Private Construction and Improvement Programs—By Puget Sound Regional Planning Commission.	151

534268—43——10

PART IV

1. REVIEW OF MAJOR ECONOMIC FUNCTIONS

By N. H. Engle [1]

The Puget Sound region is coming of age as a result of the forced-draft development necessitated by the war effort. The pioneer stage of exploiting natural resources had about run its course and was scheduled for decline even before the war clouds gathered. A new age of greater industrial diversification is heralded by the events of 1943.

Light Metals

While it would be an exaggeration to say that a transition from a wooden to a metal age is portended, it appears certain that a much larger place than heretofore will be taken in the future industrial pattern of the region by both ferrous and nonferrous metals. The light metals, aluminum, magnesium, and their alloys, in particular, have made tremendous headway, the momentum of which may well be expected to carry over into the future. Two concrete facts may be cited. The region's largest single employer of labor at the war peak will be an employer of aluminum metal workers, the Boeing Aircraft Co. Thousands of trained workers in this metal will be available for the post-war market. Again, aluminum metal is actually being produced for the first time in the history of the region by the Olin Co. at Tacoma. Forty to fifty million pounds a year will thus be available to the new peacetime industries of post-war Puget Sound. Here, then, are two basic ingredients, labor and materials, for industrial diversification.

Heavy Industry

In addition substantial expansion has come to the iron and steel industry, quite apart from shipbuilding, which has seen a repetition on a larger scale of World War I experience, with a much larger use of steel. Thus an army of new heavy-industry workers has been recruited to add to those in the light metals. These facts make it probable that Puget Sound will find itself with all the ingredients for a new burst of industrialization when the war ends.

[1] Director, Bureau of Business Research, University of Washington.

Forest Resources

Nor need this new opportunity be at the sacrifice of older industries. New and better days appear in the offing for the wood-based industries. Progress in technology points the way to wood-based plastics, plywood, pulp, and even more of the larger products for which the region is famous. The trends point to a new age in which more efficient utilization will be made of forest resources, which in time will be conserved by improved care of the forests, by fire prevention, selective cutting, and replanting. The fact that Puget Sound can, if it will, maintain a perpetual source of as vital and varied a raw material as wood, is one of the great assets of the region.

Markets

But what of the markets for all of this new industry? The answer lies in several directions. First of all, the State of Washington has become a larger market by reason of the rapid influx of new citizens. When the war ends, the State will have between 300,000 and 400,000 more population than it had in 1940. Some of these newcomers may drift away, but many will remain. In addition, many service men, perhaps 100,000 to 200,000, may be expected to swell the total even higher.

But Puget Sound industries are not limited to the local market. They should be able to sell effectively throughout the Western States and compete with other producers at home and abroad. Low water rates to the east coast make possible the development of the rich markets of that seaboard.

Again we need not limit our outlook to the national market. The same sea lanes lead to the ends of the earth. The great continent of Asia is a natural market for Puget Sound sellers. (See fig. 49.) China is certain to launch a great new era of industrial development for which materials and equipment will be demanded on a huge scale. Our Government, in cooperation with others of the United Nations, is even now laying plans for an international clearing house or bank to facilitate the financing of foreign trade with

China, with Russia, even with Japan, one of our best pre-war customers.

Transportation

Indeed, no region enjoys a more enviable asset than the great inland waterway from which the Puget Sound region takes its name. Development of port facilities should stimulate a great volume of business in shipping. As a byproduct of the war, Alaska has been rediscovered, and Puget Sound is the gateway to Alaska. New shipping lines should be opened to the north and west to Alaska, Siberia, Japan, and China, and to the south and east to Latin America and our own east coast.

Puget Sound is also the natural taking-off point for the vastly expanded air traffic of the future. Air freight and express, air mail, passenger service, all may confidently be expected to darken the skies of Puget Sound in the years that lie ahead.

PART IV

2. SUMMARY OF POST-WAR PROBLEMS OF THE PUGET SOUND REGION

By N. H. Engle [1]

Statement of the Problem

The post-war problem which faces this region may be concisely stated in a single word—jobs. Work must be provided for the thousands of people who have come to the area, as well as those of longer residence. As a corollary, purchasing power must be maintained in order to maintain the standard of living.

Concentration of war industries in and about the lower Puget Sound region has created the major manpower problem of the State, with Seattle the focal point. Shipyards at Tacoma, Seattle, and Bremerton, and the Boeing Aircraft Co. factory at Seaftle were natural magnets for war orders. A large and early influx of war workers followed the concentration of demand in these centers. At the outset severe strains were imposed upon these communities to provide living accommodations for such a sharp expansion in population. As the war advanced, relief was had from two or three directions. War orders were fanned out to other Puget Sound centers and to other parts of the State, thus relieving the pressure of the original impact of war inmigration on the Seattle-Tacoma-Bremerton section. The rapid construction of housing facilities, schools, and other essential living accommodations in the primary war centers has eased the tightness of war-generated congestion somewhat. The decision to hire women workers for Boeing, the shipyards, and other war plants has been of great assistance in easing the manpower situation. While this program did not prevent women as well as men from migrating to the region, there has been a large use made of Puget Sound's own womanpower. There remains nevertheless a large reservoir not yet utilized, the importance of which lies in the fact that new housing is not required since these workers live in the region.

Table 44, prepared by the United States Employment Service, gives an appraisal, based on existing employment reports, of the breakdown of employment by industries in detail, as of January 1, 1943. Distorted by the war effort, this picture is of value as revealing what has happened. What the future holds may be quite another story.

[1] Director, Bureau of Business Research, University of Washington.

TABLE 44.—*Estimated employed labor force, Puget Sound region, January 1, 1943*

Industry	Employed labor force
Total: All industries	583,654
Agriculture	29,219
Forestry	2,920
Mining	2,058
Construction	46,788
Manufacturing	223,863
Food products	15,627
Textiles and apparel	4,087
Logging and basic lumber	30,110
Finished lumber products	4,404
Paper and pulp	4,959
Printing and publishing	4,207
Chemicals	2,156
Petroleum products	176
Leather products	874
Stone, clay, and glass	1,504
Iron and steel (ordnance)	8,698
Nonferrous metals	3,230
Machinery	5,899
Automobile equipment	659
Aircraft and parts	34,690
Ships and boats	101,486
Other manufacturing	1,097
Utilities	37,519
Railroads	9,817
Trucking service	5,499
Other transportation	9,950
Communication	6,184
Other utilities	6,069
Trade and services	179,843
Wholesale trade	27,300
Food and Dairy products	11,778
Eating and drinking places	18,055
Automobile sales, repairs, and gas	9,261
Other retail trade	33,945
Other businesses and repair services	6,370
Finance, insurance, real estate	15,701
Domestic service	8,257
Hotels and lodging places	6,878
Laundries, cleaning, miscellaneous services	8,213
Amusement and recreation	6,424
Professional services	27,661
Government	53,422
Postal service	3,988
National defense	29,302
Federal Government [1]	10,844
State and local government [1]	9,288
Industry not reported	8,022

[1] Not elswhere classified.

Source: United States Employment Service.

Figures 56 to 61 show graphically employment distribution by counties prior to wartime expansion.

Table 45 summarizes the manpower picture in the region before the war and as it is forecast for the war peak. Similar information for the region, city of Seattle and State, is shown graphically in figures 62, 63, and 64.

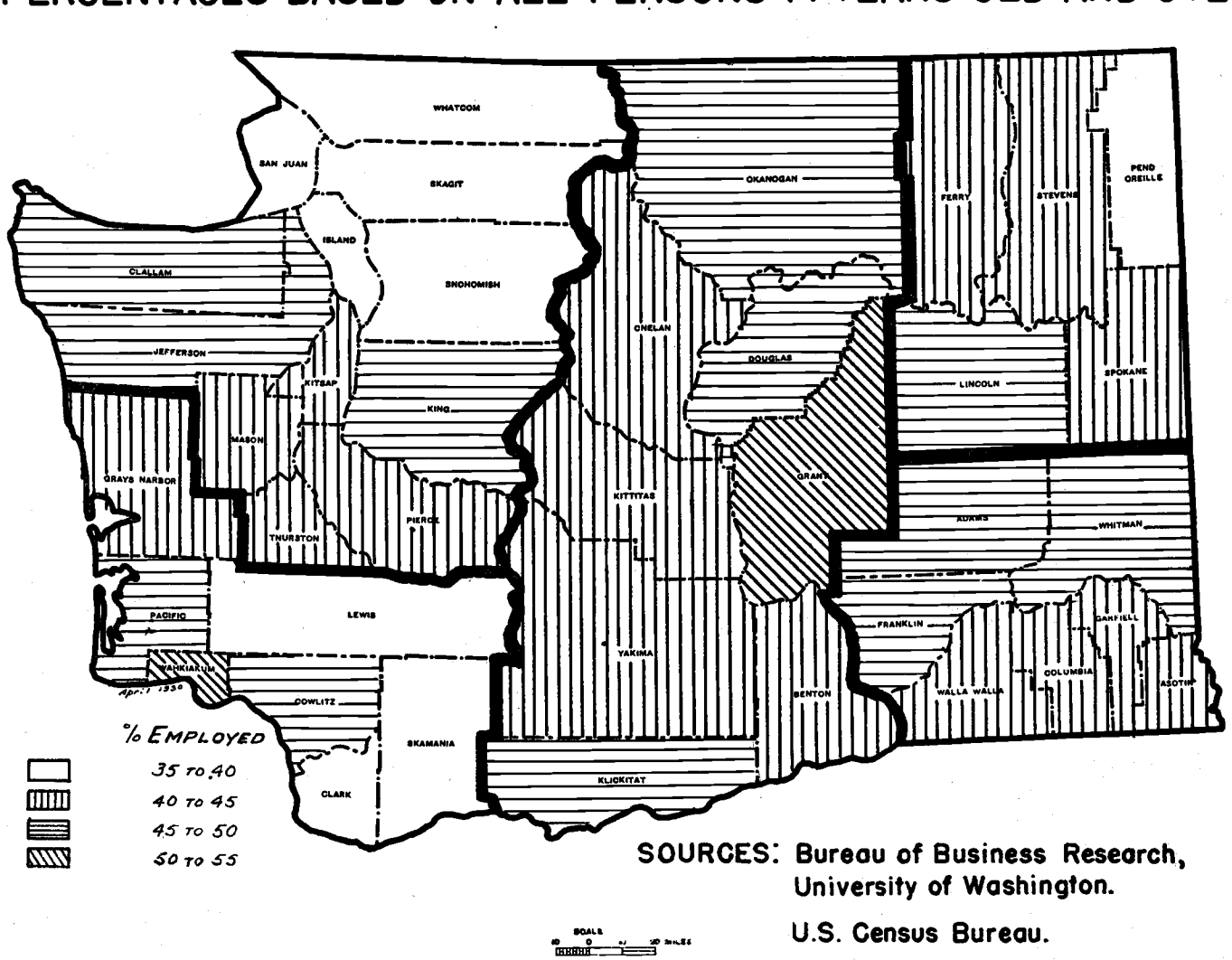


FIGURE 56.

TABLE 45.—*Manpower in the Puget Sound region, 1940 and war peak*

Occupational status	1940		War peak	
	Number in thousands	Percent	Number in thousands	Percent
Total population	1,007	100.0	1,315	100.0
14 years old and over	823	81.7	1,107	84.2
In the labor force	423	42.0	690	52.5
Employed	359	35.6	687.5	52.3
Unemployed	65	6.4	2.5	.2
Not in labor force	400	39.7	417	31.7
In school	73	7.2	80	6.1
Own home work	232	23.0	252	19.2
Unable to work	49	4.9	60	4.6
All other	46	4.6	25	2.4
Under 14 years old	184	18.3	208	15.8

Source: 1940 U. S. Census. War peak (end of 1943 or early 1944), estimated by Bureau of Business Research, University of Washington.

A total increase of more than 300,000 people since 1940 is indicated. The larger percentage of those over 14 years of age at the war peak than in 1940 is explained by the influx of war workers, some without families, others leaving their families behind. Unemployment will be reduced to the minimum and the proportion of employed workers greatly expanded from 35.6 percent to more than half of the total population. Although the actual numbers of school children and women in the home will be larger at the estimated war peak than before the war, the percentages are down. Many of the older boys have, of course, entered the armed services, but many boys and girls have also gone to work at high war wages. Women have left their homes to build ships of the air and sea and to engage in other war industries. Many more women could be absorbed into industry if ways and means could be found to care for the younger children.

The size of this problem is not great when it is observed that there will be only about 200,000 children under 14 years of age out of some 330,000 families. Even if those in school over 14 years of age are included, there is less than 1 child per family on the average.

Suggested Solutions

Stating the problem in general terms is comparatively simple, once the facts are assembled. To be specific in pointing to practical solutions is more difficult. Where, after the war, are we to look for the 300,000 or 400,000 more peacetime jobs than existed in the region before the war? Four groups may be singled out for further analysis: returning service men, women newly employed in industry, formerly unemployed workers, and new citizens from outside the State. Some of the service men will want to return to college or to technical or other schools to complete their education and prepare themselves for peacetime employment. Others, after a brief respite at home, may well return to the Army or the Navy as a career. The majority will want to marry and settle down in good jobs, at a good rate of pay, with a chance for promotion. Some of the women war workers will also want to complete their education. Many of them will marry returning service men, or others, and devote their lives to the important job of homemaking. Some will want to remain in industry. Those who before the war were unemployed or WPA workers will want to keep their jobs. So, also, will the majority of new citizens, although some of them will return to their former homes.

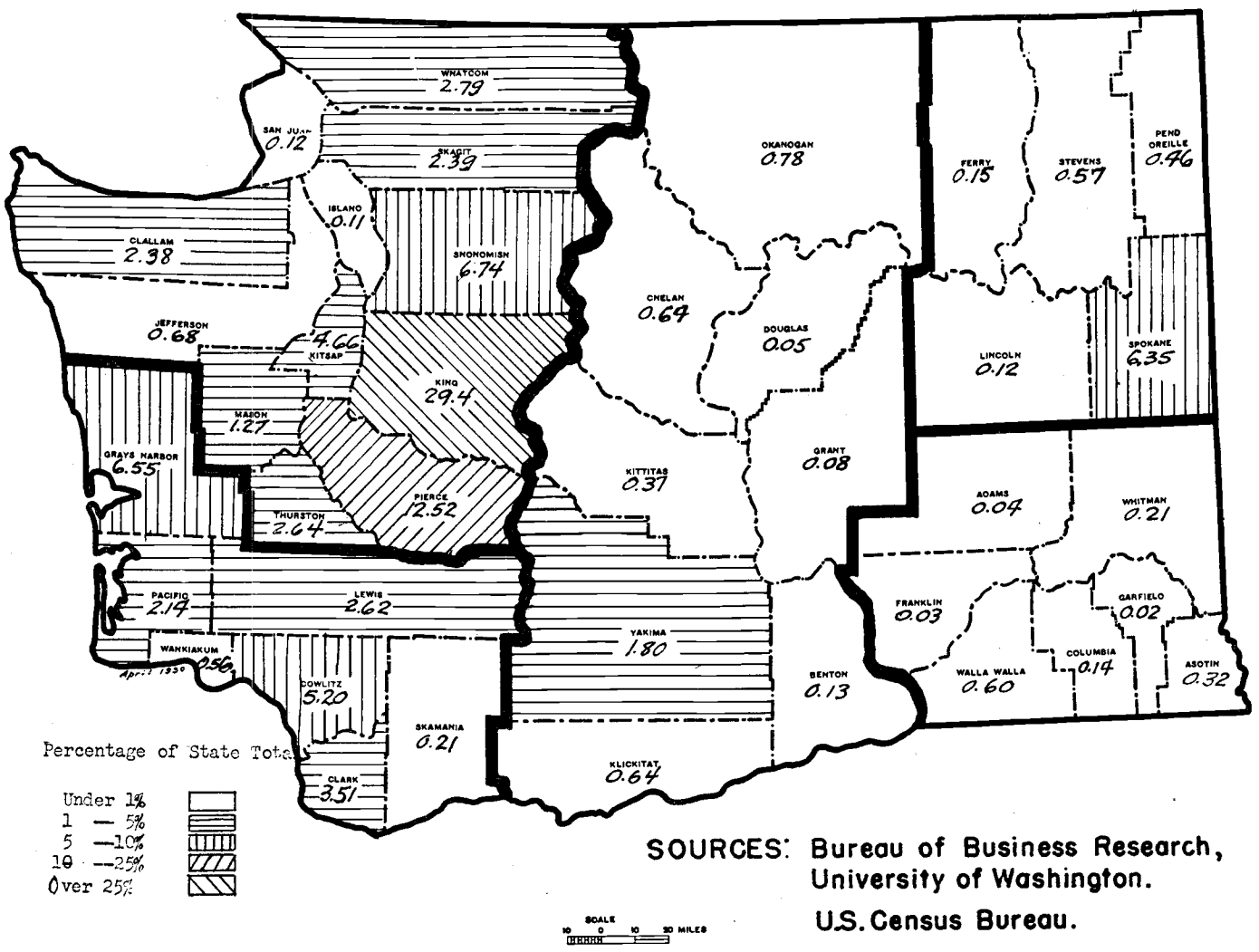


FIGURE 57.

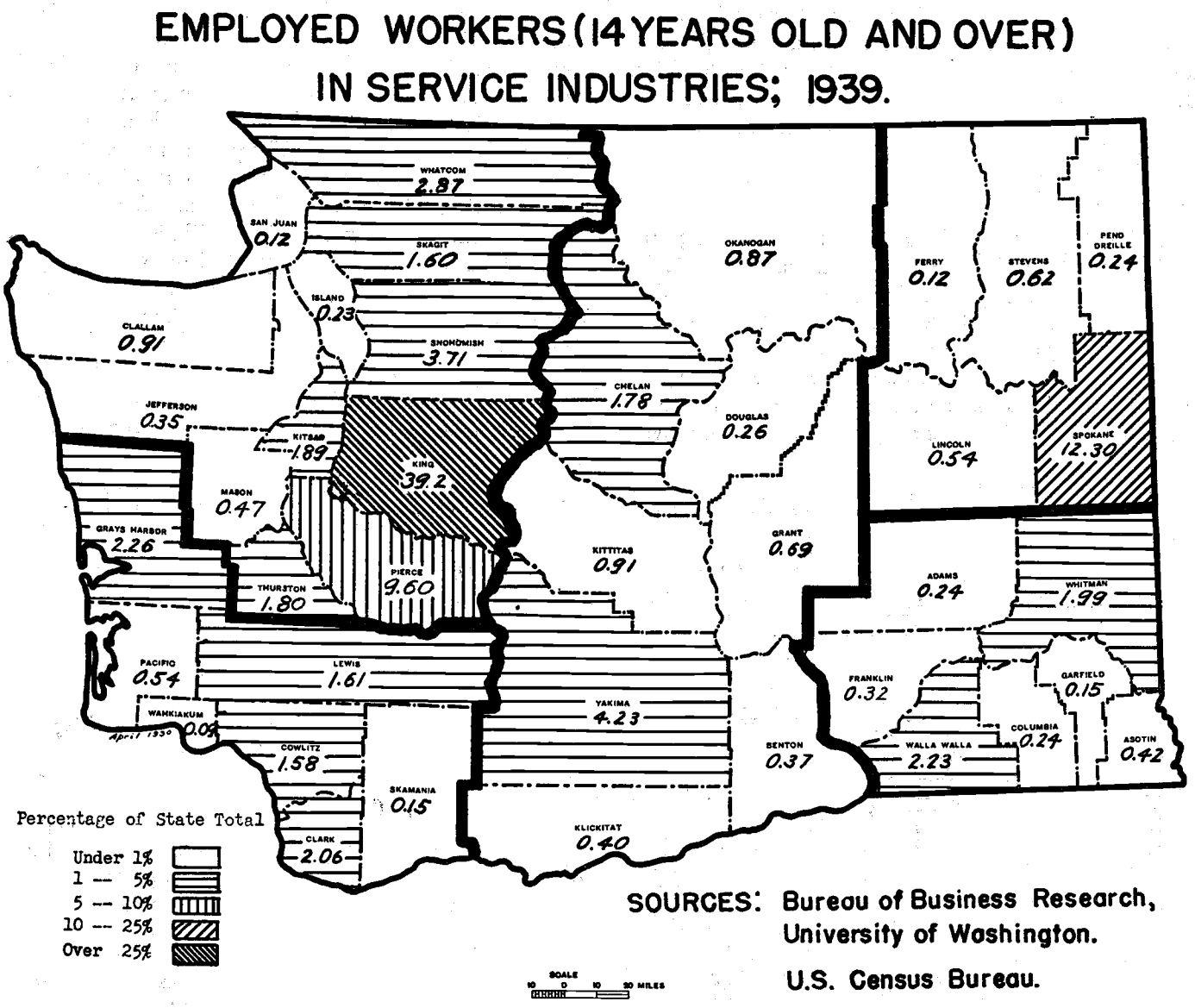


FIGURE 58.

Some of the war workers may also be attracted back to their farms or to new farms in such areas as that embraced by the Columbia Basin project. Just how many will drop from the Puget Sound labor force can only be conjectured. Undoubtedly there will remain a very substantial number of workers wanting jobs. Where are the jobs to be found?

The answer lies in existing industries, in new industries, or on public-works projects. Let us examine each field. First of all, existing industries are dominated by aircraft and shipbuilding. Reports in the press indicate that Boeing's are planning definitely to provide as much employment as possible by utilizing their plants, equipment, and engineering skills in producing new products after the war demand for Flying Fortresses ends. If they can start early enough on the designing and marketing of new products of various kinds and if they can get the necessary new machinery and tools, they should be able to build a peacetime business comparable in scope to their vast war operation. Of course, almost every aircraft manufacturer in the country probably has similar plans and it is obvious that, even in an expanding air age such as we probably will enter at the end of the war, full wartime capacity throughout the industry cannot be maintained. The competitive position of the Boeing organization is believed to be generally favorable.

The outlook for the shipyards is less hopeful. To the unbiased observer there appears little reason to hope that a repetition of the decline which effaced the World War I shipyard industry from Puget Sound can be averted. It should be pointed out, however, that the decline following World War I was due largely to the fact that the Northwest was specializing in wooden

ships, the need for which ended with the war. But even though we retain a two-ocean Navy, vastly increase our shipping under conditions favorable to world intercourse and trade, and even though U-boats have been sinking great numbers of ships, the fact remains that we have yet to prove that we can compete, where cost is a factor, with other nations of the world in ship construction. There may well remain a substantial volume of repair work which will provide many jobs, but far fewer than at the war peak.

The basic forest industries may look for a substantial volume of peacetime orders to fill up the gap in housing, to reconstruct foreign lands, and to reconvert American plants to peacetime operations. These industries may be expected to provide jobs for their peak loads or even more.

In addition, the development of new industries using new techniques in wood utilization, such as those involved in plastics, plywood, chemical utilization of wood waste, tannin, and cork from Douglas fir bark, point the way to many new jobs for the future.

New industries in other lines may also be mentioned. The following, among others, have been recommended by the Market Development Section of the Bonneville Administration for future consideration in developing the area:

1. The electrolytic production of metallic aluminum from purified aluminum made from local clays and alunite or imported bauxite.
2. The electrolytic production of metallic magnesium from magnesium chloride prepared from the chemical treatment of sea water by the Dow process, or from anhydrous magnesium chloride made by the carbon-chlorine treatment of olivine, serpentine, or talc.

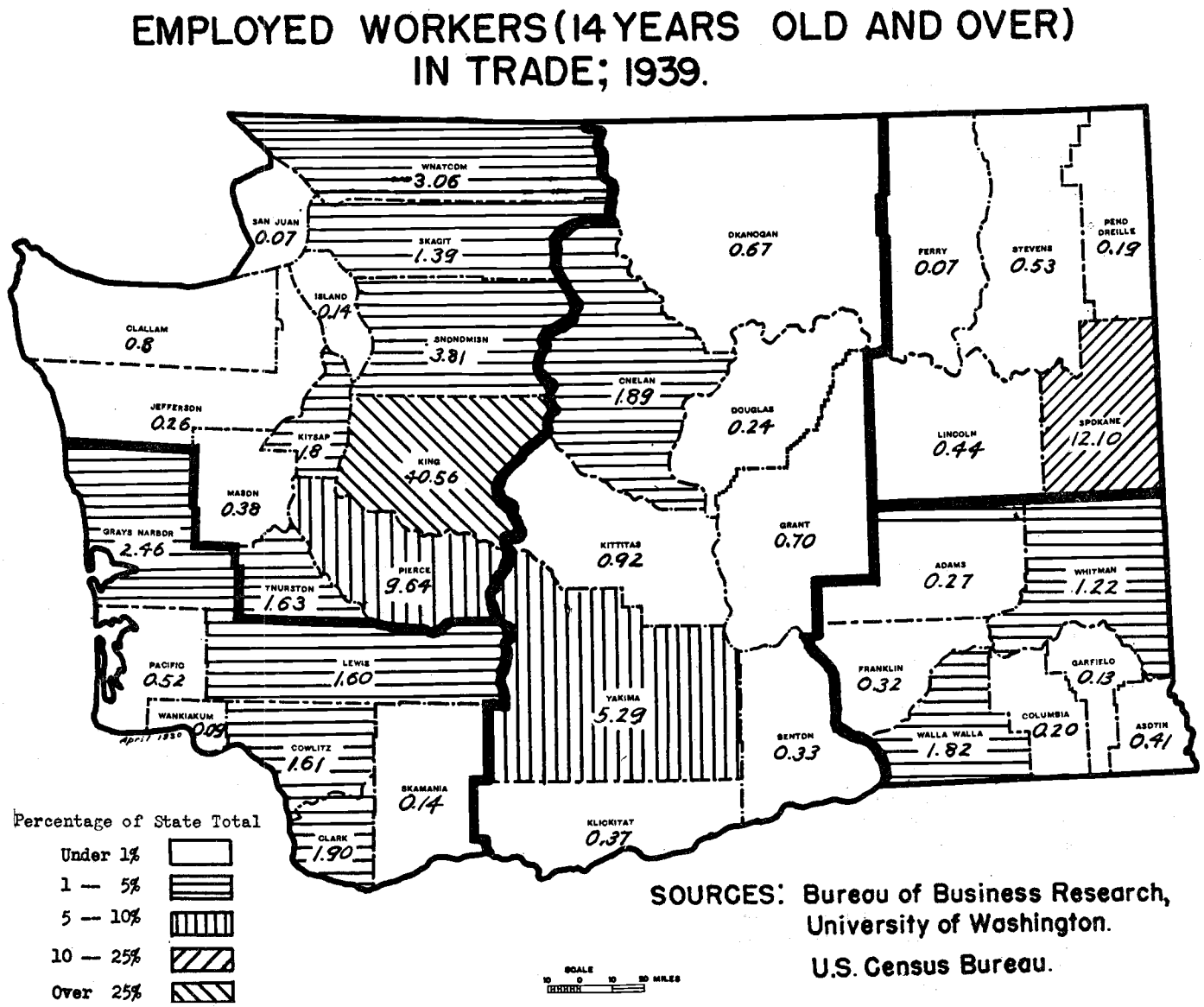


FIGURE 59.

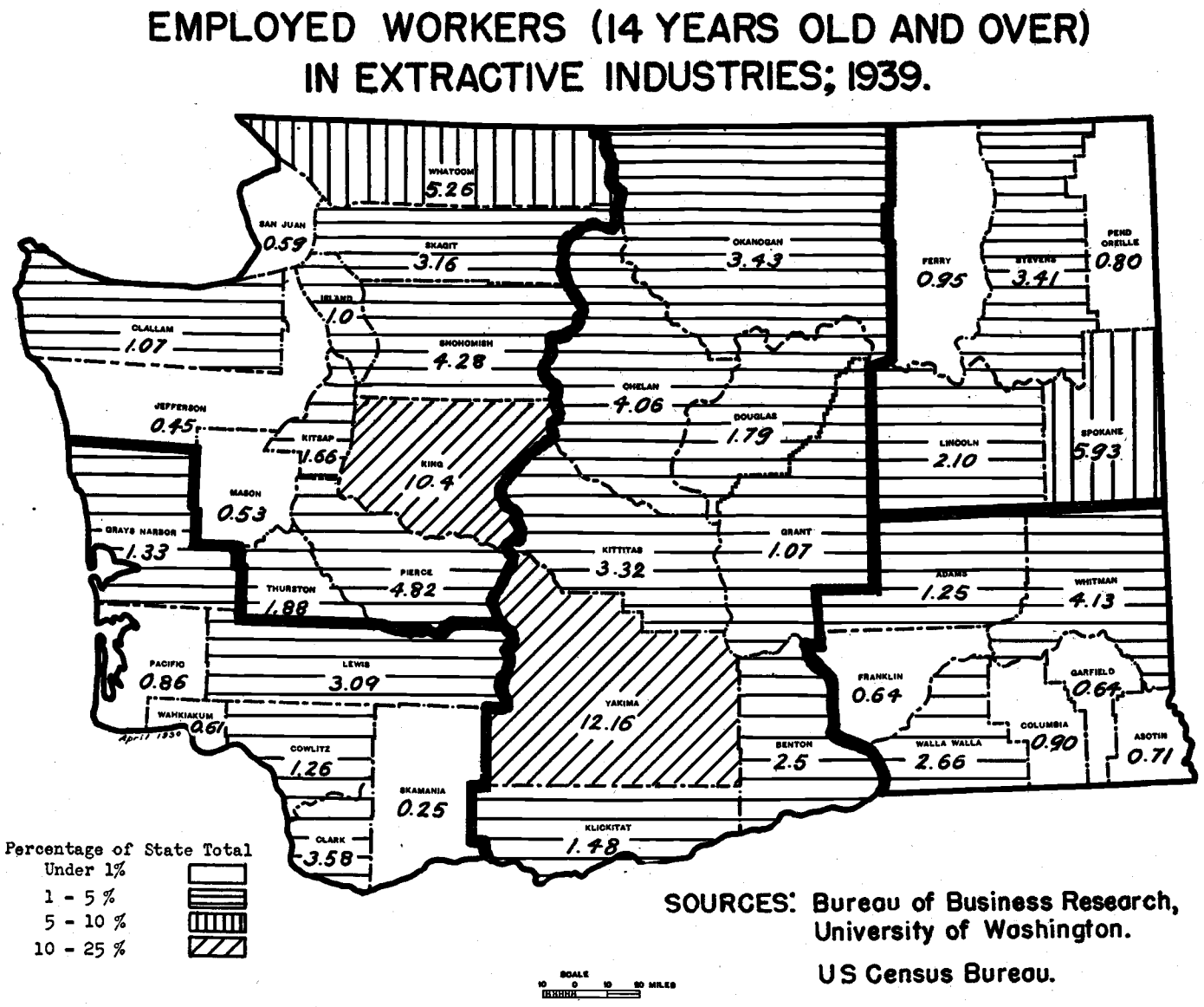


FIGURE 60.

3. The electric furnace manufacture of phosphoric acid or ferrophosphate from imported phosphate rock and local coke and silica sand, with ammonium phosphate and trisodium phosphate as derivatives.

4. The production of sponge iron from iron oxide ores and also from pyritic ores with the accompanying production of liquid sulfur dioxide for the pulp and paper industry and sulfuric acid manufacture.

5. An electrolytic zinc plant to treat ores and concentrates derived from the coastal mining districts, Alaska and the Orient.

6. Additional electrothermal production of copper matte, utilizing copper ores and concentrates of the Coast, Alaska, and the Orient, with subsequent electrolytic refining of the matte to metal.

7. The electric furnace production of pig-iron from Alaska, British Columbia, and local iron ores and concentrates.

8. The electric furnace production of ferrosilicon from iron ore and silica rock.

9. The manufacture of mineral pigments and mortar colors from low-grade iron ores.

10. The manufacture of wall and insulation fiberboard from wood waste and asbestiform minerals such as asbestos and talc, with binding materials such as magnesium oxychloride cement, etc.

Public Works

Private industry, it is hoped, will provide the bulk of the post-war employment in the old and new industries just discussed. In addition, the private construction industry will find a large scope for employment in the back-log of public works which has accumulated during the war. In this field government and business must cooperate, government indicating the need and letting the contracts to business which hires the labor and does the work.

The State of Washington has been forehanded in this field. A recent report by the Washington State Planning Council outlines a 6-year program of essential

public works. In the following section of this report will be found a partial list of the proposed construction projects for the Puget Sound region.

Conclusion

In conclusion it appears that existing industries, new industries, and public works offer great possibilities for optimism for the future. Just what contribution each may be able to make is difficult to say. Perhaps the best way to approach the task of allocating responsibility for jobs is to use the same percentages prevailing in the immediate prewar years. On this basis we may break down the estimated 750,000 jobs, which will be needed to keep our regional manpower fully employed, as shown in table 46.

TABLE 46.—*Jobs required for full employment after the war, Puget Sound region, by major industries*

Economic group	Post-war	Pre-war	New jobs
Total	750,000	358,900	391,100
Manufacturing	178,500	86,100	92,400
Services	174,000	83,720	90,280
Trade	154,500	73,795	80,705
Extractive industry	69,750	32,960	36,790
Transportation	66,750	32,100	34,650
Government	52,500	25,000	27,500
Construction	42,750	20,412	22,338
All other	11,250	4,818	6,432

It is inevitable that these proportions would be changed somewhat but probably less than might be expected. Basic regional economic patterns change slowly.

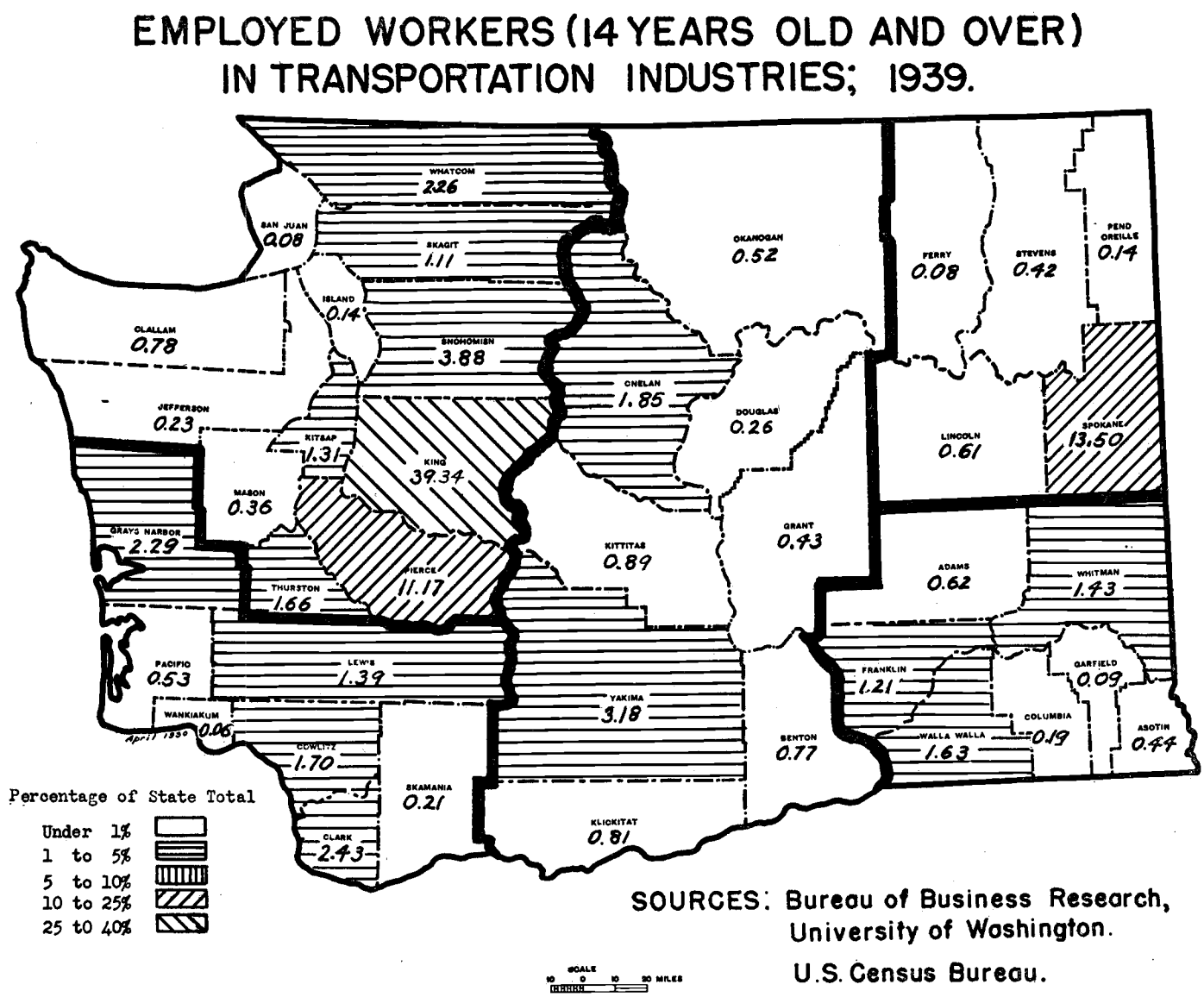
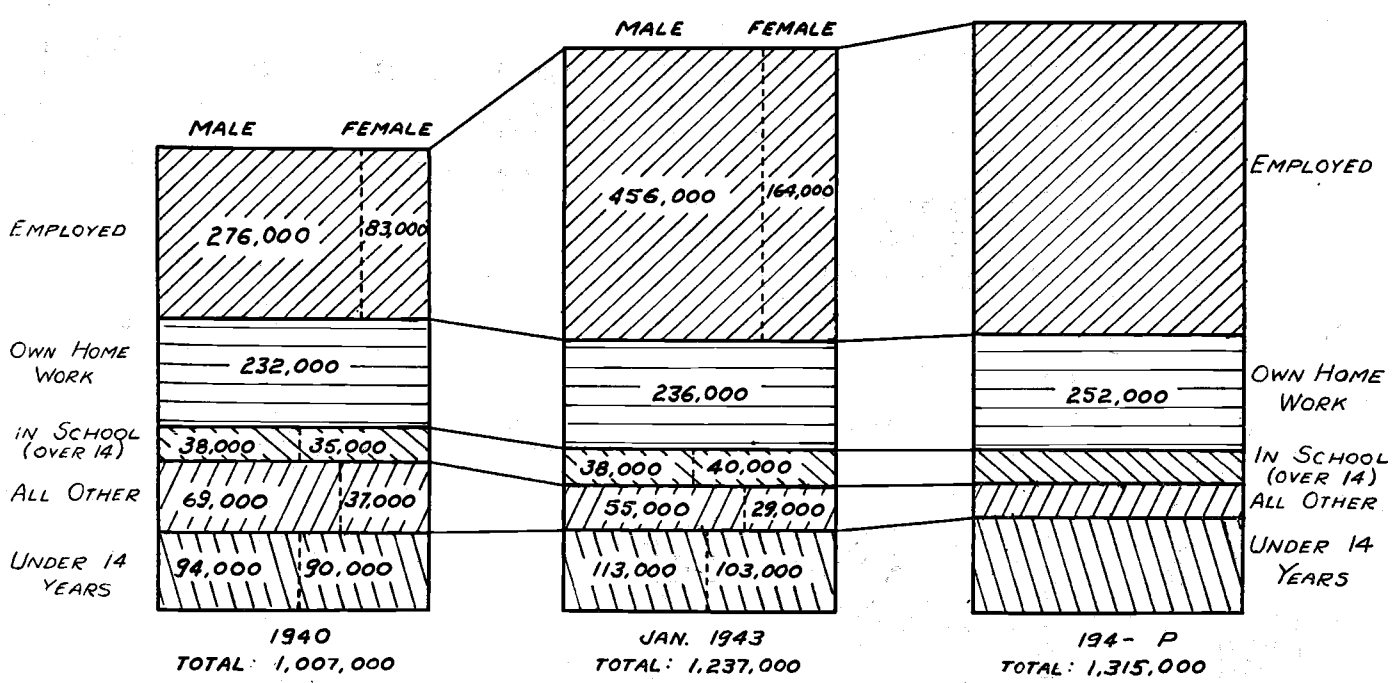


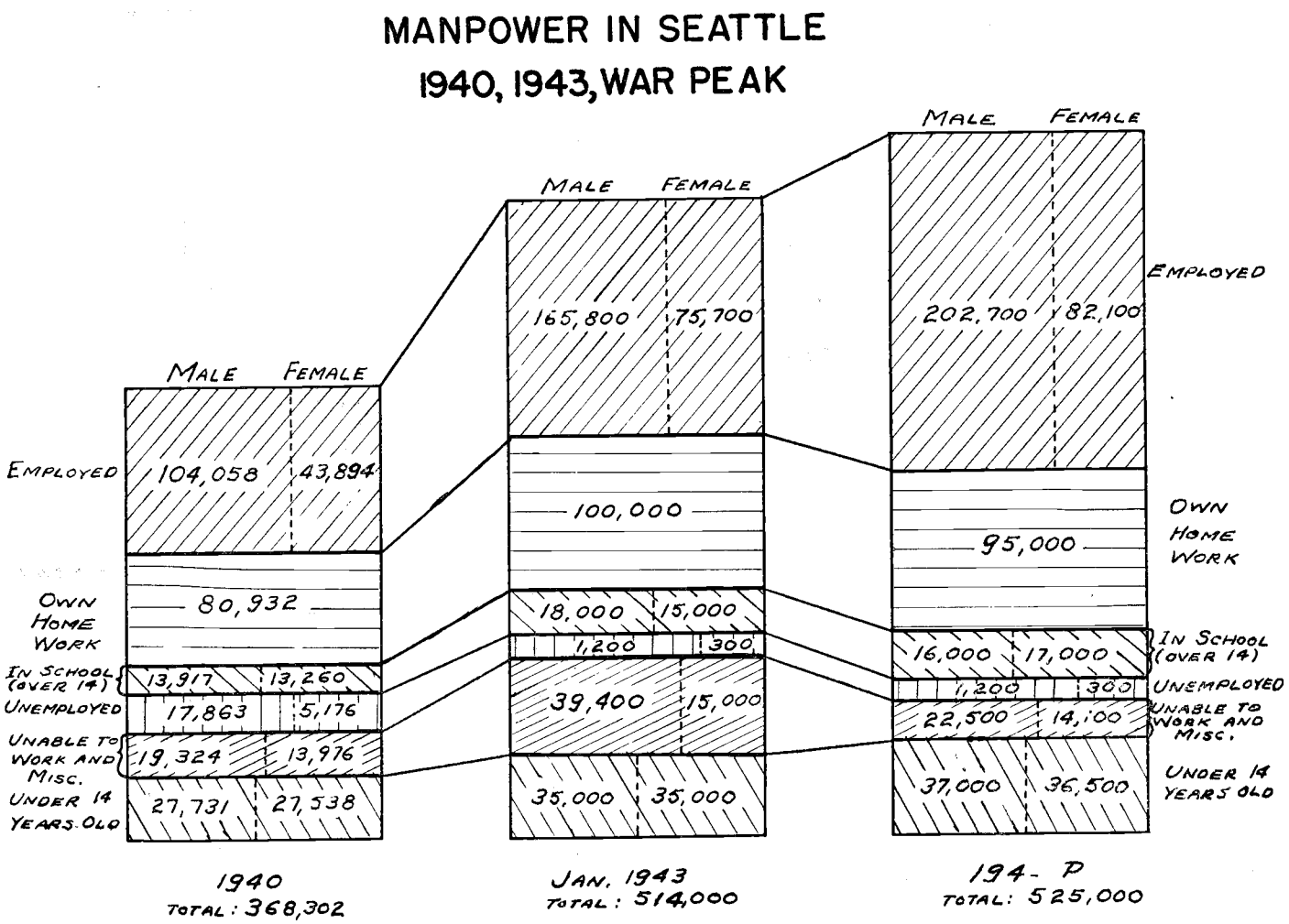
FIGURE 61.

MANPOWER IN PUGET SOUND REGION; 1940, 1943, WAR PEAK.



SOURCES: 1940– U.S. Census Bureau. 1943 and War Peak (Late 1943 or 1944)– Estimates by Bureau of Business Research, University of Washington.

FIGURE 62.



SOURCES: 1940 – U.S. Census Bureau. 1943 and War Peak (Late 1943 or 1944) – Estimates by Bureau of Business Research, University of Washington.

FIGURE 63.

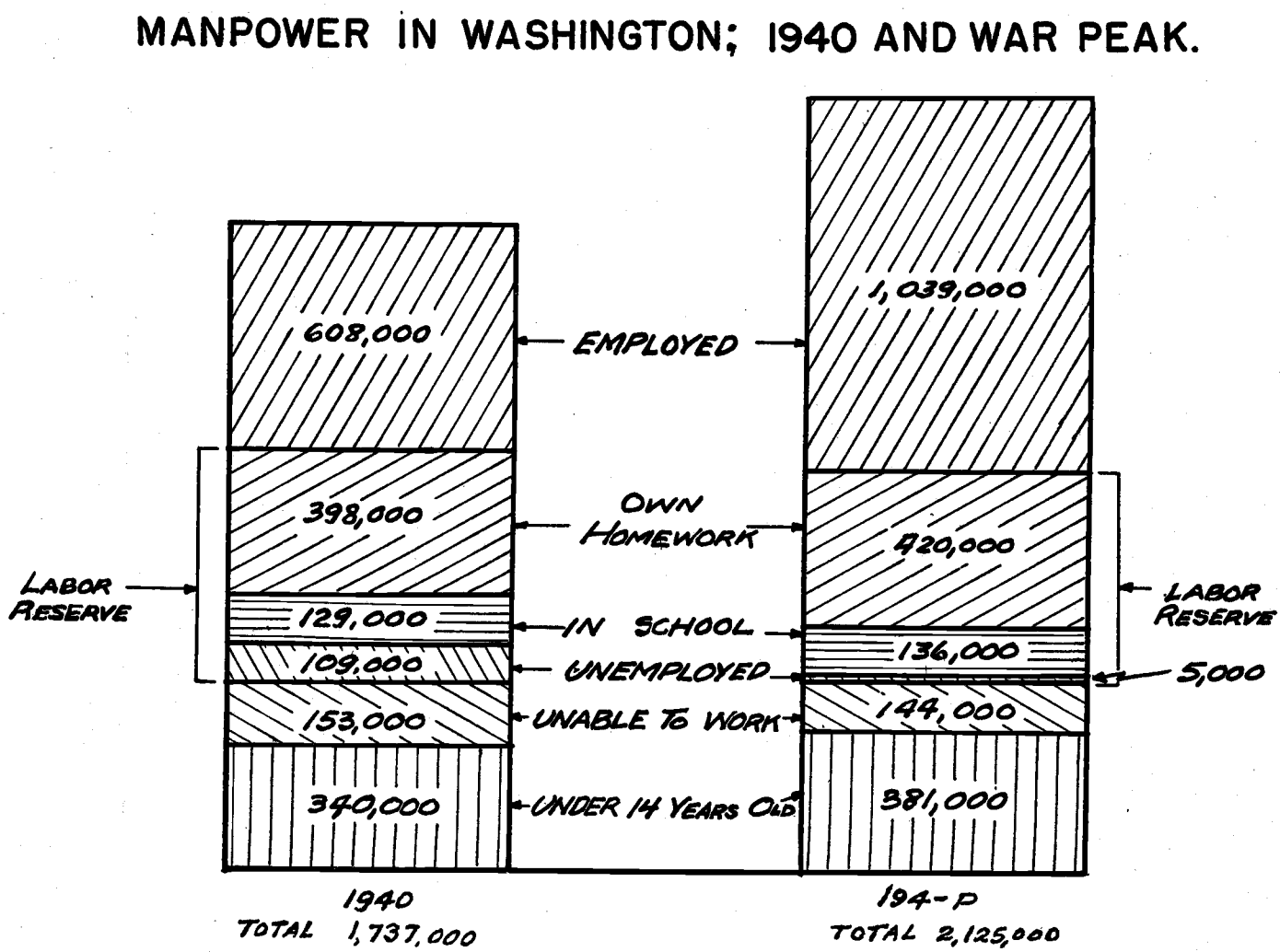

MANPOWER IN WASHINGTON; 1940 AND WAR PEAK.
608,000
EMPLOYED
1,039,000
398,000
OWN HOMEWORK
420,000
LABOR RESERVE
129,000
IN SCHOOL
136,000
LABOR RESERVE
109,000
UNEMPLOYED
5,000
153,000
UNABLE TO WORK
144,000
340,000
UNDER 14 YEARS OLD
381,000
1940
TOTAL 1,737,000
194-P
TOTAL 2,125,000
SOURCES: 1940-U.S. Census Bureau.
194-War Peak-Estimates by Bureau of Business Research. University of Washington.

FIGURE 64.

PART IV

3. PUBLIC AND PRIVATE CONSTRUCTION AND IMPROVEMENT PROGRAMS

By Puget Sound Regional Planning Commission

Following a period of relatively rapid development from the primitive stage, the Puget Sound region now approaches maturity, with war-expanded industries, community facilities and housing, and with an increase in population and labor force. Along with these has come a newly awakened consciousness of inadequacies and constrictions which were discovered when peak loads, theoretically "planned for," were suddenly forced upon the region's systems of utilities, transportation, highways, terminals, ports and general community facilities.

In earlier years—and again even more notably during the present war expansion—growth of the communities and their service facilities has been found to have been insufficiently guided by well-thought-out plans. The result, in structures and facilities, is a mixture of the good and the bad. Unfortunately, little of the recent construction has been consciously and scientifically designed for an enlarging population. With an even larger population forecast, services will become even less efficient, facilities less adequate and living conditions less favorable—unless by effective planning we can avoid these results.

Millions of dollars in war contracts have come to the region. Many of these millions have been invested in new and improved manufacturing plants and military facilities. Their construction has caused the formation within the expanded labor force of a large nucleus of skilled construction workers, surrounded by many more capable of becoming construction workers. Thus there is present in the region an unusually large group capable of profiting from a sound construction industry program.

Some general problems must be solved before the post-war period if we are to be ready to accelerate private and public construction programs. Among the major problems facing the local governments are:

1. The development and expansion of public facilities to meet needs resulting from the defense effort and the increase in population.
2. The development and construction of projects, such as flood control, which were required and planned prior to the war.
3. The planning and construction of projects which will meet needs arising out of anticipated industrial growth, based upon available low-cost electric energy.
4. The preparation of projects for area reconstruction and development, to further the conservation, development and use of resources, to improve the base for industries and services and to improve communities.

Planning

It is the forthcoming period of transition and the possible period of inflationary spending after the transition which may hold as great danger for the people of the region and the Nation as the war itself. Therefore, it is highly important that despite the stress of the war effort, the greatest preparation possible be made before the war's conclusion to alleviate and cushion the problems of the post-war period.

The Puget Sound Regional Planning Commission, organized during 1940, embodies and expresses the desire of the people of the region to give consideration to problems of the Puget Sound basin, to propose solutions, and to lend assistance toward coordinating the activities of existing agencies, including State and Federal, which are concerned with such problems. In addition the Commission has rendered, and intends to continue to render, every possible assistance in the preparation of well-conceived plans and programs for construction projects, and for conservation and development of the region's resources as a partial solution of future employment problems.

Before private interests can feel free to make their plans for cooperation in over-all city and county plans, certain legal machinery must be provided and policies determined.

Some of the existing challenges which, if met, will generate construction work include: adequate housing of both urban and garden tract types; recreational facilities to offset juvenile delinquency; new thoroughfares and bridges to improve transportation; the elimination of unnecessary streets and razing of obsolete buildings, both residential and industrial, to improve living facilities and property values; development of airports with modern terminals and express highways connecting them with population centers; off-street

parking areas to aid retail business and the general public; balancing retail shopping facilities against resident population to stabilize the value of residential districts; building more efficient types of neighborhood supply and service centers; "daylighting" congested districts with parkways; developing large-scale redesigning and rebuilding programs to bring depreciated and decaying central areas of cities to a modern state of efficiency.

Our planning should be on the basis of the improvement of groups of properties and buildings rather than the individual building or plot. We should have programs for the use and restoration to tax rolls of tax delinquent and tax reverted lands and properties. We should control "shack" development within and on the fringes of cities. Workable techniques should be developed to permit local groups of property owners to take the initiative in analyzing their own problems and working out plans for development of their own districts. Details of city and county plans are thus provided for presentation to planning commissions for adoption.

Our needs include not only new homes, improvements to present houses, apartments and hotels, but new industrial plants and business properties built to higher standards. These should be grouped in units which would provide the amenities—playfields, parks, open spaces, traffic facilities, sunshine and shade, peace and quiet—with easy access to workers' homes.

Economies will naturally follow, if we eliminate the costs now connected with blighted or backward areas, such as delinquency, tax losses, extra fire protection, high insurance rates, lack of sanitation, ill health, and relief. Society as a whole will profit if by proper planning the community becomes more efficient, with security assured industry, business, workers, and the general public. It is possible to construct and maintain more economically all utilities, including water, sewer, and treatment systems. Waste in handling freight and passengers can be eliminated through better transportation systems, new terminal facilities, and interconnections between railways, waterways, highways, and airfields. New fireproof wharves, freight warehouses, sanitary markets, libraries, schools, playhouses, and many other structures should be included in our vision for a more productive economy and a better life.

When a substantial share of these aspirations can be met, a long-range construction program is provided, which can be accelerated as necessary during some transition period following peace. Construction under such conditions becomes a substantial industry in itself, contributing importantly to the labor income of the region.

Projects

Various local political units have submitted lists of projects thought necessary to meet requirements in their respective communities. To these were added local or regional projects, such as forestry, drainage, or flood control, which overlap political boundaries. There must be a continuous development of this list so that it can be used as a basis for a post-war program for the construction industry. Priority of construction and methods of financing should be given consideration as integral parts of the planning. This proposed construction program must be augmented by private undertakings, such as industrial plant construction, as well as by an expanded local industry for manufacturing materials of construction, such as plastics, metals, equipment, furnishings, etc. As the local cement industry has been developed to meet the needs of this area, so must other industries develop to produce similar construction materials. A study of the possibilities for manufacture of plastics, metals, wall coverings, and other materials is now being conducted by private and public agencies.

Table 47 indicates the nature and volume of projects assembled to date, and the suggested sources of funds for their financing. The total value of all taxable property in the 12 Puget Sound counties for 1942 was $611,622,288. The program outlined in the table, based

TABLE 47.—*Summary of a partial list of proposed construction projects*

Type of project	Proposed sources of financing	Estimated cost
Highways	Gasoline taxes	$147, 500, 000
Sewers and disposal plants	Special assessments and revenue bonds.	8, 010, 000
Water supplies	Revenue bonds	6, 800, 000
Schools and institutions	Local tax levies and State building funds.	30, 350, 000
Libraries	Local tax levies	525, 000
Hospitals	Federal and local funds	1, 400, 000
State hospitals	State funds	3, 000, 000
Recreational and parks projects	Local tax levy	790, 000
Flood control and navigation	Federal funds	10, 000, 000
Land reclamation	Revenue bonds and State funds	20, 000, 000
Reforestation, fire protection, roads.	State and Federal funds	5, 000, 000
Mineral exploration	do	5, 000, 000
Fisheries projects	do	10, 500, 000
Power projects	Revenue bonds	30, 000, 000
Railroad terminals and ports	Revenue bonds, private and general funds.	29, 000, 000
Housing	Homeowner rents	[1] 288, 000, 000
Major repairs	Private funds	[2] 240, 000, 000
Total		835, 875, 000
Approximate annual total on basis of a 6-year program		139, 000, 000

[1] New houses, on the basis of 16,000 a year at $3,000 per unit for 6 years.
[2] Based on a 6-year period.

Sources: Local and State governments, State department of education, the medical profession, Army Engineers, drainage and diking districts, the forest industry, mineral industry, State department of fisheries, power companies, railroad companies, port commissions, realtors. Detailed data from which the estimates were drawn are on file in the Puget Sound Regional Planning Commission office. They have not been published because they are tentative and continually being revised.

upon a 6-year spread and to repeat thereafter as necessary, represents an annual industry of approximately $139 million in labor and materials. From the local standpoint, most materials should be largely of local manufacture, so that as much as possible of this sum will go directly into labor and trade channels of the region itself. The sums involved are not beyond the financial ability of the various governmental units, as determined by constitutional limitations. Use of funds from revenue bonds will help pay part of the cost.

Recommendations

It is recommended that present efforts to develop a substantial construction industry should be continued, having the following objectives in mind:

1. That during the war there should be only the most necessary developments of well-conceived defense emergency public works, and when possible this construction should be a segment of the area's master plan development.

2. Since assistance is desired by some cities and some counties in the preparation of long-range improvement programs, and since there is a public interest in the principle of advance works programming and planning, encouragement should be given by the governmental units in the form of financial assistance to the planning and engineering agencies for continuation of this work, which will alleviate, later, some of the major problems connected with industrial growth and post-emergency employment.

3. The various cities and counties, the school, drainage, diking and utility districts should avail themselves of the existing enabling legislative acts (some just enacted) permitting, encouraging and urging political units to set up reserve funds for future construction projects, delayed repairs and replacements, thus to accumulate funds for future employment. If followed now, when excess funds are available, such a policy will aid both in meeting the present problem of inflation and in paying in advance for much work which normally would be done annually and paid for now in any event. As a corollary, the public should realize a responsibility in meeting programs to retire floating debts where they exist and in giving intelligent support to public officials for going forward thereafter in building up reserve funds.

4. Present private and public studies of possibilities for manufacturing construction materials, such as plastics, metals, wall coverings, etc., should be continued.

Conclusions

Increased war activities and increased population have added greatly to the governmental and service problems of the area, particularly as to power, transportation, schools, housing, and sanitation. Public improvements have been limited largely to the more urgent of projects directly related to the war effort. A number of public improvements are overdue, and much maintenance is also being deferred.

A large program of public and private construction improvements will be needed for the immediate post-war period, with its necessity for readjustments before there can be a resumption of more normal trends of development. It will be necessary to overcome the war-caused lag in development of physical plant and services. It is imperative that we plan and build now a framework for private and public works and services for the period of growth that is coming shortly after the close of the war. This development seems inevitable as a result of our resources, power, industry, strategic location and expanded markets. We must plan and build to profit from a stimulated and released science, from invention and new technology in industry, commerce and transportation.

Assuming continued development in the Pacific Northwest and in a wider North Pacific region, extending as far as Alaska, together with a post-war renaissance of world trade, the future growth of the Puget Sound area will probably be substantial. Thus we need to make "large" plans with a vision and a certainty of fulfilment, at first providing an employment cushion and later a continuous construction industry in providing useful economic regenerative works and services for the enjoyment of this generation and those to follow.

534268—43——11

PART V

CONCLUSIONS

By Puget Sound Regional Planning Commission

	Page
A. Summary of Recommendations	157
B. What Is To Be Done?	159

PART V

CONCLUSIONS

By Puget Sound Regional Planning Commission

A. SUMMARY OF RECOMMENDATIONS

The Puget Sound Region

The region contains slightly more than 15,000 square miles and had in 1940 a population of just over a million. It is distinct geographically and coherent both economically and culturally. With its diverse industries and trade, the region serves an extensive hinterland in the Pacific Northwest. Its principal ports have special relationship to Alaskan, North Pacific, trans-Pacific, coastal, and intercoastal trade. During the past 2 years population in the 12 counties comprising the region has increased by more than 200,000 with a further increase in prospect under the impetus of war production. By the end of 1943 a population of 1,315,000, as compared with a 1940 population of 1,007,000, is indicated. Many industries have been expanded and several entirely new ones added. Present activity in Navy shipbuilding and repair, merchant shipbuilding, aircraft fabrication, forest products manufacturing and aluminum production is particularly noteworthy. Expanded military activities involve ground, air and supply forces of the Army and Navy sea, air, and supply establishments. Alaskan and overseas shipping activities have been stepped up markedly.

The Current Situation

The current situation might be summarized as follows: After a long period of growth at a rate considerably in excess of the national average, the region has recently experienced an extremely large accession of war industries, new population, and new housing, and with it new problems attendant upon large dislocations which have occurred in community life. The region faces post-war problems of unusual intensity involving the conversion of industry, new shifts in population, deferred and new public improvements, and a new adjustment to resume normal growth. Coordinated region-wide solutions are required for many of the problems of the war and post-war eras.

Increased war activities and increased population have added greatly to the governmental and service problems of the region, particularly those relating to power, transportation, schools, housing, and sanitation. Public improvements since the period of rapid expansion began have been limited largely to urgent projects directly related to the war effort. A number of much needed public improvements are now overdue and much normal maintenance has been deferred. To catch up with these needs and to furnish employment, a large program of public improvements will be needed for the post-war period of readjustment and the resumption of more normal trends of development.

Assuming continued development in the Pacific Northwest and in a larger International Northwest extending as far as Alaska and assuming a post-war renaissance of world trade, the future growth of the region probably will be substantial.

General Plans

In an area more than ordinarily tied together by geographic conditions, with a number of extensive metropolitan communities, and with substantial agricultural, forest, mineral, recreational, and other resources, there is a definite need for continuous over-all planning to supplement that of counties and cities, especially to meet the common problems of war adjustment and of post-war reconstruction and development. The advantages of over-all and multiple-use planning in various fields are particularly striking.

The foregoing report includes general plans in all the various fields of regional development. Assembly of these plans provides a first draft of an over-all regional plan. It is hoped that this will lead toward the further development of specific working designs, programs, and additional projects. Beyond the values involved in plans for development in specific fields there are important benefits in an integrated view of objectives, directions, and plans for meeting the social, economic, cultural, and governmental needs of the region and its present and prospective population. The consolidated plan envisaged as a result of the present project should provide a valuable guide to the development of more detailed policies, plans, projects, and programs.

Land and Agriculture

After the war and for a considerable period in the future there will undoubtedly be increased pressure on

the land and an increased need for well planned and orderly land settlement. Land use controls are essential. Land settlement opportunities involving a total of about 130,000 acres ultimately will provide about 1,600 new farm units. These opportunities can be created as required by reclamation through clearing, drainage, diking, and irrigation. Similar developments on an additional 410,000 acres would benefit about 12,000 present farms or fully one-third of all which now exist in the region. Supplemental summer irrigation in some areas will increase the productivity of agricultural lands.

We may not all agree that our population volume is limited by the cultivated and available agricultural land acreage of the Pacific Northwest. Puget Sound residents will continue to squeeze oranges from California and drink coffee from South America, because of long-existing trade relationships and the necessity of continuing them for national and international, as opposed to purely regional, prosperity. Nevertheless, it is essential that there be developed all possible acreage for crop lands. The use of land must be intensified by irrigation and soil conservation. This will assure food for our present increased population at reasonable costs and will also supply employment opportunities for many families on reclaimed lands.

Minerals

As the industrial situation, which has recently been changing so rapidly, continues to develop in the post-war period, more intensive and extensive geological surveys are required to provide private initiative with necessary information as to mineral resources. The mine-to-market road program now in effect appears adequate. Public research in treatment of ores and in extraction of metals should continue, as should public assistance to prospectors through preliminary determination of ore samples.

Forests

Most of the forest and forest industry problems have been accentuated by war activity. A large part of the more accessible and valuable forest lands of the region have been cut over. There should be a wider recognition of the urgency of putting an end to localized overcutting. Adequate restocking must be fostered in many areas if the basis for the forest industries in the region is to be perpetuated. Adequate protection of all forest land against fire must be provided. Forest lands should be managed on a sustained yield basis under a cooperative plan. This will involve stabilization of ownership including removal of some of the economic obstacles to private ownership and a better distribution of private and public ownership. Forest industries providing a higher degree of utilization and a larger proportion of local remanufacture should be developed.

Water Resources

Public water supplies are generally pure at their sources and ample in quantity. The demands of war production have overtaxed a few supplies but their expansion presents no serious problems. The reservation of certain streams and the elimination of existing sources of pollution of a few surface supplies are recommended in the body of the report. Pollution most seriously affects the supplies taken from the Skagit River. Increasing pollution of Lake Washington is seriously affecting its recreational uses. Early construction of sewage treatment plants adequately to treat all sewage entering these waters is recommended. Serious flood problems exist on most of the rivers of the Puget Sound basin. Each stream requires separate study. Improvement of the Puyallup through Tacoma as planned by the United States Army Engineers should be undertaken at the close of the war. Added protection is urgently needed in the Skagit, Snohomish, and Green Rivers, following plans of the Army Engineers. The major need is increased Federal funds for speeding up the river improvement program. An increase in fisheries productiveness for the area's streams appears economically feasible through stream improvements recommended in detail in this report. A continued expansion of the water power resources of the area should be guided by the economic considerations involved and the principle of multiple use; it should precede the development of markets. Cheap and ample power is the key to the industrial development of the area, and its maximum utilization is essential. Preparations for an expansion after the war in waterborne commerce, both coastwise and foreign, require improved terminal facilities and a better coordination of all forms of transport at the various Puget Sound ports. Recreational advantages will be augmented by eliminating pollution, improving the fish runs, and providing additional safe salt water moorings for small boats and easier access to the lakes and streams of the area. Further studies of erosion and its control should be carried out with a view to reducing the cutting away of farms and the silting up of harbors and river mouths. Supplementary irrigation during the dry summer months is proving effective and profitable. Groundwater investigations should be made by the United States Geological Survey under local cooperative agreements so that data will be available as needed by local interests. More comprehensive basic stream flow data are needed and an expansion of stream gaging facilities and program is recommended.

Industry and Commerce

On private initiative rests the responsibility for the providing of jobs in industry and commerce. Public initiative may well examine existing regulations and taxation to determine that every encouragement be given to private enterprise. To aid industry and commerce, public funds may well be expanded in research to further new or improved industrial processes which use our natural resources and to facilitate the marketing of these products. Trade relationships with the Pacific Northwest, the North Pacific, and northeastern Asia will probably be particularly significant after the war. National policy affecting the volume of commerce with the rest of the world will dictate the region's future in this field. Therefore, it is in the region's interest to work for the freeing and promoting of mutually beneficial international trade.

Transportation

Engineering surveys, designs and specifications for the integrated plans in the field of transportation development reviewed in this report are especially needed. A system of limited or express highways with interregional, national, and international connections is overdue. War activities have demonstrated inadequacies in port and terminal facilities. The cities and ports need to take the lead in these recommended improvement programs. The revolutionary development of air transport, both passenger and freight, domestic and foreign calls for radical revision of air transport facilities as well as their connections with rail, motor and water transport. Most of the plans for airport facilities already are being developed. Airports should be completed as indicated in this report. A streamlining of railroad trackage, terminals, and equipment will benefit the region, and maintain the necessary railroad facilities for normal and future emergency use. Port and channel improvements are a continuing need.

Communities and Facilities

There should be further development of standards and criteria for the improvement of community patterns, facilities, services, and governmental organization. Specific detailed designs should be drawn to meet problems created by the war, to make adjustments in the transition period following the war and to secure a long-term peacetime economy. In these problems common to the communities of the region some important general lessons may be drawn from the current Tacoma progressive urban planning project.

Housing

Before the war, some beginnings had been made, particularly in Seattle, toward slum eradication through low-rent housing developments. We recommend adoption of clearly defined policies for the disposal of present temporary war housing, bearing in mind that some of the Lanham Act war housing may be of sufficiently high standard partly to meet local ordinance requirements and could be used for low-income families. Amendments to State and Federal legislation should stimulate strong local housing authorities which will be able to encourage private enterprise or a combination of public and private enterprise to build housing for low income groups.

Recreation

Climate and physiographic features provide unparalleled opportunities for varied recreation. With the exception of inadequate local facilities of playgrounds and buildings the recreational needs of the region are substantially met. Better organization to administer existing facilities at State, county and city levels is necessary and greater attention should be given in construction of new highways to the preservation of, and ready access to, recreational features. Since the providing of services and facilities to tourists and recreationists calls for extended investments and provides a substantial income to the area, private enterprise should be encouraged to the maximum.

Medical and Public Health Services

While medical and public health services supplied previous to the war reached, in some cases, accepted standards, there were areas which showed serious deficiencies. The armed forces' demand for such services has seriously reduced standards. With increased population following the war, pre-war standards, at least, should again be attained and surpassed, public health personnel increased and a system of medical and hospitalization insurances such as is now in force in one county considered for adoption in all counties.

Education

Reorganization of school districts is serving to improve educational opportunities in the region. A school building construction program should be an important part of post-war planning.

B. WHAT IS TO BE DONE?

The Puget Sound Regional Planning Commission believes that, with this report as a basis, the constituent counties, cities, and other public bodies should now individually proceed to develop, by further engineering studies, their own detailed plans for public improvements, together with methods of financing construction.

Evidently the region's transportation systems require such a body as this commission to coordinate plans and to work with the State, but within each city separate consideration should be given to improvement of traffic facilities, to elimination of grade crossings, to off-street parking and to other improvements to facilitate the safe and easy flow of traffic. It is expected that other public and cooperative agencies having jurisdiction over other items in these proposed plans will also take necessary steps immediately to set up action programs, as time may be limited.

While the interest of the business men of the region in these plans and studies is not only highly desirable but essential for their ultimate success, it is believed that they themselves should proceed to develop their own plans for post-war full employment.

The Puget Sound Regional Planning Commission commends this first report to people of the area and urgently requests that they give it sympathetic study so that it may be improved and refined and ultimately translated into action programs. Only by such means can the region take its proper place in the State, in the Pacific Northwest and the Nation and secure for itself an economically efficient and socially desirable civilization, one that will provide for present and future inhabitants and occupy a significant place in national and world reconstruction, industry, commerce, and security.

○