AN ABSTRACT OF THE THESIS OF

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Title: A QUANTITATIVE METHOD FOR USING AN INVENTORY OF THE SOIL AND WATER RESOURCES OF THE STATE OF OREGON TO DETERMINE HUMAN POPULATION CARRYING CAPACITIES FOR TWO ACCEPTABLE QUALITIES OF LIFE

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A method was developed for converting the food producing capabilities of Oregon's soils to numerical data from which state and county carrying capacities for human populations could be calculated. Another method was developed for converting the needs for housing and related support construction to numerical data which would consume cultivated soils as the population increased. An existing inventory of the state's soils and their characteristics was used to determine the locations and quantities of soils for each of the 36 counties and 17 major drainage basins. Seven major characteristics and limiting factors were included with other soil type information on 3,102 computer cards. Tabulation of the characteristics and limiting factors is presented in appendices by counties, drainage basins and the state. Streamflow records were obtained for all surface water gauging stations on Oregon streams.

Records of the frequency and length of consecutive lower than average streamflow years were determined for significant streams by computer. The carrying capacity for human needs for housing and associated construction, dietary carbohydrates, proteins, and for water were determined for each county, drainage basin and the state for two different qualities of life. The computer program simulated competition between building and agricultural uses for cultivated soils. Printouts included all carrying capacities and final projected equilibrium dates. Oregon's carrying capacity was determined to be about 4.0 million people at a high standard of living, and about 4.8 million at an adequate standard of living. Factors which enhance or limit the carrying capacity were discussed for each county and basin and, for the state as a whole. Suggestions were presented which could refine data to be used for more precise information.

A QUANTITATIVE METHOD FOR USING AN INVENTORY OF THE SOIL AND WATER RESOURCES OF THE STATE OF OREGON TO DETERMINE HUMAN POPULATION CARRYING CAPACITIES FOR TWO ACCEPTABLE QUALITIES OF LIFE

by

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DEDICATION

This work is dedicated to the people of the State of Oregon.

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A QUANTITATIVE METHOD FOR USING AN INVENTORY OF THE SOIL AND WATER RESOURCES OF THE STATE OF OREGON TO DETERMINE HUMAN POPULATION CARRYING CAPACITIES FOR TWO ACCEPTABLE QUALITIES OF LIFE

CHAPTER I

INTRODUCTION AND OBJECTIVES

The intent of this study is to demonstrate a means of calculating the size of the largest human population that the state of Oregon's own resources can sustain on a long term basis at an acceptable quality of life. The key resources used as the basis of the study are the capabilities of the soils to consistently provide acceptable diets and housing for present and future populations in Oregon, and the reliable water supplies upon which the populations must depend.

An acceptable quality of life includes many real and intangible contributing factors. Some of the needs which must be satisfied to attain an acceptable quality of life are the needs for food, shelter, space, a supporting economy, status, security, recreation, and others. However, the fundamental physiological needs for food and shelter must be satisfied before any of the other needs become of importance (Bennis and Schien, 1966). By limiting the calculations to the capacity of Oregon's soils and waters to satisfy only the fundamental physiological needs for food and shelter, a maximum figure for the population of the state can be derived. The many other factors which contribute to a more comfortable quality of life may demand more land and water per individual than the bare minimum required for food production and shelter.

Later studies which include the more comforting qualities of life will almost certainly reduce the maximum figure derived by this study and, eventually, the real human population carrying capacity of the state could emerge.

Sufficient inventories of quantities and capabilities of soils and quantities of reliable water supplies exist from which the initial maximum population calculation can be made. While all of the inventories were originally compiled to optimize the utilization of these resources by humans, no previous study has quantitatively equated the inventories to food and shelter satisfaction. Consequently, certain assumptions have been made in this study. One set of assumptions deals with the diet, water supply and shelter necessary to provide an acceptable quality of life. A second set deals with the abilities of Oregon's soils to provide food and building space. A brief introduction to these groups of assumptions follows.

A single diet and housing determination at a barely acceptable level for Oregon's residents would be intolerable and unrealistic. Therefore, two separate qualities of life were defined. One has a more restrictive but still acceptable limitation of nutrients, water and shelter, this was named the standard quality of life. The other has more liberal limitations of the same necessities and was named the present quality of life. The standard quality of life used dietary requirements of 3,000 calories per individual per day which included 70 grams of protein (50 percent from animal sources), 150 gallons of consumable water per person per day and 0.225 acres of land for housing requirements as a calculating base. The present quality of life used dietary requirements of 4,500 calories per individual per day which included 105 grams of protein (70 percent from animal sources), 250 gallons of consumable water and 0.289 acres of land for housing requirements.

The more restrictive, or standard diet was based on an average of the recommended dietary allowances of the U.S. Public Health Service, U.S. Army, Canadian Army and the United Nations World Health Organization (Burton, 1965). This diet was selected as one containing the least nutrients which an individual would require for an acceptable quality of life. The more liberal, or present dietary requirement was obtained from a variety of sources which reflect normal daily diets enjoyed by affluent individuals at this time.

Estimating the potential productivity of 1,478 different types of soils required certain value judgements to be made for each soil type. Data about the soils were entered on computer cards and included code numbers which referred to each value judgement. While most of the data contained on each card, such as location, percent of slope, major crop use, irrigability, etc., are not debatable, others, such as acres involved, potential yields, limiting factors, etc. could be debatable. The population predictions are calculated by a computer, using both the "debatable" and firm data. Whenever updated versions of "debatable" data become available, the presently used data card can be replaced by another card which contains the corrected data, and the program can be rerun to determine a more accurate maximum population value for the state.

Each cultivated soil was considered to be used either for the production of wheat or for construction purposes. The productivities of pasture, hay and range lands were considered to be used only for beef production to satisfy dietary animal protein requirements. However, Oregon's farmers and ranchers raise a multitude of crops other than wheat and beef on their soils. Cultivated soils are also used to grow vegetable and fruit crops for fresh produce and processing, potatoes, nuts and others. This study uses calories of carbohydrates for dietary satisfaction and wheat has the highest caloric value of all carbohydrate foods normally produced. By using wheat as the named carbohydrate crop, the caloric values for other crops are increased, or, to put it another way, their acre yield will be increased. Some comparable caloric values for carbohydrate foods, published in the Heinz Handbook of Nutrition are (Burton, 1965):

70 percent extraction of cereal grains	4.12 calories per gram
Dry beans, peas and nuts	4.07 calories per gram
Potatoes	4.03 calories per gram
Vegetables	3.99 calories per gram
Fruits	3.60 calories per gram
Sugar	3.87 calories per gram

Later studies may wish to detail the carbohydrate caloric output more closely for a county, but the present study was intended to be generous with the producibility of the soils. The 70 percent extraction rate for wheat is also higher than the extraction rate of most other crops by the time they reach the table (Burton, 1965). Similar conversions are possible for interchanging beef production with sheep (five sheep to one beef), horses (one and one-quarter horses to one beef), mule deer (four deer to one beef) and other animals harvested for protein supplies (U.S.D.A. S.C.S., 1967).

The dependable flows of water from streams and rivers which drain the precipitation falling on Oregon were also evaluated. Only those waters which arise in the state are considered in this study to belong to the state. Oregon residents utilize waters from the Columbia and Snake Rivers, which are interstate waters. Present levels of use of those rivers were included in this study. However, increased usages of these waters are in question, as the organization of an interstate compact between users does not seem likely at this time (Doerksen, 1972), and the fate of Columbia River waters arising in Canada is unknown. An indication of the importance of Canadian water in the Columbia River is:

> "If the water arising in Canada, 43 million acre feet [35.2 percent of the flow equalled or exceeded in 4-of-5 years], is assumed to be diverted from the Columbia Basin by Canadian interests, the flow at the Dalles would be deficient of meeting all requirements [in Oregon] by 28,200,000 acre feet [by the year 2070].
>
> (S.W.R.B., Ultimate Needs, page xvii, 1969)

The apparent uncertain future of these interstate waters interferes with their long-range dependability, so expanded uses of the resources were not considered. The only expanded uses for water considered in this study were for human consumptive uses. Irrigation waters were assumed to be available in unlimited (but unidentified) supply.

Groundwater supplies are extensively used throughout the state. This study assumes that present levels of use of this resource can continue indefinitely. Expanded usage of these waters cannot be reliably predicted until more comprehensive studies of groundwater supplies become available.

Oregon is, basically, a renewable resource oriented state. The importance of the continuing production of forestlands, cultivated soils and ranges, and the protection of water supplies, should not be underestimated. The contributions of lumber and forest products exported from the state were not considered in this study. Reference to their importance throughout the text is generally relative to the reasons for population concentrations in certain areas and not to their ability to economically support more or fewer individuals. Economic carrying capacity studies of Oregon's forest resources may show the possibility of their being used as barter products for additional food supplies, which could be used to support more residents than the state's own soils can sustain. The task has not been performed, and this possibility is not considered in this study.

New studies of Oregon's land and water resources and their utilization are presently being made by state agencies. The Department of Environmental Quality (D.E.Q.) of Oregon was created in 1969 with responsibilities to administer and enforce the laws of the state relating to air, water and noise pollution and solid waste disposal (Meyers, 1973). Staff members of the D.E.Q. have been drafting drainage basin water quality management plans for the state (D.E.Q., 1974) in compliance with requirements contained in the federal Clean Water Act of 1972, P.L. 92-500 (E.P.A., 1972). However, for the voters in Oregon, more studies were necessary than those conducted by the D.E.Q. In 1973, the

Oregon Legislative Assembly passed Senate Bill 100 which created the State Land Conservation and Development Department. Governor Tom McCall appointed Arnold Cogan as the Department's first director. The working body of the new department is the Land Conservation and Development Commission (L.C.D.C.) with its director, L.B. Day. The Commission's charge was to immediately set goals and suggest guidelines whereby long-range state-wide land use planning could be accomplished. The law which established the L.C.D.C. instructed that each county make its own plans, and that citizens be involved with the planning processes. Such an ambitious task requires inventories to be made of the amounts and capabilities of each county's soils. The Commission recommended that carrying capacities for each of the goals be included in all planning activities.

The carrying capacity concept is inseparably linked to a desired quality of life. An acceptable quality of life must be defined before reliable land use planning can proceed and carrying capacities can be calculated. The only previous study of the human population carrying capacity for this part of the nation was published in 1973 by the Pacific Northwest River Basin Commission (P.N.W.R.B.C., 1973). It was determined for the Columbia River Drainage Basin under the able direction of Eugene K. Peterson, who used the gross regional product as a common denominator. The quality of life desired for the residents in this study was a dependable per capita income of $7,500 in 1965 dollars with an 80 percent pollution control on the contributing industries. The study used a "sustained yield" approach and defined carrying capacity as:

> "The achievement, and management in perpetuity of annual or regular periodic outputs or other functions of the various renewable natural resources without permanently impairing long term productivity, ecosystem integrity or the quality of the land, air and waters and their environmental values. Within the above limitations, the quantity and quality of outputs or other functions can be varied in accordance with the quality and intensity of the management and technology inputs. Similar to 'steady state' or 'ecolibrium'."
>
> (Ecology and the Economy, 1973, page 68)

Another definition of carrying capacity has been published by the L.C.D.C. as:

> "Level of use which can be accommodated and continued without irreversible impairment of natural resources productivity, the ecosystem and the quality of air, land and water resources."
>
> (L.C.D.C. Statewide Planning Goals and Guidelines, January 1, 1975, page 2)

The definition of carrying capacity used in this study is:

"The level of use of the soils and waters which can continuously accommodate human population numbers without irreversible impairment of their potential productivity."

The "Ecology and the Economy" study was statistical in nature and implied the presence of a complete and current inventory of all factors upon which the economy of the Pacific Northwest depends. However, the source from which their data were taken for the carrying capacity determinations, freely states that their plans and programs were formulated after:

> "...using general relations, reasoned approximations, available data, and judgement of experienced planners, and they were formulated after public meetings in nearly all of the various states."
>
> (P.N.W.R.B.C., 1972, page 1)

The lack of complete information from which to determine carrying capacities should not detract from the importance of their determinations. The P.N.W.R.B.C. carrying capacity study is important as a milestone with which future studies can be compared. Data from previous drainage basin studies within the Columbia River Drainage Basin were used to determine a potential human carrying capacity of not over nine million persons for the specified quality of life they declared acceptable.

Drainage basin data are frequently used to calculate the potential of an area. A major reason for this approach is that a specific quantity of water is contained within the basin, and the combination of soils of each basin is unique in quality and location. The State Water Resources Board of Oregon (S.W.R.B.) and the D.E.Q. consistently use drainage basins as their units of study. However, governmental responsibilities within the state rest with the counties and oftentimes a single county will have soils in as many as four drainage basins (e.g., Klamath County). This study presents data and discusses the potential carrying capacities of the 17 drainage basins and 36 counties in the state separately.

This study used only the land and water resources of Oregon as the basis of population support for three reasons. First, the productivity of soils is directly related to their ability to obtain sufficient water supplies to produce harvestable crops. Most of Oregon's precipitation occurs between October and March and must be conserved for use during the months of greatest plant and animal demands. While a few streams could support additional reservoirs, most streams in the state presently show lower minimum flows than are recommended by the State Water Resources Board for economic uses, or the Oregon Fish Commission for continued fish production. Regulation of the water quality in streams and rivers by the Department of Environmental Quality will ultimately maintain the reliable surface water supplies at their maximum multiuse potential, but the necessary corrective measures will not yield more water. This study evaluates the ability of drainage basin water supplies to consistently support present and future populations and still maintain the productivity of their soils.

Second, the quantities of good producible soils and reliable water supplies are finite in quantity. Fundamental land use planning will be conducted at the county level. The success or failure of the planning processes will depend upon the quantitative nature of their approach.

Third, the point of irreversibility in resource use can be passed without recognition of its existence. Indiscriminate action in resource management oftentimes squanders a portion of the soil and water bases unknowingly, and the quality of life for the residents of the area will decrease without real recognition.

CHAPTER II

METHODS AND MATERIALS

GENERAL REMARKS

The calculations which follow define the soil resources required by one individual in order to live at either of two specified qualities of life with regard to carbohydrate and protein consumption, and with regard to living space. The locations, quantities and characteristics of the soils were obtained from existing inventories. The data contained on the 3,102 computer cards which identify the locations and uses of the soils is included and explained.

The method used to determine the acreages of soils necessary for dietary sufficiency and housing satisfaction are detailed. The soil and water requirements that were derived and used to determine the carrying capacities for each quality of life were:

Requirement	Present Quality of Life	Standard Quality of Life
Carbohydrates	0.602 acres	0.517 acres
Animal Protein	2.597 acres	1.237 acres
Housing	0.298 acres	0.225 acres
Water Supplies	0.384 c.f.s./1,000 individuals	0.231 c.f.s./1,000 individuals

(c.f.s. = cubic foot per second)

The method used to calculate the consecutive lower than average water years from streamflow data is given. The Deschutes River is used as an example for determining the quantity of waters available for future population growths.

Finally, the procedures and calculations used to allow competition to exist between agriculture and building uses for cultivated soils are presented.

Examples are used to demonstrate the use of several of the methods utilized in the study.

Soils

Soil data used in this study were taken from existing public sources or from studies which had not yet been released, but which were in preparation for public presentation. The only complete inventory of the state's soils, as of January 1, 1975, was compiled by the Agricultural Experiment Station at Oregon State University (O.S.U.) and the U.S. Department of Agriculture's Soil Conservation Service (S.C.S.) for the State Water Resources Board (S.W.R.B.). The S.W.R.B. used and published the soils data in 1969 (S.W.R.B., 1969, Appendix I-1 through 18), for the determination of Oregon's long-range requirements for water for irrigation purposes. All soil data for the present study were taken from this 1969 publication, except that for the nine counties contained within the Willamette River Drainage Basin. Data for the Willamette River Basin were copied at S.C.S. offices at Eugene, Salem and Hillsboro from surveys not yet released for publication, and from published information for three counties (Clackamas County, 1970; Washington County, 1971; Yamhill County, 1970). Data for other counties in the state have been compiled by S.C.S. personnel, but as it was not possible to accurately identify the quantities located on the divides of the drainage basins, they were not used. All of the above reports caution the user that data may be inaccurate and should be used for general purposes only.

Oregon's soils have been classified by S.C.S. soil scientists according to uniform procedures set forth by the U.S. Department of Agriculture (U.S.D.A.). The classification divisions are by "soils series", which are descriptions of the soil type from the surface downward. Each soil series is further classified by sub-series, which are determined by the slope of the soil (i.e., sub-series 1 = 0-3 percent slope, sub-series 2 = 4-7 percent slope, etc.). Some soil series used in this study have tentative status in the national system of soil classification or have not, as yet, been named.

Characteristics of the soil were obtained by S.C.S. by field and laboratory evaluations. Soil type locations were identified by field and aerial photograph study. Acreages of types of soils were determined by means of a calibrated grid device or by planimeter. The acreage for each series or sub-series was listed for each county and basin in the S.W.R.B. publication. Many soil series or sub-series occur in more than one county or drainage basin. Two or more cards were made if the soil type was in two or more basins and yet, is located in the same county, each with the specific quantity of soil involved. All cards were sorted to assure accurate recall of data.

The S.C.S. is presently publishing detailed information about each of the state's soil series on <u>OR-1 Soils</u> forms. The characteristics and potential uses and yields are extensively described, but the locations and quantities of the soil type are not included. This study used the descriptive information and data from the OR-1 forms, where available, as the latest and most authentic information about the series. The forms are available at local and district S.C.S. and County Extension offices for soils series which have been completed in their district. An <u>OR-1 Soils</u> form is shown in Appendix C, page 773.

Soils oftentimes have features which limit their use for agriculture or construction, such as excessive clay or stones, excessive slope, elevation, a brief frost-free period, low annual precipitation, flooding and others. A list of 99 such limiting factors was prepared from S.C.S county soil interpretations for land use (Clackamas County, 1970; Washington County, 1971; and Yamhill County, 1970) and from OR-1 forms (Appendix C, Fig. C1).

A computer card was made which described important features of each soil series or sub-series within a series. The following information was contained on each card:

1. An identification code number for the soil series and sub-series.
2. The county in which that soil type is located.
3. The basin in which the soil type is located.
4. Average slope of the soil type.
5. Elevation of the soil type (hundreds of feet above sea level).
6. Frost-free period (32°F. of the location of the soil type).
7. Range of annual precipitation in inches on the location of the soil type.
8. Number of acres occupied by the soil type in the county and the basin.
9. The probability of encroachment by construction activities relative to the location of the soil type (see explanation following).

10. The percentage of useability for construction purposes relative to limiting factors inherent to the soil type (see explanation following).
11. The probability of crop use relative to the location of the soil type (see explanation following).
12. The percent of useability for agriculture relative to limiting factors inherent to the soil (see explanation below).
13. The identification number of the limiting factor used to establish item #10 above (Appendix C, Table C7).
14. The identification number of the limiting factor used to establish item #12 above (Appendix C, Table C7).
15. Current major land use of the soil type.
16. Hydrologic grouping of the soil type (engineering) (see explanation below).
17. Land capability class and subclass of the soil type (Appendix C, Fig. C2).
18. Septic tank filter field limitation of the soil type.
19. Code to identify the card as one containing information about soils.
20. Irrigation suitability of the soil type (see explanation below).

Explanation for items #9, #10, #11, #12, #16 and #20 (items #9 and #11 are related, and are explained together):

9 & 11. Studies of soil maps (S.W.R.B., 1969) county highway maps (State Highway Division, 1973), and aerial photographs were made for each county in order to predict the possible future uses of soils near urban centers. Discussions with realtors and planners were often necessary to establish the probability that soils close to urban centers might be utilized for construction. Then, the total quantity of each soil type in the county was considered, and a judgement was made that a certain percent of that soil type acreage would be built upon. The values ranged from one percent for soil types located far from urban growth to 99 percent for soil types located adjacent or in urban areas. This value is the "probability of encroachment", item #9. Item #11, the probability of crop use was determined simultaneously with the probability of encroachment. This is the quantity of the acreage not likely to be built upon and will be used for agricultural purposes. As an example, consider a small acreage of a certain sub-series of soil which is located adjacent to an urban area. The soil is nearly level (0-3 percent slope) and has a road through one side of the acreage. Urban growth would probably encroach upon most of the soil near the road and the urban center, so, a value of 0.85 (85%) might be assigned as an

encroachment probability. In this case, a value of 0.15 (15%) is also given as the probability of crop use. In determining the actual future use of that soil, 85 percent might be considered to be used for construction, 15 percent for crops, and the soil type is fully utilized.

10. Ninety-nine limiting factors for construction or agricultural use were identified and used to assign a "percent of useability" value to each acreage of soil of a particular type. The useability value was determined from studies of OR-1 Soils forms, S.W.R.B. soils descriptions and other records available about the soil type. The percent of useability was determined relative to the capabilities of one of the best Oregon soil types - Willamette, 0-3 percent slope, non-flooding. Considering that nearly all of the Willamette soil can be used for construction, the percent of useability is the percent of one acre of soil of another given soil type which can be occupied by urban development. Values for utilization for building ranged from zero percent for watershed and dune areas, to 99 percent for the Willamette soil described. Support facilities such as roads, schools and other public facilities, commercial establishments, industry, etc. were taken into consideration where limiting factors such as slopes above seven percent, possibility of flooding, etc. were characteristic features of the soil type. Whereas the probability of encroachment is an estimate of the fraction of a soil that will be utilized for

urban development (because of the proximity to present development), the percent of useability value states the fraction of the encroached soils which can actually be occupied, due to limitations of the soil itself.

12. The percent of useability for crops relative to limiting factors inherent in the soil was a value given to each soil series and sub-series. This is the fraction of an acre of the Willamette soil that would equal the production of an acre of the given soil type being evaluated. The value was assigned after detailed study of S.C.S. OR-1 forms, Commodity Data Sheets (O.S.U., Commodity Data Sheets, 1972), U.S.D.A. Reports (U.S.D.A., Water and Related Land Resources, 1962-68) and consultations with S.C.S. field men, County Extension Agents, O.S.U. staff members, Bureau of Land Management (B.L.M.) field men, farmers and ranchers. Where information about the soil type was incomplete or unavailable, comparisons were made to similar soil types and generous values were given. As an example, consider a soil with the property "prolonged inundation" (item #30 on the list of limiting factors, Appendix C, Table C7). The percent useability for construction is 0.01 (one percent) and for crop production is 0.10 (ten percent). This means that, on the average, this soil has the capability of producing ten percent of the crop that the finest soil in the state produces or, one acre of this soil is required to produce as much as 0.1 acre of the Willamette soil could

produce. During wet years there would likely be no crop at all, but during dry years, a higher fraction than ten percent could be produced. A specific example with calculations appears later in this section.

16. The "hydrologic soil group" includes soils with similar potentials for water runoff. Groupings are based on interpretations of physical profile features such as depth, texture, permeability and mottling. The groups are very broad and include soils that are quite dissimilar in slope, soil characteristics, annual precipitation and vegetative cover. While the hydrologic grouping is not further used in the discussion of this study, it was valuable in the determinations of values assigned in items #9, #10, #11, and #12 above.

20. The irrigabilities of soils were rated as excellent, good, fair, poor or nonirrigable. The information was taken from the 1969 publications of the S.W.R.B. (S.W.R.B., 1969, Appendix I, 1-18) and from S.C.S. OR-1 forms.

A FORTRAN computer program was constructed to tabulate the following information contained on the soil type cards.

1. The acreages of land capability classes and subclasses in each county and drainage basin. The program does this by examining all 3,102 cards for the state, selecting, sorting and tabulating the acres (item 8 on the card) by counties and drainage

basins (items 2 and 3 on the card) for each of the land capability classes and subclasses (item 17 on the card). Examples may be seen in Appendices A and B for counties and basins. Additional totals of soils in subclasses "e" (erosion) and "w" (water in or on the soil) for Capability Classes I through IV are included in the tabulations. Erosion and water in or on the soil are problems which may often be minimized by management and corrective procedures. Capability Classes V and VIII are not included in the tabulation for reasons discussed in Appendix C, Fig. C2.

2. The acreages of all types of soils in the state which have different slopes (0-3%, 4-7%, 8-12%, 13-20%, 21-30%, and greater than 30%) for each county and drainage basin.
3. The acreages of all types of soil in the state which are located at different elevations (in hundreds of feet) from sea level to 6,000 feet in each county and drainage basin.
4. The acreages of all types of soil in the state with average frost-free growing periods (32°F.) of less than 30 days per year to greater than 210 days per year for each county and drainage basin.
5. The acreages of all types of soil in the state separated into their different current major land uses for each county and drainage basin. The major land uses are for cultivation, hay, pasture, range, forests and watersheds.

6. The acreages of all types of soil in the state were separated by their potential responses to irrigation for each county and drainage basin. The irrigability classes are: excellent, good, fair, poor and nonirrigable.
7. The acreages of all types of soil in the state were grouped according to their septic tank filter field limitations for each county and drainage basin. The filter field limitations used are: slight, moderate, severe and very severe.

All seven of the above tabulations for each of the 36 counties and 17 drainage basins in Oregon are contained in Appendices A and B. The acreage totals for each county include the fraction contained within different drainage basins and also the total for the entire county. For example, Wasco County has soils in Hood, Deschutes River and John Day River Drainage Basins. The types and uses of soils are different between basins as are the population distributions and related urban expansion demands. The total acreage of the seven tabulations binds the various ecological divisions of the county into a single, politically bounded management unit. Drainage basin data are divided into tabulations for each county within the basin and are totaled for the entire basin.

Computer Calculations

In order to calculate the food production capabilities of the 584 different soil series and their 1,478 sub-series, it was convenient to compare their potentials with that of a single optimal soil type. The values assigned and recorded in items 9, 10, 11 and 12 were utilized for this purpose.

The soil series selected as an optimum type of cultivated soils was Willamette, 0-3 percent slope, non-flooding of Capability Class I. All other soil series which had cultivation as the present major land use were standardized by comparison with Willamette soils. By this procedure a single calculation was possible for all equivalent acres, regardless of the soil series or sub-series of the soil series from which they originated.

Example 1. Calculations for Equivalent Acres

Hood soil, which is a soil series located in and above the city of Hood River was selected for the example. The soil series has three sub-series: sub-series A has 2,700 acres of silt loam soil with 3-8 percent slope; sub-series B has 1,300 acres of silt loam soil with 8-12 percent slope; sub-series C has 3,800 acres of silt loam soil with 35-65 percent slope (S.W.R.B., 1969). The soil is good, deep, well drained orchard soil and, wherever possible, is utilized for growing apple and pear trees. Sub-series A was assigned a probability of 0.05 (five percent) of being encroached upon by construction, and a probability of 0.95 (95 percent) that it would be used for crops. In terms of acres, 135.0 acres (0.05 x 2,700 acres) of sub-series A will probably be utilized for construction purposes, and 2,565 acres (0.95 x 2,700 acres) will probably be utilized for crop purposes.

Sub-series B with 8-12 percent slope was given a probability of encroachment of 0.02 (two percent) and a 0.98 (98 percent probability for crop utilization; this yields 26 acres (0.02 x 1,300 acres) for construction and 1,274 acres (0.98 x 1,300 acres) for crops. Sub-series C with 35-65 percent slope was given a probability of encroachment of 0.01 (one percent)(this sub-series is located high on the bluffs overlooking the main channel of Hood River), and a 0.99 (99 percent) probability for crop utilization; this yields 38 acres (0.01 x 3,800 acres) for construction and 3,762 (0.99 x 3,800 acres) for crops.

Sub-series A and B have cultivation as their major land use and sub-series C has forests as its major land use (item #15 on the computer card). Therefore, for the 7,800 acres in the Hood soil series, 199 acres (135 + 26 + 38) were judged to be located in areas where construction would probably remove it from crop production, and 7,601 acres (2,565 + 1,274 + 3,762) were located in areas where crops would be their probable major use. Of the 7,601 acres of crop land, 3,839 acres were located in cultivated areas (sub-series A and B) and 3,762 acres were located in forest lands (sub-series C).

Further calculations are necessary to compare the acreage of the Hood soil series to equivalent acres of the best Oregon soil for construction and/or for crop production, as follow: Sub-series A with 3-8 percent slope was placed into #3 on the limiting factor classification table which is "sloping" (Appendix C, Table C7). Limiting factor #3 gives a 0.30 percent utilization value for construction and a 0.50 value for crops. The reasoning behind the decision was that Hood soils are composed of ancient lake deposits over a smooth rock base (OR-1 Soils, Hood; U.S.D.A. Reports, Hood Drainage Basin, 1964). Runoff is poor on 0-8 percent slopes, and all of the Hood series soils have a tendency for slippage and slides when excessive weight is applied during moist periods. Roadbeds sink and shift, cracks and patches are evident in parking lots and driveways, and old, heavy buildings are not level. Thus, sub-series A soils were considered able to support only 30 percent as much residential development, per acre, as the best Oregon soils.

The classification value for crop use gives a 0.50 equivalent value for crops. The soil is deep, loamy silt, and is fertile but is in very small crop utilization units because of eroded ravines and brush areas (on-site observation). Only a few cultivation units are larger than 20 acres, which increases the cost of machinery manipulation and decreases the net energy yield of the crop. Orchard yields are good, but the soil is generally restricted to this unique use. Value judgements were made for sub-series B and C after similar analyses of their potentials. Sub-series B, with 8-12 percent slope, was given a construction equivalence of 0.05 and a value of 0.10 for crop use. Sub-series C, with 35-65 percent slope, was given a construction equivalence of 0.01 and a crop use value of 0.01.

Calculations for sub-series A for construction used the 135.0 acres of the total 2,700 acres which would probably be encroached upon by construction and multiplied the 135.0 acres by the 0.30 limiting factor utilization. The product was 40.5 acres (135.0 x 0.30) of soil equivalent to the optimum type Willamette soil. The 94.5 acres (135.0 acres

- 40.5 acres) of the sub-series A soil which had been encroached upon by construction, but which would not be utilized, was added to the crop soils for calculation. In practice, such soils might well be left uncultivated, as parks, green spaces or vacant lots among buildings. Addition of these empty spaces to the land under cultivation thereby tends to inflate the final figure derived for Oregon's maximum sustainable population. The 2,565 acres of sub-series A soil which had been calculated for crop use (2,700 acres - 135.0 acres) gained the 94.5 non-utilized acres from the construction calculation above and became 2,659.5 acres. The 2,659.5 acres of crop land was multiplied by the 0.50 equivalent value which yielded 1,329.75 acres of sub-series A, Hood soils which could be added to all other cultivated soils and be considered equal to the most productive, the Willamette soil series.

Sub-series B is also cultivated and its potential was calculated in the same manner as sub-series A's. Sub-series C is forest land, and its 0.01 construction utilization was calculated and totaled as were those of sub-series A and B. The total acres available for crop utilization for sub-series C were calculated in the same manner, but the final acreage was added to grazing acreage rather than cultivated acreage.

All 1,478 different sub-series in 3,102 locations in the state were evaluated, given a value judgement, and calculated to equivalent acreage values by the same methods used in this example.

A crop-yield adjustment was made by the program for the irrigation suitability of each soil type, if relevant. The availability of irrigation water was not considered to be limited. Where the irrigation suitability for the soil is "excellent", the annual yield of the soil was multiplied by a factor of two, whether the land is irrigated or not. The program does this by examining item #20 on the card, and if a letter "E" is present, the calculated equivalent acreage is multiplied by two (which is the same as doubling the yield). Where the irrigation suitability for the soil type is "good", the annual yield was multiplied by a factor of one and one-half. No multiplication factor was used for a soil with "fair", "poor" or "nonirrigable" irrigation suitability.

All soils whose major land use is for hay are imagined to yield four tons of hay per acre per year (O.S.U., Commodity Data Sheet, Hay, 1974). Where the irrigation suitability for the soil is "excellent", the annual yield was multiplied by a factor of two (by doubling the calculated equivalent acreage). Where the irrigation suitability for the soil is "good" the annual yield was multiplied by a factor of one and one-half. No multiplication was used for a soil with "fair", "poor" or "nonirrigable" irrigation suitability.

Soils with a major land use of pasture were also examined by the program for irrigability. Where the irrigation suitability for the soil was "excellent", the annual yield of beef was multiplied by a factor of three. Where the irrigation suitability for the soil is "good" the annual yield was multiplied by a factor of two. No multiplication was used for a soil with "fair", "poor" or "nonirrigable" irrigation suitability.

No irrigation adjustments were made on rangeland.

Thus, the maximum population calculation is based on the assumption that all land which can be irrigated will be irrigated, and that irrigation water (unlike water for urban consumption) is unlimited.

Example 2. Calculations for Irrigation Allowances

The Hood soil series, sub-series A, will be used as an example for irrigability calculations. The 1,329.75 equivalent acres (calculations above) of sub-series A are rated "good" for irrigability (S.W.R.B., Hood Basin, 1969). These are cultivated soils and their acreages were multiplied by one and one-half for irrigation adjustment. The 1,329.75 irrigated acres are considered to produce the crop equivalent of 1,994.625 acres, and the number 1,994.625 is added to all other equivalent acres in Hood River County, Hood basin and the state.

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The program calculated dietary units from equivalent acres at this time. For this study, all cultivated soils were assumed to produce the caloric output that could be obtained by growing wheat on them. The 1970 average wheat yield for the state was 40 bushels per acre, which is higher than a three or five year average (O.S.U., Commodity Data Sheet, Wheat, 1972). Forty bushels per acre were used in this study as the wheat production per acre of good soils. At this point it is important to recall the irrigability of the soil, which, if "excellent", was considered to have doubled the production on the soil type. Such a soil type would be considered to produce 80 bushels of wheat as an average yield. Sub-series A of the Hood soil series, as an example, would be considered capable of producing an average yield of 60 bushels of wheat for each equivalent acre (1,329.75 acres before the irrigation suitability adjustment).

Hayland was assumed to produce four tons of hay per acre (O.S.U., Commodity Data Sheet, Hay, 1974) and was converted to that tonnage by the program. Hayland, pastureland and rangeland were all assumed to produce beef for human dietary needs. Five tons of hay per year[1], 1.8 acres of pastureland[2], or 36 acres of rangeland[3] were considered necessary to produce one, 1,100 pound beef a year. The last five months before slaughter, the assumption is made that the animal will be grain "finished". The finished beef was called a "beef unit" for this study.

Nutrition Conversion Calculations

Two different assumptions were made in determining "acceptable qualities of life" in relation to dietary needs. The first assumption used an average of the Recommended Dietary Allowances (R.D.A.'s of the

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1 Personal communications with ranchers and cattle-feeders.

2 Personal communication with Dr. Church, O.S.U., Animal Science Dept.

3 Personal communication with ranchers using their own rangeland and Taylor grazing rangeland.

U.S. Public Health Service, the U.S. Army, the Canadian Army and the United Nations World Health Organization for an average sized man engaged in moderate physical activity [Burton, 1965]) as the minimum diet for an "acceptable quality of life". This diet required 3,000 calories and at least 70 grams of protein (50 percent from animal sources) per person per day. This will be called the "standard quality of life" in the study.

An alternative assumption established a more liberal diet by increasing the recommended dietary allowances by 50 percent to 4,500 calories, which included 105 grams of protein (70 percent from animal sources)(Aykroyd, 1970) per person per day. The second diet is not excessive in caloric or protein intake; Schaefer (1971) indicates that the 1965 U.S. population protein consumption was 103 grams per day. Therefore, some leeway was included in the second dietary life style, which does not press an individual to the edge of the poverty or hardship level. This will be called the "present quality of life" in the study. The calculations for each dietary standard will be presented separately.

All energy conversion factors used the following standards (Price, 1971):

Protein	=	4.27 Calories/gram
Carbohydrates	=	4.00 Calories/gram
Fat	=	9.02 Calories/gram

Recommended Dietary Allowances for a "Standard" Acceptable Diet

3000 CALORIES PER DAY
Base used: 70 Kilogram man (154 lbs)

Protein:	1.0 grams/kg/day	=	70 grams/day	=	300 Calories
Carbohydrates:	7.6 grams/kg/day	=	532 grams/day	=	2128 Calories
Fat:	0.9 grams/kg/day	=	63 grams/day	=	568 Calories
					2996 Calories
					(3000 Calories)

Carbohydrate requirement satisfaction was assumed to be met by the consumption of wheat. Conversion calculations to satisfy the carbohydrate requirement per individual are:

a. 532 grams carbohydrate/day = 194,180 grams/year

b. 194,180 grams ÷ 28.35 (grams per oz) ÷ 16 (oz per lb)
= 425.8 lb/year

c. 70% digestibility of wheat (Aykroyd, 1970) = 425.8 ÷ .70
= 608.3 lb/year

d. 12% of the wheat as digestible protein (Aykroyd, 1970)
(608.3 ÷ 100) x 12 = 73.0 lb + 608.3 lb = 681.3 lb/year

e. 681.3 lb/year ÷ 60 lb/bushel (bu) = 11.52 bu/year

f. 40 bu/acre average annual wheat production (11.52 ÷ 40 bu/acre)
= 0.288 acres/year

Protein satisfaction was assumed to be met by consumption of 50 percent from animal sources (beef) and 50 percent from plant sources (wheat). Calculations for the satisfaction of animal protein requirements are:

a. 70 grams = daily protein requirement

b. 70 grams x 365 days/year = 25,550 grams/individual/year

c. 25,550 grams/year ÷ 28.35 (grams/oz) ÷ 16 (oz/lb)
= 56.327 lb/year

d. 0.50 (50%) protein from animal sources (beef) x 56.327 lb/year
= 28.163 lb/year

e. One 1,080 lb finished beef dresses about 60.1 percent edible products (Tomhave, 1925).

f. 1,100 lb x 0.601 (60.1%) = 661.1 lb edible meat/beef

g. 18.6 percent protein/100 grams raw beef (medium fat) (Chaney, 1960).

h. 661.1 lb edible beef x 0.186 (18.6%) = 122.965 lb protein/beef

i. 122.965 lb protein/beef ÷ 28.163 lb protein/individual/year
(animal source) = 4.366 individuals/beef/year

j. One beef calf ranging 7 months on 0.6 acres of pasture (rated "excellent" for irrigability)(Church, 1970) = 700 lb

K. One feeder beef fed five months at one lb gain per six lb grain
= 400 lb

One year total = 1100 lb

l. One beef produced in one year on 1.8 acres (nonirrigated pasture which equals 0.6 acres of pasture of "excellent" irrigability) or 1.25 acres of hayland (5 ton/year/beef ÷ 4 ton acre/year hay production) or 36 acres of grazing land + 2,400 lb grain (6 lb grain/one lb gain x 400 lb) = 1,100 lb beef.

m. 2,400 lb grain (wheat) ÷ 60 lb/bu = 40 bu wheat required to "feed out" one beef.

n. 40 bu wheat/acre (average production) ÷ 40 bu wheat required = 1 acre cultivated soil required to "feed out" one beef (plus 1.8 acres pasture land or equivalent hay or range land).

o. For each butcher beef produced, two additional cattle are maintained for brood, breeding, replacements, culls, "slow gainers", mortality, etc. These animals are not considered to be fed with grain rations in this study.

p. Each butcher beef produced/year = 5.4 acres (1.8 x 3) pastureland + 1 acre cultivated land.

q. One acre cultivated land ÷ 4.366 individuals/beef/year (see i above) = 0.229 acres cultivated land required/individual/year to "finish off" beef (see t below).

r. Equilibration of pastureland to rangeland and hayland:

1. Rangeland: 1.8 acres pastureland = 36 acres rangeland (3 acres/month)

2. Hayland: 1.8 acres pastureland = 1.25 acres hayland

   a) One ton of good hay at 14 lb hay/one lb gain (Church, 1970) = 143 lb gain/ton

b) Five ton hay x 143 lbs gain/ton = 715 lbs (700 lbs considering waste and shrinkage of hay)(see j above)

c) One acre hayland = 4 ton hay/acre

d) One and one-fourth acres = 5 ton hay/year.

s. Protein requirements/beef/year = 5.4 acres (see p above) ÷ 4.366 individuals/year (see i above) = 1.237 acres pastureland (or equivalent hayland or rangeland) individual/year.

t. Adjusted carbohydrate requirements in acres of cultivated land per year are:

0.288 acres/individual/year (see f in carbohydrate calculations) + 0.229 acres/protein/individual/year (see q in protein calculations) = 0.517 acres of cultivated land/individual/year.

Thus, a single person living at the standard diet in Oregon requires more than a half acre (0.517 acres) of the state's best cropland to provide the carbohydrates, and 1.237 acres of the state's best pastureland (or equivalent hay or rangeland) to provide the animal proteins.

Plant protein requirement satisfaction is more than adequately satisfied by the 73.0 lbs of wheat protein calculated in item d of the carbohydrate calculations.

Fat requirements were assumed to be satisfied without special calculations when the animal protein requirement was satisfied with beef "finished" on grain.

Dietary Needs for the "Present" Acceptable Diet

The "present" diet of 4,500 calories includes 105 grams of protein (Schaefer, 1971) and has some leeway for individuals with different life styles. The 70 percent protein from animal sources was the 1968 average for citizens of the United States (Aykroyd, 1970). Lactating mothers, active teenagers, active sports persons, persons engaged in heavy labor and others will consistently exceed a 4,500 calorie diet, but others will seldom exceed the diet.

4500 CALORIES PER DAY
Base used: 70 Kilogram man (154 lbs)

Protein:	1.50 grams/kg/day	=	105 grams/day	=	450 Calories
Carbohydrates:	9.90 grams/kg/day	=	695 grams/day	=	2780 Calories
Fat:	1.94 grams/kg/day	=	136 grams/day	=	1225 Calories
					4455 Calories
					(4500 Calories)

Exactly the same reasoning derives the acreage requirements for this diet as for the "standard" diet. One difference in the relationship of dietary allowances is that this diet utilizes 70 percent animal protein for the total protein satisfaction, whereas the "standard" diet requires 50 percent animal proteins.

The acreage requirements for the "present" diet are:

Carbohydrates	0.602 acres
Animal Protein	2.597 acres.

A general comparison between the two diets reveals the "present" diet requires about 14 percent more acreage for dietary carbohydrate satisfaction and more than double the amount of acreage for animal protein satisfaction; each from equivalent acres.

Space Requirements for Residential and Supportive Functions

An average family which requires one unit of space for a residence will also require almost one-third of a unit of schools and recreation, more than one-third of a unit for streets and roads and almost one-third of a unit for industry, business and railroads in order to fit into the economy without increasing the pressure on existing facilities. Two patterns of land development will be presented; a "standard" and a "present" pattern. The supportive functions of construction will remain the same but that portion required for residential building sites will be different. The immediate portion of the text describes the "standard" pattern of land development.

Minimal space requirements assumed the following land use distribution which is comparable to calculated space use in the more densely populated portions of Portland, Salem, Eugene, Roseburg, Medford, Bend, Klamath Falls, Pendleton, Baker and Ontario (Salberg, 1958). The total developed acreage is referred to as the "gross acreage".

a. 15% gross acreage for schools and recreation (and public services).

b. 18% gross acreage for streets and roads (and utilities).

c. 15% gross acreage for industry, business and railroads (and private transportation companies).

d. 52% gross acreage for residential building sites.

100% gross acreage for economic activity and residential building.

The average family size used was 2.94 individuals per family, the size present during the 1970 census survey (U.S. Bureau of the Census, 1970).

Residential building area is divided into urban, rural non-farm and rural building units. Existing and proposed land use laws will confine a greater percentage of the increasing populations in Oregon to urban centers and decrease the rural non-farm population percentage. The percentage of rural population will probably remain the same for some years. The 1970 census in Oregon listed 67 percent of the population as urban, 29 percent as rural non-farm and 4 percent as rural (U.S. Bureau of the Census, 1970). These percentages will be used for calculating the "present" space allowance per person later in this section.

For the "standard" space allowance, the percentage breakdown for the three residential areas will vary from county to county. However, for this study, a single percentage breakdown was used for the entire state. This assumes that the figures are an average population distribution for the state, similar to the present population distribution but more concentrated. The assumed "standard" acceptable population distribution of the gross area occupied by residential sites is 76 percent urban, 20 percent rural non-farm and four percent rural. The figures were derived by the author after critical review of the L.C.D.C. meetings while state-wide land use goals were being derived and discussions with D.E.Q. officials about inclusive waste water disposal plans when completed.

The 52 percent gross acreage for residential building sites for the two qualities of life are:

	"Standard"	"Present"
Urban	76 percent	67 percent
Rural non-farm	20 percent	29 percent
Rural	4 percent	4 percent
	100 percent	100 percent

Standard Quality of Life

The urban portion (76 percent) was further divided after several discussions with realtors and field observations. The rural portion remained the same as the four percent listed in the 1970 census figures and the rural non-farm occupied the remainder. Calculations are:

Urban (76 percent)

59% used by 5,000 sq. ft. lots = 4.42 families/acre = 13.00 individuals per acre

40% used by 8,000 sq. ft. lots = 2.76 families/acre = 8.12 individuals per acre

1% used by multifamily units (2 families/5,000 sq. ft. lot) = 8.84 individuals per acre

(0.59 x 13.0) + (0.40 x 8.12) + (0.01 x 8.84) = 11.18 individuals per acre

Considering ten percent of urban land will not geometrically fit into the above divisions or will be reserved as "extra lots" by individuals, etc.:

0.90 (90 percent) x 11.18 = 10.06 individuals per urban acre.

Rural Non-farm (20 percent)

One-half acre lots were used as a base for these determinations:

2 families per acre = 5.88 individuals per acre.

Considering 25 percent of rural non-farm land as vacant area, held by owners and never built upon:

0.75 (75 percent) x 5.88 = 4.41 individuals per acre.

Rural (4 percent)

Calculations from the 1970 census survey of rural residents (1970) and the 1969 agricultural census survey (1969) revealed 11.0 acres per individual in Yamhill County, 4.0 acres per individual for Lane County, 3.0 acres per individual for Lincoln County and 438.7 acres per individual for Harney County. The state average was 26.9 acres per individual. The number of farms in the state west of the Cascades was greater than those east of the Cascades. Calculations were made for all counties and areas. Ten acres per rural individual was used as an average for all rural calculations in this study, which, when multiplied to the average family size of 2.94 individuals per family was 29.4 acres per family.

Assuming 29.4 acres per family = 10.0 acres per individual

1.0 individuals ÷ 10.0 acres per individual = 0.1 individuals per acre.

A weighted average was taken to determine the population density:

Urban population (76 percent)	=	10.06 individuals per acre
Rural non-farm population (20 percent)	=	4.41 individuals per acre
Rural population (4 percent)	=	0.10 individuals per acre

(0.75 x 10.06) + (0.20 x 4.41) + (0.04 x 0.10) =

7.645 + 0.882 + 0.0004 = 8.531 individuals per acre on the 52 percent gross useable acres allotted to residences

0.52 (52 percent) x 8.531 individuals per acre = 4.436 individuals per space use acre

1.0 acres ÷ 4.436 individuals per space use acre = <u>0.225 space use acres per individual.</u>

Present Quality of Life

Space requirements for this portion of the study were based on 1970 census data for urban, rural non-farm and rural Benton County. Benton County was selected as an "average" county which had neither excessive rural non-farm intrusion on farm land (as in Washington, Clackamas, Marion, and other counties), or having little to no rural non-farm intrusion on farm land (as in Harney, Lake, Sherman, and other counties). Many personal interviews with residents of Benton County during 1969 and 1970 indicated a satisfaction of the residents with their quality of life in relation to the utilization of space in the county.

The 48 percent gross acreage used for supportative functions remained the same for both qualities of life. The 52 percent gross acreage used for the construction of residences was divided the same as recorded during the 1970 census for Benton County. The divisions were:

Urban	67 percent
Rural non-farm	29 percent
Rural	4 percent
	100 percent

The urban areas were not divided into types of housing by the census survey. However, the total urban population was divided by the acres occupied by the urban population and 7.94 individuals were calculated for each urban acre. This figure was rounded to 8.0 individuals per acre. The rural non-farm and the rural population were calculated as for the "standard" quality of life. Weighted averages for the "present" quality of life were taken to determine the population density:

Urban population (67 percent) = 8.00 individuals per acre

Rural non-farm population (20 percent) = 4.41 individuals per acre

Rural population (4 percent) = 0.10 individuals per acre

(0.67 x 8.00) + (0.29 x 4.41) + (0.04 x 0.10) =

5.36 + 1.28 + 0.004 = 6.664 individuals

per acre on the 52 percent gross useable acres allotted to residences

0.52 (52 percent) x 6.664 individuals per acre = 3.455 individuals per space use acre

1.0 acres ÷ 3.455 individuals per space use acre = <u>0.289 space use acres per individual.</u>

An example is given to demonstrate how the dietary and construction carrying capacities were derived. The example will use the Hood soil series, sub-series A. There will not be any animal protein calculations involved as the only Hood soil sub-series with grazing involved is sub-series C.

Example 3. Calculations for Carrying Capacities

The Hood soil series, sub-series A, equivalent acre determinations used as an example earlier in this section will be used to demonstrate the conversion of acres to dietary satisfaction and construction requirements for a standard quality of life. The cultivated acres of soil (adjusted for irrigability) were calculated to be 1,994.624 acres. The carbohydrate requirements are assumed satisfied by wheat grown on cultivated soils and require 0.517 acres per individual (this acreage includes that necessary to "finish" beef used for animal protein satisfaction). Calculations are:

Carbohydrates: 1,994.625 acres ÷ 0.517 acres per individual = 3,858.075 individuals. This is the number which can be supplied with carbohydrate requirements for a standard quality of life by Hood soil sub-series A.

Protein (vegetable): Each carbohydrate requirement satisfaction per individual (by wheat) yields 73 lbs of digestible vegetable protein.

3,858.075 individuals x 73.0 lbs/individual = 281,639.5 lbs available vegetable protein. This is sufficient to provide the 50 percent vegetable protein in the diet for:

381,639.5 lbs ÷ 28.164 lbs/individual (50% protein requirement) = 13,550.614 individuals.

Construction: The space requirement satisfaction from the Hood soil series is:

4.5 equivalent acres ÷ 0.225 acres per individual = 180.00 individuals.

In summary, the 2,700 acres of Hood soil series, sub-series A, in Hood River County has the potential to supply for a standard quality of life:

Carbohydrate dietary requirements for 3,858.075 individuals; and

Protein (plant) dietary requirements for 13,550.614 individuals; and

Residential sites and supportive construction for 180.000 individuals.

The same methods were used to determine the carrying capacities for the same soil for the "present" quality of life. The determinations were:

Carbohydrate dietary requirements for 3,324.4 individuals; and

Protein (plant) dietary requirements for 12,617.19 individuals; and

Residential sites and supportive construction for 140.138 individuals.

Water

Certain assumptions were made before determining the carrying capacity of the waters of the state for future growth and expansion of human populations. These assumptions were:

1. Only that water which falls on, is contained within and drains from the state belongs to the state.
2. Total water supplies available in the state immediately available for use by human populations are depleted by the quantity consumed, not by the quantity diverted from one location to another.
3. All good irrigable soils which are close to dependable water resources are presently under irrigation and will not exert greater demands than are being satisfied at this time.
4. Return flows of non-consumed irrigable water are included in streamflow gauging records.
5. Surface water discharges into interstate receiving waters are not available for withdrawal but are considered Oregon's contribution toward maintaining streamflows for fish passage, navigation and hydroelectric power generation.
6. The minimum permissible streamflow in all rivers is the higher of the two minimum flows established by the State Water Resources Board and the Oregon Fish Commission.

7. The streamflow of the middle of three consecutive lower than average water years during the five critical summer months or annual flow during the 1960's is considered the reliable water supply for the stream.
8. The difference between the reliable streamflow and the minimum permissible streamflow is the quantity of water available for future use by human populations within the drainage basin.

Complete surface water streamflow data were obtained from U.S.G.S. hydrological gauging stations' records for all streams in the state. Streamflow records were selected for strategically located gauging stations in each drainage basin before the stream entered the main river, interstate receiving waters or the ocean. Years of less than average annual streamflow and for the five critical summer months (May, June, July, August and September) were examined for their severity and frequency of occurrences. Computer cards were made for the complete streamflow record at each gauging station selected. Each computer card contained:

1. The year of the streamflow record.
2. The streamflow for May, June, July, August and September in acre feet.
3. The annual average flow of the stream.

Header cards for each selected stream contained:

1. The name and location of the gauging station.
2. The gauging station code number (U.S.G.S.).
3. The average monthly streamflow of record for the five critical summer months and the average annual streamflow of record (U.S.G.S.).
4. The major county drained by the stream (determined by topographical map examination).

A COBAL computer program was written which determined:

1. The percentage of monthly and annual streamflow (relative to the average flow) for the history of measurement at the station.
2. The number of episodes in which annual flows were lower than average for two consecutive years, three consecutive years, etc.
3. The number of episodes in which the May through September average flows were lower than the average five month flow for two consecutive years, three consecutive years, etc.
4. A final tabulation of less than average streamflow for the critical summer months flows, and the annual average flow. This printout included the number of times the consecutive lower than average streamflows occurred during the history of the gauging station records (see example below).

Minimum permissible streamflow levels have been determined and published by both the State Water Resources Board and the Oregon Fish Commission. They are not the same, nor were they established with the same goal in mind. The S.W.R.B. minimum permissible streamflows are established after consideration is given to needs for: domestic and municipal use, irrigation, power development, industrial use, mining, recreation, wildlife and fishlife, and for pollution abatement, as well as for drainage, reclamation and flood control. The Oregon Fish Commission establishes minimum permissible streamflows after studies of the needs for migration of anadromous fish and the continuing productivity of spawning beds and aquatic organisms used as fish food. This study lists both agencies' minimum permissible streamflows for each selected river and uses the higher of the two as the minimum permissible streamflow.

The quantity of reliable water supplies in each stream was determined from the computer program printout. Three consecutive May through September or annual lower than average water years during the 1960's were selected as critical levels. The middle year of the three low water years was selected as the reliable water supply for the river. (Nearly all rivers showed lower reliable surface water flows during the 1930's and the 1940' than during the 1960's).

The quantity of water in the stream available for use by human population increases was assumed to be the difference between reliable streamflows and the higher minimum permissible streamflow.

Example 4. The Determination of the Reliability of Surface Water Supplies

Consider the Deschutes River, one of our most stable rivers, which drains the entire Deschutes River Basin as an example for the determination of reliable water supplies. The strategic gauging station selected from the computer program printout was the Deschutes River near Madras in Jefferson County (Station #140925.00), which is 102 miles above where the river empties into the Columbia River near Biggs, Oregon. At this station, 45 complete water year records have been compiled from 1924 through 1968 from 7,820 square miles of drainage area. The reference site selected is downriver from the confluence of the Deschutes River with the Metolius and Crooked Rivers, and downriver of the major population centers and areas of heaviest irrigation water useage. Below the station near Madras, the Deschutes River begins its steep descent through a deeply carved gorge cut into the Columbia Plateau to where it flows into the Columbia River.

The average river flows between 1924 and 1968 inclusive are:

May	:	285,971 acre feet
June	:	245,255 acre feet
July	:	230,766 acre feet
August	:	223,962 acre feet
September	:	218,766 acre feet
Annual	:	3,173,302 acre feet

Consecutive lower than average streamflow years over the 1924-68 period are:

Consecutive Years Lower than the Annual Average		Consecutive Years Lower than the May through September Average	
Years in Length	Occurence	Years in Length	Occurence
2	2	4	2
3	1	10	1
4	1		
9	1		

The data show that one time, the river flow was lower than average for ten consecutive years during the five critical summer months, and twice it flowed lower than average for four consecutive years for the same months.

This study uses the second lowest of three consecutive lower than average water years during the 1960's as the reference year of reliable water supplies. The low water years during the 1960's were selected as being more relevant to present uses than those during the 1930's and 40's. The single occurrence of three consecutive lower than average annual flows (during the 1960's) were 1966, 1967 and 1968. The streamflow in acre feet were (U.S.G.S., 1968):

MONTH	1966 Flow	1966 % of Average	1967 Flow	1967 % of Average	1968 Flow	1968 % of Average
May	239,100	83.6	273,400	95.6	920,000	321.7
June	240,400	98.0	243,400	99.2	217,100	88.5
July	254,800	110.4	235,900	102.2	222,500	96.4
August	228,500	102.0	230,700	103.0	222,600	99.3
September	228,600	104.4	226,100	103.3	213,100	97.4
Annual	3,119,200	98.2	3,057,000	96.3	2,886,000	90.1

The year selected as the "reliable water year" was 1967. The river flow for 1967 is converted from acre feet per month to cubic feet per second (cfs) to correspond with S.W.R.B. and the Oregon Fish Commission minimum permissible stream flow requirements. The 1967 May through September streamflow thus determined, and the S.W.R.B. and Oregon Fish Commission minimum permissible streamflow requirements are:

MONTH	Flow (cfs)	S.W.R.B. Minimum Requirements (cfs)	Oregon Fish Commission Minimum Requirements (cfs)
May	3,642	3,000	5,500
June	3,463	3,000	5,500
July	3,135	3,000	4,850
August	3,140	3,000	4,200
September	3,055	3,000	4,200

Both the S.W.R.B. and the Oregon Fish Commission have declared that streamflows during average annual water years are insufficient in the Deschutes River to supply existing and future demands (S.W.R.B., Deschutes River Streamflow, 1967; Oregon Fish Commission, 1965). Both agencies used the "best of four out of five water years" as their reliable streamflow, while this study uses the middle of three consecutive lower than average flows as the reliable streamflow. This study, therefore, assumed no additional water was available from the Deschutes River for future population uses.

The Deschutes River was selected as an example because of its recorded continuously steady annual flow through the years. Tributaries of the Deschutes River and of all other streams of the state which could indicate the water supplies for the counties were tabulated by the same procedures. Data compiled and tabulated for water supply determinations in the 17 drainage basins is included in Appendix C, Table C8 . Data were compiled from the water year records of the tributaries of major streams and were of value in evaluating available water supplies for counties but are not included in this study. They are available upon request.

The waters flowing in most of our streams are utilized for non-consuming uses several times before reaching the final receiving waters. Some non-consuming uses are for transportation, dilution of wastes, fishery uses, and for hydroelectric power. However, once a quantity of water has been assigned a consumptive use it is lost from the supply to the atmosphere by evaporation or transpiration of plants, is incorporated into plant or animal tissue or is used to dilute effluents so that the wastes contained in the effluents will not deteriorate the quality of the receiving waters. Irrigation, domestic use, industry, recreation and thermal power are the principal consumptive water users in Oregon. Since 1909, water rights have been required for the consumptive use of surface and groundwater for all except domestic use by individual households. These water rights are issued for specific quantities of surface or groundwaters by the State Engineer in Salem, Oregon. Legal rights to water are determined by their date of issue, the older rights bearing priority over later rights. Water rights will be referred to in the discussion of many of the basins and counties.

Irrigation uses of water are assumed to remain reasonably constant for this study, assuming that most soils which respond readily to irrigation and are near available resources are presently irrigated (in many areas, additional water rights are not available for irrigation). Consumptive uses of water for industry, recreation and thermal power were not considered, assuming that domestic consumptive use will hold priority for water rights over all other uses. Calculations used to determine the carrying capacity of available water supplies are restricted to domestic consumptive use.

Domestic consumptive use of water is considered to be a combination of urban, rural non-farm, rural and livestock uses. These uses include both personal and public requirements. Personal requirements include the preparation of food, cooking, cleaning and washing of dishes and cooking utensils, clothing, bedding and living area, and attending to personal hygiene and sanitary requirements such as bathing, washing, water closets, etc. Public requirements include sprinkling and flushing streets, fire protection, irrigation of lawns, parks, etc., swimming pools, sewage conveyance and waste decomposition, dilution of dissolved solids from waste water treatment plants, and a portion to each of the many support businesses. An estimated 20 percent of consumable water is unaccounted for, mostly lost by leakage and evaporation (Bodhaine, et. al. 1963). A better quality of life may include additional demands on water supplies such as air conditioners, private swimming pools, etc., but generally, a better quality of life only uses more water for each of the basic needs (automatic dishwashers, automatic washers, ice makers, more irrigation for lawns, shrubbery and flower beds, etc.).

Surface water supplies were used to satisfy domestic consumptive needs for increasing populations in this study. Groundwater is extensively mined throughout the state for domestic, municipal, industrial and irrigation consumptive uses. The quantity of these supplies used or available is unknown. While much is already generally known about groundwater in alluvial basins such as the Willamette, and about the basalt underlying the Columbia Lava Plateau in central Oregon, the dependability of the reservoirs can be determined only after the discovery that recharge to the reservoir is less than the demands on the supply.

Oregon is a heavily forested state whose economy and quality of life depend heavily upon maintaining the forests in the best production possible. A common misconception is that forests create water supplies. However, the water is not there because the forests are there; rather, the forests are there because the water is there. Forests, and all other native vegetation, compete viciously for groundwater. Streams draining forested slopes represent the surplus of precipitation after the relative high water demands of the trees have been satisfied (McGuinness, 1963). These facts were taken under consideration during this study while determining the reliability of streamflows in areas under reforestation policies and in areas of sustained yield harvest methods. Records from the State Engineer's Office, the State Water Resources Board publications and available logs of existing wells were interchangeably used to determine the reliability of groundwater reservoirs. Documentation is insufficient to justify the inclusion of groundwater supplies into the calculations of this study. However, groundwater studies by the State Engineer's staff are cited and discussed wherever possible.

Recommended Water Requirements

Standard Quality of Life

The water requirements were calculated at 150 gallons per individual per day. Most literature sources on this subject include other water needs than personal consumption. Borgstrom (1969) cites the U.S. average individual consumption at 160 gallons per day. Various personal and public health books were used to obtain the itemized breakdown of use. Water use measurements by the author contributed to the information (table 1).

Table 1. Daily Water Requirement for a Standard Quality of Life

Personal Requirements		Public Requirements	
Requirement	Gallons/day/ individual	Requirement	Gallons/day/ individual
Drinking water	1	Street & park care	10
Food Preparation	5	Fire protection	5
Laundry & cleaning	10	Sewage conveyance & disposal	10
Personal hygiene	25	Support businesses, schools, hospitals etc.	10
Sanitary waste disposal	40	Leakage & evaporation	20
Lawn & yard irrigation Miscellaneous	15		
Total	96	Total	55

The 151 gallons per individual per day was rounded to 150 gallons. This requirement equals 0.231 cubic feet per second for 1,000 individuals.

Surface water flows in rivers and streams were assumed to supply the necessary per capita demands. Present use of groundwater reserves were considered to be continued, but no additional demands were placed on these water supplies for lack of numerical data required in calculations, and for lack of assurance that these sources can indefinitely supply the amounts being removed.

Present Quality of Life

This water supply was calculated at 250 gallons per individual per day. The additional 100 gallons per day over the "standard" quantities required and listed above, were added to the personal requirements of the individual. Use of automatic dishwashers and laundry facilities added 55 gallons per day per individual. The other 45 gallons per day was assumed equally divided between personal hygiene, with increased showers at five gallons per minute (Borgman, 1965), increased lawn and yard irrigation, and miscellaneous uses which include such items as automobile washing, sidewalk and driveway washing, etc. The 250 gallons per day per individual calculates to 0.384 cubic feet per second for 1,000 individuals.

Surface water flows in rivers and streams were assumed to supply the necessary per capita demands without further demands on groundwater supplies.

COORDINATION OF DATA

Calculations similar to the four examples were carried out for each of the 3,102 soil cards in the state, for both the "standard" quality of life and the "present" quality of life. Carrying capacity information on the printout forms was separated by human carbohydrate units, human protein units and human building units; each unit being one individual. The first concluding computation was separated into the following categories:

1. The contributions of each county within the 17 different drainage basins toward the carrying capacity of the basin for human carbohydrate, protein and building units.
2. The total contribution of each of the 36 counties toward the state's carrying capacity.
3. The total contribution of each of the 17 drainage basins toward the state's carrying capacity.
4. The total carrying capacity for the state.

Items #2, #3 and #4 are contained in Appendix C, Tables C1 through C6.

It is on the cultivated soils where the major competition exists between raising crops and the construction of residences with their associated support facilities. The initial computer printout did not reflect this competition but simply calculated the numbers of humans which the state's carbohydrate, protein and construction sites could support, given the percent capabilities which were assigned them. A short program was added to the main computer program which would equilibrate this competitive use for cultivated soils to within a population of 10,000 individuals above or below the carrying capacity for the state. That is, in order to obtain more of the best soils for construction purposes, cultivated soils used for producing carbohydrates (wheat) are encroached upon. The two uses for the cultivated soils were "traded off", one for the other, until the carrying capacity was approached, then the program ceased. No calculations of carrying capacities were made for counties or drainage basins.

At the beginning of the competitive program, all of the soils that would be occupied by construction (e.g., the 40.5 acres of the Hood soil, sub-series A, in the example) are already occupied. The new encroachment of construction will be on soils identified with the use of producing carbohydrates for the state's residents. All acreages of soils at this point are equivalent acres (100 percent useable).

The standard quality of life requires 0.517 acres of cultivated soils annually per individual to satisfy the carbohydrate requirements. The figure includes that amount necessary to "feed out" beef for animal protein requirement satisfaction. This quality of life also requires 0.225 acres of cultivated soils to satisfy individual construction requirements. Where one individual required 0.225 acres for construction purposes, 10,000 individuals would require 2,250 acres (10,000 x 0.225). Thus, by increasing the state's population by 10,000 individuals, 2,250 acres of cultivated soils would be taken from use for raising carbohydrate producing crops. This action decreases the state's carbohydrate satisfaction carrying capacity by 2,250 acres ÷ 0.517 acres (the acres needed to produce wheat to satisfy carbohydrate requirements per individual) which is 4,352.03 individual carbohydrate support units. This part of the program required the computer to increase the carrying capacity for construction by 10,000 individuals and to simultaneously decrease the carrying capacity to supply carbohydrates by 4,352.03 individuals.

The program continued until the construction demand on cultivated soils for the final 10,000 individuals (2,250 acres at a time) became greater than the carrying capacity to produce carbohydrates for that number of individuals. Then the program ceased, and the population numbers were printed. In other words, each time 10,000 individuals' housing demands were satisfied (by utilizing 2,250 acres) and the number of carbohydrate satisfaction units decreased by 4,352.03, the computer examined the numbers to see if the state's carbohydrate satisfaction units were still higher than the new total state demand for construction units. The procedure was repeated if the differences were still greater than 10,000.

Eventually, after continually removing cultivated soils from farming uses (raising wheat) 4,352.03 support units at a time and placing construction on 2,250 acres of cultivated soils required for 10,000 individuals, a time arrived when there were less carbohydrates being produced in the state than there were residents depending upon them for dietary support (within a range of 10,000 individuals).

When the computer noted this event, the substitution of land use ceased and the carrying capacities were again printed.

The computer counted the number of times 10,000 individuals were added to the population. The population increase in Oregon between the 1970 census survey and the 1972 population estimate (Meyers, 1973) was used as the present growth rate of the state's population. The population increase was 91,885 individuals or 125.78 individuals per day over the two year period. This rate of growth required 79.5 days for the population to increase 10,000 individuals. The period of time required for the population to equal that of the 1970 census survey was determined. The approximate time of the carrying capacity equilibrium was calculated.

An identical procedure was executed with the program which had been changed to accommodate the present quality of life. In this program, 2,890 acres of cultivated soils were required for construction purposes for each 10,000 individuals (10,000 individuals x 0.298 acres required per individual for construction satisfaction). However, for each 2,890 acres used for construction purposes, the state's cultivated soils decreased in capacity to supply carbohydrates by 4,800.66 individuals (2,890 acres ÷ 0.602 acres per individual). The program proceeded by the same methods, and the final carrying capacities for construction and carbohydrate satisfactions were printed out for the state's population to within 10,000 individuals for the more liberal quality of life. Identical methods were used to determine the approximate time the carrying capacities would be approached for the second quality of life as for the first. The results are included in the writeup for the State of Oregon, page 335.

Most pastureland, hayland and rangeland soils which contribute to dietary protein satisfaction are not easily used for construction because of the soil structure and location. They were not used competitively with construction in this study.

Water requirement satisfaction for drainage basins was determined on a calculator using the requirements of 0.231 cubic feet per second for the needs of 1,000 individuals enjoying a standard quality of life and 0.384 cubic feet per second for the needs of 1,000 individuals enjoying the present quality of life.

The materials and methods presented in this section are used to determine the carrying capacities for the 36 counties, the 17 basins and for the State of Oregon. Each are individually discussed in the following chapter. The tabulations related to the physical, geographical and climatic features of their soils are contained in tables in Appendices A and B. Direct or indirect reference is made to the data contained in each of the tables during the discussions or the determinations and justifications for the carrying capacity calculations. However, reference is made to the location of the tables only once during each discussion in order to present the information in an easy to read text.

CHAPTER III

RESULTS

COUNTIES

BAKER COUNTY

Baker County was created September 22, 1862 from a portion of Wasco County. It is named for Colonel E. D. Baker who was a brilliant orator. He came to Oregon from California in the spring of 1860 with the intention of being elected a U.S. Senator from Oregon. He was elected but later was killed October 21, 1861 at the battle of Ball's Bluff, Virginia, the first member of Congress to die in the Civil War (Holman, 1910). The county is bounded on the west by Grant County, on the south by Malheur County, on the east by the Snake River and the State of Idaho and on the north by Wallowa and Union Counties. Ninety-six percent lies in the Powder River Basin with small portions included in the Malheur River, Grande Ronde River and John Day River Basins. It is the tenth largest county in the state, encompassing 1,973,760 acres of which 1,691,100 acres (85.7 percent) are classified and included in this study (Appendix A, Tables A1 through A7).

Climatic conditions vary with the elevations. Heavy winter snowpacks on the 7,000 to 10,000 foot peaks of the Wallowa Mountains to the north and the 6,000 to 8,000 foot peaks of the Blue Mountains to the west contribute summer water supplies to the county's cultivated soils. Violent summer rainfalls also contribute nearly half of the 9 to 12 inch average rainfall to the cultivated areas, but most of this drains off before reaching the plants' root zones. Frost may occur any month of the year in the mountains, but most of the cultivated areas have frost-free growing periods greater than 120 days.

Eighty-two different soil series and sub-series were inventoried for Baker County (S.W.R.B., Appendix I-9, 1969). Rangeland is the major land use of nearly half (48.2 percent) of the county's land, and forests occupy another 550,700 acres. A total of 1,495,000 acres of land or 76.3 percent of the county's land is in rangeland and forests. Forest floors are also grazed at lower elevations during the late summer months. In 1970, Baker County reported 106,000 head of cattle and 19,000 sheep (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

The temperate climate and long growing season allow a variety of crops to be produced on the 182,000 acres of soils with cultivation as their major land use. Cereal grains occupied the following areas in 1971: wheat - 9,500 acres, oats - 1,200 acres and barley - 4,000 acres, totaling 14,700 acres. Harvested acres of hayland during 1971 was 76,500 acres, more than five times the total quantity of cereal crops (O.S.U., Commodity Data Sheets, Wheat, Oats, Barley, Hay, 1972). In 1969, 126,515 acres of land were reported under irrigation (U.S. Bureau of the Census, Census of Agriculture, 1969). The combination of large numbers of livestock, spacious grazing lands, winter hay and sufficient grains for feeding has helped Baker County to become one of the finest livestock producing counties in the state.

Unfortunately, there are not sufficient water supplies to adequately irrigate the acreage to obtain maximum production. During the late summer and early fall months many streams and rivers approach zero flow. Legal water rights in Baker County would deplete 1,382,549 acre feet from the streams. This is more than 154 percent the estimated historical average annual yield from all streams. Groundwater sources are limited and must be considered as a supplemental source with only a small contribution to total water needs.

Carrying Capacity and Future Trends in Baker County

The county's population has steadily decreased from 18,297 residents in 1940 to 14,919 in 1970 (Meyers, 1973). Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 1,199 individuals for the present quality of life and 1,540 for a standard quality of life. The discrepancy between the present population and the computer calculated carrying capacity of the soils reflects the types of soils contained in the construction areas. Less than three percent of the soils are rated to have less than "very severe" restrictions for septic tank filter field limitations.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, the soils could provide 152,095 individuals with their dietary carbohydrate needs. For a standard but still acceptable quality of life, the soils could supply the dietary carbohydrate requirements for 177,101 individuals. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 1,667 individuals could be provided their dietary animal protein needs. For a standard quality of life, 3,500 individuals could be supplied their dietary animal protein requirements.

Many acres of cultivated soils are used for hay and pasture and, because of their classification, were not calculated to produce animal protein supplies.

The major limiting factors in Baker County are the scarcity of good soils for construction and an all-season dependable water supply. Construction requirements can be managed by limiting growth to within service areas of municipal facilities. Reservoir sites to store water for supplemental supplies may cause the inundation of a considerable quantity of presently productive soils and siltation as stream gradients are too steep in the mountains to offer good storage areas.

The calculation determinations of the carbohydrate production potential were greater than those presently produced in the county. Most of the "cultivated" soils are used as range and pasture or for hay production. This factor and a low value given to the long-term potential for soils used as range, depressed the true agricultural activity in the county. Carbohydrates are probably produced in sufficient quantities for the present population, and animal protein supplies are being exported.

BENTON COUNTY

Benton County was created December 23, 1847. It is named for Senator Thomas H. Benton of Missoiri who, for many years, had been a strong advocate of Oregon (Holman, 1910). It is bounded on the west by Lincoln County, on the south by Lane County, on the east by the Willamette River and Linn County, and on the north by Polk County. Twenty-eight percent of the county's area lies in the Mid-Coast Basin and the remainder lies in the Willamette River Basin. Benton County ranks 33rd in size of Oregon's 36 counties, encompassing 427,520 acres of which 319,019 acres (74.6 percent) are classified and included in this study (Appendix A, Tables A8 through A14).

The climate is temperate with wet, open winters and dry, warm summers. Most of the precipitation arrives between November and March, sometimes exceeding 100 inches annually in the Mid-Coast Basin portion of the county but having only a 40 inch average in Corvallis (U.S. Department of Commerce, Weather Bureau, 1965). The highest mountain in the Coastal Range, Mary's Peak (4,097 feet), is located in the western part of the county and is usually covered with snow during the late winter months. Other elevations in the county's mountainous portion range from 1,600 - 2,500 feet, not high enough to block all of the marine influence of the ocean breezes. The average frost-free period in the agricultural area is from 165 to 210 days a year.

Forests are the major land use of 136,795 acres of the classified soils. Grazing by the county's 1970 population of 12,000 cattle and 16,000 sheep (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972) proceeds on a nearly year around basis. The cattle graze near the margins of the forest-valley interface where brushy pastures and open parks are common. Many flocks of sheep graze in pastures on the valley floor and on grass seed fields during the winter.

Eighty-six different soil series and sub-series were inventoried in Benton County (S.C.S., Benton County, 1973). Within these soil types, 106,197 acres are classified with cultivation as their major land use and 73,679 acres have pasture as their major land use. Small grains, grass seed and hay are raised on the greater number of acres. In 1970, 7,100 acres of small grains, 9,100 acres of hay crops and 24,275 acres of grass seed crops were reported by Benton County farmers (O.S.U., Commodity Data Sheets, Wheat, Oats, Barley, Hay, Grass Seed, 1972). These 40,475 acres of cereal grass and other grass type crops reflect the better use of most of the Willamette Valley soils. More than 68,000 acres of Benton County soils are of Capability Classes I and II with only erosion and water problems as their major limiting factor. Cannery crops, orchards, berries and mint fields occupied 8,570 acres of the county's finest soils in 1970 (Atlas, Benton County, 1974). Most of the specialty crops require irrigation.

A total of 78,116 acres of soils are rated as "excellent" or "good" for irrigability. In 1969, 15,000 acres were irrigated in the county (U.S. Bureau of the Census, Census of Agriculture, 1969), mostly by overhead sprinkler systems. The areas of greatest crop diversity and irrigation use lie adjacent to the Long Tom River in the southern portion of the county and north of Corvallis on the terraced west bank of the Willamette River. About half of the irrigation waters are supplied by surface waters and the remainder from groundwater supplies (Atlas, Benton County, 1974).

Surface water flows in the Willamette River are regulated by a series of large reservoirs in Lane County which maintain a static flow throughout the dry seasons. Streamflows in the Long Tom River are regulated by releases from the Fern Ridge Reservoir west of Eugene. Streamflows in Mary's River are not supplemented from reservoirs but depend upon the river's tributaries which drain the east slope of the Coast Range. This river often dwindles to a mere trickle where it empties into the Willamette River at Corvallis. The Luckiamute River at the county's northern boundary is undependable for a consistent supply of irrigation water during the late summer and early fall months.

Groundwater supplies are not consistent throughout the county. Alluvial beds near the Willamette River provide good supplies for irrigation uses. The relatively impermeable sedimentary rocks underlying the east facing slopes of the Coast Range store minor amounts of groundwater. Usually these supplies are sufficient for domestic and minor livestock use but they are often of poor quality. Saline waters have been obtained by drilling in this area (Wheeler, 1970).

Carrying Capacity and Future Trends in Benton County

The population in Benton County has grown steadily from 18,629 residents in 1940 to an estimated 59,800 residents in 1972, a 321 percent increase (Meyers, 1973). The increase in enrollment at Oregon

State University at Corvallis has contributed significantly to the present population numbers. Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 15,115 individuals for the present quality of life and for 19,414 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 121,566 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 141,552 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 5,297 individuals could be provided their dietary animal protein needs. For a standard quality of life, 11,125 individuals could be supplied their animal protein requirements.

The discrepancy between the calculated carrying capacity for construction and the present population was caused by the evaluations of the characteristics of soils close to present urban and suburban growth. The clay soils close to present population concentrations are difficult to prepare and expensive to maintain for construction uses, which limits their carrying capacities. Although there are 23,151 acres of soils considered to have "slight" or "moderate" limitations for use as septic tank filter fields, only those located along the River Road north of Corvallis and in West Albany are being utilized most extensively for construction. The other soils with this rating are some distance from present urban centers. Nearly two-thirds of Benton County's population (65.4 percent) were residents of Corvallis, Philomath and Monroe in 1972 (Meyers, 1973). The land use planning procedures being enforced in the county are containing the population in planned growth areas. It should be possible to maintain an acceptable quality of life for the county's residents if the population does not increase significantly.

The county's cultivable soils have the capability to produce sufficient carbohydrate supplies for the present and near future populations and to export some of those nutrients should the need arise. The present use of the cereal crop producing soils for the production of grass seeds could well be the best method of utilization of the soils at this time. Animal protein supplies are insufficient for the present population and are being imported from other areas in the state.

CLACKAMAS COUNTY

Clackamas County was one of the four original Districts or Counties created on July 5, 1843, six years before Oregon became a U.S. Territory and 16 years before statehood. It is named for the Clackamus Indian nation that resided on a river of the same name. Lewis, a "fierce" speller, entered the name "Clarkamus" in his journal, but on Clark's map, printed in 1814, the name was Clackamus (Holman, 1910). It later changed to Clackamas. It is bounded on the west by Washington, Yamhill and Marion Counties, on the southwest and south by Marion County, on the east by Wasco and Hood River Counties and on the north by Multnomah County. It is completely contained within the Willamette River Basin. Clackamas County is the 18th largest of Oregon's 36 counties, encompassing 1,209,600 acres of which 672,310 acres (55.6 percent) are classified and contained in this study (Appendix A, Tables A15 through A21).

The climate is temperate with mild, wet winters and dry, warm summers. The maritime influence of the coastal winds coming up the Columbia River has a moderating effect on the harshness of the seasons in the county's northern portion. The average annual precipitation ranges from 40 inches at Canby to well over 100 inches near the peak of towering Mount Hood. The average frost-free growing period in the agricultural areas is from 180 to 210 days a year. In the high mountainous area along the eastern boundary line, frost may be expected any day of the year.

The eastern half of the county is heavily forested. The 44.4 percent of the county's soils that were not inventoried by the Soil Conservation Service personnel are mostly public forest lands. The higher mountain areas are densely forested and have little livestock forage. However, at lower elevations, each stream provides some grazing on its widening flood plains and many grassy knolls and hills are fenced for pasture. The 122,305 acres of soils with pasture as their major land use are scattered throughout the lower elevations of the foothills. In 1970, 46,000 cattle and 22,000 sheep were reported by Clackamas County farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Hay and grass fields are also grazed after the crops have been harvested.

One hundred seventy-five different series and sub-series of soils were inventoried in Clackamas County (S.C.S., Clackamas County, 1970). Cultivation is the major land use of 305,160 acres. However, this quantity is far in excess of the reported 83,245 acres of harvested crops in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969). Specific crops reported in 1969 were 9,500 acres of wheat, 9,000 acres of oats, 4,000 acres of barley, 13,500 acres of grass and clover seed crops, 3,100 acres of vegetables, 4,775 acres of berries and 3,050 acres of tree fruits, nuts and grapes for a total of 43,875. By including the 41,200 acres of harvested hay, the total comes to 85,075 acres or nearly the same as recorded with the 1969 agricultural census (Atlas, Clackamas County, 1974). The 1969 census also reported 12,572 acres of these soils were under irrigation the same year.

Most of the 292,870 acres of soils rated "excellent" or "good" for irrigability are located between the Pudding and Molalla Rivers. Both rivers have recorded nearly zero streamflows during dry water years (U.S.G.S., 1968), and their average streamflows during normal water years are overappropriated. Groundwater supplies are not plentiful on the valley floor but many irrigation wells have good sources of water from the underlying alluvial aquifers (Hampton, E.R., 1963). These supplies supplement surface water supplies but an extension of their use should not be included in long range planning until more is known about their dependability.

Carrying Capacity and Future Trends in Clackamas County

The population in Clackamas County has increased from 57,130 residents in 1940 to an estimated population of 178,400 residents in 1972 (Meyers, 1973). Besides a typical growth rate, the city of Portland has extended into the northern portion of the county, and many individuals who work in Portland have selected Clackamas County areas for their residences. Computer calculations from this study, using present patterns of land use, show the carrying capacity for construction to be 126,296 individuals for the present quality of life and 162,220 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 216,215 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 251,763 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 30,952 individuals could be provided their dietary animal protein needs. For a standard quality of life, 65,002 individuals could be supplied their dietary animal protein requirements.

The discrepancy which exists between the calculated carrying capacity for construction and the numbers of residents already living in the county is partially related to the large concentration of construction occurring in the Lake Oswego and Gladstone areas, and partially from the number of rural non-farm dwellings being constructed on fragile pasture and fringe forest areas. County comprehensive planning is actively working toward retaining the better soils for agricultural uses. The Portland city expansion will likely spread further into the county and the quality of life for the present residents could become an issue.

The calculated quantities of carbohydrates are in excess of those possible to be produced in the county unless extensive clearing of brush from cultivable soils occurs. However, sufficient carbohydrates could be produced to provide the present and a moderate increase in population with their dietary needs. Animal protein supplies are being imported into the county at this time and additional imports would be required for any further increase in population.

CLATSOP COUNTY

Clatsop County was created June 22, 1844. Its name is that of a small Indian tribe living south of the mouth of the Columbia River. Lewis and Clark named their 1805 - 1806 winter quarters Fort Clatsop (Holman, 1910). It occupies the extreme northwestern corner of the state, being bounded on the west by the Pacific Ocean, on the south by Tillamook County, on the east by Columbia County and on the north by the Columbia River. It lies completely within the North Coast Basin. Clatsop County ranks 28th in size of Oregon's 36 Counties, Encompassing 524,800 acres of which 81,800 acres (15.6 percent) are classified and included in this study (Appendix A, Tables A22 through A28).

The climate is mild and humid, tempered by the large bodies of water to the north and west. Annual precipitation at Astoria and Seaside exceeds 80 inches, most of it arriving during the winter and spring months. The Coast Range Mountains along the county's eastern boundary forms a cloud barrier except near the Columbia River. Precipitation in the higher mountain areas exceeds 120 inches a year, mostly coming as rain with occasional winter snows remaining for short periods of time (U.S. Department of Commerce, Weather Bureau, 1965). The frost-free growing period is from 150 to 195 days in the agricultural areas.

Forests cover about 90 percent of the county, many of them offering year-around grazing for livestock herds. Dairy cattle made up only one-eighth of the total 10,000 cattle reported by farmers in 1970, which is considerably less than reported on previous years. Only 400 sheep were reported the same year (O.S.U., Commodity Data Sheets, Cattle, Dairy

Cattle, Sheep, 1972). Woodland and brushy pastureland often contains small meadow hayfields close to streams. There were no cereal crops reported but 3,750 acres of haylands were harvested in 1970 (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, Hay, 1972).

Twenty different series and sub-series of soils were inventoried (S.W.R.B., Appendix I-1, 17, and 18, 1969). Soils with cultivation as their major land use totaled 16,800 acres and pastureland soils totaled 49,400 acres. The agricultural land extends along the coast in a narrow band from Seaside to the mouth of the Columbia River. It also extends up the rivers where irrigation waters are available during the early summer months.

Water supplies are limited in most parts of the county. The impermeable sedimentary rocks underlying the south and western portion of the county are poor aquifers, so groundwater supplies are limited. The Columbia River basalt along the upper Columbia River portion of the county has some groundwater reservoir capacity where sedimentary formations are not deep. Most of the annual precipitation drains quickly down the steep stream gradients into the ocean or the Columbia River. Municipal water supplies for Astoria and other cities are reserved in lakes and reservoirs but little surplus is available for industrial and irrigation uses.

Carrying Capacity and Future Trends in Clatsop County

The Clatsop County population has remained quite stable since 1940 when 24,697 residents were inventoried. The estimated 1972 population was 28,800 residents (Meyers, 1973). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 1,456 for the present quality of life and 1,868 for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 26,260 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 30,577 individuals could be supplied their carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 5,163 individuals could be supplied their dietary animal protein needs. For a standard quality of life, 10,843 individuals could be supplied their dietary animal protein requirements.

Most Clatsop County soils have excessive slope, poor internal drainage, high water tables or are prone to slides or flooding. Only 2,600 acres are classified with "slight" and "moderage" limitations for use as septic tank drainage fields. Waste water disposal facilities are poor but can be constructed. Some population increase could be accommodated but long-range plans would need to be initiated before significant growth could occur without a decrease in the quality of life in the area.

The soils classified as "cultivated" in the county are not used for growing cereal crops but produce forage for livestock production. However, even if these acres were converted to beef production, the county would still import both carbohydrate and animal protein supplies for their residents.

Clatsop County is unique among Oregon's counties in that extensive fish and shellfish processing occur there. It is estimated that half of the total weight of fish and shellfish products for the state are harvested or processed in the Astoria area (Atlas, Clatsop County, 1973). This study did not include fish or shellfish products into the calculation for animal protein supplies because they are not a managed harvest. With few exceptions, increases or decreases in fish and shellfish supplies depend upon the method of hunting and finding the prey rather than managing a harvestable dietary source.

COLUMBIA COUNTY

Columbia County was created January 16, 1854 from a portion of Washington County (Holman, 1910). It is bounded on the west by Clatsop County, on the south by Washington and Multnomah Counties and on the east and north by the Columbia River, for which the county is named. About 21 percent of its eastern area is contained within the Willamette River Basin with the remainder within the North Coast Basin. Columbia County is the third smallest of Oregon's 36 counties. It encompasses 413,400 acres of which 202,300 acres (48.9 percent) are classified and included within this study (Appendix A, Tables A29 through A35).

The county has a temperate maritime climate with dry, warm summers and wet, mild winters. The range in elevation is from 20 feet above sea level along the Columbia River to 2,500 feet in the mountainous southwestern portion. The northern extension of the Coast Range dwindles to large hills along the Columbia, neither offering a significant barrier to heavy rainclouds propelled inland from the ocean. Average annual precipitation ranges from nearly 100 inches in the higher mountains to about 45 inches near St. Helens (U.S. Department of Commerce, Weather Bureau, 1965). The average frost-free growing period in the agricultural areas is from 150 to 195 days.

Most of the county is heavily forested. The 92,100 acres of soils with a major land use of pasture are generally bushy pasturelands on slopes too steep to accommodate machinery and conventional irrigation equipment. Only 35.2 percent of the classified soils have slopes less than 31 percent. Twenty-four thousand cattle and 3,200 sheep were reported by the county's farmers in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Forty-two different series and sub-series of soils were inventoried (S.W.R.B., Appendix I-1, 17, 18 and 2, 1969). Within these soil types, 77,800 acres were classified with cultivation as their major land use and 92,100 acres had pasture as their major land use. A loess mantle overlies a portion of the county's eastern soils and extends on over the Portland Hills in Multnomah County. The fine, wind transported soils are nearly the same as the fertile Walla Walla soils in north-central and north-eastern Oregon. While these good, cultivable soils are present west of the St. Helens area, many are difficult to reach and the cost of clearing brush and trees from them is often greater than the agricultural returns which could be anticipated. In 1971, the county's farmers reported 10,700 acres of hay, 200 acres of wheat, 900 acres of oats and 500 acres of barley harvested (O.S.U., Commodity Data Sheets, Hay, Wheat, Oats, Barley, 1972). This totals to 12,300 harvested acres, which is less than 16 percent of the acreage classified with cultivation as its major land use.

Thirty-two thousand seven hundred acres of soils are considered "excellent" and "good" for irrigability. Winter and spring precipitation is plentiful, but the waters quickly drain from the area with only small amounts percolating into the soils. Groundwater supplies are slight and cannot aid in maintaining late summer streamflows by draining laterally into their systems. The light winter snowpack in the mountain melts early and does not aid in maintaining summer streamflows.

Only 6,244 acres of soils were reported under irrigation in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969).

Carrying Capacity and Future Trends in Columbia County

The population in Columbia County increased slowly from 20,971 residents in 1940 to 22,379 residents in 1960. However, a 34.4 percent increase in population has occurred since 1960, and the estimated 1972 population is 30,070 residents (Meyers, 1973). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 4,591 individuals for the present quality of life and 5,897 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 49,771 individuals could be provided their dietary carbohydrate requirements. For a standard but still acceptable quality of life, 57,954 individuals could be supplied their carbohydrate needs. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 7,027 individuals could be provided their animal protein needs. For a standard quality of life, 14,756 individuals could be supplied their dietary animal protein requirements.

The broad discrepancy between the calculated carrying capacity for construction and the present population was caused by the evaluations of the capabilities of the soils to tolerate construction stresses. Only 6,600 acres of the soils have "slight" and "moderate" limitations to support septic tank filter fields; all others have "severe" and "very severe" limitations. The rapid increase of rural non-farm dwellings in the county is expected, where a considerable portion of the good soils are less than 35 miles from the Portland city limits. The county can tolerate the increase in growth, but municipal services for water and waste water treatment will need to be supplied.

The calculated carbohydrate supplies are higher than are being produced in the county at this time. However, the soils are present which have the potential to raise the crops and excess water is in the nearby Columbia River to irrigate the soils. More than 115,000 acres of Capability Class I, II and III soils have only erosion or water problem limitations, both of which can be managed by good farming practices. The difficulty of access to many of these soils can also be managed should the need occur. At present, many of the soils with cultivation as their major land use are being used for growing hay and as pastures. Therefore, the animal protein production in the county is actually higher than indicated by the computer calculations.

Columbia County can support a larger population than exists by carefully planning where the population will be located and by realizing the limitations of most of the soils. Eventually, it will be economically feasible to bring the soils not presently used for crop production into that use. Both carbohydrate and animal protein supplies are being imported at this time.

COOS COUNTY

Coos County was created December 22, 1853 from parts of Umpqua and Jackson Counties. Its name is derived from that of a tribe of Indians of the Kusan family whose habitat was at what is now called Coos Bay. In the Lewis and Clark "Journals" the name is spelled "Cook-koo-oose", this was obtained from the Clatsop Indians (Holman, 1910). It is bounded on the west by the Pacific Ocean and Curry County, on the south by Curry County and on the east and north by Douglas County. Less than two percent of its area lies in the Rogue River Basin, the remainder is contained in the South Coast Basin. Coos County is the 23rd largest of Oregon's 36 counties, encompassing 1,031,040 acres of which 134,400 acres (13.0 percent) are classified and included in this study (Appendix A, Tables A36 through A42).

The climate is mild and humid with few extreme variations in temperature throughout the year. The annual coastal precipitation is about 60 inches a year but exceeds 100 inches in the Coast Range. Most of the area is mountainous and broken with a few flat inland valleys. Eighty-nine percent of the classified soils have slopes greater than 31 percent, with many areas being nearly impossible to reach with roads. Flooding is frequent on the lower lying valley soils during the rainy season. The average frost-free growing period is between 150 and 180 days with cold periods of short duration. Grazing can proceed throughout the year, although the nutrient value of the forage is low during the rainy season. Consecutive sunny days are rare except during the fall months.

Forty different soil series and sub-series were inventoried (S.W.R.B., Appendix I-1, 17 and 18, 1969). The major agricultural activity is in farm woodlots and pasture. Soils with pasture as their major land use occupy nearly 50 percent of the classified acres. Deep, nearly level grassy plains near Bandon and the inland delta lands of the Coquille River are the county's more heavily grazed areas. Thirty-five thousand cattle and 24,000 sheep were reported on Coos County farms in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Cultivation is considered the major land use on 34,900 acres of soils. However, the 1969 Census of Agriculture reported only 978 acres in grain crops, 10,871 acres in hay and forage crops and 133 acres of other crops for a total of 11,982 acres harvested on farms with sales over $2,500 (U.S. Bureau of the Census, Census of Agriculture, 1969). The consistent cool temperatures during the summer growing season do not stimulate rapid plant growth nor do they produce large crop yields. The 1970 average hay yield was barely two tons to the acre.

Most of the streams are short and have low flows during the late summer and early fall months when irrigation activity is greatest. Groundwater supplies are usually adequate for domestic use, but insufficient for irrigation. Large quantities of groundwater of poor quality have been found in the dune areas north of Coos Bay. Logs of observation wells in the county reveal severe drawdown during the fall months (Wheeler, 1970).

Carrying Capacity and Future Trends in Coos County

The county's population has increased from 32,466 residents in 1940 to an estimated 57,300 residents in 1972 (Meyers, 1973). The population has remained fairly stable with a small but steady growth since 1960. Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 3,817 individuals for the present quality of life and 4,903 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, the soils could provide dietary carbohydrate needs for 25,052 individuals. For a standard but still acceptable quality of life, 29,171 individuals could be supplied their dietary carbohydrate requirements. All soils with hay and pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 4,716 individuals could be provided their animal protein needs. For a standard quality of life, 9,904 individuals could be supplied their animal protein requirements.

The calculated carrying capacity for carbohydrate supplies is higher than actually exists and that for animal proteins is lower because most of the cultivated soils are used to produce forage for the large numbers of livestock in the county. Correct identifications of the land uses would lower the carbohydrate totals, but would not increase the protein values sufficiently to supply the present population. The county presently imports both nutrient supplies in considerable quantities.

The major limiting factor in the county is the shortage of good construction sites. Construction areas in the mountains are prone to slides and flooding while those along the coast must contend with tertiary sand dune problems. Future population expansion would need to concentrate close to municipal water and waste water facilities in order to maintain an acceptable quality of life.

CROOK COUNTY

Crook County was created October 24, 1882, from what was originally Wasco County. It was named for Major General George Crook, U.S. Army, who had command at one time of the Department of the Columbia (Holman, 1910). The county is located east of the Cascades, nearly in the center of the state. It is bounded on the west by Deschutes County, on the north by Jefferson and Wheeler Counties, on the east by Grant and Harney Counties and on the south by the irregular panhandle of Deschutes County. More than 96 percent of the county lies in the Deschutes Drainage Basin, with a small portion lying along the drainage divides of Goose and Summer Lakes Basin and Malheur Lake Basin. Crook County is the 12th largest of Oregon's 36 counties, encompassing 1,907,200 acres of which 1,869,000 acres (98 percent) are classified and presented in this study (Appendix A, Tables A43 through A49).

Most of the county lies on the semi-arid central Oregon plateau with an average precipitation of from eight to ten inches a year. In the higher altitudes of the Blue and Ochocho Mountains in the northern portion and in the Maury Mountains in the center of the county, the precipitation averages from 16 to 30 inches a year. Frost has been recorded every month of the year in the county, and less than 17 percent of the soils have more than a 90 day frost-free growing period.

One hundred thirty-five different series and sub-series of soils were inventoried in the county (S.W.R.B., Appendix I-5, 1969). Nearly two-thirds (1,250,900 acres) of the total acreage is classified as rangeland with another 22 percent classified as forest; together they total over 87 percent of the county area. Except in the higher altitudes of the three mountain ranges, grazing is possible along the forest floor. Ponderosa pine is the dominant species in the grazed forest area, while juniper grows on most of the rangeland in varying densities. More than half of the soils are above 4,200 feet in altitude, and 751,100 classified acres in the heavily dissected county have slopes greater than 30 percent. However, cattle graze along horizontal trails which follow the contours of the steep slopes. Sheep originally cut the trails on the slopes, but are no longer a major livestock resource, having decreased from 52,000 in 1940 to an inventory of 2,060 in 1969 (O.S.U. Extension Service, Data Sheet, Sheep, 1971). Nearly 62,000 cattle were listed in the county's 1969 inventory. Many areas between Paulina and Prineville have been cleared of sage brush and reseeded to hardy grasses which thrive on the dry plateau and gentler slopes. Good range management is evident and could be expanded.

Presently cultivated soils are limited to areas which have access to irrigation waters. Only 190,000 acres of the soils are rated as either "excellent" or "good" for irrigability in the county. The short growing season is reflected in the inventory of soils by capability classes and subclasses. Only 81,200 acres are rated from Class I through IV with erosion or water as the major limitations, while 442,400 acres of ClassI through IV soils show the chief limitation to be climatic factors. The type of crops grown on the 71,000 inventoried acres of cultivatable soils reflect the county's concentrated efforts toward producing beef. In 1969, more than 25,000 acres of soils were harvested as hay crops, while only 4,800 acres were harvested as small grains (Atlas, Crook County, 1973). Many of the small grain fields are seen scattered through the stream bottoms, intermingled with alfalfa and hay fields and are probably harvested for stock feed.

The availability of water supplies has always been a problem in Crook County. Nearly the entire area drains into the Crooked River and its tributaries, all of which have shown zero streamflow at one time or another. The Ochoco and Prineville Reservoirs impound waters for use in the lower reaches of the river, but surface water supplies in the Upper Crooked River areas are heavily dependent on winter snowpacks in the mountains. Groundwater supplies are poor, as much of the area is underlain with rock formations, barren of productive groundwater reservoirs. Shallow wells in and around Prineville vary from generally poor to a few good producers. Water rights on the Crooked River and its tributaries are not in excess of the total annual runoff, but water shortages exist due to the natural unequal distribution of the water in relation to water rights. Bringing water back upstream for irrigation would require lifting it several hundred feet which would not usually be economically feasible. Total exercise of water rights would decrease the flow rates below those minimums recommended by the Oregon Fish Commission.

Carrying Capacity and Future Trends in Crook County

Between 1940 and 1970 the population of Crook County has increased from 5,533 to 9,985 residents. Since 1960 to 1970 the county population has increased only five percent. Some ranchettes and acreages have spread onto agricultural land near Prineville, but the movement has not yet been significant. Subdivisions of soils in the Capabiltiy Classes VI and VII are significant and increasing. Most of these soils have been used for grazing and are typically fragile and require long periods of time to return to productivity once they are damaged. The area between Prineville and the Prineville Reservoir in the southwestern part of the county is being heavily subdivided. Most of these soils are rocky juniper and sage brush areas which will rapidly deteriorate and become less attractive, resulting in a general decrease in the quality of life for the residents. Less than ten percent of the soils in the county bear "moderate" or "slight" limitations for septic tank filter field locations and these are widely scattered. The general practice at the present time is to sink deep holes into the underlying lava and inject waste waters into the cavities. The present and future effect on the limited groundwater supplies is unknown.

Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 8,758 individuals for the present quality of life and 11,249 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 54,929 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 63,960 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 40,257 individuals could be provided their dietary animal protein needs. For a standard quality of life, 84,542 individuals could be supplied their animal protein requirements.

Most of the soils with cultivation as their major land use grow hay and forage crops instead of small grains. The difference in the type of crop "cultivated" on the soil results in more animal protein being produced and less carbohydrate type crops in actual production. The residents presently import most of their carbohydrate supplies and export large quantities of animal protein supplies.

Two major factors exist which will limit population growth in the county. The first and greater is the absence of reliable water supplies. The second is the shortage of good building sites close to existing urban centers. Considerable care must be exercised with planning future growth in the area in order to avert a possible loss in the quality of life for the residents.

CURRY COUNTY

Curry County was created December 18, 1855 from a portion of Coos County. It is named for George L. Curry, the last Territorial Governor of Oregon (Holman, 1910). It occupies the far southwestern corner of the state and is bounded on the west by the Pacific Ocean, on the south by the State of California, on the east by Josephine County and on the north by Douglas and Coos Counties. About one-third (32.7 percent) is contained in the Rogue River Basin and the remainder in the South Coast Basin. The county ranks 22nd largest of Oregon's 36 counties, encompassing 1,038,080 acres of which 56,800 acres (5.5 percent) are classified and included in this study (Appendix A, Tables A50 through A56).

The climate is humid and under the direct influence of the Pacific Ocean along which the county extends. Elevations vary from sea level to more than 3,000 feet within a few miles. The small quantities of classified soils lie in a narrow, broken band along the coast and extend for short distances up a few of the larger streams. All streams drain into the ocean through deeply eroded canyons. The county contains some of Oregon's most valuable standing timber. Forestry is considered the major land use on 20,000 acres of the classified soils, and by adding those soils not classified but considered to be timbered [N], 96.4 percent of the county's soils would have forestry as their major land use.

A considerable amount of the forested soils and most of the rolling hills along the coast are grazed. In 1970, farmers in the county reported 11,000 cattle and 22,000 sheep (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Irrigated pastures and haylands extend along the streams and rivers. Dairy cattle supply local markets with products.

Thirty different soil series and sub-series were inventoried (S.W.R.B., Appendix I-15 and I-17, 1969). The 27,900 acres of soils which have cultivation as their major land use raise a variety of crops, few of which are cereal grains. Hay, berries and horticultural crops (mostly lily bulbs) are the major crops raised on these soils. More than 80 inches of precipitation falls along the coast, and in excess of 120 inches a year falls on the mountainous areas. Minerals leach from the soils rapidly and must be returned as fertilizer in order for crops to obtain their nutrients. Only a few of the more specialized crops can economically support the required soil treatments.

Surface waters are usually sufficient for irrigating the narrow bands of soils along the streams but are insufficient for extensive use along the coast during the drier summer months. The rock masses in the Klamath Mountains do not have good aquifer capabilities. Groundwater supplies are usually sufficient for domestic but not for irrigation uses.

Carrying Capacity and Future Trends in Curry County

The county's population increased from 4,301 in 1940 to 13,006 in 1970. Most of this growth occurred between 1950 and 1960. Since that time, the population has remained reasonably stable. Computer calculations, using present patterns of land use, show a carrying capacity for construction of 4,604 individuals for the present quality of life and of 5,913 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 16,504 individuals could be provided their dietary needs. For a standard but still acceptable quality of life, 19,217 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 390 individuals could be provided their dietary animal protein needs. For a standard quality of life, 820 individuals could be supplied their animal protein requirements.

The major limiting factors for population growth in Curry County are adequate water supplies and acceptable building sites. The discrepancies which exist between the carbohydrate and animal protein carrying capacities and the existing population in the county were created by the classification of many soils as "cultivated" when they actually produce hay and forage crops for animal consumption. The 1969 Census of Agriculture inventoried only 2,226 acres of harvested land on farms with sales over $2,500 (U.S. Bureau of the Census, Census of agriculture, 1969). The animal protein calculations were similarly depressed by this inconsistency of the definitions of land use.

Curry County has a severe limiting factor in the small acreage of good soils for crop production. The farmers are utilizing the soils to their best possible use but are experiencing difficulties in continuing to maintain the land in its present use. The beautiful coastal scenery and remarkable recreational attractions will continue to concentrate population in a small area. The county's residents are presently forced to import both carbohydrate and animal protein supplies, and the rate of import will accelerate. It will be difficult to maintain an attractive quality of life within the carrying capacity of Curry County's capability for nutrient production.

DESCHUTES COUNTY

Deschutes County was created from a portion of Crook County on December 13, 1916. The Deschutes River was named by French trappers in the early 1800's because of its fearsome gorge. The county was named after the river (Atlas, Deschutes County, 1973). It is bounded on the west by the divide of the high Cascade Mountains where it shares county lines with Lane and Linn Counties, on the north by Jefferson County, on the east by Crook County and on the south by Klamath and Lake Counties. More than 90 percent of the county lies in the Deschutes River Basin, with the remainder lying in the Goose and Summer Lakes Basin. Deschutes County is the 11th largest of Oregon's 36 counties, encompassing 1,937,280 acres of which 1,652,800 acres (85.3 percent) are classified and presented in this study (Appendix A, Tables A57 through A63).

Precipitation varies from more than 70 inches a year on the crest of the Cascades to less than six inches in parts of the semi-arid plateau at the county's central portion. In areas of cultivated soils the average annual precipitation is eight to ten inches, mostly falling as snow during the winter months. More than 50 percent of the soils are above 5,000 feet in elevation and frost has been reported every month of the year. Climatic limitations are harsh, with nearly two-thirds of the soils having less than 60 day frost-free growing periods.

Fifty-four different series and sub-series of soils were inventoried in Deschutes County (S.W.R.B., Appendix I-5, 1969). Nearly 38 percent of the soils have forestry as their major land use with another 42 percent classified as rangeland. Together they total more than

80 percent of the inventoried acreage. Logging and the manufacture of limber products are major industries in the county. Most logging operations are in ponderosa pine forests on the lower slopes, but some fir is transported to mills from the higher Cascades. More than 72 percent of Deschutes County's lands are in federal ownership and nearly all of the forests are under federal control (Atlas, Deschutes County, 1973). Grazing on the pine forest floors is practiced in addition to the grazing of 821,400 acres of soils whose classified major land use is rangeland. In 1970, 32,000 cattle and 4,000 sheep were reported by Deschutes County ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Fifty-one different series and sub-series of soils were inventoried for Deschutes County (S.W.R.B., Appendix I-5, 1969). Cultivation is the major land use of 203,100 acres of these soils. However, in 1969, only 27,735 acres were harvested with 296 acres in wheat, 24,055 acres in haycrops and 1,992 acres in potatoes. Irrigation water was reported to have been used on 39,469 acres of harvested cropland (U.S. Bureau of the Census, Census of Agriculture, 1969). Field investigation revealed that a large number of acres considered cultivable could be put to that use if irrigation water was available.

Two hundred thirty-six thousand one hundred acres of all soils inventoried are rated "excellent" or "good" for irrigability. In the county, 318,700 acres are classified in Capability Classes I through IV with erosion or excess water as their major limiting factor. These soils are considered capable of producing crops. The loose pumice sand, silt and humus soils produce good harvests when sufficient water is continually applied. Otherwise, the water quickly percolates through the loose soil and flows away from the root zone.

Sufficient irrigation water at the proper time has always been a problem in Deschutes County. Good supplies are available early in the year but become scarce during the late summer months. Water produced by melting snowpacks at the head of the basin percolates quickly into the loose pumice soils and emerges as springs in the river below the county. Groundwater reservoirs are suspected to be present, but only a few wells show substantial productivity.

Carrying Capacity and Future Trends in Deschutes County

Between 1940 and 1970 the population increased from 18,631 to 33,800 residents and between 1960 and 1970 it increased 32 percent (Meyers, 1973). However, during the period 1960 to 1972, while the county's population increased 46 percent, the population in the combined cities of Bend, Redmond and Sisters increased only 17 percent (Atlas, Deschutes County, 1973). The movement toward rural non-farm from urban use is as noticeable in the central portion of Deschutes County as in any area of the state. Populations listed in the county census do not include the owners of numerous summer and vacation homes in the many subdivided areas of the county's southern portion.

Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 7,153 for the present quality of life and 9,188 for a standard quality of life.

A significant reason for the difference between the calculated and actual population numbers can be seen in tabulations of Septic Tank Filter Field Limitations, where less than one percent of the soils are rated to have "slight" or "moderate" limitations, and nearly 72 percent are rated to have "very severe" limitations. Most wastes from septic tanks are discharged into underlying lava caves, posing an unknown problem for future generations.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 154,803 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 180,254 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 2,943 individuals could be provided their dietary animal protein needs. For a standard quality of life, 6,180 individuals could be supplied their animal protein requirements.

The calculated carbohydrates produced are higher and the calculated animal proteins produced are lower than actually occur in Deschutes County. Most of the 200,100 acres of the Deschutes soil series classified as "cultivated" are presently used for range, hay production and pasture. However, most of these soils could produce cultivated crops if irrigation waters were available.

The major limiting factor for Deschutes County is a shortage of dependable water supplies. The county lies high in the watershed where water supplies are difficult to accumulate and store. It is unlikely that great changes will occur with land use from the present time.

DOUGLAS COUNTY

Douglas County was originally created as Umpqua County on January 24, 1851. It was named for the Umpqua River which flowed through the county and for an Indian tribe whose habitat was near the river. The present Douglas County was created January 7, 1852 out of the eastern part of Umpqua County. This time it was named for United States Senator Stephen A. Douglas (1813 - 1861), Democratic candidate for the presidency against Abraham Lincoln in 1860, and an ardent congressional advocate for Oregon (Holman, 1910). It is bounded on the west by the Pacific Ocean and Coos County, on the south by Curry, Josephine and Jackson Counties, on the east by Klamath County and on the north and northwest by Lane County. Most of its area is in the Umpqua River Basin with minor portions in the Rogue River, South Coast and Mid-Coast Basins. It is the fifth largest of Oregon's 36 counties, encompassing 3,239,680 acres of which 1,255,600 acres (38.8 percent) are classified and included in this study (Appendix A, Tables A64 through A70).

The county's climate is generally mild with wet winters and warm, dry summers. However, its area extends from the Pacific Coast at Reedsport to the crest of the Cascade Mountains at Diamond Lake, so many variations in climate exist within its boundaries. The Umpqua River Basin lies almost entirely within the county's boundaries. The river and its tributaries drain waters from four different mountain ranges - the Calapooya Mountains to the north, the Coast Range to the west, the Klamath Mountains to the south and the Cascades to the east. It contains one-twentieth of the nation's virgin timber reserve and ranks second in forest products manufactured in Oregon (Atlas, Douglas County, 1973). About 64 percent (799,300 acres) of the classified soils have forestry as their major land use and, if they were added to the county soils not classified but assumed to be in forests [N], 85.9 percent of the county's total area could be classified as forest land.

Most of the mountainous areas are steep and rugged. Only 10.1 percent of the classified soils have slopes less than 31 percent. The gentler slopes and many parts of the central valley are pastured or serve as hayland. In 1970, 42,000 cattle and 110,000 sheep were reported by the county's ranchers and farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). This is more than twice the number of sheep reported by the next three largest sheep producing counties in the state (Marion, Klamath and Umatilla Counties).

The annual precipitation varies with the portion of the county under consideration, but in the central valley where most of the agricultural activity occurs, about 24 inches a year are received. Most precipitation falls as rain with the only significant snowpack for summer moisture supplies occurring in the Cascades. With the exception of the Cascade mountain snowpack, all other precipitation in the county drains off quite rapidly.

Groundwaters provide most of the flow of the North Umpqua River, which drains the slopes of the Cascade Mountains. The porous volcanic rocks become saturated during the wet winter months and yield their water loads slowly as the streams begin to lower. The South and Lower

Umpqua sub-basins are underlain with rocks of low permeability and have poor or nonexistent underground water supplies.

One hundred fourteen different soil series and sub-series were inventoried in Douglas County (S.W.R.B., Appendix I-15, I-16, I-17 and I-18, 1969). Less than seven percent of the county's soils (183,000 acres) list cultivation as their major land use, but another 273,300 acres list pasture as the soils' major land use. However, the 1969 Census of Agriculture reported only 4,200 acres in cereal crops, 38,000 acres in hay crops and 4,543 other acres of assorted crops for a total of 46,743 acres harvested from farms producing an income of $2,500 or more (U.S. Bureau of the Census, Census of Agriculture, 1969). This represents only 25.5 percent of the soils which have cultivation as their major assigned land use.

The difficulty dxperienced in obtaining sufficient irrigation waters at the location and time they are required has seriously restricted the production of potentially irrigable soils. One hundred ten thousand acres are rated "excellent" or "good" for irrigability and another 81,400 acres are rated as "fair". Most of the better irrigable soils are fragmented along small streams. Those along the south fork of the Umpqua River have historically suffered from insufficient water supplies and are mostly kept in hayland and pasture. The fertile areas between Roseburg and Lookingglass are nearly all divided into rural non-farm acreages, and this practice has spread onto other fertile soils close to urban centers.

Carrying Capacity and Future Trends in Douglas County

The county's population increased from 25,728 residents in 1940 to 71,743 in 1970. Most of the growth occurred between 1940 and 1950, but a steady increase in county residents is continuing (Meyer, 1973). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 8,513 individuals for the present quality of life and 10,934 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 142,013 individuals could be provided with their dietary carbohydrate needs. For a standard but still acceptable quality of life, 165,362 individuals could be supplied their carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 15,916 individuals could be provided their dietary animal protein needs. For a standard quality of life, 33,425 individuals could be supplied their animal protein requirements.

The quantity of calculated carbohydrate supplies is in excess to what is actually grown in the county. Also, the quantity of animal protein supplies produced is much less than the livestock numbers in the county would suggest. A considerable quantity of soils identified in the inventory as "cultivated" are cultivable when irrigation waters are available. However, in the absence of irrigation water, these soils are used for hayland and grazing instead of for crop use.

The major limiting factor in Douglas County is the unequal distribution of adequate water supplies. Some of this problem can be alleviated by storing winter and spring runoff in reservoirs. However, soils along the South Fork of the Umpqua are those most critically affected and good reservoir sites in the Coast Range are difficult to locate. Flooding, a frequent occurrence, further complicates the problem by forcing construction onto the more fertile benchlands in order to reduce the flooding threat. Only 28,400 acres of soils have "slight" or "moderate" limitations for septic tank filter field percolation and many of these already support construction facilities. In order to maintain an acceptable quality of life, future population growth should be encouraged to develop close to municipal water and waste water facilities.

GILLIAM COUNTY

Gilliam County was created February 25, 1885 from a portion of Wasco County. It is named for Colonel Cornelius Gilliam, an Oregon pioneer of 1844, who was accidently killed at Wells Springs on March 20, 1848, while in command of the Oregon Volunteer forces in the Cayuse Indian Wars (Holman, 1910). It is part of the Umatilla plateau and is bounded on the west by the John Day River, on the south by Wheeler County, on the east by Morrow County and on the north by the Columbia River. Eighty-five and six-tenths of the county's 775,040 acres lie in the John Day Drainage Basin, and the remaining 111,340 acres lie in the Umatilla Drainage Basin. It is the 24th largest of Oregon's 36 counties and all of its area is classified and included in this study (Appendix A, Tables A71 through A77).

The climate in Gilliam County is semi-arid with the low rainfall and wide range of temperatures typical of other counties in north-central Oregon. At Arlington, on the Columbia River, the annual precipitation averages about nine inches, and at Condon, the county seat (elevation 2,850 feet), it is about 13 inches. While frost has been recorded every month of the year, the average frost-free growing period is from 120 to 165 days. Temperatures in excess of 100°F. are not uncommon most years throughout the county.

The county's terrain is gently rolling and slopes toward the Columbia River to the north. Deep swales and canyons lie between the hills which provide excellent graze for the 24,000 cattle and 5,000 sheep recorded in the area in 1969 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Only six percent of the county's soils have forestry as their major land use, and nearly 41 percent of the soils are considered as rangeland. Forest lands and most of the rangelands are located in the southern portion of the county. However, rangeland and cultivated land cannot be separated in most areas where hilltops are cultivated and the ravines between the hilltops are grazed, and since the stubble from the harvested crops is also grazed. Many hilltops have rocky outcrops and thin soils, which are included as rangeland in this study.

Eighty-two different soil series and sub-series were inventoried (S.W.R.B., Appendix I-6 and I-7, 1969). The inventory included 14,460 more acres than the county's actual total area. Fifty-five percent of the soils have cultivation as their major land use. Most of these cultivable soils are irrigable with 210,800 acres (27.2 percent) having an irrigation suitability of "excellent" or "good". An important use of irrigation is for producing hay and other forage crops on the 10,500 acres of hayland along the streams. Insufficient water is available to irrigate most of the county's better soils. Nearly nine percent of the state's Capability Class I soils are in Gilliam County. Soils with cultivation as their major land use total 426,200 acres with 27 percent being of Capability Classes I and II, and, if Capability Class III were included, would total more than 68 percent of the cultivable acres. However, summer fallowing is practiced on most of these soils in order to conserve the precipitation from two years to raise a single crop. Even then moisture is insufficient to fully utilize the good soils.

Wheat yields during the 1971 and 1972 harvest years were 32.6 bushels per acre for 83,500 acres and 28.4 bushels per acre for 103,150 acres respectively. The state average was 44.9 and 41.9 bushels per acre respectively for those years. Barley was produced on another 32,000 and 14,000 acres respectively those same years (O.S.U., Commodity Data Sheets, Wheat, Barley, 1972). Some good soils are at lower altitudes and could be irrigated, but within a 38 mile distance of Arlington (228 feet above sea level) good soils are located at more than 3,000 feet in elevation. This prohibits economical transmission of irrigation waters using present methods of supply.

Carrying Capacity and Future Trends in Gilliam County

The population in Gilliam County has decreased from 2,844 in 1940 to 2,342 in 1970. A 1972 estimated population shows a further decrease to 1,980 residents (Meyers, 1973). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 10,684 individuals for the present quality of life and 13,724 for a standard quality of life. The presence of large quantities of Capability Class I and II soils in the county tends to inflate this figure. An indication of the reasoning behind this inflation can be recognized where 191,600 acres of the county's soils show only a moderate limitation for septic tank drainage fields. A major industry such as the installation of a nuclear plant site near Arlington (Oregonian, July 24, 1974) could bring other industry into the sparsely populated county.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat), and, for the present quality of life, 364,715 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 424,678 individuals could be supplied their dietary carbohydrate requirements. All soils with range or hay as their major land use were converted to the production of animal protein (beef), and, for the present quality of life, 1,298 individuals could be provided with their dietary animal protein needs. For a standard quality of life, 2,725 individuals could be supplied their dietary animal protein requirements.

The major limiting factor for an extensive increase in population in the county is the absence of reliable water supplies. Groundwater supply studies have not been made, and the few wells scattered throughout the sparsely populated county do not reveal any pattern of groundwater occurence.

Diversified ranching practices include grazing of the stubble of harvested grainfields. The quantity of animal protein produced in this manner was not calcuable by the computer program. The county probably produces sufficient animal protein supplies for the present and a modest increase in population. However, Gilliam County will continue to supply impressive quantities of carbohydrate supplies to other areas of the state which have larger populations than their soils can supply with nutritive requirements. Any increase in available water supplies could be efficiently used on the good soils.

GRANT COUNTY

Grant County was created October 14, 1864 from a portion of Wasco County. It is named for General U. S. Grant, who, at that time was the most popular Union General in the Civil War (Holman, 1910). It is bounded by Harney County on the south, by Morrow, Umatilla and Union Counties on the north, Baker County on the east and Wheeler and Crook Counties on the west. Nearly 80 percent of Grant County is contained within the John Day River Basin, about ten percent in the Malheur Lake Basin, nine percent in the Malheur River Basin and a small portion in the Powder River Basin. It is the seventh largest county in the state, containing 2,900,480 acres with only 1,399,200 acres (48.2 percent) classified for use in this study (Appendix A, Tables A78 through A84).

Except for portions in the northern part, the county is very mountainous. Annual precipitation ranges from nearly 25 inches to less than ten inches. Frost frequently occurs each month of the year, and only one of the five official recording stations in the county has recorded more than a five day frost-free period per year. The station at Monument frequently records up to 145 days per year of frost-free growing season (U.S. Department of Commerce, 1971).

One hundred fifteen different soil series and sub-series were inventoried in Grant County (S.W.R.B., Appendix I-6, I-10, I-12, 1969). Although the data contained on the 115 computer cards included only 48.2 percent of the county's area, it is assumed that all soils of agricultural and range importance have been classified by the Soil Conservation Service. Fifty-nine and six-tenth percent of the county's area was owned by federal agencies in 1963 (Carolan, 1963). It is unlikely that this acreage has varied greatly during the past 12 years.

Of the 1,729,750 federally owned acres, 59.6 percent is owned by the Forest Service (Atlas, Grant County, 1973). The forests are owned by the Malheur, Umatilla, Wallowa-Whitman and Ochocho National Forests. The county is located in the center of the largest stand of ponderosa pine in the United States. Ponderosa pine forests usually have open forest floors which permits extensive controlled grazing. Ranchers in Grant County utilize this resource, and in 1969, 62,000 cattle of all types and more than 5,000 sheep were reported (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Even more stock could be supported in the large county if the slopes were not so steep on the mountainsides. Less than 30 percent of the soils inventoried in this study have slopes under 30 percent, and the unclassified acreages are located in even more remote and mountainous terrain than the classified acreages.

Many intermittent and a considerable number of perennial streams drain the area. Springs are common in the Blue Mountains and furnish water for stock and residents throughout the mountainous areas. Natural water supplies are also available in most of the 782,400 acres of soils whose major land use is rangeland, so that most of the county's available grazing areas are utilized at some time during the year. Hay is extensively grown along streams and utilized for stock feed during the harsh winter months.

The 98,500 acres of soils that have cultivation as their major land use occupy less than four percent of the county's area. Most of these soils are located along branches of the John Day River near Prairie City, Beech Creek, Fox and Bates, and in the more level areas of the northeastern portion of the county. However, none of the areas are large and most are contained on benches along streams or in semi-marsh areas which drain into the streams. Only 51,100 acres (less than two percent) have an "excellent" or "good" rating for irrigability, and most of the 41,453 irrigated acres (U.S. Bureau of the Census, Census of Agriculture, 1969) are utilized to grow forage crops for stock feed.

Climatic conditions greatly limit the types of crops which may be grown. Of the 127,500 acres of Capability Classes I (none), II and III, 86,000 acres (67 percent) have climate as their limiting factor. Some cereal crops are grown, but wheat yield in 1971 from 1,000 acres total was only 27 bushels per acre, while the state average was 44.9 bushels per acre. In 1972, 750 acres of wheat produced an average of 15.2 bushels per acre, while the state average was 41.9 bushels (O.S.U., Commodity Data Sheet, Wheat, 1974). Ranchers and farmers have found that hay production and pasturage is the best use of most of the county's cultivated soils.

Carrying Capacity and Future Trends in Grant County

The population of Grant County has decreased from 8,329 in 1950 to 7,726 in 1960 to 6,996 in 1970 (Meyers, 1973). In 1970, 63.3 percent of the 6,996 residents were contained within the county's nine incorporated areas. Computer calculations using present patterns of land use show a carrying capacity for construction to be 4,218 individuals for the present quality of life, and 5,417 individuals for a standard quality of life. These numbers are considerably less than the present population. The major reason for such a difference is that most of the soils suitable for construction are in flood and slide prone areas in the mountainous county.

All soils with cultivation as their major land use were converted to the production of carbohydrate (wheat) units. For the present quality of life they could provide 59,159 individual dietary needs, and at a standard quality of life could supply dietary requirements for 68,886 individuals. All soils with range, pasture and hay as their major land use were converted to the production of animal protein (beef) units. For the present quality of life, the county could provide 14,512 individuals with their dietary protein needs. For a standard quality of life, the animal protein requirements for 30,475 individuals could be supplied.

The major limiting factor in Grant County for supporting an increase in population is the lack of good building sites in areas near present centers of population. Most of Grant County was originally settled during and soon after gold was discovered in the Canyon City area in 1862. The cities rapidly grew near the gold findings, which were in the gorges of the mountain streams (O.S.S.H.E., 1940). Now, the remaining nuclei of formerly large cities remain at the original townsites where soils capable of sustaining long term construction stretches along the narrow canyons of the streams. The county will likely continue to supply substantial quantities of carbohydrate and protein dietary surplus supplies to more densely settled areas in the state which are deficient in these dietary needs.

HARNEY COUNTY

Harney County was created February 25, 1889 from a portion of Grant County. It was named for Major General William Selby Harney who, upon being appointed Brigadier General in January 1858, was assigned to the command of the Department of Oregon. He was stationed at Vancouver Barracks (Holman, 1910). The county is bounded on the west by Crook, Deschutes and Lake Counties, on the south by the State of Nevada, on the east by Malheur County and on the north by Grant County. The county has soils in five different drainage basins: 79.7 percent in the Malheur Lake Basin, 13 percent in the Malheur River Basin, 5.8 percent in the Goose and Summer Lakes Basins and small portions in the Deschutes River and John Day River Basins. It is the largest of Oregon's 36 counties, encompassing 6,484,480 acres of which 5,778,900 acres (89.1 percent) are classified and included in this study (Appendix A, Tables A85 through A91). The county is larger than seven eastern states in the nation.

The climate is semi-arid with hot, dry summers and cold winters. Precipitation varies from less than eight inches a year to more than 35 inches a year, with the more heavily populated areas receiving about ten inches. Growing seasons are brief, with less than one-sixth of the total area having a 90 day frost-free growing season and more than 700,000 acres having less than a 60 day frost-free growing season. Frost may occur any month of the year throughout the county. There are no soils located at less than 3,900 feet in elevation, and more than half of the county's nearly six and a half million acres are located above 4,500 feet. Most of the slopes of soils in Harney County are gentle, with more than a million and a half acres having slopes less than eight percent and nearly four million acres having slopes less than thirteen percent. The only abrupt mountain slopes in this large county are found in the Steens Mountains.

Sixty-two different soil series and sub-series were inventoried in Harney County (S.W.R.B., Appendix I-5, I-10, I-12, I-13, 1969). Raising livestock is the county's major industry. Nearly five million acres have range as their major land use and 326,800 acres have pasture as their major land use. Approximately 73 percent of the county's land is owned by the federal government and 84 percent of that quantity is administered by the Bureau of Land Management (Atlas, Harney County, 1973). The remainder of the federally owned land is contained in the Ochoco National Forest along the county's northern border. Ponderosa pine is the major tree species in the forest areas and the open forest floors are also grazed. In 1970, 97,000 head of cattle and 9,000 head of sheep were reported by the county's ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Hay for winter feed was harvested from 109,000 acres during the same year, but the yield was poor, averaging only 1.4 tons per acre (O.S.U., Commodity Data Sheet, Hay, 1972).

There were no soils in Harney County classified with cultivation as their major land use. However, small grain is raised on some acreage if the season proves long enough for it to ripen, otherwise the grain is harvested as forage. In 1971, 1,700 acres of harvested wheat produced an average yield of 16.7 bushels per acre (O.S.U., Commodity Data Sheet, Wheat, 1974). Another 1,200 acres of oats and 3,900 acres of barley were reported harvested that same year, but the total quantities are small and the grain is mostly utilized as stock feed.

Insufficient water supply is a perennial problem in Harney County. More than three-quarters of a million acres (760,500) are rated "excellent" or "good" for irrigability and legal water rights have been granted for 292,539 acres. However, about 45 percent of the land having water rights is not irrigated because of the water shortage (S.W.R.B., Malheur Lake Basin, 1967). Late summer flows in most streams oftentimes approach zero. Groundwaters are limited in supply and location but, where they are found, are an important source of supply for domestic and livestock uses.

Carrying Capacity and Future Trends in Harney County

From 1940 to 1970 there was a population increase from 5,374 to 7,215 residents in the county. The estimated 1972 population was 6,900 (Meyers, 1973). At the time of the 1970 census survey, 4,700 of the 7,215 residents of the county lived in two cities - Burns and Hines. Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 5,831 individuals for the present quality of life, and 7,490 for a standard quality of life.

There are no soils with cultivation as their major land use in Harney County, so no carbohydrate supplies could be calculated. All soils with range, pasture and hay as their major land use were converted to the production of animal protein (beef). For the present quality of life, 67,656 individuals could be provided with their dietary animal protein needs. For a standard, but still acceptable quality of life, 142,032 individuals could be supplied with their dietary animal protein requirements.

The major limiting factor for Harney County is lack of an adequate and dependable water supply. Actually, the large county cannot benefit greatly by a few large water storage areas. A multitude of small reservoirs which could extend the available water supplies through the summer months would significantly increase the potential carrying capacity for animal protein production. The short frost-free growing season in Harney County does not permit large plantings of carbohydrate producing crops, so the residents will continue to import carbohydrates for their dietary requirements. However, large quantities of animal protein supplies will continue to be exported to other areas of the state.

HOOD RIVER COUNTY

Hood River County was created June 23, 1908 and named for Hood River which arises on Mt. Hood, flows through the county and into the Columbia River. Mount Hood was named October 29, 1792 by Lieutenant W.R. Broughton, R.N., Vancouver's chief lieutenant and second in command. The mountain was named for Lord Hood, an English Nobleman, for whom is also named Hood's Canal, an arm of Pugent Sound (Holman, 1910). It is bounded on the west by Multnomah County and a portion of Clackamas County, on the south and east by Wasco County and on the north by the Columbia River. It is the second smallest of Oregon's 26 counties, encompassing 338,560 acres of which 290,800 acres (85.9 percent) are classified and included in this study (Appendix A, Tables A92 through A98). More than 91 percent of the county's soils lie in Hood Basin. The less than nine percent of the soils contained in the Deschutes River Basin are heavily forested and unclassified.

For such a small county, Hood River has a wide variety of climates. The effects of the high Cascades, the maritime breezes coming up the Columbia Gorge and the dry semi-arid Columbia Plateau all influence the pattern of rainfall, the frost-free growing period and the types of crops grown. Dense forests cover the Cascade Mountain crests where the average annual rainfall is about 130 inches with from 0 - 30 day frost-free growing periods. On and near the floor of the valley the rainfall averages from 30 - 45 inches per year with about 180 frost-free growing days. Along the eastern boundary of the county the average annaul rainfall decreases to about 10 inches a year and the dense Douglas fir forests are replaced by more hardy ponderosa pine. Nearly 75 percent of Hood River County is forested and when the unclassified (mostly watershed) land is added to the forested land, nearly 89 percent of the soils in the small county are not available for cultivation nor residential growth.

The county's terrain is rough and mountainous. More than 85 percent of the classified soils have slopes greater than 30 percent and the unclassified soils lie high in the Cascade Mountains. The densely forested slopes are not good for grazing and most of the 3,000 cattle and 500 sheep reported by the county's ranchers and farmers in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972) grazed the 4,500 acres of soils with pasture as their major land use and forests in the eastern portion of the county.

Fifty different series and sub-series of soils were inventoried (S.W.R.B., Appendix I-4, 1969). There were no cereal crops reported harvested from the 27,400 acres of soils with cultivation as their major land use and only 1,700 acres of hay were harvested. Almost half of the cultivated soils are of Capability Class IIe with erosion as the only limiting factor, and 19,800 acres are rated either "excellent" or "good" for irrigability.

Most of the good soils support old and new orchards of apples and pears. The orchards in the upper river valley are on the rolling hills of the valley floor or extend up onto the base slopes of towering Mount Hood. The county's most fertile soils are around Parkdale. Most of the orchards are small (less than 50 acres) and are separated by deep, eroded ravines, poorly drained pastures or oak and fir thickets. Fruit packing sheds and limber mills located at Parkdale and Odell, with other mills in the area, process most of the fruit and timber of the upper valley. While the greater measure of the good soils are between Dee and Parkdale in the upper valley, good soils with their corresponding orchards extent into the city of Hood River. In only a few places have orchards been removed to be replaced by residential dwellings. Most new residential home sites are located along the major state and county highways rather than intruding in clusters in typical subdivision patterns. This pattern of growth will most probably continue because the high investments and anticipated returns from good orchard land raises land values beyond the usual prices paid for residential home sites.

Water supplies in the county are sufficient for present domestic, municipal, industrial and recreational uses. Records of surface water runoff for the main stem of Hood River and its West Fork are the only streamflow measurements of sufficient record to allow accurate anticipated supplies. Storage of water will be necessary to increase consumptive uses for the upper valley orchards, mills, and packing sheds, and for domestic use. Increasing water supplies by developing storage reservoirs will create complex natural silting problems in the county where the stream gradients are so great. Suspended, glacial formed rock dust will also contribute to the problems associated with increased useage of the water.

Carrying Capacity and Future Trends in Hood River County

The county's population has been remarkably stable since the 1940 census survey showed the presence of 11,580 residents. The 1970 census recorded 13,187 residents, and the 1972 estimated population was 13,540 (Meyers, 1972). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 13,906 individuals for the present quality of life and 17,862 individuals for a standard quality of life. Population growth will continue to be slow.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, the soils could provide 31,142 individuals with their dietary carbohydrate needs. For a standard quality of life, 36,262 individuals could be supplied their dietary carbohydrate requirements. All soils with hay, pasture or range as their major land use were converted to the production of animal protein (beef). For the present quality of life, 897 individuals could be provided their dietary animal protein needs. For a standard quality of life, 1,883 individuals could be supplied their dietary animal protein requirements.

Apple and pear crops are very compatable to the soil types and terrain of Hood River County. The high carbohydrate content of the fruit probably produces more of the nutrient than if the soils were planted to wheat. Irrigation water is sufficient to adequately supply most of the county's needs.

Hood River County presently exports carbohydrates but imports animal protein supplies for its residents.

JACKSON COUNTY

Jackson County was created January 12, 1852 and was named for President Andrew Jackson (Holman, 1910). It is bounded on the west by Josephine County, on the south by the State of California, on the east by Klamath County and on the north by Douglas County. About 160,000 acres (8.9 percent) lies in the Klamath River Basin and the remainder is contained within the Rogue River Basin. It ranks 13th in size of Oregon's 36 counties, encompassing 1,802,880 acres of which 1,536,900 acres (85.2 percent) are classified and included in this study (Appendix A, Tables A99 through A105).

The county experiences mild, wet winters and hot, dry summers. The central Rogue River valley receives less rainfall than any other valley west of the Cascade Mountains. The 1951 - 1960 average precipitation at Medford was 21.71 inches with only 4.22 inches arriving in the May-through-September growing season (U.S. Department of Commerce, Weather Bureau, 1965). That portion of Jackson County near the Rogue River is flat or has low rolling hills, but more than 80 percent of the county's soils have slopes greater than 31 percent. Most of the terrain in the Klamath and Cascade Mountains is steep and rough. The elevation at the Medford airport is 1,312 feet, but less than half of the soils are below 3,700 feet. Many mountain peaks rise above 5,000 feet. Soils with forests as their major land use occupy 67.1 percent of the county and, if those acres not classified [N] were also considered forestland soils, more than 80 percent of the total area would be forested.

Fifty-two different soil series and sub-series were inventoried in Jackson County (S.W.R.B., Appendix I-15, 1969). Soils with cultivation as a major land use occupy only 35,700 acres, or less than two percent of the total area. Pastureland soils occupy 267,400 acres (14.8 per cent). Livestock farms are more numerous than cereal crop farms and 42,000 cattle were reported in 1970. The 5,000 sheep also reported in 1970 were significantly fewer in numbers than were the 11,000 reported in 1960 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Extensive use of the limited quantities of irrigation waters has developed the cultivated acreage to be some of the most productive in the state. Nearly 11,000 acres were in fruit, nuts and grapes in 1969, most in the Bear Creek valley near Medford (U.S. Bureau of the Census, Census of Agriculture, 1969). Pear orchards occupy most of this land. Only 550 acres produced wheat in 1971, but their yields equalled the 44.9 bushels per acre - the average state yield (O.S.U., Commodity Data Sheet, Wheat, 1974). Pastures and hayland extend along the tributaries of the Rogue River and are irrigated from the streams throughout the hot, dry summer. The 1970 average yield of 2.3 tons of hay per acre and the 1971 yield of 2.1 tons per acre (O.S.U., Commodity Data Sheet, Hay, 1973) do not reflect the extensive use of the cropland. In most fields, a single hay crop is harvested and the fields become pastures for the remainder of the year.

Summer water supplies are nearly non-existent in many streams late in the season. Water imported into the Bear Creek Valley from the Klamath River aids in keeping summer stream levels from reaching near zero flows. Legal water rights for irrigation use far exceed the quantity of water available during the summer months. During the winter and spring months the water runs rapidly from the steep slopes and floods much of the basin area. Contamination of groundwater supplies by flooding and irrigation practices further complicates the county's serious water supply problems.

Carrying Capacity and Future Trends in Jackson County

The county's population has grown from 36,213 residents in 1940 to an estimated 100,100 in 1972 (Meyers, 1973). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 40,738 individuals for the present quality of life and 52,326 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 45,926 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 53,477 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 22,918 individuals could be provided their dietary animal protein needs. For a standard quality of life, 48,129 individuals could be supplied their dietary animal protein requirements.

The limiting factors for population growth in Jackson County are numerous. Insufficient water supplies and the limited quantity of good soils are the major factors limiting nutrient production. Construction limitations are evident, since only 55,900 acres of soils (3.1 percent) have "slight" or "moderate" filter field drainage limitations, mostly because of the flooding tendency of the valley soils. Slides frequently occur on most sloping soils, which become fluid during the winter rainy season.

At this time, Jackson County must import carbohydrate and protein supplies for a population which increased by 27.8 percent between the 1960 and 1970 census survey (U.S. Bureau of the Census, 1970), and by another 5.9 percent by 1972 (Meyers, 1973). The mild winters and the natural beauty of the county's setting readily attract new residents. The carrying capacity of the county has already been exceeded and, as future growth is likely, the quality of life could decrease in the area.

JEFFERSON COUNTY

Jefferson County was created on December 12, 1914 from a portion of Crook County. It was named after Mount Jefferson, the highest peak of the Cascades within its boundaries (Atlas, Jefferson County, 1973). It is bounded on the west by the crests of the Cascades where it shares its county line with Linn and Marion Counties, on the north by Wasco County, on the east by Wheeler County, on the southeast by Crook County and on the south by Deschutes County. More than 88 percent of the county lies in the Deschutes River Basin, nearly 10 percent lies in the John Day River Basin, with the remainder draining from the crest of the Cascades into the Willamette River Basin. Jefferson County is the 19th largest of Oregon's 36 counties, encompassing 1,148,160 acres of which 1,014,400 (88.4 percent) are classified and are presented in this study (Appendix A, Tables A106 through A112).

Precipitation varies from 70 inches a year along the crest of the Cascades to a low of five or six inches annually on the semi-arid plateau. In areas of cultivation, the average precipitation is 8 to 11 inches a year. The altitude through the central part of the county is from 2,000 to 2,600 feet, but the influence of the snow-clad Cascades is strong, and frost has been recorded every month of the year. The average frost-free period in the central, cultivated area is over 75 days.

Seventy-seven different soil series and sub-series were inventoried for Jefferson County (S.W.R.B., Appendix I-5, I-6, 1969). The 11 percent of soils with the major land use of forestry lie along the western border on the eastern slope of the Cascades. Douglas fir is the dominant species high in the mountains, but on the gentler slopes the trees are mostly ponderosa pine. Grazing is possible on the lower forest floors, compatible with the selective logging management of pine forests. Log and lumber production by Jefferson County is and has been second highest in the Deschutes River Basin (Wasco County being the leader).

Fifty-one percent of the soils have rangeland as their major land use. The numbers of cattle have increased steadily since the 1940 report when 12,550 head were listed (compared to the 34,880 head listed in the 1969 report). Sheep have decreased in numbers from 40,000 head in 1940 to 1,985 head in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969). Most of the grazing land is in the eastern part of the county, where the climate is arid and production is low. The rough, mountainous country toward the breaks of the John Day-Deschutes Rivers watersheds is deeply dissected, but ranching has been successful in the small stream bottoms draining the area, for over a hundred years. Most stream bottoms have pastures, hay fields and small fields of grain to produce feed for the winter months. Most streams are intermittent and undependable, but groundwater supplies are sufficient to carry through the dry season.

The cultivated area from the county's southern boundary to the north and west of Madras has been developed into fine irrigated fields of pasture, alfalfa, potatoes and small grain. In 1969, 24,891 acres of cereal grain, 8,923 acres of hay crops and 8,091 acres of potatoes were harvested (U.S. Bureau of the Census, Census of Agriculture, 1969).

Billy Chinook Lake impounds water for the area behind Round Butte Dam, which contains the confluence of waters from the Metolius, Crooked and Deschutes Rivers. An elaborate network of irrigation canals supplies water from the reservoir to a large area. Twenty percent of the county's soils are cultivable and more than 246,000 acres (21.5 percent) are of Capability Classes I through IV with erosion and excess water as their major limiting factors. Specialty crops, such as mint and potatoes, are being grown in the area, and in normal years they have more than sufficient water for their development. Although 142,700 acres of soils are rated "excellent" and "good" for irrigability, only 53,771 acres were under irrigation in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969).

Water supplies for Jefferson County are insufficient for present use. The proximity of the Billy Chinook reservoir and the steady, dependable flow of the Metolius River normally cares for the needs around and downriver from Culver, Metolius and Madras. However, the Deschutes River supply from Deschutes County is fully utilized before it reaches the lake and by midsummer consists mainly of return water from irrigation. The undependable water supply from the Crooked River is contained in a deep gorge until it reaches the reservoir. Water flowing into Crooked River from large springs on its lower reaches would have to be lifted as much as 1,000 feet to be utilized.

Carrying Capacity and Future Trends in Jefferson County

The population of Jefferson County has quadrupled from 2,042 residents in 1940 to 8,548 residents in 1970 with an increase of nearly 20 percent since 1960. The largest city, Madras, increased in population by 11 percent between 1960 and 1970. The 1972 estimated population of Madras did not show any increase during the decade, although the growth in the county was nearly five percent during that time (Meyers, 1973). One reason could be that rural non-farm homes and ranchettes are increasing north of Culver, and have formed pincher-like settlements around many agricultural areas. Some subdivision areas are in the juniper clad hills, but most rural non-farm building is occurring along the roads near and on the more fertile soils.

Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 5,913 individuals for the present quality of life, and 7,595 for a standard quality of life. There are sufficient vacant areas in existing urban developments and enough good soils adjacent to them to incorporate larger populations, should they evolve. However, the large number of mobile homes on rural non-farm locations, in subdivisions and in mobile home parks does not indicate that all present residents have identified the area as a permanent location.

All soils with cultivation as the major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 159,394 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 185,600 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 1,111 individuals could be provided their dietary animal protein needs. For a standard quality of life, 2,332 individuals could be supplied their dietary animal protein requirements.

The animal protein supply calculated for the area is smaller than is being produced, as many acres classified with cultivation as their major land use grow hay crops for winter livestock feed. Jefferson County will continue to export large quantities of carbohydrate and probably some animal proteins to other areas of the state.

The major limiting factor for Jefferson County is the shortage of dependable water supplies close to the location of fertile soils.

JOSEPHINE COUNTY

Josephine County was created January 22, 1856 from the western portion of Jackson County. It is named for Josephine Rollins, a daughter of an early miner in that part of Oregon (Holman, 1910). The county is bounded on the west by Curry County, on the south by the State of California, on the east by Jackson County and on the north by Douglas County. It is completely contained within the Rogue River Basin. The county is the 22nd largest of Oregon's 36 counties, encompassing 1,040,000 acres of which 978,900 acres (94.1 percent) are classified and included in this study (Appendix A, Tables A113 through A119).

The county experiences mild, wet winters and hot, very dry summers. The two narrow valleys near Grants Pass and Cave Junction received 3.38 inches of precipitation from May through September in 1971, nearly half of that arriving during September. The total precipitation that year was 30.86 inches (U.S. Department of Commerce, Weather Bureau, 1971). Steep mountainsides with peaks above 6,000 feet occupy all lands except in the two central valleys and a few areas alongside streams. Only 11.2 percent of the county's soils have slopes less than 31 percent. Winter rains and the spring snow melt quickly leave the area, drained by the Applegate and Illinois Rivers and other smaller tributaries of the Rogue River. Heavy forests cling to the mountainsides, with 84 percent of the soils claiming forestry as their major land use. Most of these soils are on too steep terrain to be grazed.

Twenty-two different soil series and sub-series were inventoried (S.W.R.B., Appendix I-15, 1969). Soils with cultivation as their major land use occupied 33,100 acres (3.2 percent) and are mostly located in the Grants Pass, Central Point and Cave Junction areas. Pastureland occupied another 72,700 acres. Fifteen thousand cattle and 2,000 sheep were reported on Josephine County farms in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Some small grains are raised, as is hay along the many streams. Irrigation is essential during the dry summer months when the streams are at their lowest flows.

The rocks in the mountains in this area of Oregon do not have the capability to retain winter water supplies and slowly release them. Neither are there quantities of rock which could offer groundwater reservoir sites. Logs of wells near the Grants Pass area show severe drawdown during the summer months (Wheeler, 1970). Most wells produce adequate supplies for domestic but not for irrigation use.

Carrying Capacity and Future Trends in Josephine County

The county's population increased from 16,301 to 35,746 in 1970. Between the 1960 and 1970 census years, the population increased 19.8 percent (U.S. Bureau of the Census, 1970), and another 7.7 percent increase is indicated between the 1970 census and the 1972 estimated population (Meyers, 1973). Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 29,135 individuals for the present quality of life and of 37,422 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 57,745 individuals could be provided thier dietary carbohydrate needs. For a standard but still acceptable quality of life, 67,238 individuals could be supplied their annual dietary carbohydrate requirements. All soils with pasture or hay as their major land use were converted to the production of animal protein (beef). For the present quality of life they could provide 6,134 individuals with their dietary animal protein needs. For a standard quality of life, 12,881 individuals could be supplied their dietary animal protein requirements. The quantities of carbohydrates which were calculated are higher than actually exist, because rural non-farm settlement has already removed a considerable quantity of the productive land from that use.

The major limiting factors for future population growth in Josephine County are insufficient dependable water supplies and a limited quantity of good soils. Frequent flooding and land slides restrict most building to nearly level elevated soils. Direct competition for soils exists between cultivation and construction processes.

Carbohydrate and animal protein supplies are imported into Josephine County at the present time and the practice will continue in the future. The county's population will most likely continue to increase because of the natural beauty of the area and the presence of the only highway servicing the southern Oregon and northern California coastal region. It will become increasingly difficult to maintain an acceptable quality of life for most residents.

KLAMATH COUNTY

Klamath County was created October 17, 1882 from a portion of Lake County. Its name is derived from the Klamath Lakes. The name of the lakes and the Indian tribe whose habitat was near the lakes is spelled "Clamitte" in Peter Skene Ogden's Journals when he was at or near there in the autumn of 1826 (Holman, 1910). It is bounded on the west by Lane, Douglas and Jackson Counties, on the south by the State of California, on the east by Lake County and on the north by Deschutes County. Seven and a half percent of the county is in Goose and Summer Lakes Basin, 12.8 percent in the Deschutes River Basin, 81.4 percent in the Klamath Basin and a small portion is in the Rogue River Basin. It is the fourth largest of Oregon's 36 counties, encompassing 3,822,720 acres. The county's soils, tabulated by the 1969 State Water Resources Board study in 1969, total 4,606,600 acres which is 120.5 percent of the county's actual area. It includes land not otherwise classified in the heavily forested divide along the Cascades on the western border and in the semi-arid range along the Deschutes and Lake Counties border (Appendix A, Tables A120 through A126).

The climate within the county's basin portion is semi-arid with hot, dry summers, cold winters and temperate falls and springs. The western portion of the county lies in the high Cascades where elevations rise to over 8,900 feet on Mt. Scott and snowpacks are frequently more than 150 inches deep at beautiful Crater Lake. Precipitation falling on the cultivated areas averages from 9 to 14 inches a year, with the higher elevations along the county's eastern portion receiving up to

20 inches. Frost may occur any month of the year throughout the county, but during most years the cultivated areas have a 90 to 105 day frost-free growing period. However, more than half of the soils have less than a 50 day frost-free period. All soils in the county are at elevations greater than 4,000 feet, and well over half lie nearly a mile above sea level. Clear, sunny days are typical throughout the year in the central basin area.

Seventy-six different soil series and sub-series were inventoried for this study (S.W.R.B., Appendix I-14, 1969). More than 55 percent of the county's land is publicly owned and nearly 70 percent of that is in national forests. Forestry is the major land use in the county with rangeland use being second in acreage. Ponderosa pine forest floors in the county's northern and eastern portions furnish additional graze for the large numbers of livestock. The county's ranchers reported 127,000 cattle and 32,000 sheep in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). In addition to those raised in the area, 92,612 cattle entered the county from California under permit for summer grazing in 1973 (Oregon Agri-Record, 1974).

In spite of the short growing season, many crops are grown on the cultivated soils. Potatoes, small grains, peas, grass and legume seed, alfalfa hay, grass hay and pasture are the more common crops. Soils with cultivation as their major land use total 171,100 acres with an additional 273,700 acres in pasture. In 1964, 86 percent of the total cropland was irrigated from the plentiful water supplies in the largest body of frest water west of the Rocky Mountains, Klamath Lake. Yields are good, with wheat yielding nearly 47 bushels per acre in 1971 when the state average yield was 44.9 bushels per acre. A total of 61,500 acres of wheat, barley and oats and 78,500 acres of hay were harvested in 1971 (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, Hay, 1974).

Most of the presently irrigated lands have adequate water supplies throughout the summer months. Some smaller streams flow near or at the zero level under natural conditions, but few demands are placed on these resources. Many major contributions to surface water yields are supplied directly from spring flows. The groundwater resource is stable and of major significance for domestic, livestock, irrigation, municipal and industrial needs (S.W.R.B., Klamath Basin, 1971).

Carrying Capacity and Future Trends in Klamath County

The population in Klamath County has slowly increased from 40,497 in 1940 to an estimated 51,940 in 1972 (Meyers, 1973). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 18,922 for the present quality of life and 24,304 for a standard quality of life. The discrepancies between the present population in the county and the computer calculated carrying capacity reflects the presence of high water tables in soils located near the major urban centers in the southern portion of the county. Soils located in the fragile areas on the head of the watershed near Chemult, Crescent, Gilchrist and Crescent Lake are unable to tolerate great disturbances. The 217,600 acres of soils with only "slight" and "moderate" limitations for septic tank filter field locations are mostly located some distance from present urban concentrations.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 249,645 indiviudlas could be provided their annual dietary carbohydrate needs. For a standard but still acceptable quality of life, 290,690 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 86,052 individuals could be provided their animal protein needs. For a standard quality of life, 180,712 individuals could be supplied their dietary animal protein requirements.

Nearly 100,000 acres of soils with a declared major land use of cultivation are used for the production of hay in this county. The computer calculated this acreage as carbohydrate nutrients rather than as a producer of animal protein. Therefore, the calculated carrying capacities for carbohydrate production is higher and the animal protein production is lower than actually occurs in the county.

The major limiting factors in Klamath County are the limited acreages of good soils which readily permit construction, and the short growing season. The construction problems may be overcome by concentrating populations close to existing municipal facilities.

Klamath County will continue to be a major producer of surplus carbohydrate and animal protein supplies to other areas in the state that are unable to raise these essentials for their residents.

LAKE COUNTY

Lake County was created October 24, 1874 from a portion of Jackson County. It derives its name from the numerous lakes contained within its boundaries (Holman, 1910). It is bounded on the west by Klamath County, on the south by the States of California and Nevada, on the east by Harney County and on the north by Deschutes County. Less than two percent of the county lies in the Deschutes River Basin, about 10 percent is in the Malheur Lake Basin and the remaining 87 to 88 percent lies in the Goose and Summer Lakes Basins. It is the third largest of Oregon's 36 counties, encompassing 5,292,800 acres of which 4,679,700 acres (88.4 percent) are classified and included in this study (Appendix A, Tables A127 through A133).

The climate is semi-arid with hot, dry summers, cold winters and temperate springs and falls. All soils in the county lie above 4,200 feet, with about 30 percent lying more than a mile above sea level. Frost-free growing seasons are short, being less than 90 days in most of the cultivated areas. Precipitation ranges from 8 to 12 inches in the cultivated areas to a little over 20 inches in the forested uplands. The county's terrain is mostly high and quite flat plateau lands, occasionally broken by sheer, formative cliffs where portions of land have settled to lower levels, leaving the unmoved plateau several hundred feet above the sunken area.

One hundred sixteen different soil series and sub-series were inventoried in Lake County (S.W.R.B., Appendix I-12, I-13, I-5, 1969). More than 67 percent of the soils have a major land use as range, with another 10.7 percent having forestry as their major use. Nearly all of the forested areas are grazed. Livestock production is the major industry with large stock ranches utilizing most of the range. In 1970, 88,000 cattle and 4,000 sheep were reported by the ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Nearly 75 percent of the county's land is publicly owned with about 67 percent of this supervised by the Bureau of Land Management and 27 percent by the Fremont National Forest.

More than 98 percent of Lake County lies within closed basins which have no outside drainage. Natural precipitation percolates as deeply as possible into the soil, becomes saturated with minerals and then evaporates, leaving the minerals in the tilth layer. As a result of this natural process, most soils are quite alkaline and a calcium pan has developed between 10 and 18 inches below the surface at the edge of the percolation zone. Only a few more hardy trees and shrubs, such as juniper and sage have roots which penetrate the pan and seek deeper water supplies. The Bureau of Land Management is rehabilitating different ranges by reseeding areas which respond to such treatment. Rotation grazing management is practiced in areas which may become more productive by natural reseeding. These efforts are sharply curtailed by limited funds and personnel.

Soils with cultivation as a major land use occupy 132,500 acres and those with pasture as their major land use occupy another 159,200 acres. Together they total only five and one-half percent of the county's area. Most crops require irrigation, as the annual precipitation is insufficient for optimum plant utilization. The 184,000 acres with legal surface water rights would consume about 97 percent of the average stream yields if they could be exercised. However, the average water yields are inadequate to completely supply presently irrigated lands (S.W.R.B., Goose and Summer Lakes Basin, 1963). More than 216,000 acres of land are rated either "excellent" or "good" for irrigability. Most stock ranches irrigate some acreage for pastures and hayland. Often, a haycrop is initially harvested and then the land is pastured until irrigation is no longer possible from the lowering streams.

Surface water supplies are less than the demand for their use nearly every year. Large groundwater supplies are suspected to exist below 500 feet, and many of the county's streams originate and are fed by springs. However, wells are too scattered to yield a reliable profile of groundwater in the basins. Excessive use of surface water and groundwater for irrigation will tend to accelerate the natural mineralization of the tilth layer. In areas where flushing of the soil is possible and the leached minerals can be drained, receiving waters become vulnerable to increased mineral content. Caution must also be exercised to avoid removing more groundwater from reservoirs than may be recharged into them from the county's low annual precipitation, although this is not evident as yet by a study of observation wells (Wheeler, 1964).

Carrying Capacity and Future Trends in Lake County

The population in Lake County has remained relatively stable since 1940 when 6,293 residents were reported. The 1970 census survey reported 6,343 residents and an estimated 1972 population was reported as 6,740 (Meyers, 1973). Computer calculations, using present patterns of land use, show a carrying capacity for construction to be 4,798 individuals for the present quality of life and 6,163 for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 44,413 individuals could be provided their annual carbohydrate needs. For a standard but still acceptable quality of life, 51,714 individuals could be supplied their carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 12,339 individuals could be provided their dietary animal protein needs and for a standard quality of life, 25,912 individuals could be supplied with their animal protein requirements.

All soil types which had cultivation as their major land use were calculated into carbohydrate units by the computer. Of the 132,500 acres of soils with a declared major land use of cultivation, only 14,100 acres were reported harvested as small grains in 1971. Hay was reported as a crop on 82,300 acres during the same year (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, Hay, 1974). Therefore, the calculated carbohydrate supply was higher and the calculated animal protein supply was lower than actually occurs.

The major limiting factors for Lake County are inadequate water supplies and its location within closed basins. Importing water into the water deficient areas would eventually magnify the alkaline soil problems in the county. Continuing efforts of rangeland rehabilitation will increase the carrying capacity of the soils for livestock, and Lake County will continue to be a substantial animal protein producer for other areas of the state.

LANE COUNTY

Lane County was created January 28, 1851 and was named for Joseph Lane, the first Territorial Governor of Oregon who had been a distinguished Brigadier General in the Mexican War (Holman, 1910). It is bounded on the west by the Pacific Ocean, on the south by Douglas County, on the east by Klamath and Deschutes Counties and on the north by Linn, Benton and Lincoln Counties. It is one of the two counties in the state that encompasses soils from the crest of the Cascade Mountains to those along the Pacific Ocean. Twenty-one percent lies in the Mid-Coast Basin with most of the remainder in the upper Willamette River Basin. Small portions also occupy fringe acreages in the Deschutes and Umpqua River Basins. Lane County ranks sixth in size of Oregon's 36 counties, encompassing 2,926,720 acres of which 2,384,238 acres (81.5 percent) are classified and included in this study (Appendix A, Tables A134 through A140).

The climate in western and central Lane County is temperate, marine, and humid, with cool, wet winters and warm, dry summers. The low divide in the Coast Range between the Willamette River Basin and the Pacific Ocean is penetrated by the meanders of the Siuslaw River where it eroded its passage to the coast. Rain laden clouds are often propelled up the Siuslaw River valley and into the county by strong winter winds. Average annual precipitation ranges from 80 inches on the coast, more than 100 inches at the crest of the Coast Range, 40 to 50 inches in the central valley and from 60 to 80 inches along the crest of the High Cascades (U.S. Department of Commerce, Weather Bureau, 1965). Most of the precipitation arrives between October and April with only a small portion falling during the summer growing period. Snowpacks in the Cascades last far into the summer, slowly melt and contribute their water to the decreasing streamflows. Late spring and early fall rains serve to temper the air masses and most of the county's agricultural lands enjoy a 165 to 210 day frost-free growing period.

More than 64 percent of Lane County's classified soils have forests as their major land use. The 18.5 percent of unclassified soils are in forested areas. The total of the forested and unclassified [N] soils would be 2,412,210 acres (82.6 percent) of the County's area, which agrees closely with the 81.29 percent of land in forests published by the Oregon Department of Planning and Development (Oregon Department of Planning and Development, 1964). Some forested lands in the Cascades are grazed but most are too dense for forage to grow well. The more open and brushy foothill areas along the Calapooya Mountains to the south and the east facing slopes of the Coast Range offer good grazing. Most of the 42,000 head of cattle and 24,000 sheep reported in Lane County in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972) are concentrated on the lower hills around the basin floor. Sheep grazing is also managed on some grass fields in the northern part of the county. Dairy herds are managed near the Eugene-Springfield area, along the flood plains of the Siuslaw, and near Florence on the coast where they supply the urban population with their commodities.

Eighty-one different series and sub-series of soils were inventoried (S.C.S., Lane County, 1973). Within these soil types, 209,590 acres are classified with cultivation as their major land use and another 292,900 acres have pasture as their major land use. The county's most fertile soils lie on the flood plains along the lower McKenzie River an on those along the Willamette River from Eugene to the county's northern boundary. The soils have been deposited and reworked when simultaneous flooding occurred in both major rivers and the silt laden waters spread widely over the surrounding countryside. As the waters slowly receded, some silts settled on the flooded soils or, where ponding occurred in lower areas, all the silt remained as the waters percolated into the soil and deposited their load. Twenty-eight hundred fifty acres of Capability Class I and another 133,200 acres of Capability Class II with only erosion or water problems are located in the two flood plains. These are Lane County's most fertile soils.

A total of 201,120 acres of Capability Class III soils with only erosion or water problems as their limiting factors extend across the western portion of the basin and north to the county border. Cereal grains, grass seed and hay are their major crops. In 1971, 2,300 acres of wheat, 4,000 acres of oats, 2,000 acres of barley, 33,900 acres of hay and 23,600 acres of grass seed were reported harvested by Lane County farmers (O.S.U., Commodity Data Sheets, 1974).

A wide variety of specialty crops are grown on the Class I and II soils. Cannery crops, including beans, beets, carrots, rhubarb, squash, pumpkins, berries and others, were grown on 5,235 acres in 1979. Fruit and nut orchards and vinyards occupied another 5,035 acres (U.S. Fureau of the Census, Census of Agriculture, 1969). Mint was harvested from another 3,000 acres (Loy and Mitchener, 1972). Most of the specialty crops require irrigation waters for their harvests to be acceptable for processing.

Surface water supplies are regulated in all of the county's major streams except those in the Siuslaw River. Major dams retain waters from winter rains and spring snowmelt and use them to maintain good streamflows in the McKenzie, Willamette and Long Tom Rivers. Alluvial beds underlie the more fertile soils along the rivers and are continually recharged by the lateral subsurface flows. One hundred sixty-four thousand six hundred forty acres of the county's soils have "excellent" or "good" capabilities for irrigation. Application of water by sprinkler systems is the most common method used. About 49 percent of the irrigation use consists of surface waters, 33 percent of groundwaters and 18 percent are a combination of the two (Atlas, Lane County, 1973). Most of the irrigable soils along the Siuslaw River and its tributaries use surface water supplies. Streamflows which are not supplemented by reservoir storage waters, dwindle during the late summer and early fall months.

Groundwater supplies are plentiful when drawn from the alluvial beds near the McKenzie and upper Willamette Rivers and from most of their tributaries. Pollution of shallow well systems occurs where livestock and human wastes percolate into the groundwaters. In areas distant from the confluence of the two major rivers, groundwaters are more difficult to obtain and are often of poor quality. The coastal portion of Lane County has serious difficulty in obtaining sufficient groundwater supplies. Large stores of groundwater of poor quality are available from the sand dunes along the coast from Mercer Lake to the county's southern boundary.

Carrying Capacity and Future Trends in Lane County

The population in Lane County has increased from 69,096 residents in 1940 to an estimated 227,200 in 1972 (Meyers, 1973). A 31 percent increase in population was recorded between the 1960 and 1970 census surveys (U.S. Bureau of the Census, 1970). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 37,602 individuals for the present quality of life and for 48,298 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 262,448 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 305,597 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 31,072 individuals could be provided their animal protein needs. For a standard quality of life, 65,252 individuals could be supplied their animal protein requirements.

The broad discrepancy which exists between the calculated carrying capacity for construction and the present population in Lane County was caused partly by the evaluations of the capability of the soils to absorb construction stresses, and partly by the concentration of the population in the Eugene-Springfield area. Only 16,450 acres of the county's nearly three million acres have only "slight" or "moderate" limitations for septic tank filter fields. The expansion of rural non-farm dwellings and subdivisions onto soils which cannot take such a stress over a long period of time, seriously jepardizes the future quality of life of the residents. Extensive building has occurred and is proceeding on soils which periodically have flooded. The threat of reoccurrence of a flood also decreases the quality of life of the occupants of such soils.

The cities of Eugene and Springfield as well as the smaller cities in Lane County are extending their boundaries as rapidly as possible in order to bring more residents into municipal water and waste water disposal districts. Land use planning is alleviating the rapid expansion of rural non-farm dwelling construction but has not stopped the process. A decrease in the quality of life for the county's residents is probable as the population continues to increase.

Lane County presently imports both carbohydrate and animal protein dietary supplies from other areas in the state but could, if necessary, raise sufficient carbohydrates for the present population.

LINCOLN COUNTY

Lincoln County was created February 20, 1893. It is named for Abraham Lincoln (Holman, 1910). It is bounded on the west by the Pacific Ocean, on the south by Lane County, on the east by Benton and Polk Counties and on the north by Tillamook County. Less than two percent of the county's area lies in the Willamette Basin and the remainder is contained in the Mid-Coast Basin. Lincoln County is the 27th largest of Oregon's 36 counties, encompassing 630,400 acres of which 64,200 acres (10.2 percent) are classified and included in this study (Appendix A, Tables A141 through A147).

The county is nearly 60 miles long and from 15 to 20 miles wide. The eastern boundary closely follows the crest of the Coastal Mountain Range which has peaks more than 3,000 feet high. The mountains form an effective barrier that causes the rain-laden clouds from the ocean to drop most of their load as rain in the fall, and oftentimes as snow in the winter. Precipitation in the mountains usually exceeds 150 inches a year while the coastline area receives from 60 to 100 inches annually. Stream gradients are very steep at the headwaters, as are the mountain slopes draining their waters into the streams. Flooding, slides and erosion are common occurrences in all areas of the county. The climate is humid during the winter rainy season and remains the same through the summer, when coastal fogs penetrate the lower lying valleys almost every night. About 150 to 195 frost-free days a year are common throughout most of the agricultural area.

Twenty-nine different soil series and sub-series were inventoried (S.W.R.B., Appendix I-17 and 18, 1969). The classified soils lie on the bottomlands and on streamside terraces, with a small amount on low slope uplands and coastal plains. These areas include all of the acreage in the county suitable for cultivated crops or improved pasture production. The remainder of the soils are on forested mountain uplands. Some of the gentler mountain slopes and meadows are grazed, as are most of the streamside meadows. Ten thousand cattle and 4,200 sheep were reported by their owners in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Most of the 13,200 acres of soils with cultivation as their major land use produce forage for the livestock populations. Hay was harvested from 3,600 acres in 1970 but no harvested cereal crops were reported (O.S.U., Commodity Data Sheets, Hay, Wheat, Barley, Oats, 1972). Many types of horticultural specialty crops utilize a minor amount of area, as do fruit and berry crops raised mostly for local markets. Most crops not native to the area require large quantities of fertilizer and minerals to replace those leached from the soils during the rainy season. This added expense limits the type of crops to those that can offer attractive economic returns.

Water supplies are very limited. The winter and spring runoffs quickly drain from the area, mostly leaving via the county's five major rivers - the Salmon, Siletz, Yaquina, Alsea and Yachats. Soils under and near the rivers and other streams are quite impervious, so little groundwater remains in the area. Most small streams and all of the rivers have very low flows during the late summer and fall months during average water years and sometimes run dry during low water years.

Carrying Capacity and Future Trends in Lincoln County

The county's population increased from 14,549 in 1940 to 21,308 in 1950. Since that time a slow but steady growth has brought the estimated 1972 population to 26,100 residents (Meyers, 1973). Computer calculations from this study, using present patterns of land use in the county, show a carrying capacity for construction to be 8,009 individuals for the present quality of life and 10,287 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life the soils could provide the dietary carbohydrate needs for 14,608 individuals. For a standard but still acceptable quality of life, 17,010 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 3,266 individuals could be provided their animal protein needs. For a standard quality of life 6,858 individuals could be supplied their animal protein requirements.

The discrepancies which exist between the calculated carrying capacity for construction and the present population in the area were determined by the types and quantities of soils in the areas where populations are concentrated. These soils are limited in quantity and have severe limitations for use as septic tank filter fields.

The soils considered cultivable have not been used for cereal crop production but are mostly used to produce forage for livestock. Therefore, the number of calculated individuals that could be supported for carbohydrate diet satisfaction should be very low and those calculated for animal protein satisfaction should be higher. Nevertheless, both dietary necessities would be produced below the required need and the county imports substantial quantities of these nutrients at this time.

The major limiting factor in the county is a dependable water supply. Caution should be exercised in encouraging any increase in population until this critical commodity has been assured for all types of water years.

LINN COUNTY

Linn County was created December 28, 1847. It is named for Senator Lewis F. Linn of Missouri, a great friend of Oregon and the Ariginator of the Oregon donation land law (Holman, 1910). It is bounded on the west by the Willamette River and Benton County, on the southwest and south by Lane County, on the east by Deschutes County and on the north by Marion County. It lies entirely within the Willamette River Basin. Linn County ranks 14th in size among Oregon's 36 counties, encompassing 1,468,160 acres of which 956,350 acres (65.1 percent) are classified and included in this study (Appendix A, Tables A148 through A154).

The climate is temperate with mild, wet winters and dry, warm summers in the agricultural area. The eastern portion of the county has elevations in excess of 5,000 feet along the crest of the Cascades where seasons are short and climatic conditions are harsh. The average precipitation near Albany is about 40 inches a year but it exceeds 80 inches a year in the Cascade Mountains. The frost-free growing period in the valley is between 165 and 210 days a year.

The valley soils are quite level with 371,750 acres (25.3 percent) having less than eight percent slope. The classified soils extend to where the eroded Western Cascades yield to the steeper High Cascade slopes. The lower mountain slopes contain many areas of open meadows and park-like grazing sites. Most of the county's 41,000 cattle and considerable numbers of the 40,000 sheep (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972) grazed this area in 1970. The remainder of the livestock grazed fields on the valley floor.

Ninety-six different series and sub-series of soils were inventoried in Linn County (S.C.S., Linn County, 1973). Cultivation is the major land use on 266,150 acres of the soils and pasture is the major land use on 284,600 acres. Most of the cultivated soils are harvested for grass seed, cereal crops and hay. A total of 110,000 acres of grass seed, 6,400 acres of wheat, 5,800 acres of oats and barley and 23,600 acres of hay were reported by Linn County farmers in 1970 (O.S.U., Commodity Data Sheets, Seed, Wheat, Oats, Barley, Hay, 1972). Another 15,385 acres of specialty crops including sweet corn, snap beans, berries, tree fruits, nuts and others were harvested for fresh produce and processing (Atlas, Linn County, 1973). Most of the specialty crops required irrigation and were produced on the county's better soils.

A total of 159,200 acres of soils of Capability Classes I and II with only erosion or water problems as their limiting factors are contained in the county. Of these soils, 103,500 acres are rated "excellent" for irrigability. Another 101,400 acres are rated "good". These soils lie along the Willamette River in rather narrow (one to three mile) bands and in large areas where the Santiam River enters the Willamette. The soils were laid down as silt deposits when the two large rivers flooded concurrently and the combined waters slowly drained away. Most are deep and respond well to irrigation. Interspersed with the good soils are those that are poorly drained and have high water tables during the winter and spring months, or when irrigated.

Streamflow in the Willamette River is regulated during the dry summer and fall months by reservoir releases from waters impounded behind large dams in Lane County. Streamflows in the Santiam River are regulated by releases of water from three reservoirs on the North Santiam River. The streamflows in the South Santiam River are not regulated. Flooding is frequent in many small sub-basins, wholly or partially contained within the county.

Only 28,334 acres were reported under irrigation in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969). Groundwater supplies near the better soils are of sufficient quantity to irrigate large acreages of land (S.W.R.B., Middle Willamette River Basin, 1963).

Carrying Capacity and Future Trends in Linn County

The population in Linn County has grown steadily from 30,485 residents in 1940 to an estimated 75,540 residents in 1972 (Meyers, 1973). Increased industrial activity in the vicinity of Albany has been the most significant cause of the increase, but similar population increases are evident in all of the county's other cities and towns. Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 60,177 individuals for the present quality of life and 77,294 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 301,921 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 351,560 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 26,290 individuals could be provided their dietary animal protein needs. For a standard quality of life, 55,211 individuals could be supplied their annual dietary animal protein requirements.

Linn County's current population is about equal to the construction carrying capacity determined by this study. Careful utilization of available methods for concentrating population growth close to existing or proposed municipal facilities could indefinitely extend the quality of life enjoyed by residents in the area. More than sufficient carbohydrates can be raised on the soils that presently grow grass seeds. A considerable portion of these crops can be exported to less fortunate areas. The calculated animal protein supplies generated in the county are less than are evident in the area. Some animal proteins will need to be imported to supplement the inadequate quantity determined by this study.

MALHEUR COUNTY

Malheur County was created February 17, 1887 from a portion of Baker County. It is named for the Malheur River, which flows through the county before entering the Snake River. Malheur is a French word meaning misfortune, bad luck, disaster, literally "evil hour". Peter Skene Odgen wrote in his "Journal" under the date February 14, 1826, "... we encamped on River au Malheur (unfortunate river) so called on account of goods and furs hid here discovered and stolen by natives." (Holman, 1910).

The county is bounded on the west by Grant and Harney Counties, on the south by the State of Nevada, on the east by the State of Idaho and on the north by Baker County. Twenty-eight percent of the county lies in the Malheur River Basin, 59.8 percent lies in the Owyhee River Basin, and there are small portions of the county extending into the Goose and Summer Lakes Basin and the Powder River Basin. It is the second largest of Oregon's 36 counties, encompassing 6,316,800 acres of which 6,131,000 acres (97.0 percent) are classified and included in this study (Appendix A, Tables A155 through A161). Malheur County is rectangular in shape, roughly 64 miles wide and 177 miles long and is larger than either of the States of Vermont or New Hampshire.

The county's climate is semi-arid with hot, dry summers and cold winters. Precipitation ranges from nearly zero in some desert areas to almost 25 inches on the peaks of the Blue Mountains. Most of the cultivated areas average from six to eleven inches of precipitation annually. Frost-free growing periods are more than 150 days in the county's more heavily cultivated northeastern portions, decreasing in the southern portions to 90 to 120 frost-free days. Still, 493,500 acres (an area the size of Polk County) have a zero to thirty day frost-free period. More than 80 percent of Malheur County's soils lie above 4,000 feet in elevation. Slopes are steep along canyon walls and in the Strawberry Range of the Blue Mountains on the northern border. However, more than half of the county's area (3,293,000 acres) has slopes less than 13 percent, and nearly a half million acres are almost flat.

One hundred twenty-nine different soil series and sub-series were inventoried in Malheur County (S.W.R.B., Appendix I-10, I-11, and I-12, 1969). Rangeland is the major land use of 5,240,100 acres (83.0 percent). Forests and their lumber products are not major industries in this county, but the floors of the 17,200 acres of pine forest are grazed. In 1970, 175,000 head of cattle and 23,000 sheep were reported by Malheur County ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Many areas of the rangelands have irrigable soils interspersed among the lava plateaus. Some of these have had range improvement programs, and others are planned by the Bureau of Land Management. Stony soils which appear to have little vegetation generally have native wheatgrass, needlegrass or Sandberg bluegrass growing amongst the lava rocks, which serve as forage.

Most of the cultivated soils in the county are irrigated. Irrigating waters are limited, most of them generated from the Malheur River, Willow Creek, Bully Creek and the Owyhee River. Waters from the Owyhee Reservoir also service a large acreage in Idaho near Homedale.

A wide variety of truck and specialty crops are produced, some of which are potatoes, onions, sweet corn, fresh vegetables, sugar beets, berries, tree fruits and nuts, and others. In 1969, Malheur County harvested 39,600 acres of corn and cereal grains, 92,500 acres of hay, 15,500 acres of potatoes and 5,500 acres of sweet corn, not to mention the many other acres of crops necessary to supply one of the largest food processing plants in the country and a large sugar refinery.

Most of the consumable water rights in the county are used for irrigation. A total of 424,800 acres of soils are rated "excellent" or "good" for irrigability. Another three-quarters of a million acres are rated "fair". Legal water rights are established on 306,590 acres of soils, but the water stored or generated in the county is barely sufficient for 273,900 acres at the present time (S.W.R.B., Malheur-Owyhee Basins, 1969). Groundwater supplies in the northern portion of the county are appreciable and represent an important potential water source. Many wells throughout the grazing areas yield high quantities of water and are used for irrigating haylands. Others yield insufficient quantities for irrigation but sufficient for domestic and livestock uses.

Carrying Capacity and Future Trends in Malheur County

The population of the county has increased only slightly since 1940 when it had 19,767 residents to the 1972 estimated population of 23,380 (Meyers, 1973). Nearly half (11,250) of the 1972 population lived in Ontario, Nyssa and Vale in the northern part of the county. Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 16,175 individuals for the present quality of life and 20,776 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, they could provide 387,504 individuals with their dietary carbohydrate needs. For a standard but still acceptable quality of life, the soils could produce dietary carbohydrate requirements for 451,214 individuals. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 33,347 individuals could be provided their dietary animal protein needs. For a standard quality of life, 70,031 individuals could be supplied their dietary animal protein requirements.

The major limiting factors in Malheur County are shortages of dependable water supplies. There are areas close to existing urban centers to accommodate future construction, providing municipal water and waste water facilities are available, but water supplies will continue to limit growth. Population increases may come about in the northern county areas, but Malheur County will continue to be a significant provider of dietary carbohydrate and animal protein supplies to other areas in the state.

MARION COUNTY

Marion County was one of the four original Districts or Counties created on July 5, 1843, six years before Oregon became a U.S. Territory and 16 years before statehood. Originally it was named Champooick District, but the name was changed on December 28, 1847 to Champoeg County. The county received its present name on September 3, 1849 when it was changed to honor General Francis Marion of the American Revolutionary War (Holman, 1910). It is bounded on the west by Yamhill and Polk Counties, on the south by Linn County, on the east by Deschutes County and on the north by Clackamas and a portion of Yamhill County. It lies entirely in the Willamette River Basin. Marion County ranks 25th in size of Oregon's 36 counties, encompassing 750,720 acres of which 532,856 acres (71 percent) are classified and included in this study (Appendix A, Tables A162 through A168).

The county's climate is temperate with mild, wet winters and dry, warm summers. The annual average precipitation ranges from about 40 inches at Salem to more than 100 inches in the mountains. The average frost-free period is from 165 to 210 days in the agricultural areas but is very short at the crest of the Cascades along the county's eastern boundary.

The densely forested slopes of the high Cascades are dissected with deep, long canyons with many rocky outcrops and sheer cliffs. Melting winter snows and water releases from the porous basalt rocks contribute to streamflows during the dry summer months. The older western Cascade Mountains have more gentle slopes and a softer profile.

Open meadows and reforesting areas offer good grazing along the margin of the valley. In 1970, 40,000 cattle and 26,000 sheep were reported by Marion County farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Many flocks of sheep and some cattle are grazed in the 123,996 acres of classified pasture soils on the valley floor. Grass seed fields are also grazed during the fall, winter and early spring months.

Eighty-eight different series and sub-series of soils were inventoried in Marion County (S.C.S., Marion County, 1973). More than a quarter of a million acres (251,567 acres) have cultivation as their major land use and 218,630 acres of these are of Capability Classes I and II with only erosion and water problems as their limiting factors. The 159,575 harvested acres reported in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969) included 25,000 acres of wheat, 10,000 acres of oats, 10,000 acres of barley and 46,050 acres of field seed crops. Other county crops included corn, hay, mint, vegetable crops for produce and processing, berry crops, tree fruits, nuts, grapes, and others. Most of these good producing soils extend from a few miles south of Salem to the Clackamas County boundary to the north, between the Willamette River and the foothills of the western Cascades. The fertile area is roughly 25 miles long and from 11 to 15 miles wide. These deep, silty loam soils were deposited through historic times while flood waters were waiting to pass through the narrow rock cleft at Oregon City. Some of the soils are poorly drained and others are located in depressions, each posing their particular problems during wet years. The installation of the many large reservoirs on the major tributaries of the Willamette River has decreased the threat of spring floods and assured harvests on many acres of soils not previously considered for consistent production. Other good producing soils are located in the Jefferson, Turner, Aumsville and Stayton areas. Several processing plants freeze and can fruit and vegetables for export to other areas.

Irrigation waters are needed to bring many crops to harvest. Nearly 234,000 acres of soils are classified to have "excellent" or "good" irrigability characteristics but only 66,758 acres were reported to have been irrigated in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969). Streamflows are the source of water for about 50 percent of the irrigated acreage, groundwater is the source for about 45 percent, and reservoirs and ponds which include both surface and groundwaters make up the remainder (Atlas, Marion County, 1974).

Surface water supplies are seasonal and undependable in most streams close to the intensively farmed areas. Legal water rights have overappropriated the available supplies during any normal water year. Groundwater supplies are adequate in the Pudding River area although severe drawdowns in the wells are experienced each summer (Bartholemew and Debow, 1970). The major underground reservoirs are recharged during the wet winter months.

Carrying Capacity and Future Trends in Marion County

The population in Marion County has steadily increased from 75,246 residents in 1940 to the estimated 157,200 residents in 1972 (Meyers, 1973). Most of the urban centers have shown about the same percent of growth as has the county. Computer calculations from this study, using present patterns of land use, show the carrying capacity for construction to be 41,221 individuals for the present quality of life and 52,946 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 267,371 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 311,329 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 16,588 individuals could be provided their dietary animal protein needs. For a standard quality of life, 34,836 individuals could be supplied their animal protein requirements.

The discrepancies which exist between the calculated carrying capacity for construction and the present recorded county population were caused by the evaluations of soils with past histories of flooding. Many of these soils presently support construction units and more are being occupied. Comprehensive land use planning has been active in Marion County since 1970 and great progress is being made in controlling the patterns of urban and rural non-farm development. There are sufficient areas for future population growth near most of the existing urban centers, which would not remove large quantities of good soils from agricultural production. These growth areas would require municipal water and waste water treatment services.

The quantities of carbohydrates produced by the county's soils at this time may not equal the computed numbers. However, the potential is present to change from producing grass seed crops to producing cereal seed crops if it becomes necessary. The surplus carbohydrate supplies could be exported to less fortunate areas. Animal protein supplies are presently being imported into the county.

MORROW COUNTY

Morrow County was created February 16, 1885. It is named for Jackson L. Morrow, an old resident who was a member of the Oregon Legislature when the bill passed (Holman, 1910). It is bounded on the west by Gilliam County and a small portion of Wheeler County, on the south by Wheeler and Grant Counties, on the east by Umatilla County and on the north by the Columbia River. Nineteen percent of Morrow County lies in the John Day River Basin with the remainder lying in the Umatilla River Basin. It is 15th largest of the state's counties, containing 1,317,760 acres of which 1,192,700 acres (90.5 percent) are classified and included in this study (Appendix A, Tables A169 through A175).

The county's climate is temperate and semi-arid. Less than eight inches of precipitation falls annually on the lower elevations along the Columbia River, but along the county's southern boundary, more than 20 inches a year fall on the heavily forested slopes of the Blue Mountains. Violent rainfalls occur during the summer months, which erode the loose soils and run off before percolating into the soils; strong winds further erode the soils. Generally, frosts do not occur during the summer months, and 78.5 percent of the soils average a frost-free growing season greater than 105 days.

Ponderosa pine is the major tree species in the 81,000 acres of soils with forestry as their major land use. Grazing on the forest floors and on the 480,000 acres of rangeland soils has been a major industry in the county for greater than 100 years. More than 36,000 cattle and 10,000 sheep were inventoried in the county in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Eighty-four different series and sub-series of soils were inventoried for Morrow County (S.W.R.B., Appendix I-6 and I-7, 1969). The largest income of the county comes from cereal crops harvested from the 638,700 acres of soils whose major land use is cultivation. Wheat is harvested from more than 50 percent of this acreage. While average yields of 31.6 and 24.8 bushels per acre respectively were not equal to the 1971 and 1972 state averages of 44.9 and 41.9 bushels per acre, the county still produced 4,042,000 bushels of wheat in 1971 and 3,487,000 bushels in 1972 (O.S.U., Commodity Data Sheet, Wheat, 1974).

The acreages of soils planted to wheat vary from year to year, governed by market prices and sometimes by the quantity of precipitation which had accumulated during the summer fallow period. The depth of the loess mantle over the underlying rock governs whether the soils will be used for grazing or cultivation. Roadcut and field examinations show a leached calcium pan a few inches from the surface in grazing lands and from 15 inches to 30 inches below the surface in most cultivated soils. Many marginal soils, now being used as rangeland, show evidence of being previously cultivated. Gullying is evident in fallowing fields of even minor slopes, and mud drifts along roads are common where the eroding topsoil has washed from the fields. Dust storms are generated easily from the loose, fine soils, and equipment working in fallowing fields is sometimes barely visible through the encompanying dust clouds.

Morrow County contains more than 15 percent of the state's Capability Class I soils. Morrow and Umatilla Counties combined contain more than 31 percent of this most versatile of the state's soils. Of the 628,700 acres of soils with cultivation as their major land use, 363,500 are in Capability Classes I, II and III with erosion and water problems as their only limiting factors for extensive use. The more versatile Class I and II soils respond readily to irrigation and produce a wide variety of crops. A shortage of adequate water supplies limits the use of both cultivated and grazing lands.

Water supplies for grazing stock are sparse in the southern and mid-central portions of the county. Streamflows are low during the summer months and during the summer months most tributaries into Willow and Little Butter Creeks become dry washes with occasional pools. Quantities of available groundwaters are not generally known, as wells are too scattered to yield a definite reservoir pattern. Some observation wells have been drilled and records are being generated which will lead to better knowledge for groundwater utilization (S.W.R.B., Umatilla River Basin, 1963).

Irrigation is extensively used in the northern portion of the county. Overhead sprinkling is more efficient, as the soils are sandy with poor water holding capacity. Flood irrigation waters quickly percolate through the root zone. The sandy soils are very fine and subject to wind erosion. Sand drifts are evident where the loose soils have been left exposed.

Carrying Capacity and Future Trends in Morrow County

The county's population has remained relatively stable from 1940 (4,337) to 1970 (4,465). The 1972 estimated population shows a slight decrease to 4,320 residents (Meyers, 1973). However, considerable activity around the Boardman area could rapidly increase the population in the northern portion of the county (Oregonian, April 10, 1974). Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 10,256 individuals for the present quality of life and 13,173 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrate (wheat) units. For the present quality of life they could supply 442,290 individual dietary requirements. For a standard quality of life, 515,007 individual dietary needs could be provided. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life the county could provide 1,207 individuals with their animal protein needs. For a standard quality of life, 2,534 individuals could be supplied with their dietary animal protein requirements. The protein calculations do not reflect the large numbers of beef grazed on fallowing soils nor on soils which are marginal for cultivation and are used as rangeland.

The greatest limiting factor in Morrow County is the lack of dependable water supplies. Groundwater supplies near the Columbia River could prove very beneficial if available. The second greatest limiting factor in the county is the makeup of the easily eroded soils. The soils originated as wind blown silt and sand deposits and, unless special care is exercised in erosion control, will as easily leave the areas where they were deposited. With present use and including known future plans for the uses of the light soils, the productive potential of the fertile areas will probably decrease. Most grazing areas have thin mantles of these same light soils. The productivity of these range soils could be significantly increased by selective range plantings.

Morrow County can support a larger population in some areas without significantly decreasing its vital role as a supplier of wheat and beef to less fertile counties in the state. The county's value as one of the more fertile and productive in the state should not be underestimated.

MULTNOMAH COUNTY

Multnomah County was created December 22, 1854. "Multnomah" is the Indian name for the Willamette River from the falls at Oregon City to its mouth. It was also the name of a tribe of Indians whose principal habitat was at the upper end of Wappatoo (now Sauvies') Island near the mouth of the Willamette River where it meets the Columbia (Holman, 1910). The county is bounded on the west by Columbia and Washington Counties, on the south by Clackamas County, on the east by Hood River County and on the north by the Columbia River. About 400 acres lie in Hood Basin and the remainder is in the Willamette River Basin. It is the smallest of Oregon's 36 counties, encompassing 271,360 acres of which 201,350 acres (74.2 percent) are classified and included in this study (Appendix A, Tables A176 through A182).

Multnomah County has a temperate maritime climate with warm, dry summers and mild, wet winters. The moist ocean breezes which penetrate the Columbia River Gorge have a moderating effect on harsh seasonal weather changes. The average annual precipitation at the Weather Bureau in Portland is 43.5 inches, and at Bonneville Dam at the county's eastern boundary it is 78.9 inches (U.S. Department of Commerce, Weather Bureau, 1965). The annual precipitation often exceeds 100 inches a year along the county's mountainous western and eastern boundaries. The average frost-free growing period in the agricultural area is from 165 to 195 days.

Most of the county's terrain is gentle with rolling hills, typical of a flood plain where two large rivers join. More than 60 percent of the county's soils are at less than 900 feet elevation with only a small quantity above 1,000 feet. Slopes are gentle except in the mountains, with more than 60 percent of the soils having less than a 20 degree slope. Forest lands at lower elevations, brushy canyonland, riverbanks and grassy hills are grazed by livestock. In 1970, 11,000 cattle and 1,100 sheep were reported by the county's farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). The 73,000 acres of soils classified as pasture are fragmented throughout the county, but a good portion of these are close to the rivers on soils most likely to flood. Many livestock graze the pastured areas throughout the year.

Seventy-one different series and sub-series of soils were inventoried (S.C.S., Multnomah County, 1973). Cultivation is the major land use of 96,000 acres of soils, most of them contained on the terraces along the rivers. Thirteen thousand two hundred fifty acres of the inventoried soils are of Capability Class I and another 56,940 acres are of Classes IIe and IIw, soils capable of producing crops of a variety of types. A ready market for the products of the soils is the county's population of more than a half million people. Fresh vegetables, fruit and berries are grown in abundance along with tree fruits and nuts, and special horticultural crops. Harvested soils totaled 16,968 acres in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969), mostly contained within a roughly triangular area with Gresham, Parkrose and Troutdale as the three points of the triangle. The agricultural land is affected by the pressures of the spreading urban population, but a considerable portion of the soils has been placed into crops with high economic returns. Cereal crops occupied only 1,000 acres and haycrops another 5,700 acres in 1970 (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, Hay, 1972). Most of the crops with high economic returns require large quantities of irrigation waters for them to be successfully brought to harvest.

Surface waters are used for irrigation early in the season but the supply is insufficient during the dry summer months to be considered dependable. Groundwater supplies are good in the eastern portion of the county where most of the intensive farming occurs. Most of the wells are in unconfined water areas of alluvium which recharge readily each year during the rainy season. Some wells at higher elevations pump from perched water tables which are recharged from runoff of higher soils (Foxworthy, et. al. 1964). The large numbers of wells depending upon the resource at the present time could pose a serious production problem during an extended period of lower than average water years.

Carrying Capacity and Future Trends in Multnomah County

The population in Multnomah County has increased from 355,099 residents in 1940 to an estimated 560,000 residents in 1972 (Meyers, 1973). The increase would be much larger if all of the people who depend upon the Portland Metropolitan area for economic support had their residences in the county. Instead, many live in Clackamas, Washington and Yamhill Counties or in Clark County, Washington. Computer calculations from this study, using present patterns of land use, show the carrying capacity for construction to be 44,300 individuals for the present quality of life and 56,901 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 70,172 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 81,709 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 5,345 individuals could be provided their dietary animal protein needs. For a standard quality of life, 11,225 individuals could be supplied their dietary animal protein requirements.

The concentrations of people in the Portland, Troutdale and Gresham areas pose stresses upon local producing soils which cannot be closely approached by their capabilities to supply the necessary nutients or construction sites. Fortunately, the construction pressure for growth near the large urban center has been released into adjoining counties who have organized their planning to accommodate the pressures. The soils still in production in Multnomah County are very important and are being utilized better by producing their present crops than if they were used for construction. The county imports both carbohydrate and animal protein supplies at the present time and will continue to do so in the future.

POLK COUNTY

Polk County was created December 22, 1845. It was named for James K. Polk who was president of the United States at that time (Holman, 1910). It is bounded on the west by Lincoln County, on the south by Benton County, on the east by the Willamette River and Marion County and on the north by Yamhill County. Approximately 13 percent of the county is contained in the Mid-Coast Basin and the remainder lies in the Willamette River Basin. Polk County ranks 30th in size of Oregon's 36 counties, encompassing 472,960 acres of which 455,590 acres (96.3 percent) are classified and included in this study (Appendix A, Tables A183 through A189).

The county's climate is temperate with mild, wet winters and dry, warm summers. The annual average precipitation ranges from 51 inches at Dallas to 126 inches at Valsetz which has the highest average precipitation in the state (U.S. Deaprtment of Commerce, Weather Bureau, 1965). The tempering influences of the rain provide a 165 to 210 day frost-free growing period in the agricultural portion of the county.

The mountainous terrain in the western portion is rough and deeply dissected. Heavy forests cover all slopes except those in various stages of reforestation. The lower hills along the western margin of the Willamette Valley provide excellent grazing for livestock. In 1970, 19,000 cattle and 19,000 sheep were reported by the county's farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). The 71,075 acres of soils classified with pasture as the major land use offer supporting graze throughout the year. Many soils used for pasture still show evidence of former cultivation.

Ninety-five different series and sub-series of soils were inventoried in Polk County (S.C.S., Polk County, 1973). Cultivation is the major land use of 157,915 acres of soils which is one-third of the county's total area. More than half (83,830 acres) of these soils are of Capability Classes I and II with only erosion and water problems as their major limiting factors. In 1969, 99,763 acres were reported by Polk County farmers as harvested (U.S. Bureau of the Census, Census of Agriculture, 1969). A total of 16,000 acres of wheat, 14,000 acres of oats, 17,000 acres of barley and 12,850 acres of grass seed made up nearly 60 percent of the total harvested acreage. The yield of wheat per acre in 1969 was 52.7 bushels per acre, well in excess of the 38.1 bushels per acre state average for that year. Other crops harvested were hay, mint, vegetables, berries, tree fruits and nuts. Most of these crops require irrigation water sometime during their growing season. Ninety-one thousand four hundred fifteen acres of soils are classified as "excellent" or "good" for irrigability. Unfortunately, there are insufficient available water supplies to irrigate that much land, and only 15,000 acres were reported irrigated in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969).

Streamflows are the source of water for most irrigated acreage. A few small reservoirs and ponds store irrigation waters for use, but the streams draining the county are small and their waters are overappropriated during normal streamflows. Salt Creek, Rickreall Creek and the Luckiamute River have all registered nearly zero flow during low water years (U.S.G.S., 1968).

Good groundwater supplies are contained in the sand and gravel deposits underlying the Willamette River flood plains. Most areas near the Coast Range encounter underlying marine sediments which yield small quantities of water of poor quality (Bartholemew and Debow, 1970). Wells near the Eola Hills yield from poor to good quantities of water of good quality. However, the supply of groundwater is not great and only supplements the overall irrigation needs.

Carrying Capacity and Future Trends in Polk County

The population in Polk County has grown steadily from 19,989 residents in 1940 to an estimated 37,060 residents in 1972 (Meyers, 1973). The city of Monmouth has shown the greatest increase, caused by the expansion of the Oregon College of Education campus and a corresponding increase in enrollment. Other cities have shown steady population growth. Computer calculations from this study, using present patterns of land use, show carrying capacity for construction to be 17,242 individuals for the present quality of life and for 22,147 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 150,617 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 175,379 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 5,293 individuals could be provided their dietary animal protein needs. For a standard quality of life, 11,115 individuals could be supplied their animal protein requirements.

The discrepancies which exist between the calculated carrying capacity for construction and the present recorded population were caused by the evaluation of the growth directions of the present urban centers. There are good soils which can accommodate construction near all urban centers except West Salem, the fastest growing area at this time. The Eola Hills area can accommodate some growth but the amount of energy to maintain construction in the area will be excessive. Planned future population growth in the county will allow a much larger population to be accommodated without using too many of the good agricultural soils they possess.

Carbohydrate supplies are presently being exported from the county and, if the need arises, the soils presently growing grass seed could produce cereal crops of good yield. Animal protein supplies are being imported into the county at the present time; this will continue in the future.

SHERMAN COUNTY

Sherman County was created February 25, 1889 from a portion of Wasco County. It is named for General William Tecumseh Sherman (Holman, 1910). The county is small, ranking 28th in size and contains 531,200 acres. It is located between three rivers, the Columbia on the north, the Deschutes on the west and the John Day on the east. Its southern boundary is shared with Wasco County. The county's soils are nearly equally shared between two drainage basins with 56.7 percent contained within the John Day River Basin and 43.3 percent contained within the Deschutes River Drainage Basin. Nearly all (99.3 percent) of the county's soils have been classified and are considered in this study (Appendix A, Tables A190 through A196).

Climatic conditions are similar to those in other counties located on the semi-arid Columbia Plateau. Average annual precipitation is approximately 10 to 12 inches, more than half of it falling during the winter months. Elevations vary with a general sloping of land masses toward the three rivers. More than 37 percent of the soils lie above 2,400 feet and another 15 percent between 1,800 and 2,400 feet in elevation. Less than two percent of the soils have a frost-free growing period of less than 120 days; frost has been recorded every month of the year. The county lies in the part of the state with the highest summer temperatures and usually experiences more than 25 days a year with temperatures greater than 90°F.

The terrain in the county consists of gently rolling hills, with more than 68 percent of the soils having less than 12 percent slope.

The more steeply sloped soils lie along the canyons of the John Day and Deschutes Rivers and on steep canyons between the hills. Most of the cultivated fields are gullied where runoff water has eroded loose unprotected soils.

Eighty-three different soil series and sub-series were inventoried for Sherman County (S.W.R.B., Appendix I-5, I-6, 1969). Less than three percent of the soils have forestry as their major land use. More than 36 percent of the soils have rangeland as their major land use, but this quantity is less than the acreage actually grazed as fields of small grain stubble are grazed after the harvest. More than 14,000 head of cattle of all types utilize the grazing areas (Atlas, Sherman County, 1973). While sheep raising was a large industry in this county before the 1940's, their numbers decreased to only 500 head by 1970 (O.S.U., Commodity Data Sheet, Sheep, 1974).

Most of the county's soils were developed in loess deposits which rest as a mantle from a few inches to 15 feet deep over basalt rock. Dryland farming is practiced on most of the 322,000 acres of soil that have cultivation as their major land use. The practice of summer fallowing cereal crop producing soils is revealed where, of the 322,000 acres considered cultivable, 145,170 acres (45 percent) were harvested in 1968, and 131,340 acres (40.7 percent) were harvested in 1969 (Atlas, Sherman County, 1973). Wheat is the major cereal crop grown in the area. The yield per harvested acre for wheat was 40.5 bushels per acre in 1971 and 34.5 bushels per acre in 1972, which is nearly the statewide average yield of 39.7 and 44.9 bushels per acre respectively (O.S.U., Commodity Data Sheet, Wheat, 1974).

Less than 1,500 of the 198,000 acres rated "excellent" and "good" for irrigability were irrigated in 1969. Water supplies are limited on the uplands where most cultivated soils lie. No known reservoirs of groundwater are contained in the underlying basalt, and existing wells in the sparsely settled county are too scattered to yield a definite pattern of containment. Quantities of water for irrigation are available in the Deschutes and John Day Rivers, but transporting the supplies from the deep canyons which contain the rivers to the irrigable upland soils would probably not be economically feasible at this time.

Carrying Capacity and Future Trends in Sherman County

The population in Sherman County has decreased from 2,446 residents in 1960 to 2,139 residents in 1970. In 1970, 1,172 of these residents (54.8 percent) lived in the incorporated areas of Grass Valley, Moro, Rufus and Wasco. Using present patterns of land use, computer calculations show a carrying capacity for construction of 12,957 individuals for the present quality of life and 16,642 individuals for a standard quality of life. The present absence of any major supportive industry in the county contributes to the county's being 33rd in 36 counties in population density.

All soils with cultivation as their major land use were converted to the production of carbohydrate (wheat) units and for the present quality of life could provide 285,705 individual dietary needs. For a standard but still acceptable quality of life, the soils could supply dietary requirements for 332,677 individuals. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life they could provide 670 individuals with their dietary animal protein needs. For a standard quality of life, the soils could supply 1,406 individuals with their dietary animal protein requirements. The calculations do not reflect the large numbers of beef grazed on fallowing land nor on cultivated soils which have not proven successful under tilth and are used for grazing.

The major limiting factor in Sherman County is water. Nearly all of the surface waters in the perennial and intermittent streams are presently used to satisfy livestock and domestic needs. Some storage is possible but not dependable. The county will most likely continue to supply a significant amount of carbohydrate and protein dietary surplus supplies to other areas of the state that are deficient in these dietary needs.

TILLAMOOK COUNTY

Tillamook County was created December 15, 1853 from portions of Yamhill and Clatsop Counties. Its name is derived from that of a small tribe of Indians whose habitat was near and south of Tillamook Head. Its name is spelled "Kilamox" and "Killamuck" in the Original Journals of Lewis and Clark. A.N. Armstrong, for years a government surveyer in Oregon, published a book in 1857 where he called the bay "Tillamook" (Holman, 1910). It is bounded on the west by the Pacific Ocean, on the south by Lincoln County, on the east by Yamhill and Washington Counties and on the north by Clatsop County. Less than two percent of its area lies in the Mid-Coast Basin, the remainder is contained within the North Coast Basin. Tillamook County ranks 26th in size of Oregon's 36 counties, encompassing 713,600 acres of which 65,300 acres (9.2 percent) are classified and included within this study (Appendix A, Tables A197 through A203).

The climate is mild and humid, tempered by the closeness of the ocean and the heavy rainfall. Temperatures vary little throughout the year. The county's eastern boundary somewhat follows the crest of the Coast Range which forms an effective barrier to the rain-laden clouds. A few mountain peaks are higher than 3,500 feet, but snow which falls in the higher elevations is of short duration. Precipitation ranges from more than 150 inches in the mountains to about 90 inches annually at the city of Tillamook on the coast (U.S. Department of Commerce, Weather Bureau, 1965). The frost-free growing season is from 150 to 195 days a year in the agricultural areas.

More than 90 percent of the county is forested. Some livestock grazing occurs along the less dense areas on the lower elevations, but most grazing is on the broad coastal plain and up the valleys of the Nestucca, Trask and Wilson Rivers. Dairying is an important industry. In 1970 the county's farmers reported 27,000 cattle, 17,500 of which were dairy cattle. Only 400 sheep were reported for the county that same year (O.S.U., Commodity Data Sheets, Cattle, Dairy Cattle, Sheep, 1972). (Agriculture is almost exclusively related to the dairy industry.)

Thirty-two different soil series and sub-series were inventoried (S.W.R.B., Appendix I-1, 17 and 18, 1969). Although 20,900 acres of soils are classified with cultivation as their major land use, in 1971 there were no reported acreages of cereal grains, although 4,900 acres were reported harvested for hay (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, Hay, 1974). Pasture was considered the major land use of 40,400 acres of the 61,300 acres of agricultural land.

Although all areas in the county average more than 80 inches of precipitation a year, only a small fraction arrives during the summer months, and most of this is in the form of fog or misty rains. Irrigation is necessary to maintain production on the heavily grazed fields and water supplies are limited. Most streams run low during July, August and September, and the underlying sedimentary rocks act as poor aquifers, which severely limits the recharge of groundwater supplies. The newly growing forests on the sites of the disasterous 1933, 1939 and 1945 Tillamook fires transpire more water each year of growth, so summer stream flows will become lower as the years progress.

Carrying Capacity and Future Trends in Tillamook County

The county's population increased from 12,263 individuals in 1940 to 18,606 in 1950. Since that time it has remained about the same with a 1972 estimated population of 18,400 residents (Meyers, 1973). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 5,861 individuals for the present quality of life and 7,528 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 20,893 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 24,328 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 5,040 individuals could have these needs satisfied. For a standard quality of life, 10,584 individuals could be supplied their dietary animal protein requirements.

The discrepancies which exist between the calculated carrying capacity for construction and the present population is related to the makeup of the soils and the possibility of flooding on soils adjacent to urban centers. The county could support a larger population by concentrating construction close to existing municipal water and waste water facilities. However, both of these community services are limited by the lack of dependable water supplies and reservoir construction in the Coast Range Mountains is difficult.

The soils classified as "cultivated" in Tillamook County are not used for cereal grain production but are producing graze and forage for livestock. Consequently, the calculated carbohydrate supplies are greater and the animal protein supplies are less than truly exist. On-site evaluations showed almost no carbohydrate production in the county. Residents presently import nearly all of their carbohydrate supplies and probably produce sufficient animal protein for their needs.

The availability of water supplies for domestic, industrial and irrigation purposes is the greatest limiting factor to the carrying capacity of Tillamook County.

UMATILLA COUNTY

Umatilla County was created September 27, 1862. It derives its name from the river which flows through the county and empties into the Columbia. The first mention of the name was in the Lewis and Clark journals where it is spelled "Youmalolam". Farnham, in 1852, called it "Umatilla" in his book Travels in the Great Western Plains (Holman, 1910). The county is bounded on the west by Morrow County, on the south by Grant County, on the east by Union and Wallowa Counties and on the north by the State of Washington and the Columbia River. Fifteen and one-tenth percent of the county's soils lie in the John Day River Basin, eighty-three and two-tenth percent lies in the Umatilla Drainage Basin and a small portion lies in the Grande Ronde River Basin. It is the 8th largest of Oregon's counties, encompassing 2,067,840 acres of which 1,791,300 acres (86.6 percent) are classified and included in this study (Appendix A, Tables A204 through A210).

Climatic conditions in the county vary widely with the season and location. The northwestern area of the county near the Columbia River experiences semi-arid conditions with less than a 10 inch average annual precipitation. Most of the agricultural areas have precipitation averages of 10 to 20 inches per year. However, high in the forested watershed of the Blue Mountains, precipitation averages more than 40 inches a year. Unfortunately, the more than 40 percent of soils lying at elevations above 3,600 feet do not usually maintain their snowpacks until midsummer, as do the snowpack areas seen in the Cascades. Warm spells during the winter, oftentimes caused by Chinook winds, cause excessive melting, and swollen streams flood and erode the loose soils. Frost has been recorded every month of the year, but most years the agricultural areas enjoy a growing season longer than 150 days. Soils in the heavily cultivated areas are nearly continuous on gently rolling hills. More than ten percent have zero to three percent slopes and nearly half (49.7 percent) of the soils have less than a 13 percent slope. The 578,400 acres of soils with greater than 30 percent slopes are mostly contained in the Blue Mountains and in the rough broken lands along the rivers.

One hundred nine different soil series and sub-series were inventoried in Umatilla County (S.W.R.B., Appendix I-6 and I-7, 1969). Douglas fir, white fir and ponderosa pine are the three major tree crops in the county's mountainous southern region. Ponderosa pine stands are interspersed with rangeland along the lower slopes, both furnishing good spring and early summer graze. In 1970, 93,000 cattle and 26,000 sheep were inventoried in Umatilla County (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Livestock and livestock products account for around 50 percent of all agricultural sales (Atlas, Umatilla County, 1973). Also interspersed in the rangeland are presently cultivated areas and other areas showing evidence where cultivation had been practiced, but soils had not been deep enough to provide continuing economic returns.

Cultivated crops are many and varied. The county has a higher precipitation supply than any other county in Oregon east of the Cascades and has the good soils to make the most of this advantage.

Wheat is the major agricultural crop. In 1971 the county raised more than 28 percent of the state's wheat crop and in 1972 more than 30 percent. Yields are good. In 1971 and 1972 the average yields of wheat were 52.8 and 49.8 bushels per acre respectively, while state averages were 44.9 and 41.9 bushels per acre respectively. While some acreages require summer fallowing as do most central and eastern Oregon wheat lands, wheat-green pea crop rotations are practiced where rainfall is sufficient. Thirty-nine percent (804,400 acres) of the county's soils list cultivation as their major land use. Thirty-one thousand six hundred acres are of Capability Class I, the most versatile of all soil types. This is 16.4 percent of the state's Class I soils. Furthermore, the total Capability Class I soils in Morrow and Umatilla Counties account for more than 31 percent of the state's total qu tity.

More than a half million acres (529,100) in the county are of Capability Classes I, II and III with erosion and water problems as their only limiting factors. Potatoes, alfalfa, green peas, bush beans, tomatoes, sugar beets, melons, tree fruits and grass seed are some of the crops raised in the temperate areas near the Washington State border. Good market facilities and diverse means of transportation encourage the farmer to broaden the types of crops raised. Irrigation from groundwater sources and river waters is rapidly developing. Columbia River water is lifted to the crop areas and distributed for use. Groundwater supplies are suspected to equal surface water supplies (S.W.R.B., Umatilla River Basin, 1963).

Observation wells in the Milton-Freewater and Pendleton-Pilot Rock area show no excessive drawdown of water unless drilled deeply into the Columbia River Basalt formation (Wheeler, 1965).

Carrying Capacity and Future Trends in Umatilla County

The county's population has increased from 26,030 in 1940 to 44,923 in 1970. The 1972 estimated population increased again to 45,450 (Meyers, 1973). Computer calculations, using the present patterns of land use in the county, show a carrying capacity for construction to be 38,920 individuals for the present quality of life and 49,991 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrate (wheat) units. For the present quality of life they could provide 661,459 individual dietary needs for carbohydrates. For a standard quality of life, 770,210 individual dietary requirements could be supplied. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life the soils could provide 2,779 individuals with their dietary needs and, for a standard quality of life, they could supply 5,836 individuals with their dietary protein requirements. The protein calculations do not reflect the large numbers of livestock grazed on fallowing soils nor the cultivated lands that are used for pasture. Some acreage rated as "cultivated" is of borderline value for raising cereal crops and is presently being grazed.

The major limiting factor in Umatilla County for extensive utilization of the resources over an indefinite period of time will likely be the lack of dependable water supplies. The county's agriculture is already heavily dependent upon Columbia River waters which this study does not consider a reliable source (see page 45). The discrepancy of present and future population carrying capacities for construction which exists with the computer tabulations can be traded off with cultivable land when necessary. The county has good soils close to present population centers which can tolerate extensive development in a minimum of space.

Umatilla County contributes a more diverse agricultural development than any other county in the state. Its contribution toward the state's carrying capacity should not be underestimated.

UNION COUNTY

Union County was created October 14, 1864 from a portion of Baker County. Its name was given during the Civil War when the word "Union" was popular (Holman, 1910). It is bounded on the northwest by Umatilla County, on the southwest by Grant County, on the southeast by Baker County and on the northeast by Wallowa County. Thirteen percent of the county lies in the Powder River Basin, 85.8 percent in the Grande Ronde River Basin and less than one percent is contained in the Umatilla Drainage Basin. It is the 16th largest of the state's 36 counties, encompassing 1,300,480 acres of which 1,256,100 acres (96.6 percent) are classified and included in this study (Appendix A, Tables A211 through A217).

The climate is temperate in the lower altitudes and the county enjoys from 11 to 14 inches of precipitation annually on its cultivated soils. The shelter afforded the cultivated areas by the western ranges of the Rocky Mountains often shields them from harsh Canadian cold waves. More than 50 percent of the soils have frost-free periods greater than 90 days, and 23.8 percent have a frost-free growing season greater than 105 days.

Eighty-two different soil series and sub-series were inventoried in Union County (S.W.R.B., Appendix I-8, I-9, 1969). Forestry is the major land use of 62.3 percent of these soils, cultivation for 18.5 percent and rangeland grazing for 12.3 percent. Ponderosa pine is the major tree species, and forest floors are grazed at the lower elevations. Sixty-four percent of the forest lands are federally owned. In 1970, 45,000 cattle and 4,500 sheep grazed the area (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Steep slopes prevail in most of the county where only 35.1 percent of its soils have slopes less than 31 percent. The steep slopes discourage cattle from grazing many areas, and the more agile sheep, which can graze the areas, have decreased in numbers from 23,000 in 1940 to the 4,500 in 1970. Agriculture is the principal economic activity in the county, with about 55 percent of the income in 1970 generated by sale of crops and 45 percent from sale of livestock (Atlas, Union County, 1973).

Wheat is the major cereal crop, raised with yields far above the state average. The Union County average yields for wheat for 1971 and 1972 were 58.0 bushels per acre on 18,000 acres and 55.6 bushels per acre on 16,000 acres respectively. The state averages were 44.9 and 41.9 bushels per acre respectively for those years. Most of the irrigated soils produce hay and forage for the county's livestock. While 136,300 acres are rated "excellent" or "good" for irrigability, only 41,040 acres were reported under irrigation in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969).

Water supplies are usually sufficient to meet current needs in the county. However, during the late summer months most of the snowmelt has run off and critical water deficient periods develop. After June, the stream levels decrease rapidly and when irrigation is at its height, the streams are at their normally low annual streamflows. Flooding is common during the peak snowmelt periods in the spring and during midwinter warm spells. Groundwater supplies exist in some portions of the county, but the amounts available are not known.

Carrying Capacity and Future Trends in Union County

The county's population has shown a slow but steady growth from 17,399 residents in 1940 to the estimated population of 20,660 in 1972 (Meyers, 1973). Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 3,892 individuals for the present quality of life and 5,000 individuals for a standard quality of life. The discrepancy between existing populations and the computer calculated population carrying capacities developed from the tendency for flooding of most of the better soil types; the computer regarded such soils as unsuitable for construction, but they have been used for this purpose despite this problem.

All soils with cultivation as their major land use were converted to the porduction of carbohydrates (wheat). For the present quality of life, 133,259 individuals could be provided with their annual dietary carbohydrate needs. For a standard but still acceptable quality of life, 155,168 individuals could be supplied with their dietary requirements for carbohydrates. All soils with range, hay or pasture as their major land use were converted to the production of animal proteins (beef). For the present quality of life, 388 individuals could be provided with their dietary animal protein needs. For a more restrictive quality of life, 815 individuals could be supplied their animal protein requirements. The protein determinations do not reflect the amounts of "cultivated" land that is actually used as pasture nor other acreages of cultivated land that are used for grazing.

The greater limiting factors to future population growth in Union County are the inadequate water supplies during the periods of low streamflow and the tendency for flooding in the populated areas. Union County exports carbohydrate supplies and, considering the large numbers of livestock reported by the county's ranchers, probably provides sufficient animal protein supplies for the present population.

WALLOWA COUNTY

Wallowa County was created February 11, 1887 from a portion of Union County. It is named for beautiful Wallowa Lake and its outlet, the Wallowa River. Wallowa is the Nez Perce Indian name for "fish trap", which is what they called the river (Holman, 1910). The county is in the extreme northeastern corner of the state. It is bounded on the west by Umatilla and Union Counties, on the south by Union and Baker Counties, on the east by the Snake River and the State of Idaho and on the north by the State of Washington. About one percent of the county lies in the Powder River Basin and the other 99 percent is contained in the Grande Ronde River Basin. It is the ninth largest of Oregon's 36 counties, encompassing 2,033,920 acres of which 1,786,500 acres (87.8 percent are classified and included in this study (Appendix A, Tables A218 through A224).

The climate in Wallowa County varies with the elevation. Along the lower valleys of the Grande Ronde and Wallowa Rivers, the elevations are 2,700 to 4,200 feet above sea level. Precipitation ranges from a 1951 to 1960 average of 13.7 inches at Enterprise (3,760 feet in elevation) to 25.7 inches of precipitation at Minam (3,584 feet in elevation)(U.S. Department of Commerce, Weather Bureau, 1965). The distribution periods of the precipitation resemble those of the rest of Oregon's counties, with most coming as rain or snow during the winter months. In the predominantly mountainous areas, only 57.7 percent of the soils lie below 4,800 feet, and precipitation falls mostly in the form of snow. Spring snowmelts and unseasonable winter snowmelts cascade huge quantities of uncontained water down steep slopes. Only 23.1 percent of Wallowa County soils have slopes less than 31 percent. Lowland flooding is a common catastrophe throughout the Grande Ronde and Wallowa valleys.

In this county where there are no Capability Class I, II or III soils with erosion or water problems as their only limiting factors, the diversity of soil types decreases. Accompanying the decrease in diversity of soil types is a decrease in the types of crops which can be raised on the soils. Thirty-seven different soil series and sub-series were inventoried (S.W.R.B., Appendix I-8, 1969). Only 95,100 acres (4.7 percent) of the soils have cultivation as their major land use. The higher-than-average eastern Oregon precipitation on these soils assists the poorer soils in the production of good crop yields. In 1971 and 1972, the average wheat yields were 38.8 and 44.0 bushels per acre respectively, while the state's average yields were 44.9 and 41.9 bushels per acre respectively. However, the acreage used for wheat in the county was only 9,000 acres (less than one percent of the county's area) for each year (O.S.U., Commodity Data Sheet, Wheat, 1974).

Forestry is the major land use of 53.0 percent of the soils and range is the major land use of 22.6 percent of the soils. Ponderosa pine is the major tree species in the county and grazing is common on the gentler forest floors. Fifty-two thousand cattle and 22,000 sheep were reported in Wallowa County in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Also, 38,600 acres of hay were reported harvested in the county the same year (O.S.U., Commodity Data Sheet, Hay, 1973). The use of cultivated soils of poorer quality for hay and pasture is a common agricultural practice and, in the case of Wallowa County, an excellent method of supplying the large numbers of livestock with necessary winter forage.

Surface water supplies are sufficient for all purposes during the early summer months. In 1969, 39,329 acres were reported irrigated by the county's farmers (U.S. Bureau of the Census, Census of Agriculture, 1969). Most of these acres were irrigated from streams which have low streamflows during the late summer months when the demand for hay and pasture irrigation water is high. Some groundwater supplies are available for use along the streams and rivers, but the potential for future increased usage is unknown.

Carrying Capacity and Future Trends in Wallowa County

The county's population has gradually decreased from 7,623 residents in 1940 to an estimated 6,210 residents in 1972 (Meyers, 1973). Computer calculations, using present patterns of land use in the county, show a carrying capacity for construction to be 3,858 individuals for the present quality of life and 4,955 individuals for a standard quality of life. The discrepancy between the existing population and the computer calculated carrying capacity exists because of flooding conditions over soils, which are actually used for construction, but which were not regarded as suitable by the computer.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 31,346 individuals could be provided with their dietary carbohydrate needs. For a standard but still acceptable quality of life, 36,500 individuals could be supplied with their annual carbohydrate requirements. All soils with range, pasture or hay as their major land use were converted to the production of animal protein (beef). For the present quality of life, 775 individuals could be provided their dietary animal protein needs. For a standard quality of life, 1,628 individuals could be supplied their animal protein requirements. The protein determinations do not reflect the amounts of cultivated lands used as pasture nor producing hay crops. Many poorer-yielding cultivated soils are also used for grazing.

The major limiting factor in Wallowa County is the shortage of good soils for construction purposes. Less than one percent of the county's soils have only moderate limitations for use as septic tank filter fields, which reduces the possibility for extension of building beyond municipal sewer lines. Another major limiting factor is the shortage of water during the late summer months. The cities of Joseph, Lostine, and Wallowa use lake or stream water for municipal water supplies. Significant increases in the quantities used from these sources by increasing populations may pose additional problems in the county. The county exports carbohydrate supplies and, from the large numbers of livestock reported, probably exports some animal protein also.

WASCO COUNTY

Wasco County was created January 11, 1854 and originally included all of Eastern Oregon, or rather, that part of Oregon Territory east of the Cascade Mountains from the Columbia River to the northern state lines of Nevada and California. It was named for a small tribe of Indians of that name who lived at the site of Dalles City (The Dalles) (Holman, 1910). The county is located in north-central Oregon. It is bounded on the west by Marion and Clackamas Counties at the divide of the Cascade Mountains and by Hood River County, on the north by the Columbia River, on the east by Sherman and Wheeler Counties and on the south by Jefferson County. About 70 percent of the county lies in the Deschutes River Basin, 23 percent in Hood Basin and the remainder in the John Day River Basin. Wasco County is the 14th largest of Oregon's 36 counties, containing 1,527,680 acres of which 1,315,200 acres (86.1 percent) are classified and presented in this study (Appendix A, Tables A225 through A231).

Precipitation in the county varies from more than 90 inches annually in the Cascade Mountains to less than ten inches on the semi-arid Columbia plateau. In the cultivated area, annual precipitation is from 8 to 12 inches. The climate varies greatly, partly because it extends from the snow fields of the Cascades to the Columbia plateau, but also because it extends from the 5,000 foot rim of the Cascades to the Columbia River, which at The Dalles is 102 feet above sea level. Frost-free growing periods range from less than 30 days to greater than 180 days.

Eighty-eight different series and sub-series of soils were inventoried in Wasco County (S.W.R.B., Appendix I-4 and 5, 1969). About 11.5 percent (174,200 acres) of the soils have forests as their major land use. Logging and lumber manufacturing industries are important to Wasco County's economy. The Douglas fir forests are dense along the divide of the Cascades and along the ridges which border the southern and eastern boundary of Hood River County. The lower and dryer forests are mostly ponderosa pine, where the grassy floors support controlled grazing practices. Besides the forestland grazing, 49.2 percent (750,500 acres) of the county has rangeland as its major land use. Moreover, the practice of summer fallowing dryland cereal crops permits grazing the stubble of fallowing soils. The numbers of cattle in Wasco County increased from 17,000 in 1940 to 35,000 in 1970, while the numbers of sheep decreased from 75,000 in 1940 to 5,500 in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). From a distance, the rolling fields on the Columbia plateau appear to be gentle slopes, but between most hilltops are steep- to very steep-sided ravines. The grassy sides of the ravines have had horizontal paths cut around them by sheep and cattle hooves, and most, even with slopes greater than 60 percent, contribute to the productivity of the county. The 497,100 acres of classified soils in the county with slopes greater than 30 percent include those soils named for steep north-facing or south-facing ravine walls.

Only 363,000 acres (23.8 percent) of the county's soils identify cultivation as their major use. One hundred seventy-nine thousand acres are rated "excellent" or "good" for irrigability, and 505,900 acres (33.1 percent) are of Capability Classes I through IV with erosion or excess water as their major limiting factor. Most of the cultivable soils are of volcanic ash and wind blown silt (loess) origin and are deep and easily worked. However, there is no irrigation water available and natural precipitation is scant. On the plateau, most soils are used to grow a variety of cereal crops by summer fallowing, where the soils lie idle one year to conserve moisture to grow a crop the next year. Near the White River and along some more dependable streams, irrigation permits annual crops to be grown. Hay is the reliable crop in many irrigated stream bottoms, and is used to supplement grazing during the winter months. Groundwater supplies are not fully understood, although wells drilled in the alluvium of stream beds are sufficient to supply domestic needs. The Deschutes River canyon is too deep in most areas of Wasco County to be used for irrigation.

Many fine orchards, mostly cherries, are grown near the cities of The Dalles and Mosier. Groundwater or Columbia River water is used for irrigation as these orchards are only a few hundred feet above the river. Groundwater supplies from the Threemile and The Dalles pool have steadily declined since 1928, dropping by more than 45 feet during the period. The two pools have been declared "critical" by the State Engineer, and only domestic wells can be drilled into the source (Wheeler, 1970). Columbia River water has been considered for artificial recharge into the pools, but extreme caution must be used when recharging goundwater supplies with water which has had the variety of uses as have those flowing in the Columbia River.

Carrying Capacity and Future Trends in Wasco County

The population of Wasco County has increased from 13,069 residents in 1940 to 20,133 in 1970. However, it has not increased proportionally since 1970, so is considered reasonably stable. Nearly two-thirds of the county's residents are concentrated along the Columbia River either in or near the cities of The Dalles and Mosier. Some expansion is taking place from the City of The Dalles up Mill and Chenoweth Creeks. However, the dependency of new construction on city water services could contain the population growth along the rim of the Columbia Gorge, which is the area of choice for most residents. The other cities and towns of the county are stable and will continue to service their surrounding areas. Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 30,173 individuals for the present quality of life and 38,755 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 258,274 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 300,736 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 2,826 individuals could be supplied their dietary animal protein needs. For a standard quality of life, 5,936 individuals could be supplied their animal protein requirements.

The animal proteins produced in Wasco County are of greater quantity than were indicated by the computer calculations. Large numbers of livestock graze soils of low productivity that were once cultivated and steep slopes that have low productive values on the computer cards. Wasco County exports both carbohydrates and animal proteins to areas in the state.

The county's major limiting factor is the absence of reliable water supplies. Sufficient water for irrigation and domestic uses could greatly enhance the quality of life for the anticipated population growth. Without the needed water, the quality of life could decrease substantially for the residents if the population increases.

WASHINGTON COUNTY

Washington County was one of the four original Districts or Counties created on July 5, 1843, six years before Oregon became a U.S. Territory and 16 years before statehood. Originally it was named Twality, after the Tualatin River which is an Indian name meaning sluggish, restful, peaceful - for the action of the river. The name was changed to Washington on September 3, 1849, named to honor George Washington (Holman, 1910). It is bounded on the west by Tillamook County, on the south by Yamhill County, on the southwest by Clackamas County, on the northwest by Multnomah County and on the north by Columbia County. About 12 percent is contained within the North Coast Basin with the remainder in the Willamette River Basin. Washington County ranks 31st in size of Oregon's 36 counties, encompassing 458,240 acres of which 431,630 acres (94.2 percent) are classified and included in this study (Appendix A, Tables A232 through A238).

The climate in the agricultural portion is temperate with mild, wet winters and dry, warm summers. The western portion of the county lies on the crest of the Coast Range which intercepts heavy clouds and coastal winds. The average annual precipitation at Forest Grove is about 45 inches while the higher mountainous areas receive more than 100 inches. Most of the grazing and agricultural lands enjoy from 165 to 195 frost-free growing days a year.

The terrain on the valley floor is composed of gently rolling hills which yield to the sharply rising slopes to the west. About two-thirds of the soils have slopes less than 31 percent and a fourth of the soils are nearly level. Livestock are grazed along the margin of the valley, in the brush draws on the valley floor and on 61,950 acres of soils classified as pastureland. In 1970, 28,000 cattle and 5,000 sheep were reported by the county's farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

One hundred twenty-seven different series and sub-series of soils were inventoried (Washington County, 1971). Cultivation is the major land use of 209,660 acres of soils which is 45.8 percent of the county's total area. Ninety-two thousand five hundred twenty-five acres were reported harvested in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969). The major harvested crops consisted of 45,000 acres of small grains, 22,800 acres of hay, 10,700 acres of field seed crops, 6,970 acres of produce and berries for processing, 12,740 acres of tree fruits, nuts and grapes and other crops. The county's good soils can produce a wide diversity of crops which are processed by industries in the county or sold as fresh produce. There are 8,750 acres of Capability Class I soils and 94,710 acres of Class IIe and IIw soils in the county.

Most of the specialty crops require irrigation water to bring them to profitable harvests. One hundred thirty-two thousand acres of soils have characteristics which rate them as "excellent" or "good" for irrigability. However, the 1969 census reported only 13,936 acres of the soils were under irrigation.

The Tualatin River drains most of the watershed of the county and either directly or indirectly supplies water for irrigation, municipal and industrial uses. The winter and spring streamflows of the Tualatin River and its tributaries are high with occasional flooding. By early summer the streamflows drop and by late summer and early fall, the main river is low and lives up to its name as a "sluggish" river. The river's flow rate often approaches zero during low water years. Twelve of the 40 years of streamflow record from 1928 to 1968 have had entire months when the riverflow was less than one cubic foot per second at West Linn, where the Tualatin joins the Willamette River (U.S.G.S., 1968). Waters from the river are used for irrigation wherever possible. During the winter and spring months the high streamflows recharge groundwaters in the underlying alluvium.

Groundwater supplies are extensively used for municipal, domestic, industrial and irrigation purposes. The increased population and industrial activity in the county has placed great demands upon groundwater supplies. In May, 1974, the State Engineer, Chris Wheeler, severely restricted the use of groundwater being drawn from existing wells in a 41 square mile area of the county (Warren, 1974). Many of these water supplies are used for irrigation and their loss restricts the potential production of the soils.

Carrying Capacity and Future Trends in Washington County

The population in Washington County has increased from 39,194 residents in 1940 to an estimated 178,300 residents in 1972 (Meyers, 1973). The urbanizing influence of Portland is evident throughout the eastern portion of the county. During the past five years this influence has reached the central portion of the county in the Hillsboro, Cornelius, and Forest Grove areas. Computer calculations from this study, using present patterns of land use, show the carrying capacity for construction to be 28,947 individuals for the present quality of life and for 37,181 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 144,852 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 168,667 individuals could be supplied their carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 6,079 individuals could be provided their dietary animal protein needs. For a standard quality of life, 12,767 individuals could be provided their dietary animal protein requirements.

It is likely that, if Washington County was located away from the Portland Metropolitan area (to which it is now assuming the role as a "second bedroom"), the carrying capacity for construction would closely match the population. The county has an abundance of good soils which can be interchangeable used for agriculture or building purposes. Planning officials are presently responding to the role of the county's changing responsibility but are exercising care that the good producing soils west of Hillsboro are not needlessly sacrificed in the urbanizing process.

Both carbohydrates and animal proteins are presently imported into the county and increasing amounts of both essential nutrients will be needed. Water supplies could be a serious limiting factor for future population growth and dietary nutrient production.

WHEELER COUNTY

Wheeler County was created February 17, 1899 from parts of Grant, Gilliam and Crook Counties, and is named for Henry H. Wheeler, an old resident of that part of the country (Holman, 1910). It is bounded on the west by Jefferson, Crook and Wasco Counties, on the south by Crook County, on the east by Grant County and on the north by Gilliam County. It lies within deeply dissected mountains with 94.7 percent of its area in the John Day River Basin and the remainder in the Deschutes River Basin. It ranks 20th among the state's counties in area, containing 1,092,480 acres of which 880,700 acres (80.6 percent) are classified and included in this study (Appendix A, Tables A239 through A245).

Climatic conditions are rigorous and varied in the county. The average annual precipitation is from 11 to 20 inches per year with very little falling during the summer months. Frost-free periods range from 5 to 125 days per year, and frost may occur any month of the year (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1971). Elevations range from 2,000 feet to greater than 5,100 feet above sea level. Less than 22 percent of the county's soils have slopes under 30 percent. The rough, broken lands along the John Day River are barren and rocky in most areas, but good stands of ponderosa pine cover some slopes and ridges in southern and northeastern portions of the county. A few scattered hilltops throughout the county have thin mantles of cultivable soils.

Ninety-five different soil series and sub-series were inventoried in Wheeler County (S.W.R.B., Appendix I-5 and I-6, 1969). The 19.4

percent (211,780 acres) of soils not classified by the Soil Conservation Service were considered unmapped waste lands and were not included in this study. Forest lands occupy 256,200 acres (23.4 percent), consisting mostly of stands of ponderosa pine. Rangeland is considered the major land use of another 598,300 acres. The open forest floors and rangeland supported an impressive 24,000 head of cattle and 7,000 head of sheep and lambs in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Hay is harvested along many winding streams to supply winter feed for the large animal population. Many of these hayfields are irrigated where water is available.

Cereal crops do not yield well in the county. Less than three percent (27,500 acres) of the soils are of Capability Classes I, II, III and IV, with erosion and water limitations, and these are widely scattered in narrow bands. The 1971 and 1972 yields of wheat were 28.5 and 19.2 bushels per acre respectively while the state averages for those years were 44.9 and 41.9 bushels per acre respectively.

Carrying Capacity and Future Trends in Wheeler County

The population of Wheeler County has decreased from 2,974 in 1940 to 1,849 in 1970. A 1972 estimated population shows a further decrease to 1,820 (Meyers, 1973). Computer calculations using present patterns of land use in the county show a carrying capacity for construction to be 804 individuals for the present quality of life and 1,032 individuals for a standard quality of life. Only 7,000 acres contain soils rated with "moderate" septic tank filter field limitations. This depresses the available area upon which construction can proceed as highways and roads encroach upon the few good soils which could be used as building sites.

All soils with cultivation as their major land use were converted to the production of carbohydrate (wheat) units. For the present quality of life they could provide 25,391 individual dietary needs. For a standard quality of life, 29,566 individual dietary requirements could be supplied. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life the county could provide 3,402 individuals with their animal protein needs. For a standard quality of life, the soils could supply 7,145 individuals with their dietary animal protein requirements.

Both a lack of reliable water supplies and poor soils for construction uses are limiting factors for future population growth in Wheeler County. It will continue to supply its surplus wheat and beef to other counties in the state that are unable to produce enough for their populations.

YAMHILL COUNTY

Yamhill County was one of the four original Districts or Counties created on July 5, 1843, six years before Oregon became a U.S. Territory and 16 years before statehood. It is named for the river which flows through the heart of the county. The river's name is from an Indian word, Che-am-il, meaning "bald hills" and the area was so named because grass covered the round hills in a luxuriant growth. Settlers shortened the name to Yamil and later, southern states' immigrants changed it to Yam Hill (Holman, 1910). It is bounded on the west by Tillamook County, on the south by Polk County, on the east by Marion and Clackamas Counties and on the north by Washington County. Eight and one-half percent of the county's area is contained within the North Coast Basin and the remainder is within the Willamette River Basin. Yamhill County is 32nd in size of Oregon's 36 counties, encompassing 453,760 acres of which 426,260 acres (93.9 percent) are classified and included in this study (Appendix A, Tables A246 through A252).

The climate is temperate with mild, wet winters and warm, dry summers. The average annual precipitation varies from about 45 inches at McMinnville to more than 100 inches in the county's western portion which lies along the crest of the Coast Range. The average frost-free growing periods in the agricultural areas are from 165 to 195 days.

The terrain along the crest of the Coast Range and on its east facing slopes is rough and mountainous with steep walled canyons. Dense forests cover the slopes and ridges, softening the rugged profile of the area. More than 40 percent of the county's soils have slopes greater than 30 percent, most of which are contained in the forested areas. Grazing livestock harvest grasses in parks and the valleys of small streams along the margin of the Willamette Valley. They also graze the 55,860 acres of soils which have pasture as their major land use. In 1970, 23,000 cattle and 22,000 sheep were reported by Yamhill County farmers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972).

Ninety-seven different series and sub-series of soils were inventoried (S.C.S., Yamhill County, 1970). Cultivation is the major land use of 169,330 acres of soils which is 37.3 percent of the county's area. These soils lie between the foothills of the Coast Range and the Willamette River, extending up the South Yamhill River to Willamina and up the North Yamhill River to Cove Orchard. Rich, deep soils lie on the terraces along the rivers, some in dryland cereal crops, others pastured or harvested as hay. Nearly 82,000 acres of soils are of Capability Classes I and II with only erosion or water problems as their limiting factors. The greater proportion of these soils is in cultivated crops. Agriculture in the county is very diversified with many types of grass and cereal grass seed grown as dryland crops where irrigation waters are difficult to obtain. In 1969, the 108,825 acres of cropland reported as harvested grew 48,500 acres of small grains, 18,700 acres of hay, 15,300 acres of grass and legume seed, 8,165 acres of vegetable and berry crops for fresh produce and processing, and 12,792 acres of tree fruits, nuts and grapes. Irrigation water was utilized to bring 19,218 acres of crops to harvest (U.S. Bureau of the Census, Census of Agriculture, 1969). Only a small fraction of the potential irrigable soils are presently under irrigation because of water shortages during the dry summer season.

Yamhill County streams have abundant to overabundant water during the winter and early spring months. Early spring irrigation is possible for many soils. All of the county's streams have recorded zero or near zero streamflow during low water years. Soils lying near the Willamette River have access to groundwaters in the underlying alluvial beds as do those along some areas of the lower Yamhill River. Groundwater supplies are usually sufficient for domestic and livestock use but not for irrigation purposes in areas distant from larger streams.

Carrying Capacity and Future Trends in Yamhill County

The population in Yamhill County has increased steadily from 26,336 residents in 1940 to an estimated 42,190 residents in 1972 (Meyers, 1973). All urban areas have doubled or nearly doubled in size, but the major population growths have occurred in and near the cities of McMinnville and Newberg. Computer calcualtions from this study, using present patterns of land use, show a carrying capacity for construction to be 39,661 individuals for the present quality of life and for 50,943 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 144,092 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 167,782 individuals could be supplied their dietary carbohydrate requirements. All soils with pasture or hay as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 5,109 individuals could be provided their dietary animal protein needs. For a standard quality of life, 10,729 individuals could be supplied their dietary protein requirements.

Yamhill County's population at present nearly equals the carrying capacity for construction, has the potential to export carbohydrate supplies, and does and will continue to import animal protein supplies. The true impact of having large quantities of attractive soils for construction purposes within 40 miles of Portland is now beginning to be realized. The early signs of this impending event, where the upper county could become a "third bedroom" of Portland, are noticeable in the fragmentation of larger portions of acreages into smaller, non-agriculture units. This action removes the soils from production capability and they remain idle until the whim of the owner changes their use. The major limiting factor for Yamhill County is the lack of dependable water supplies during the late summer and early fall months.

DRAINAGE BASINS

NORTH COAST DRAINAGE BASIN

The North Coast Basin is the 15th largest in the state, encompassing 1,731,200 acres of which 620,600 acres (15.0 percent) are classified and included in this study (Appendix B, Tables B1 through B7). It is bounded on the west by the Pacific Ocean, on the south by the Mid-Coast Basin, on the southeast by the Willamette River Basin and on the east and north by the Columbia River. All of Clatsop County, most of Tillamook and Columbia Counties and portions of three other counties lie within its area (Table 2)(S.W.R.B., North Coast Basin, 1961).

Table 2. Areas of Counties Lying Within the North Coast Drainage Basin, 1961

COUNTY	Total Area Sq. Mi.	Area Within North Coast Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Clatsop	921	921	589,440	100.0	34.0
Columbia	688	543	347,520	78.9	20.1
Polk	739	3	1,920	0.4	0.1
Tillamook	1,115	1,091	698,240	97.8	40.3
Washington	716	85	54,400	11.9	3.2
Yamhill	709	62	39,680	8.5	2.3
Basin Total		2,705	1,731,200		100.0

The basin is composed of many independent waterways which drain the northern end of the Coast Range in Oregon. The streams and rivers in the basin's western portion drain directly into the ocean, while those in the northern portion drain into the Columbia River. The basin is triangular in shape, measuring approximately 85 miles in a north-south direction and 60 miles in an east-west direction across the northern portion, but is only 10 miles wide across the southern portion. Its inland boundary follows the crest of the Coast Range.

The climate is mild and humid, as a result of the moderating influence of the Pacific Ocean and from the intense rainfall induced by the Coast Range cloud barrier. Some variation in this pattern occurs along the basin's inland portion where the effects of the Columbia River are felt. Average annual precipitation is lowest, about 45 inches, near St. Helens and remains below 80 inches along the Columbia River. However, along the coast the precipitation averages about 90 inches at Tillamook and exceeds 110 inches at the headwaters of the coastal streams (U.S. Department of Commerce, Weather Bureau, 1965).

The basin's terrain is rough and deeply dissected by streams. The entire Coast Range is a result of uplifting and gentle folding processes through the geologic ages. Several periods of volcanic activity formed the basement complex, which marine sediments and more recent volcanic activity have covered. Erosive forces by water and wind have deeply dissected and rounded the softer materials, exposing mountaintops and headlands composed of the more durable volcanic rock. Wind blown silt (loess) from the Portland Hills area mantles most of the basin portion of Columbia County. This is generally quite deep and fertile (Baldwin, 1959). Less than 14 percent of the classified soils have slopes less than 31 percent and most of these lie in the basin area of Columbia County and in the lower flood plains of the rivers and streams. Elevations are not great in this northern end of the Coast Range, rarely exceeding 2,500 feet. Frost-free growing periods in the agricultural areas are from 150 to 195 days a year, with most areas remaining green throughout the year.

The mild climate, the ability of the soils to provide nearly year around grazing and the proximity of the area to markets have encouraged the development of extensive livestock industries. In 1970, an estimated 60,000 cattle and 4,000 sheep were grazed there. About 21,000 of the cattle were dairy cows (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). In 1959, 90 percent of the basin's agricultural income was from livestock and livestock products, of which 57 percent of this income was from dairy products alone (S.W.R.B., North Coast Basin, 1961). Dairying is still a large industry and Tillamook cheeses are famous throughout the nation. Many of the lower mountain slopes are grazed and contribute hay for winter feed. The nitrogen content of the winter graze is low and must be supplemented by feed or by hay from central Oregon where the nitrogen content of alfalfa is very high.

Fifty-four different series and sub-series of soils were inventoried (S.W.R.B., Appendix I-1, 17 and 18, 1969). More than 82,000 acres of soils have cultivation as their major land use and another 157,200 acres have pasture as their major land use. Most of the cultivated soils raise hay and forage for the livestock industry. The quantity of land capable of cultivation or pasture uses is greater than the quantity in use at this time. The dry late summer and fall months, when irrigation could sustain growth in the heavily grazed areas, is when available water supplies are lowest. Very few fields have sufficient irrigation water to maximize their capabilities.

Surface water supplies are in great excess from October until April when the rainy season is at its height. Steep stream gradients at the head of the watersheds accelerate the draining of waters to the lowlands, often flooding the areas during heavy storm periods. The permeability of the underlying basalt rock and marine sediments is poor; there are few areas where groundwater reservoirs could be charged. Precipitation from May to October comes as fog and light misty rains, neither contributing significant quantities to dwindling stream flows. Reservoir sites are not easily developed on the coastal portion of the basin but may be developed in the northern portion.

Groundwater supplies in most areas can support minor domestic usage but are usually insufficient for municipal, industrial or irrigation supplies. Large quantities of groundwater are trapped in sand dunes on the coastal plains and could be obtained. However, these supplies are high in dissolved minerals and would require special treatment before they could contribute significantly to the overall water supply.

Carrying Capacity and Future Trends in the North Coast Basin

An estimated 69,000 residents were in the basin in 1970 (U.S. Bureau of the Census, 1970). The population has shown a small increase since the 1960 estimate of 60,959 residents, with most of the growth occurring in Columbia County. Population projections for the basin by the State Water Resources Board are: year 1960 (actual) - 60,959; year 1980 - 83,000; year 2000 - 104,000; year 2020 - 133,100; and for the year 2070 - 324,000 (S.W.R.B., Ultimate Needs, page 34, 1969). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 8,833 individuals for the present quality of life and of 11,346 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 79,886 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 93,020 individuals could be supplied their carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 15,907 individuals could be provided their animal protein needs. For a standard quality of life, 33,406 individuals could be supplied their dietary animal protein requirements.

The discrepancy which exists between the calculated carrying capacity for construction and the present population in the basin was caused by the evaluation of the capacities and locations of the soils most likely to be used for those purposes. The tendency for many soils to be subjected to flooding and slides limits their ability for this use, while the presence of high water tables or excessive slopes reduces the capacity of others to be built upon. Only 15,000 acres of soils in the basin have only "slight" and "moderate" limitations for use as septic tank filter fields. Many of these soils are not located where construction is occurring. Thus, construction is occurring on unsuitable soils. The basin can support a larger population by encouraging population concentrations, to make possible municipal services which would supply the residents with water and waste water disposal services.

Most soils classified with cultivation as their major land use are providing forage for livestock instead of raising cereal crops for dietary carbohydrate satisfaction. Therefore, the capability to produce carbohydrates exceeds the actual production; the present use of the soils (producing animal proteins) does not appear. The basin does have soils capable of producing crops of cereal grains but they are not presently being utilized for this purpose. Even with better definitions of the more probable use of the soils the basin must import both carbohydrate and animal protein supplies to supply the present population and any further additions to that population.

Water supplies for future populations were determined by combining the flows of several streams in the basin. Only a few of the North Coast Basin's streams have active gauging stations at this time. The streamflows evaluated were:

River Station #143025 - the Trask River near Tillamook for 1967

River Station #143015 - the Wilson River near Tillamook for 1967

River Station #143010 - the Nehalem River near Foss for 1967

River Station #142515 - Youngs River near Astoria for 1958 (this was the last year measured at this station).

The combined flows of these rivers did not meet the recommended minimum flows of either the State Water Resources Board or the Oregon Fish Commission. Using these calculations (and discounting the Columbia River), there are no excess surface water supplies available for future population growth in the basin. Groundwater supplies are negligible with the exception of the Tillamook and St. Helens areas, where good supplies for municipal services are drawn from underlying alluvial beds.

Sufficient precipitation is deposited in the basin to provide the needs for all uses if storage reservoirs could be developed. Also, the Columbia River passes the eastern and northern portions of the basin a short distance before its waters mix with those of the ocean. While the economics of water supply may be too adverse at this time to provide water to the basin's population and soils, the potential is present.

WILLAMETTE RIVER DRAINAGE BASIN

The Willamette River Basin is the largest in Oregon, encompassing 7,700,000 acres of which 6,421,603 acres (83.4 percent) are classified and included in this study (Appendix B, Tables B8 through B14). It is bounded on the west by the North Coast and Mid-Coast Basins, on the south by the Umpqua River Basin, on the east by the Deschutes River and Hood Basins and on the north by the Columbia River and the State of Washington. All or part of twelve counties (Table 3) make up the basin's area (S.W.R.B., Upper Willamette River Basin, 1961; Middle Willamette River Basin, 1963; Lower Willamette River Basin, 1965).

Table 3 . Areas of Counties Lying Within the Willamette River Drainage Basin, 1965

COUNTY	Total Area Sq. Mi.	Area Within the Willamette River Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Benton	668	493	315,520	74	4.1
Clackamas	1,893	1,887	1,207,680	99	15.8
Columbia	688	145	92,800	21	1.2
Douglas	5,062	103	65,920	2	0.9
Lane	4,573	3,459	2,213,800	76	29.0
Linn	2,294	2,294	1,468,160	100	19.3
Marion	1,175	1,175	750,720	100	9.8
Multnomah	457	457	271,360	100	3.6
Polk	739	644	412,160	87	5.4
Tillamook	1,115	2.2	100	-	-
Washington	716	643	411,520	88.1	5.4
Yamhill	709	647	414,080	91.5	5.4
Basin Total			7,623,820		100.0

The climate in the agricultural areas is temperate with mild, wet winters and dry, warm summers. The average annual growing season is from 165 to 195 days. The average annual precipitation is from 40 to 60 inches with less than five percent of this arriving from June to September.

The shape of the basin is that of a long, pointed oval with forested mountains for three of the boundaries. The Coast Range along the western boundary has sharp slopes and the nearly impenetrable vegetation of a rain forest. The Calapooya Mountains along the southern rim are low and eroded, having many small valleys and meadows in the foothills. Along the basin's eastern side, the lower and older western Cascades have long, sweeping slopes and appear as foothills to the sawtooth appearance of the high eastern Cascades. The lower slopes and valley margins of all three mountain ranges are heavily grazed by the basin's livestock. In 1970 an estimated 260,000 cattle and 170,000 sheep were reported by the basin's farmers and ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Grazing is also active in the 1,166,650 acres that have pasture as their major land use and on the fields where grass is planted for seed production.

Five hundred six different soil series and sub-series were inventoried in the Willamette Basin. This inventory was compiled by totaling the soil types contained in the valley for the counties involved. References are cited for each county in their texts. Cultivation is the major land use on 1,788,869 acres of soils. These soils are in the valley of the basin, extend up the valleys of the tributary streams, and are sometimes located on the gently rolling foothills along the valley margin. Nearly three and one-third million acres are of good quality with 73,413 acres of Capability Class I soils (38.7 percent of those in the state), 1,084,741 acres of Class IIe and IIw soils and 2,110,378 acres of Class IIIe and IIIw soils, altogether totaling 3,330,855 acres of these better and more manageable soils. However, only 955,498 acres were reported harvested in the basin in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969), which is less than 29 percent the acreage inventoried in the better Classes of I, II and III soils. Dry land crops harvested that year totaled 246,500 acres of small grains and 256,275 acres of field seed crops. Another 159,200 acres of hay were harvested for a total of almost 662,000 acres. The remainder of the harvested acres were divided into a wide variety of specialty crops such as vegetables, berries and tree fruits for fresh produce and processing, mint, nuts, grapes, horticulture crops, and many others. Most of the specialty crops need irrigation waters for the products to be acceptable. The same 1969 census recorded 207,722 acres of soils had been under irrigation when the survey was made. This is about 35 percent of the soils rated "excellent" for irrigability and about 15 percent of the combined quantity of soils rated "excellent" and "good" for irrigability.

Surface water supplies and streamflows have been regulated in the Willamette River and its tributaries for many years. Sixteen major dams have been constructed which have the capacity to store 1,965,310 acre feet of water (Willamette Basin Task Force, 1969). This was approximately 98 percent the annual flow of the Willamette River in 1931, the lowest recorded streamflow (U.S.G.S., 1968). Many other major projects are authorized or are in the planning stages. With few exceptions, all major reservoirs are located in the Cascades on the east slopes of the basin. The Coast Range does not offer good sites for large reservoirs but smaller reservoirs have proven efficient.

Groundwater supplies are found in the alluvial beds underlying the old and new channels of the Willamette and the lower portions of its tributaries which drain the Cascades. Several studies have been made by the State Engineer's office, but a comprehensive study for the entire basin has not been assembled. Many municipal water supplies and a significant quantity of irrigated acreage depend entirely on groundwater for their supplies.

Carrying Capacity and Future Trends in the Willamette River Basin

The basin's population has grown rapidly from an estimated 1,165,080 residents in 1960 to an estimated 1,493,000 residents in 1972 (Meyers, 1973). Population projections for the basin by the State Water Resource Board are: year 1960 (actual)- 1,165,080; year 1980 - 1,699,100; year 2000 - 2,196,500; year 2020 - 2,925,900; and for the year 2070 - 6,560,100 (S.W.R.B., Ultimate Needs, pages 59 - 62, 1969). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 410,648 individuals for the present quality of life and 527,455 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 1,667,600 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 1,941,770 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 131,947 individuals could be provided their dietary animal protein needs. For a standard quality of life, 277,095 individuals could be supplied with their animal protein requirements.

Water supplies for future population growths were determined by combining the streamflows of the main stem of the Willamette River at Wilsonville with the tributaries that enter the river below the station to its mouth. The stations evaluated were (U.S.G.S., 1968):

River Station #141980 - Willamette River at Wilsonville

River Station #142100 - Clackamas River near Estacada

River Station #142000 - Mollala River near Canby

River Station #142115 - Johnson Creek at Sycamore

River Station #141370 - Sandy River near Marmot.

The reference year selected was 1967. The recommended minimum streamflows established by the Oregon Fish Commission were extrapolated from the year 2070 and year 2020 recommendations which became 5500 cubic feet per second (cfs)(S.W.R.B., Ultimate Needs, page 67, 1969). The minimum recommended streamflow established by the State Water Resources Board was 6,200 cfs (S.W.R.B., Willamette River Proclamation, 1971).

The minimum streamflow established by the District Engineer for navigation at Salem and to the mouth of the Willamette River is 6,500 cfs (S.W.R.B., Ultimate Needs, page 67, 1969). The 6,500 cfs minimum stream flow at the Portland harbor was considered the reference quantity. The August 1967 calculated streamflow of 6,881 provided 381 cfs useable water. For the present quality of life, this quantity of water could supply 992,186 additional individuals with their water needs. For a standard quality of life, 1,649,351 additional individuals could be supplied their water requirements.

Computer calculations from this study show a wide variation between the carrying capacity for construction on the basin's soils and the present population inhabiting the soils. The capabilities of the soils to support construction do not change when they are covered by urban activities, only their uses change. Most of the basin's more versatile Class II and Class III soils have been and still are prone to flooding. The qualities of life enjoyed by individuals inhabiting these soils are decreased by factors not included in this study. There are sufficient good soils near and within each urban area in the basin to accommodate the anticipated population growths without assimilating significant quantities of the better soils. There are also land use laws and competent planning agencies in existence to mold long-term future growth activities into a pattern that preserves the quality of life for the residents.

Cereal crops and other grass crops do well on most of the basin's soils. The Willamette Valley has not been recognized as a great wheat producing area of the state, but in 1972, valley farmers reported 110,900 acres of harvested wheat, about one-eighth of Oregon's total acreage harvested that year (O.S.U., Commodity Data Sheet, Wheat,1974). However, most of the available soils for growing cereal crops are planted to field seed crops, mostly grass seed. The basin's residents import both carbohydrate and animal protein supplies to support their present dietary needs and the activity will increase as the population increases.

Inadequate dependable water supply is the basin's major limiting factor. All soils with "excellent" or "good" characteristics for irrigability were considered irrigated in this study. This potential of the soils' producibility has not developed at the present time. Sufficient precipitation descends on the basin to fill more reservoirs. However, most of the better reservoir sites have been or are being developed. These developments should still permit sufficient streamflow to meet minimum flow recommendations. Most streamflows will be lower during the next two or three decades while the reforesting slopes exert a greater demand on the available supplies for transpiration and growth.

HOOD RIVER DRAINAGE BASIN

Hood Basin is the smallest of Oregon's 17 major drainage basins, encompassing only 654,400 acres of which 635,900 acres (97.2 percent) are classified and included in this study (Appendix B, Tables B15 through B21). It is bounded on the west by the lower Willamette River Basin, on the south and east by the Deschutes River Basin and on the north by the Columbia River. Most of Hood River, about one-fourth of Wasco and a small portion of Multnomah Counties are contained within its area (Table 4)(S.W.R.B., Hood Basin, 1965).

Table 4. Areas of Counties Lying Within the Hood River Drainage Basin, 1965

COUNTY	Total Area Sq. Mi.	Area Within Hood Basin Sq. Mi.	Acres	% of County	% of Basin
Hood River	529	482	308,500	91	47
Wasco	2,382	540	345,600	23	53
Multnomah			400	-	-
Basin Total		1,022	654,500		100

Eighty-five different series and sub-series of soils were inventoried in the basin (S.W.R.B., Appendix I-4, 1969). The basin's soils are nearly equally divided between Hood River and Wasco Counties by a north-south uplifted ridge. The differences in soils, climate and hydrology between the counties in Hood Basin has caused them to be named the Hood

Area to the west and the Wasco Area to the east. The two areas will be described separately.

Hood Area

The Hood Area contains about 309,900 acres, 400 of which are in Multnomah County and the remainder in Hood River County. The area is heavily forested except along the terraces of north flowing Hood River. More than 85 percent of the area's soils have slopes steeper than 30 percent, which discourages uses other than forestry, grazing and recreation. Of the remaining acres of the area, 27,300 (8.8 percent) are considered tillable. The tillable soils have been sorted and eroded by Hood River and its tributaries, but their origins and locations are mostly the result of a series of geological events which took place before the river was formed.

Most of the tillable soils are deep and well drained except on nearly flat areas where drainage is poor. More than 60 percent of the cultivated soils are planted to pear and apple orchards which flourish in the protection offered by the steep valley walls, and in the deep soils which permit good root penetration and adequate drainage. Pasture land occupies another 4,500 acres in areas of poorer drainage on the valley floor and scattered in small sites in the lower elevation of forested areas.

There are no soils in the area classified as Capability Class I. The combined total of acres of Classes II, III and IV with erosion and water limitations total 33,600 acres. Most of the Class IV and many

Class III soils are of marginal use for extensive agricultural practices. However, orchards can use many of these marginal soils and produce well. Nineteen thousand eight hundred acres of the area's soils are rated "excellent" or "good" for irrigation suitability. They are all contained within the 24,300 acres at elevations less than 1,500 feet and an average frost-free growing season greater than 135 days.

Water supplies are more than sufficient to meet present and future needs of Hood Area's agriculture and residents. However, most of the water supplies are available during the spring and early summer months, with dwindling to short supplies in late summer and winter months. Storage of water to accommodate a more even supply will be difficult because of the nature of silt and rock dust laden streams of glacial origin. Basic hydrology data are not adequate to accurately determine streamflows of any streams except the main stem of Hood River and its West Fork. Groundwater supplies are generally unknown but considered to be of low quantity and quality from presently available information. Most groundwater being mined is for domestic use and is sufficient for these requirements.

Wasco Area

An indication of the differences between the Wasco and Hood Areas is best illustrated by comparing their major soil uses. The Hood Area contains more than 75 percent of Hood Basin's soils whose major use is forests, while the Wasco Area contains more than 85 percent of the basin's soils whose major use is for cultivated crops. Most of Wasco

Area's forests lie along the western boundary of the area on the ridge along which the Hood River and Wasco County lines run. However, the Wasco soils used for cultivation lie east of the heavier rainfall areas near the Cascades and are limited in use by an average annual precipitation of less than 12 inches (U.S. Department of Commerce, Weather Bureau, 1965). The 161,100 acres of cultivable soils are mostly used to grow cereal crops except in the area around the cities of The Dalles and Mosier, where extensive fruit crops are produced.

Most of the soils in the area are from volcanic dust and wind deposited silts, called loess (lō'is). More than 100,000 acres of this cultivable land lies between 1,200 and 2,400 feet in elevation on the Columbia Plateau. Water and some wind erosion is oftentimes severe and presents a serious problem in silting of irrigation canals and streams. The loose soils in many areas of the mantle are several feet deep, but in other areas decrease to a depth too shallow for productive use. More than 180,000 acres are classified in Capability Classes II, III and IV with erosion as their major limiting factor. This available acreage will decrease slowly through the years of cultivation, lost by erosion of the loose soils. Some pastures and small hay fields are found along the few streams which dissect the plateau. These are mostly adjacent to ranch sites.

Fifty-one thousand nine hundred acres of soils are rated either "excellent" or "good" for irrigation suitability. However, irrigation water development is mostly by individual efforts with the exception of The Dalles Improvement District. All streams in the Wasco Area have records showing zero flow during dry years and very low flows on all but very wet years (U.S.G.S., 1968). Few storage sites for reservoirs are available because of the steep gradients of the streams after they leave the plateau to drain into the Columbia River only a few miles away. Summer fallow practices for dry-land farming which produce a single crop in two years, is a common practice of moisture conservation. This practice is probably better than planned irrigation where water would have to be lifted 1,000 to 2,000 feet and then transported a considerable distance to its use site.

Groundwater supplies are limited throughout the Wasco Area. The underground reservoirs at The Dalles and Three Mile Pools were classified as "critical areas" by the State Engineer after drawdown had exceeded recharge for several years (Wheeler, 1965). Private wells usually produce sufficient water for domestic and livestock use, but not enough for irrigation purposes.

Carrying Capacity and Future Trends in Hood Basin

The basin's 1972 population estimation of 31,120 residents was nearly the same as estimated in 1960 and 1970 (U.S. Bureau of the Census, 1970; Meyers, 1973). Population projections for the basin by the State Water Resources Board are: year 1960 (actual) - 31,816; year 1980 - 46,600; year 2000 - 53,800; year 2020 - 69,700; and for the year 2070 - 110,400 (S.W.R.B., Ultimate Needs, page 85, 1969). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 21,417 individuals for the present quality of life and 27,509 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 145,756 individuals could be provided their dietary carbohydrate needs. For a standard quality of life, 169,720 individuals could be supplied their dietary carbohydrate requirements. All soils with hay, pasture or range as their major land use were converted to the production of animal protein (beef). For the present quality of life, 1,401 individuals could be provided their dietary animal protein needs. For a standard quality of life, 2,942 individuals could be supplied their dietary animal protein requirements.

The basin presently exports carbohydrates and imports protein to provide for the population. A change in this procedure seems unlikely.

The existing water supplies were determined by evaluating the flow data for River Station #141200 (Hood River at Tucker Bridge near Hood River) for the 1967 water year. This stream drains the Hood Area of the basin. The major streams which drain the Wasco Area such as Eagle Creek, Mosier Creek and Fifteenmile Creek, were not included as zero streamflow has been reported in all streams (S.W.R.B., Hood Basin, 1965).

Hood Basin shows a water surplus in the Hood Area and a severe water deficiency in the Wasco Area. A moderate population growth may occur in the area of the Hood Area where water supplies are available. The major water problems exist in the Wasco Area of the basin near the heavier population concentrations along the Columbia River. Artificial recharge of the major groundwater reservoirs is considered with Columbia River water. Caution is urged in recharging groundwaters with any water because of the dangers involved in permanently contaminating the reservoirs. Hood Basin is water deficient, as a basin, at this time and that is the major limiting factor. A secondary limiting factor is the shortage of building sites in the areas of the population concentrations along the Columbia River.

DESCHUTES RIVER DRAINAGE BASIN

The Deschutes River Basin is the second largest in Oregon, encompassing 6,649,600 acres of which 5,925,000 acres (89.1 percent) are classified and included in this study (Appendix B, Tables B22 through B28). It is bounded on the west by the Willamette River Basin, on the south by the Klamath, Goose and Summer Lakes and Malheur Lake Basins, on the east by the John Day River Basin, on the north by the Columbia River and on the northwest by Hood Basin. Nearly all of Crook, Deschutes and Jefferson Counties and varying portions of eight other counties are included within its boundaries as seen in Table 5 (S.W.R.B., Deschutes River Basin, 1961).

Table 5. Areas of Counties Lying Within the Deschutes River Drainage Basin, 1967

COUNTY	Total Area Sq. Mi.	Area Within Deschutes River Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Crook	2,980	2,865	1,833,600	96.1	27.6
Deschutes	3,027	2,738	1,752,320	90.5	26.3
Wasco	2,387	1,677	1,073,280	70.3	16.0
Jefferson	1,794	1,584	1,013,760	88.3	15.2
Klamath	5,973	765	489,600	13.8	7.4
Sherman	830	372	238,080	44.8	3.6
Lake	8,270	116	74,240	1.4	1.1
Wheeler	1,707	92	58,880	5.4	0.9
Grant	4,532	67	42,880	1.5	0.7
Harney	10,132	67	42,880	0.7	0.7
Hood River	529	47	30,080	8.9	0.5
Basin Total		10,390	6,649,600		100.0

The basin is irregular in shape; roughly the shape is that of a piece of pie, being more than 125 miles wide at its longest east-west extension, more than 170 miles in length but only a few miles wide where it drains into the Columbia River. Extremes in elevation range from 200 feet at the Columbia River to more than 10,000 feet on several isolated peaks of the high Cascades. Nearly 80 percent of the basin's soils lie above 3,000 feet. The State Water Resources Board had divided the basin into five sub-basins in order to facilitate their analyses. These sub-basins are the Upper Deschutes, Middle Deschutes, Lower Deschutes, Upper Crooked and Lower Crooked. This study recognizes these divisions and refers to them but, as there are no physiogeographic barriers separating the sub-basins, they will not be separately discussed.

The climate in the agricultural portion is semi-arid with average annual precipitation rates of 10 - 12 inches. Greater than 50 inches of precipitation a year in the higher mountains form medium to heavy snow-packs. The melting snow aids in maintaining spring and early summer streamflows. More than 70 percent of the basin's 6,800 miles of streams are intermittent and undependable. The broad interstream plateaus in the central portion are deeply dissected by streams contained in impressive, intrenched canyons. The soils which blanket most of the basin are of wind deposited silt (loess) and pumice ash origin. In many areas, this soil mantle has eroded until the old or new bedrock is exposed.

Three hundred ninty-three different series and sub-series of soils were inventoried in the Deschutes River Basin (S.W.R.B., Appendix I-5, 1969). Rangeland soils occupy 3,144,600 acres (48.4 percent) and forest soils occupy more than 27 percent of the basin. Together they utilize more than 4,900,000 acres or nearly 76 percent of the soils.

Cattle raising and forest product harvesting are the two major industries. The small portion of Hood River County and all other counties along the basin's western edge are in the densely forested regions of the Cascades. Except along the upper slopes of the Cascades which grows mostly fir forests, the rest of the basin's forests are predominately of ponderosa pine. Ponderosa pine forests are more open than fir forests and permit controlled grazing along the nearly level forest floors.

Soils used expressly for grazing are found throughout the basin. Good to excellent grazing soils are found among those growing cereal crops in Wasco and Sherman Counties. Soils too shallow for cultivation or lying on steep slopes and in ravines are used for grazing, along with the stubble of fallowing fields. Two hundred thirteen thousand cattle and 14,900 sheep were reported by basin ranchers in 1969 (U.S. Bureau of the Census, Census of Agriculture, 1969).

Less than ten percent of the soils have cultivation as a major land use (641,900 acres) and more than 88 percent (567,900 acres) of these lie in the northern portion of the basin in Wasco, Sherman and Jefferson Counties. Summer fallowing is a common practice in the grainfields of these counties, so the 143,000 harvested wheat acres in 1970 would more likely reflect double that average committed to wheat, which accounts for about 51 percent of their total cultivable soils. The 1970 average yield of wheat in the harvested acres of Wasco, Sherman and Jefferson

Counties was 26.8 bushels an acre (O.S.U., Commodity Data Sheet, Wheat, 1972). Other cereal crops raised in these counties include barley and oats. Soil acreages originally used by early settlers to grow wheat are now used for grazing and, as tillage costs per acre increase, more borderline cultivable soils will likely be transferred to this use.

One-eighth of the state's Capability Class I soils (24,100 acres) are located in Wasco and Jefferson Counties. However, only 55.5 percent of the best Class I, II and III soils are in the three counties which contain more than 88 percent of the basin's cultivable soils. Ninety-eight percent of the remainder of the basin's better soils are in Deschutes and Crook Counties, close to the basin's more heavily populated areas. Elaborate systems of irrigation canals are located in Deschutes, Crook and southern Jefferson Counties where summer fallowing of soils is seldom practiced. This area contains 54 percent of the soils rated "excellent" or "good" for irrigability in the basin. While only 3,600 acres of soils are classified with their major use as hay production, more than 54,000 acres are in pasture for this great beef producing area of the state (S.W.R.B., Deschutes River Basin, 1961). Considerable acreages of the cultivable land produce forage and grain for beef utilization. The types of crops raised in the central section of the basin are limited by the short growing season as the average frost-free growing period is less than 70 days and early morning frosts can occur any month of the year.

Surface water supplies on the main stem of the Deschutes River near Bend are overappropriated and simultaneous use of existing water rights could reduce the river to a trickle. The undependable Crooked River waters are also overappropriated and, were it not for the many reservoirs in the Cascades upriver from Bend and on the Crooked River, considerably less acreage could be irrigated by the present surface water supplies. Additional reservoir sites are available but most of the good irrigable soils are already under irrigation. The addition of irrigation water to soils of questionable ability to accept such management could result in decreasing, rather than in increasing, their continuous carrying capacity.

Groundwater supplies in the Deschutes Basin are suspected to be large by the nature of annual flow from the basin. The Deschutes River is one of the most remarkable rivers of the United States because of its uniform flow of good water. Seldom has its discharge into the Columbia been more than five times the minimum flow except during flood periods. The pumice soils of the upper Deschutes Basin are spongy in nature and overlay porous lava and ancient gravel beds. Slowly melting snow fields percolate rapidly into the soils which retain the waters. As the main river and tributary stream levels drop, the porous soils and lava contribute their water supplies by lateral drainage. While this process may appear to provide a large supply of groundwater, it could well prove to be only an annual recharge-discharge cycle with very little long range storage capacity. Caution must be exercised in protecting the flow of water in the overappropriated river by maintaining the lodgepole, ponderosa pine and fir forests in the watersheds of the basin. The forest catches and holds the snowpack and, by its shade, extends the melting time until midsummer. Extensive groundwater studies with adequate testing facilities could locate and evaluate the capacity of suspected groundwater reservoirs. Presently, groundwater rights are few and small. Continued rapid increases in populations in the central part of the Deschutes Basin will probably exert greater demand upon the groundwater supplies.

Carrying Capacity and Future Trends in the Deschutes River Basin

Table 6 shows the population distribution of the basin at the time of the 1960 census survey (S.W.R.B., Deschutes River Basin, 1961).

Table 6. Population Distribution by Counties and Sub-basins, 1960

COUNTY	Upper Deschutes	Middle Deschutes	Lower Deschutes	Upper Crooked	Lower Crooked	Total
Crook				420	9,010	9,430
Deschutes	560	22,350		50	110	23,070
Grant				30		30
Harney				10		10
Hood River			20			20
Jefferson		6,390	280		420	7,090
Klamath	1,190					1,190
Sherman			1,140			1,140
Wasco			2,100			2,100
Totals	1,750	28,740	3,540	510	9,540	44,080

A 1970 total population for the basin was calculated from the 1970 Bureau of Census, Oregon, and the 1972 Oregon Blue Book data. The population was approximately 53,850 residents. The 22 percent increase in population in the ten year period justifies the claim of being one of the more rapidly growing areas of the state. Population growth was only 16 percent in the basin's four largest cities of Bend, Madras, Prineville and Redmond. These cities contain 43 percent of the basin's population.

Rural non-farm dwellings and subdivisions with varied degrees of planned densities are evident throughout the central and upper basin. Most of the permanent rural non-farm residences and many of the recreation homes have septic tanks. Fortunately, more than 255,000 acres of Jefferson, Deschutes and Crook Counties have soils rated with only "slight" and "moderate" limitations for septic tank filter fields. The upper basin area which includes southern Deschutes County and portions of Klamath, Lake and Malheur Counties, contains no soils rated with less than "severe" and mostly with "very severe" limitations for septic tank filter fields. Many recreational subdivisions are in this portion of the basin.

The State Water Resources Board population projections for the Deschutes Drainage Basin (S.W.R.B., Ultimate Needs, page 105, 1969) are: year 1960 (actual) - 43,534; year 1980 - 52,0-0; year 2000 - 68,700; year 2020 - 93,500; and the year 2070 - 176,200 individuals. Computer calculations from this study, using present patterns of land use, show a potential carrying capacity for construction of 48,979 individuals for the present quality of life and 62,911 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 635,176 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 739,606 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life 46,841 individuals could be provided their dietary animal protein needs. For a standard quality of life, 98,368 individuals could be supplied their dietary animal protein requirements.

The major limiting factors to future population growth in the Deschutes River Basin are the undependable water supplies and the decreasing numbers of construction sites in the area of greatest population densities. There are sufficient waters generated in the upper basin to be utilized by increasing populations if storage facilities are constructed.

The water supplies calculated for use by future populations were determined from the 1967 reference year for River Station #140925 (Deschutes River near Madras). All five critical summer months had less than the minimum streamflow recommended by the Oregon Fish Commission. Furthermore, the water years 1964 and 1968 had lower streamflows than the 1967 reference year. The 1966 water year had less than two percent greater streamflow than in 1967. There are no surplus dependable surface water supplies for an increase in population, under the criteria utilized in this study.

The basin presently exports large quantities of carbohydrate supplies and some animal protein supplies to other areas of the state. The animal protein quantities would appear greater if the acreage harvested as hay did not appear as cultivated soils.

JOHN DAY RIVER DRAINAGE BASIN

The John Day River Basin is the fourth largest basin in the state, encompassing 5,120,000 acres. The basin is bounded on the west by the divide between the lower Deschutes and John Day River canyons, on the south, east and northeast by the Blue Mountain Range and on the north by the Columbia River into which it drains. Nearly all of Grant, Wheeler and Gilliam Counties, more than half of Sherman County and portions of seven other counties are encompassed by the basin (Table 7)(S.W.R.B., John Day Basin, 1962).

Table 7. Areas of Counties Lying Within the John Day River Drainage Basin

COUNTY	Total Area	Area Within John Day River Basin			
	Sq. Mi.	Sq. Mi.	Acres	% of County	% of Basin
Grant	4,532	3,592	2,298,900	79.3	44.8
Wheeler	1,707	1,616	1,034,200	94.7	20.2
Gilliam	1,211	1,037	663,700	85.6	12.9
Umatilla	3,231	487	311,700	15.1	6.1
Sherman	830	471	301,400	56.7	5.9
Morrow	2,059	392	250,900	19.0	4.9
Jefferson	1,794	177	113,300	9.9	2.2
Wasco	2,387	175	112,000	7.3	2.2
Crook	2,980	29	18,600	1.0	0.4
Harney	10,132	27	17,300	0.3	0.3
Union	2,032	7	4,500	0.3	0.1
Total		8,010	5,126,400		100.0

The northern part of the basin is on the Columbia basalt plateau and contains most of the 718,400 acres of cultivable soils. The southern and eastern portions of the basin are mountainous and deeply dissected by the John Day River and its tributaries. Less than one-third (32.3 percent) of the soils in the entire basin have slopes less than 30 percent. Most of the level and slightly sloping soils in the southern and eastern portion of the basin are along streams near Izee, Prairie City, John Day, Mount Vernon, Dayville and Monument. The remainder of the soils with slopes less than 30 percent are in central and northern Sherman and Gilliam Counties on the Columbia Plateau Appendix B, Tables B29 through B35).

Altitudes are highest in the southern and eastern portions of the basin where the divide of the Blue Mountains forms the northeastern and eastern basin boundaries. Elevations of greater than five thousand feet are common throughout the mountainous southern portion. The growing season is short and frost frequently occurs every month of the year. Less than 40 percent of the basin's soils have an average frost-free growing period of more than 60 days. The short growing season is tolerated by the forage crops which, in most areas, can be irrigated from the nearby streams.

Precipitation averages from eight inches near the Columbia River to more than thirty-five inches in the mountains. The summer months are dry and hot, occasionally broken by sudden thunder storms. Except in valleys close to the streams, the terrain is too rough and difficult to irrigate. Most streams have records of zero flow during dry years when precipitation is below normal.

Three hundred twenty-three different soil series and sub-series were inventoried for the John Day Basin. Rangeland is classified as the major land use for 39.5 percent of the basin's area, and forestry occupies 16 percent. Ponderosa pine is the dominant harvest tree species, and grazing is common on the open pine forest floors during the dryer summer months. In 1960 the resources of the basin supported 105,390 cattle of all types, 38,550 sheep and lambs, 5,000 hogs and 3,870 head of horses and mules (S.W.R.B., John Day Basin, 1962). The numbers of sheep have declined since the 1940's when it became difficult to obtain dedicated sheepherders. Sheep are the most efficient animals for converting forage on steep slopes to animal tissue. Considerable quantities of forage are not being presently utilized by the less agile cattle and will not likely be utilized should present grazing trends continue.

Cultivated soils in the basin occupy only 14 percent of the total area. Gilliam County with 353,200 acres and Sherman County with 185,400 acres, encompass 75 percent of the total quantity. Summer fallowing on cereal crop producing soils is necessary throughout this section of the Columbia Plateau. Therefore, the actual acreage in production any one year would be about half of the acres available for use. Irrigation is not practiced on many soils as they have formed on hilltops, quite distant from available water resources.

Water supplies are limited throughout the basin. Surface water flows are not sufficient to meet present needs during dry years. Potential reservoir sites are available in the mountains, but they would be distant from most irrigable lands. The majority of the 372,900 acres of soils rated "excellent" and "good" for irrigability are located too far from the water sources for irrigation to be economically feasible at this time.

No extensive studies of groundwater supplies have been made, and existing wells are too scattered to yield a pattern of underground reservoir locations. The basalt which underlies the basin's cultivated areas is not generally considered a good aquifer. Alluvial deposits along the John Day River yield sufficient waters for domestic and some local irrigation uses. Over 1,400,000 acre feet of the waters of the John Day River and its tributaries were withdrawn in 1915 by the State Engineer for out-of-basin diversion for irrigation, power and domestic purposes (S.W.R.B., Water Restrictions, John Day River Basin, 1964). Additional out-of-basin diversion at this time seems unlikely, as the quantity withdrawn for that use is greater than the average annual discharge into the receiving waters of the Columbia.

Carrying Capacity and Future Trends in the John Day River Basin

Table 8 shows the population distribution in the basin at the time of the 1960 census survey (S.W.R.B., John Day River Basin, 1962). The four most populous counties in the basin are Gilliam, Grant, Sherman and Wheeler, but all have had decreasing populations since 1940 (Meyers, 1973). The State Water Resources Board population projections for the John Day River Basin are: year 1960 (actual) - 15,368; year 1980 - 16,100; year 2000 - 21,700; year 2020 - 28,200;

and the year 2070 - 37,600 (S.W.R.B., Composite, page 122, 1969). Computer calculations from this study showed a potential carrying capacity for construction of 22,057 individuals for the present quality of life and for a standard quality of life, a carrying capacity of 28,332 individuals.

Table 8. Population Distribution by Counties and Sub-basins in the John Day River Basin, 1960

Sub-basin	North Fork John Day	Upper John Day	Lower John Day	Total
Gilliam			2,950	2,950
Grant	1,600	5,600		7,200
Jefferson			50	50
Morrow	50		200	250
Sherman			1,200	1,200
Umatilla	550			550
Wasco			50	50
Wheeler		100	2,650	2,750
Total	2,200	5,700	7,100	15,000

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life the soils could provide 591,267 individuals with their carbohydrate needs. For a standard but still acceptable quality of life, the soils could supply 688,478 individuals with their dietary carbohydrate requirements. All soils with range or hay as their major land use were converted to the production of animal protein (beef). For the present quality of life the basin could provide 21,242 individuals with their protein needs. For a standard quality of life they could supply 44,610 individuals with their dietary animal protein requirements.

The major limiting factor for future population growth in the John Day River Basin is the shortage of dependable water supplies. The available water for the basin's future development was determined by using measurements from Station #14-0480, (John Day River at McDonald Ferry) in cubic feet per second for the year 1967 (U.S.G.S., 1968). The flows for July, August and September were all below the recommended minimum flow published by the Oregon Fish Commission. Some increase in population may occur in the basin, but it will probably be a conservative movement. The present population of about 14,475, estimated from the 1970 census (U.S. Bureau of the Census, 1972) produces carbohydrates for between 591,267 and 688,478 individual's diets and proteins for between 21,242 and 44,610 individual's diets with their available water supplies and technical methods. The John Day River Basin will probably continue to supply significant quantities of carbohydrates and proteins to areas in the state which cannot produce these nutrients for their populations.

UMATILLA RIVER DRAINAGE BASIN

The Umatilla Drainage Basin is the 12th largest in the state, encompassing 2,900,000 acres which are all classified and included in this study (Appendix B, Tables B36 through B42). The basin includes parts of the Columbia Basin, Columbia Plateau and the Blue Mountains. It is bounded on the west and south by the John Day River Basin, on the east by the Grande Ronde Basin, on the northeast by the State of Washington and on the northwest by the Columbia River. Nearly all of Umatilla and Morrow Counties and small portions of Gilliam, Union and Wallowa Counties are included in its area (Table 9)(S.W.R.B., Umatilla River Basin, 1963).

Table 9 . Area of Counties Lying Within the Umatilla Drainage Basin, 1963

COUNTY	Sub-basin			Total Sq.Mi.	% of County	% of Basin
	Walla Walla Sq. Mi.	Umatilla Sq.Mi.	Willow Creek Sq. Mi.			
Wallowa	15			15	0.5	0.3
Umatilla	471	2,210	17	2,698	83.2	59.2
Union		18		18	0.8	0.4
Morrow		438	1,226	1,664	80.6	36.6
Gilliam			159	159	13.1	3.5
Total	486	2,666	1,402	4,554		100.0
% of Basin	11	58	31	100		

The climate in the basin is semi-arid and temperate with cold winters and hot, dry summers. Heavy winter snows in the Blue Mountains provide spring and early summer water supplies to the central and northern portions where the rainfall is low and where more than 22 percent of the state's cultivated soils are located. The average annual precipitation along the upper benchlands from Heppner to Milton-Freewater is about 14 inches but decreases to about eight inches on the soils along the Columbia River.

Most of the basin is relatively flat with more than 36 percent of the soils having less than eight percent slope and 62.2 percent having less than 12 percent slope. The 896,700 acres (30.1 percent) with slopes greater than 31 percent lie mostly in the Blue Mountains and along the Columbia River. Nearly half (49.9 percent) of the soils are located at altitudes less than 1,800 feet and 51.2 percent have a frost-free growing period (32°F.) of over 150 days.

One hundred thirty different soil series and sub-series were inventoried for the Umatilla Drainage Basin (S.W.R.B., Umatilla Drainage Basin, Appendix I-7, 1969). The major land uses of the classified soils are almost equally divided, with 50.1 percent considered as having cultivation and pasture as their major land use, and 49.9 percent having forestry and range as their major land use. However, when the 38.1 percent of the basin's soils with range as their major land use is included with cultivated and pasture soils, more than 88 percent of Umatilla Basin soils have the capability of producing agricultural crops and animal proteins. Considerable portions of the lower elevation pine forests are also grazed. In 1959 the basin contained 88,600 cattle, 86,200 sheep, 16,700 hogs, 2,800 horses and mules, 73,000 laying hens and 107,000 turkeys (U.S. Bureau of the Census, Census of Agriculture, 1969). The numbers of cattle are increasing and those of sheep are decreasing as in other areas of central and eastern Oregon. In 1940, Umatilla County had 33,000 head of cattle and 145,000 sheep. By 1970 the cattle had increased to 93,000 head, and the sheep had decreased to 26,000 head (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). A decrease in availability of dedicated sheep herders is the most frequent explaination of the changing trend. A considerable amount of graze which supported sheep cannot be harvested by the less agile cattle and is not presently being converted into useable animal proteins.

Cultivated crops are many and varied in the basin. Potatoes, mint, alfalfa, bush beans, tomatoes, sugar beets, tree fruits, melons, hay and seed crops are all raised on the irrigated soils (Atlas, Umatilla County, 1973). Wheat, barley, oats and dryland hay are raised on the non-irrigated soils. In most areas of central and eastern Oregon, the practice of summer fallowing idles the soils for one year to conserve moisture and allow time for minerals to come into the soil solutions for the next year's cereal crop demands. The higher rainfall and better soils in the Umatilla Basin permits crop rotations of cereals and green peas on alternate years and a continuous use of the better soils.

Nearly half (49.8 percent) of the basin's soils have cultivation as their major land use. Included within these nearly a million and a half acres (1,451,400 acres) are more than one-third (34.7 percent) of the state's Capability Class I soils. This is nearly the 38.7 percent of Class I soils contained within the Willamette Basin. The versatility of Class I soils are limited only by the availability of water, the location of markets and the ability of the manager. Nearly a million (914,900) acres of the cultivated soils are of Capability Classes I, II and III with erosion and water problems as their only limiting factors. Production is good on these soils with most yields well over the state's average. In 1972, soils in the Umatilla Basin produced nearly 44 percent of the state's 36,848,000 bushels of wheat (O.S.U., Commodity Data Sheet, Wheat, 1974). An even greater production would bepossible if adequate water supplies were available.

Although the basin enjoys a greater rainfall and more available water than the cultivated areas of the Deschutes River and John Day River basins, shortages still exist. Over two-thirds of a million acres (678,100) are rated "excellent" or "good" for irrigability, but only 75,000 acres were listed as irrigated in 1963, with the possibility of water supplies for another 75,000 acres (S.W.R.B., Umatilla River Basin, 1963). Since that time, Columbia River water has been used to irrigate areas near Boardman and Hermiston. Good use has been made of available water supplies by the construction of irrigation diversion canals in the Umatilla and Walla Walla sub-basins. However, consumptive water rights are greater than the total runoff during low water years. Additional storage areas are available in the Blue Mountains but are not economically feasible for several reasons at the present time.

Groundwater contributes a significant quantity of the total water consumed for domestic, livestock, municipal, irrigation and industrial uses. Columbia plateau basalt is the principle aquifer except between Pendleton and Milton-Freewater where glacial gravel deposits furnish good, dependable water supplies. Natural recharge of groundwater is in a northwesterly direction from the Blue Mountains. Extensive studies of the groundwater resources would yield information for further development.

Carrying Capacity and Future Trends in the Umatilla Basin

Table 10 shows the population distribution in the basin at the time of the 1960 census survey (S.W.R.B., Umatilla Basin, 1963).

Table 10. Population Distribution by Counties and Sub-basins in the Umatilla Basin, 1960

Sub-basin	GILLIAM COUNTY	MORROW COUNTY	UMATILLA COUNTY	Total
Walla Walla			9,200	9,200
Umatilla		200	34,350	34,550
Willow	50	4,500	150	4,700
Basin	50	4,700	43,700	48,450

Umatilla County has shown a steady population increase since 1940 when it had 26,030 residents. Morrow County has been relatively stable during the same period of time, with 4,337 residents in 1940 and a 1972 estimated population of 4,320 (Meyers, 1973). The State Water Resources Board population projections for the Umatilla Basin are: year 1960 (actual) - 48,423; year 1980 - 64,500; year 2000 - 84,800; year 2020 - 105,300; and the year 2070 - 145,600 (S.W.R.B. Composite, page 140, 1969). Computer calculations from this study showed a potential carrying capacity for construction of 51,312 for the present quality of life and for a standard quality of life, 65,907 individuals.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) for dietary needs in this study. For the present quality of life the soils could provide 1,125,969 individuals with their carbohydrate needs. For a standard but still acceptable quality of life, they could supply 1,310,030 individuals with their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of protein (beef). For the present quality of life the basin could provide 1,618 individuals with their protein needs. For a standard quality of life the soils could supply 3,399 individuals with their dietary protein requirements.

Available surface water supplies for a future increase in population were determined from the 1967 May - September flows of the three major streams which drain the area. The gauging stations used were:

Station #140335 - Umatilla River near Umatilla

Station #140110 - North Fork Walla Walla River near Milton

Station #140105 - South Fork Walla Walla River below the P.P.L. Plant.

Willow Creek near Arlington (Station #140360) was not included because during the summer months of the five years 1964 to 1968 inclusive, nine of the 25 summer months showed zero streamflow. The total flow rates of the three rivers were less than both the Oregon Fish Commission's and the State Water Resources Board's recommended minimum flows (Appendix C, Table C9).

The major limiting factor for future population growth in Umatilla Basin is the shortage of dependable water supplies. Sufficient quantities of good soils are available near present urban centers to accommodate planned growth for large populations. The Umatilla Basin will probably experience considerable growth but will also continue to make significant contributions of carbohydrates and animal proteins to areas in the state which cannot produce these dietary requirements for their residents.

GRANDE RONDE RIVER DRAINAGE BASIN

The Grande Ronde Basin lies in the northeastern corner of the state, with a small portion extending into the State of Washington. Only that portion contained in Oregon is considered in this study. It is the eighth largest basin in the state, encompassing 3,180,000 acres of which 2,919,600 acres (91.8 percent) are classified and included in this study (Appendix B, Tables B43 through B49). The basin is bounded on the west by the Umatilla Basin, on the southwest by the John Day River Basin, on the south by the Powder Basin, on the east by the Snake River and the State of Idaho and on the north by the State of Washington. Nearly all of Wallowa County, a large part of Union County and small portions of Umatilla and Baker Counties are included in its area (Table 11)(S.W.R.B., Grande Ronde River Basin, 1960).

Table 11. Areas of Counties Lying Within the Grande Ronde River Drainage Basin, 1960

COUNTY	Area Sq. Mi.	Area Acres
Wallowa	3,113	1,992,320
Union	1,745	1,116,800
Umatilla	50	32,000
Baker	8	5,120
Total	4,916	3,146,240

The basin includes the Wallowa Mountain Range and portions of the Blue Mountains. The climate varies with the elevation and location of the soils being described. More than 40 percent of the basin's soils lie above 4,800 feet where heavy winter snowpacks delay the runoff of precipitation until the early and midsummer months. However, the basin contains rough mountainous land with more than 70 percent of the soils having slopes greater than 31 percent, and swollen, flooding rivers are common during most of the spring months. The soils whose major land use is cultivation lie at lower altitudes, and, while they often flood, they have frost-free growing seasons of from 90 - 105 days and enjoy from 12 to 26 inches of precipitation a year. At higher elevations, frost may be expected any month of the year.

Seventy-six different soil series and sub-series were inventoried for the basin (S.W.R.B., Grande Ronde Drainage Basin, Appendix I-8, 1969). Forestry is the major land use assigned to 57.9 percent of the soils. Nearly 58 percent of the basin's soils are in federal, state or other public ownership, with 57 percent being controlled by the U.S. Forest Service and the Bureau of Land Management. Ponderosa pine is the major tree species except at the higher altitudes. The forest floors serve as summer graze and, along with the 583,400 acres that have range as their major land use, support large numbers of livestock. In 1969, nearly 90,000 cattle and 26,000 sheep were reported in the basin (O.S.U. Commodity Data Sheets, Cattle, Sheep, 1972). Hay and forage crops for livestock feed are extensively grown throughout the basin and are the major consumers of irrigation water.

Cultivated crops are more extensively grown in Union County than in Wallowa County; nearly 68 percent of the 295,200 acres of soils with cultivation as their major land use are contained in Union County. The boundaries of the combined areas of Union and Wallowa Counties are nearly those of the basin. In 1971, 92,000 acres of cereal grains were harvested, most of them from Union County (O.S.U., Commodity Data Sheets, Wheat, Barley, Oats, 1974). The yields were better than the state averages, aided by the higher-than-average summer rainfall (compared to most eastern Oregon soils). An even 160,000 acres of soils are rated as either "excellent" or "good" for irrigability. Unfortunately, most are distant from available water supplies.

There are usually sufficient surface water supplies in the basin to supply existing needs except during the late summer months. Groundwater supplies are contained in certain portions of the basin, but the quantities available for additional sustained use are not known. The cultivated soils which could gain from increased irrigation water supplies lie at altitudes above 2,000 feet, which would economically prohibit the import of waters into those areas. Furthermore, there are only 196,400 acres of combined Capability Class I, II and III soils in the basin, many of which successfully raise crops with the existing water supplies.

Carrying Capacity and Future Trends in the Grande Ronde Basin

Table 12 shows the population distribution of the basin at the time of the 1960 census survey (S.W.R.B., Grande Ronde River Basin, 1960).

Table 12. Population Distribution by Counties in the Grande Ronde River Basin, 1960

Basin	WALLOWA COUNTY	UNION COUNTY	UMATILLA COUNTY	BAKER COUNTY	Total
Grande Ronde	7,036	17,700	50	0	23,786

Union County has shown a slight increase in population since 1940 and Wallowa County has shown a slight decrease during the same period of time. The estimated population in 1972 was about 26,370 (Meyers, 1973). The State Water Resources Board population projections for the basin are: year 1960 (actual) - 24,782; year 1980 - 30,000; year 2000 - 31,300; year 2020 - 35,000; and for the year 2070 - 53,200 (S.W.R.B., Ultimate Needs, page 158, 1969). Computer calculations from this study show a potential carrying capacity for construction of 7,667 individuals for the present quality of life and for 9,848 individuals for a standard quality of life. The discrepancy which exists between the present population and the basin's calculated long-term carrying capacity is related to the flooding character of streams in the basin and the small quantities of soil capable of accommodating septic tank filter fields and extensive engineering activities.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, the basin could provide 140,824 individuals with their annual dietary carbohydrate needs. For a standard but still acceptable quality of life, the basin's soils could supply 163,977 individuals with their dietary carbohydrate requirements. All soils with range, pasture or hay as their major land use were converted to the production of animal protein (beef). For the present quality of life, the basin could provide 1,082 individuals with their dietary animal protein needs. For a standard quality of life, 2,273 individuals could be supplied with their annual dietary animal protein requirements.

The major limiting factors for extensive population growth in the Grande Ronde Basin are insufficient dependable water supplies and a limited amount of soils capable of construction near present urabn developments. The rugged mountainous beauty of the basin has attracted many visitors, some of which have stayed and become residents. However, a climatic cycle of dry to exceptionally dry years could cause serious water supply problems for existing municipal systems, notwithstanding an increase in population from the present numbers.

The carrying capacity of surface water supplies was calculated by using the 1961 combined flows of the two gauging stations: #133330 (Grande Ronde River at Troy) and #132920 (Imnaha River at Imnaha). The two summer months of August and September were both below the recommended minimum by the State Fish Commission, although they exceeded the State Water Resources Board's recommended minimum flow. Therefore, there are no waters from these sources that would be available for any increase in population.

There are more animal proteins produced in the Grande Ronde Basin than the calculations indicate. The quantities of hay and other forage crops and the pastureland listed on other inventories were not identified for this use in the inventory used. This factor depresses the quantity of animal protein actually produced and calculates more carbohydrate supplies than are harvested.

The Grande Ronde Basin exports carbohydrate supplies and probably produces sufficient animal protein supplies to supply its residents at this time.

POWDER RIVER DRAINAGE BASIN

The Powder River Basin is the 13th largest basin in the state, encompassing 2,048,500 acres of which 1,814,100 acres (88.6 percent) are classified and included in this study (Appendix B, Tables B50 through B56). It is bounded on the west by the John Day River Basin, on the south by the Malheur River Basin, on the east by the Snake River and the State of Idaho and on the north by the Grande Ronde Basin. Nearly all of Baker County and small portions of Union, Wallowa and Malheur Counties are included in its area (Table 13) (S.W.R.B., Powder River Basin, 1967).

Table 13 . Areas of Counties Lying Within the Powder River Drainage Basin, 1967

COUNTY	Total Area Sq. Mi.	Area Within Powder River Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Baker	3,085	2,949	1,887,880	96	91
Union	2,034	262	167,600	13	8
Malheur	9,925	13	8,200	-	-
Wallowa	3,171	16	10,100	1	1
Basin Total		3,240	2,073,700		100

The climate of the basin is extremely diverse because of a wide range of elevation, exposure, precipitation and air movement. The Wallowa Mountains to the north and the Blue Mountains to the west and southwest shelter the basin's interior valleys.

The cultivated areas have low winter and high summer temperatures, low annual precipitation and abundant sunshine. About half of the annual rainfall on the valley floors comes during the growing season. Oftentimes the summer rains come in violent storms with most of the water running off before it can slowly percolate into the fine textured soils. Winter snowpacks are heavy in the mountains, but gradients are steep as the streams come down the slopes, and the runoff is rapid. About 77 percent of the basin has range and forests as its major land use. Early spring and summer grazing on the range and later summer grazing on the ponderosa pine forest floors give nearly seven grazing months a year.

Eighty-eight different soil series and sub-series were inventoried for the Powder River Basin (S.W.R.B., Appendix I-9, 1969). The 222,000 acres of land whose major land use is cultivation is to grow hay, forage and feed for the large numbers of livestock. In 1964, stockmen in the basin reported 108,600 head of cattle, 55,000 sheep and 3,000 head of horses and mules. In 1964, about 25 percent of the cultivable acres were in cropland use with the remainder of the soils being utilized for pasture, alfalfa and hay.

In 1966, 169,300 acres were reported under irrigation in the basin, but each sub-basin report added that these areas were only irrigated when water was available. Water rights have been issued for 203,819 acres. Average yields of alfalfa are less than three tons per acre because inadequate water supplies limit production. Many of the poorer soils are used for range in order to conserve water for the better producing soils.

Carrying Capacity and Future Trends in the Powder River Basin

Table 14 shows the population distribution in the basin at the time of the 1960 census survey (S.W.R.B., Powder River Basin, 1967).

Table 14 . Population Distribution by Counties in the Powder River Basin, 1960

Study Area	BAKER COUNTY	UNION COUNTY	MALHEUR COUNTY	Total
Pine Creek	2,677			2,677
Powder River	13,193	889		14,982
Burnt River	1,425		6	1,431
Total	17,295	889	6	18,190
Percent by County	95	5	-	100

Population projections for the basin by the State Water Resources Board are: year 1960 (actual) - 17,795; year 1980 - 18,700; year 2000 - 22,800; year 2020 - 27,000; and for the year 2070 - 48,900 (S.W.R.B., Composite, page 176, 1969). Computer calculations from this study show a potential carrying capacity for construction of 1,281 individuals for the present quality of life and for 1,646 individuals for a standard quality of life. The discrepancy between the basin's present population and the computer calculated carrying capacity is related to the types of soils and their capabilities for indefinitely supporting construction stresses.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, these soils could provide 175,877 individuals with their annual dietary carbohydrate supplies. For a standard but still acceptable quality of life, the soils could supply the dietary carbohydrate requirements for 204,793 individuals. All soils with range, pasture and haylands as their major land use were converted to the production of animal proteins (beef). For the present quality of life, these soils could provide dietary animal protein supplies for 1,747 individuals. For a standard quality of life, 3,669 individuals could be supplied with their animal protein requirements.

Calculations for this basin give the soils credit for producing more wheat for carbohydrates and less beef for protein than on-site observation and harvest records confirm. The fundamental reason for the discrepancy is that most of the acres of land producing forage crops are rated as cultivated soils which the computer calculates as capable of wheat production. Farmers and ranchers have been using the soils for their best possible use, which is forage production for the large animal populations. Carbohydrates are probably produced in sufficient quantities for the present populations and animal protein supplies are being exported.

The major limiting factors for the Powder River Basin are the restricted quantities of good soils for building and construction purposes and the extreme shortage of dependable water supplies. Future construction should be limited to areas near existing urban centers which have municipal services available. Increasing the quantity of all-season water supplies in the basin will be difficult. Groundwater supplies are insufficient to more than supplement meager quantities during dry years, and the underlying substratum is not the type that generally has large unknown reservoirs. Storage sites for water from Pine Creek, Powder River and Burnt River would likely be small unless considerable amounts of good soils are sacrificed for the projects. In most areas of the rugged mountain country, the stream gradients are too steep to provide large reservoir areas.

MALHEUR RIVER DRAINAGE BASIN

The Malheur River Basin is the ninth largest basin in the state, encompassing 3,100,000 acres of which 2,865,300 acres (92.4 percent) are classified and included in this study (Appendix B, Tables B57 through B63). It is bounded on the west by the Malheur Lake Basin, on the south and southeast by the Owyhee Basin, on the east by the Snake River and the State of Idaho and on the north by the Powder River Basin and a small portion of the John Day River Basin. Twenty-eight percent of Malheur County, 13 percent of Harney County, nine percent of Grant County and a small portion of Baker County compose the area of the basin (Table 15)(S.W.R.B., Malheur-Owyhee Basins, 1969).

Table 15 . Areas of Counties Lying Within the Malheur River Drainage Basin, 1969

COUNTY	Total Area Sq. Mi.	Area Within Malheur River Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Baker	3,084	107	68,400	3	2
Grant	4,533	390	249,900	9	8
Harney	10,132	1,324	847,300	13	29
Malheur	9,925	2,789	1,784,960	28	61
Basin Total		4,610	2,950,560		100

The climate is considered as semi-arid with hot summers, cold winters and moderate spring and fall temperatures. The average frost-free growing period in the heavily cultivated areas around Nyssa, Vale and Ontario is over 105 days but is less than 90 days in the western portion of the basin. The average annual precipitation along the lower main stem of the Malheur River is about eight inches with an average of more than 25 inches in the forested headwater areas.

More than a half million acres (582,600) of the basin's soils have slopes less than eight percent and 242,300 acres of these are nearly flat. The range in elevations are from 2,200 feet on the Snake River to about 5,000 feet, with an occasional mountain peak along the northern border being higher. Most of the cultivated acres are between 2,200 feet and 3,500 feet above sea level. The weather is typically sunny with occasional thunder storms in the summer.

One hundred two different soil series and sub-series were inventoried for the Malheur River Basin (S.W.R.B., Appendix I-10, 1969). Soils whose major land use is for range occupy 2,330,300 acres (75.2 percent) of the basin's area. Forest type soils occupy another 19,300 acres and are also used for grazing. Estimates of livestock in the basin place their numbers at 18,000 head of cattle, 9,200 sheep and 2,000 head of horses in 1970 (O.S.U., Commodity Data Sheet, Cattle, Sheep, Horses, 1972). The major portion of the basin's economy is derived from the production and processing of agricultural crops in the lower Malheur River Basin and along the Snake River. The more important crops grown on the 315,300 acres whose major land use is cultivation are alfalfa, clover, sugar beets, onions, potatoes, sweet corn, small grains and truck and seed crops. More than a quarter million acres (260,400) of soils are rated either "excellent" or "good" for irrigability. Another 265,700 acres are rated as "fair". A considerable acreage of haylands and pasturelands contained along the Malheur River tributaries are irrigated from the nearby streams.

Surface water supplies in the basin are being fully utilized by the present population. Legal water rights have been granted for more than the water supplies available. A sizeable quantity of good irrigable land is not irrigated at this time from lack of dependable water sources. Additional storage areas in the basin may not receive sufficient quantities of water to merit their existence. The area north of Ontario presently irrigates with Snake River waters. Other planned irrigation projects for increasing the area's productivity will depend upon Snake River waters which were not contributed from Oregon's water resources.

Groundwater supplies are limited and unreliable except for domestic and livestock purposes. Precipitation in the basin is insufficient to recharge underground reservoirs should they be overdrawn. Limits of drawdown have already been established in the Willow Creek area. Groundwater quality ranges from fair to poor because of hardness.

Carrying Capacity and Future Trends in the Malheur River Basin

Table 16 shows the population distribution in the basin at the time of the 1969 publication (S.W.R.B., Malheur-Owyhee Basins, 1969).

Table 16. Population Distribution by Counties in the Malheur River Basin, 1969

Sub-basin	BAKER COUNTY	GRANT COUNTY	HARNEY COUNTY	MALHEUR COUNTY	Total
Upper Malheur	40	20	310	200	570
Lower Malheur				21,930	21,930
Total	40	20	310	22.130	22,500

The census data shows that about 97 percent of the basin's population is located in the lower, more fertile area. The upper basin's residents are on widely scattered ranches or in small towns on the highway, such as Drewsey, Juntura and Venator. Population projections for the basin by the State Water Resources Board are: year 1960 (actual) - 19,636; year 1980 - 25,100; year 2000 - 29,500; year 2020 - 33,600; and for the year 2070 - 50,000 (S.W.R.B., Composite, page 192, 1969). Computer calculations from this study show a potential carrying capacity for construction of 10,843 for the present quality of life and of 13,928 for a standard quality of life. The discrepancy between the present population numbers and the computer calculated carrying capacity can be satisfied to allow increased construction activity by planning the population expansions closer to existing municipal facilities. Building could utilize some of the 427,900 (buildable) acres of soils in the basin with only "slight" or "moderate" limitations for the location of septic tank filter fields. However, they are usually some distance from the urban centers which are presently growing in population.

All soils with cultivation as their major land use were converted to the production of carbohydrates. For the present quality of life, these soils could provide 306,275 individuals with their annual dietary supplies. For a standard but still acceptable quality of life, the soils could provide the dietary carbohydrate requirements for 356,630 individuals. All soils with range, pasture and hayland as their major land use were converted to the production of animal protein (beef). For the present quality of life these soils could provide 19,297 individuals with their animal protein supplies. For a standard quality of life, animal protein requirements could be supplied for 40,525 individuals.

The major limiting factor which restricts continued economic and population growth in the Malheur River Basin is the shortage of good, dependable water supplies. Considerable quantities of water are already being imported from the Owyhee Basin and the Snake River. Small reservoir areas on the Malheur River tributaries may increase water supplies for the basin which is one of the more productive areas in the state.

The existing water supplies for present and future use were determined by evaluating flow data from River Station #132290 which was located on the Malheur River below the Nevada Dam near Vale. The year evaluated was 1950 because the station has been discontinued and no later data are available. The State Water Resources Board had no recommended minimum flow. Forty percent of the recommended minimum streamflow by the State Fish Commission was used as the second reference figure. This is statistically acceptable in relation comparisons with other basins. Four of the five months during the summer of 1950 were below both the Oregon Fish Commission and the derived State Water Resource Board's minimum recommended stream level. There are no surplus waters in the Malheur River for a further increase in population which could still maintain the qualities of life discussed in this study.

OWYHEE RIVER DRAINAGE BASIN

The Owyhee Basin is the sixth largest in the state, encompassing 3,775,000 acres of which 3,734,300 acres (98.9 percent) are classified and used in this study (Appendix B, Tables B64 through B70). The basin is located in the extreme southeast corner of the state. It is bounded on the west by the Malheur Lake Basin, on the south by the State of Nevada, on the east by the State of Idaho and on the north by the Malheur River Basin. It is almost entirely contained within Malheur County, with only a few square miles contained in Harney County. The basin's area is drained by the Owyhee River, one of the more important tributaries of the Snake River, which arises in Nevada, winds through southeastern Oregon in a wide bend and flows back into Idaho where it empties into the Snake. The Owyhee Basin is also drained by Succor Creek in the north which flows directly into the Snake River and by McDermitt Creek and Oregon Canyon Creek which flow into Nevada at Oregon's far southeastern corner.

The climate is semi-arid with dry, hot summers and cold winters. Most of the southern basin has a frost-free growing period from 60 to 90 days, with about one-tenth of the total acreage (372,400 acres) having a zero to thirty day frost-free period. In the more heavily cultivated area below the Owyhee Reservoir and along the Snake River, the frost-free growing period is from 90 to 150 days a year. More than 95 percent of the basin's soils lie at elevations above 3,900 feet, with the northern portion sloping toward the Snake River which is about 2,200 feet above sea level at the mouth of the Owyhee River.

Average annual precipitation is less than ten inches throughout the basin, with less than a quarter of the total precipitation falling during the growing season.

Seventy-three different soil series and sub-series were inventoried in the Owyhee Basin (S.W.R.B., Appendix I-11, 1969). More than 88 percent of the soils have range as their major land use. Most of this rangeland is the property of the federal government, with 79 percent of the area managed by the Bureau of Land Management (B.L.M.). In 1970, an estimated 27,000 head of cattle, 13,800 sheep and 3,000 head of horses were reported (O.S.U., Commodity Data Sheets, Cattle, Sheep, Horses, 1972). Many isolated areas on the undulating semi-desert benchland contain soils quite capable of development if water supplies were available. Range seeding is progressing under the able management of the B.L.M., but funds have not been available to pursue the task thoroughly. Hayland and pastures in stringer valleys along perennial streams furnish winter forage for livestock. The rangelands are at present carrying about one-fifth the livestock which could be supported on them, should small reservoirs and other B.L.M. projects come to reality (Atlas, Malheur County, 1974).

The crops raised on the cultivated land around and below the Owyhee reservoir are many and varied. Potatoes, grains, sugar beets and cannery crops are raised on irrigated soils of the flood plains formed by the joining waters of the Malheur, Owyhee and Snake Rivers. A total of 185,000 acres in the basin are rated "excellent" or "good" for irrigability. Another 473,100 acres are rated as "fair". More of this land could be placed under irrigation if waters were not exported from the Owyhee Reservoir to Idaho and the Malheur River Basin. Irrigation waters are supplied for about 35,000 acres of land in Idaho and about a billion gallons of water a year are exported to the Malheur River Basin. Supplemental water is pumped from the Snake River into the Owyhee Reservoir and, from lessons learned through the years, a two year supply of stored water is considered an optimum reserve.

Groundwater is used to irrigate about 3,000 acres and is also used to supplement surface water irrigation when streams run low. While the groundwater supplies are deep, they are sufficient to supply domestic and livestock uses throughout most of the basin. However, caution must be exercised when drawing down the underground reservoirs as the precipitation with which they are recharged is very low and undependable.

Carrying Capacity and Future Trends in the Owyhee Basin

Owyhee Basin's population has changed little since 1960. Population projections by the State Water Resources Board are: 1960 (actual) - 3,273; year 1980 - 4,100; year 2000 - 4,700; year 2020 - 5,300; and for the year 2070 - 7,500 (S.W.R.B. Composite, page 210, 1969). Computer calcualtions from this study show a potential carrying capacity for construction of 5,838 individuals for the present quality of life and of 7,498 for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 81,229 individuals could be provided with their annual dietary carbohydrate needs. For a standard but still acceptable quality of life, 94,584 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, these soils could provide 22,600 individuals with their animal protein needs. For a standard quality of life, 47,461 individuals could be supplied with their animal protein requirements.

The major limiting factor for future development in the Owyhee Basin is the absence of reliable water supplies. Small reservoirs and scattered wells for livestock uses can help the upper basin areas when combined with range reseeding practices. Without additional pumped water from the Snake River it is unlikely that a significant rise in production is possible below the Owyhee Reservoir.

It was not possible to determine the quantity of water available for future use by populations in the Owyhee Basin, with Snake River waters already being required to support the present population. Calculations were attemptd using the surface water flow records for 1967 at River Station #13-1830, the Owyhee River below the Owyhee Dam. The State Water Resources Board does not have a minimum flow recommendation for the river at this location.

The soils of the basin can continue to supply carbohydrates and animal protein dietary supplies to other areas of the state that cannot provide the nutrients for their populations.

MALHEUR LAKE DRAINAGE BASIN

The Malheur Lake Basin is the third largest in the state, encompassing 6,334,000 acres of which 5,511,900 acres (87.0 percent) are classified and included in this study (Appendix B, Tables B71 through B77). It is bounded on the west by the Goose and Summer Lakes Basins, on the south by the State of Nevada, on the east by the Owyhee and Malheur River Basins, on the north by the John Day River Basin and on the northwest by the Deschutes River Basin. Portions of five counties are contained within its area, as seen in Table 17 (S.W.R.B., Malheur Lake Basin, 1967).

Table 17 . Areas of Counties Lying Within the Malheur Lake Drainage Basin, 1967

COUNTY	Total Area Sq. Mi.	Area Within Malheur Lake Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Harney	10,185	8,122	5,198,100	79.7	81.5
Malheur	9,925	480	306,900	4.8	4.8
Lake	8,340	892	570,700	10.7	8.9
Grant	4,533	454	290,800	10.0	4.6
Crook	2,982	17	11,100	0.6	0.2
Basin Total		9,965	6,377,600		100.0

The climate is semi-arid with hot, dry summers and long, rather severe winters, but with a high proportion of clear, sunny days. The lowest point in the basin is about 4,025 feet above sea level in the Alvord desert, with most of the high desert areas more than 4,500 feet in elevation. Frost may occur any month of the year throughout the basin. The average frost-free period in the more densely populated areas is about 75 - 90 days.

There is a wide variety of terrains in the makeup of this large basin. Nevertheless, most of the range, hay and pasturelands have slopes less than 12 percent. Streams are deeply incised into the rangeland and are mostly intermittant and undependable. Average annual precipitation ranges from less than ten inches at lower elevations to more than 40 inches in the Steens Mountains. Only a small fraction of the total precipitation occurs during the growing season, and oftentimes this quantity comes in the form of violent rainstorms which are of little value to the soils.

Seventy-four different soil series and sub-series were inventoried for this study (S.W.R.B., Appendix I-12, 1969). There are no soils in the basin with cultivation as their major land use, but five percent (318,800 acres) of the soils list pasture as their major land use. It is common practice in range country to harvest, if possible, one crop of hay off land considered pasture. The estimated livestock population in 1970 was 97,000 head of cattle, 9,000 sheep and 4,000 head of horses (O.S.U., Commodity Data Sheets, Cattle, Sheep, Horses, 1972). Most of the cattle are shipped out of the basin to feedlots that are closer to the sources of feed grains.

While the precipitation is low throughout the basin, it is all available for utilization. The basin is closed with no effluent leaving to receiving streams, so the water is evaporated, consumed, enters groundwater reservoirs or is bound into plant and animal tissue. The unfortunate problem which is inherent to closed basin water supplies is the continuous decrease in water quality when it is extensively used. When water contacts the soil, the minerals come into solution. Then, when the water is used for irrigation or as it is drawn to the surface on the range, it evaporates and leaves the minerals in or near the surface layer. A certain quantity of the minerals will leach to the depth of the water retention zone during the next wet season. The result is an alkaline soil with a calcium hardpan at the bottom of the water retention area. The hardpan can be mechanically broken but the process is expensive and restricted to small areas. The alkaline soil can be treated and leached but, as poor drainage is generally the cause of the deposits, reclamation is difficult. The long term future use of irrigation in such areas appears bleak as the runoff assumes a dissolved solid (mineral) content which approaches salinity. Irrigation use of the water merely hastens the naturally occurring phenomenon.

In 1965, 276,179 acres of soils had legal surface water rights, but there is seldom enough water to irrigate this amount of land. The average annual consumption of water for irrigation is 340,000 acre-feet which contrasts with the legal rights for 712,855 acre-feet (S.W.R.B., Malheur Lake Basin, 1967). Inventory calculations show that there are 727,500 acres of soils rated either "excellent" or "good" for irrigability with another 718,700 acres rated as "fair". It is unlikely that more than a small portion of this total 1,446,200 acres will eventually remain in irrigation, even if it were possible to import water for use.

Groundwater sources of good quality are plentiful throughout most of the basin. While precipitation to recharge the underground supplies is only 10 - 12 inches per year, much of this quantity is trapped in the deep alluvium which underlies the soils on the basin's floor. Large irrigation wells draw good quantities of water from depths ranging from 60 to 400 feet. Excessive groundwater removal could seriously effect surface water flows which would then be diverted into recharge areas. Lake levels within the basin have decreased since gauging stations were installed.

Carrying Capacity and Future Trends in the Malheur Lake Basin

Table 18 shows the population distribution in the basin at the time of the 1960 census survey (S.W.R.B., Malheur Lake Basin, 1967).

Table 18. Population Distribution by Counties in the Malheur Lake Basin, 1967

Study Area	HARNEY COUNTY	LAKE COUNTY	CROOK COUNTY	GRANT COUNTY	MALHEUR COUNTY	Total
Silvies	5,620			580		6,200
Silver	280					280
Donner und Blitzen	160					160
Catlow-Alvord	300	30			10	340
Total	6,360	30	0	580	10	6,980

The census data indicate that more than 91 percent of the basin's population is contained within Harney County. Population projections for the basin by the State Water Resources Board are: year 1960 (acutal) - 6,599; year 1980 - 7,200; year 2000 - 8,000; year 2020 - 9,000; and for the year 2070 - 24,000 residents (S.W.R.B., Composite, page 231, 1969). Computer calculations from this study, using present patterns of land use, show a potential carrying capacity for construction of 6,222 individuals for the present quality of life and of 7,991 individuals for a standard quality of life.

There were no soils with cultivation as their major land use in the basin, so no carbohydrate supplies can be calculated. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 60,674 individuals could be provided with their dietary animal protein needs. For a standard but still acceptable quality of life, 127,419 individuals could be supplied with their animal protein requirements.

The existing water supplies in excess of what are presently being utilized were difficult to determine for this closed basin. However, the major stream flowing into the more heavily populated portion of the basin was examined for carrying capacity. The Silvies River flow at River Station #103935 (Silvies River near Burns) for 1961 was used as the reference (Appendix C, Table C 8). There was no minimum flow recommendations and two of the five months are equal to or lower than the derived reference quantity. There is no water on this river for use in calculating an increased population.

The major limiting factors in the Malheur Lake Basin are inadequate water supplies and the absence of drainage from the basin. Small reservoirs could be constructed to extend the use of spring runoff waters into the summer months. Groundwater supplies could also be more heavily utilized if more were known about their quantities and locations. However, the use of additional water supplies should be carefully viewed relative to the possibility of a longterm decrease in productivity of soils being irrigated. The basin will continue to be a valuable source of animal protein supplies to other areas in the state but must import the carbohydrate requirements for its residents.

GOOSE AND SUMMER LAKES DRAINAGE BASIN

The Goose and Summer Lakes Basin is the fifth largest in Oregon, encompassing 5,271,000 acres all of which are classified and included in this study (Appendix B, Tables B78 through B84). The Basins encompass 82.7 percent of Lake County, 7.5 percent of Klamath County, 9.7 percent of Deschutes County and 5.8 percent of Harney County in the State of Oregon, a portion of Modoc County in California and a portion of Washoe County in the State of Nevada (Table 19)(S.W.R.B., Goose and Summer Lakes Basin, 1963).

Table 19 . Areas of Counties Lying Within the Goose and Summer Lakes Drainage Basin, 1963

COUNTY	Total Area Sq. Mi.	Area Within Goose and Summer Lakes Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Lake	8,340	6,900	4,416,000	82.7	83.8
Klamath	5,973	447	285,900	7.5	5.4
Harney	10,185	596	381,700	5.8	7.2
Deschutes	3,027	293	187,400	9.7	3.6
Basin Total		8,235	5,271,000		100.0

The basin is composed of a number of independent but contiguous closed lake basins, of which Goose, Summer, Silver, Hart, Crump, Blue Joint Lakes and Lake Abert are the larger. They are bounded on the west by the Klamath Basin, on the south by the States of California and Nevada, on the east by the Malheur Lake Basin and on the north and northwest by the Deschutes River Basin.

They all lie in high plateau country with mountains to the east and west. The climate is semi-arid with hot, dry summers and long, cold winters. Frost may occur each month of the year throughout the area; nearly half of the basin's soils have less than 45 frost-free days a year. All of the soils lie at elevations greater than 4,200 feet, with nearly a third of them lying a mile above sea level. Almost a fourth of the soils have forests as their major land use, and most of the latter are contained within the Fremont National Forest. Seventy-one percent of the basin is publicly owned with nearly half (49 percent) of the total area being under the supervision of the Bureau of Land Management. Most of the precipitation occurs during the winter, with a low of about eight inches in the drier areas to 20 or 25 inches in the forested mountain areas. The more intensively cultivated soils near Paisley and Lakeview receive from 11 to 15 inches of precipitation annually.

One hundred fourteen different soil series and sub-series were inventoried in the basin (S.W.R.B., Appendix I-13, 1969). Nearly two-thirds (65.4 percent) of the basin's soils have range as their major land use and another 158,800 acres are pasturelands. Large livestock operations are common, and in 1970, an estimated 88,000 cattle, 4,000 sheep and 2,000 horses were reported by ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, Horses, 1972). Although 134,500 acres of soils had cultivation as their major land use, most harvests are for forage or grains to feed the large livestock populations.

The discussion of the factors which contribute to the carrying capacity of Lake County on page 141 also applies to those of Goose and Summer Lakes Basin. Only those factors which differ between the two will be discussed.

Carrying Capacity and Future Trends in the Goose and Summer Lakes Basin

An estimated 1970 population was about 6,350 residents with more than 50 percent of those living in or near Lakeview and Paisley (U.S. Bureau of the Census, 1970). The State Water Resource Board population projections for the basin are: year 1960 (actual) - 7,158; year 1980 - 7,800; year 2000 - 8,400; year 2020 - 9,500; and for the year 2070 - 20,300 (S.W.R.B., Ultimate Needs, page 251, 1969). Computer calculations from this study, using present patterns of land use, show a potential carrying capacity for construction of 5,521 individuals for the present quality of life and of 7,091 for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 44,911 individuals could be provided with their dietary carbohydrate needs. For a standard but still acceptable quality of life, 52,295 individuals could be supplied their annual dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 12,230 individuals could be provided with their animal protein needs. For a standard quality of life, 25,684 individuals could be supplied with their annual dietary animal protein requirements.

The existing water supplies in excess of what are presently used in these closed basins were difficult to determine. The combined flows of River Stations #103880 (Anna Creek near Summer Lake) and #103840 (Chewacan River near Paisley) were used because they have the larger flows. The State Water Resources Board had no minimum flow recommendations for these basins but stated:

> "The study established that almost all of the surface water resources of the basin are currently appropriated and that no significant amounts of unappropriated water occur for the purpose of formulating and implementating an integrated, coördinated water resources program. The board therefore does not propose to adopt a program for the Goose and Summer Lakes Drainage Basin."
>
> (Goose and Summer Lakes Basin-Preliminary Report, 1963, page v.)

Therefore, this study used the average annual flow for 1961 of the two river stations as their minimum flow recommendations (Appendix C, Table C). This leaves no water for use by future population increases.

The 134,500 acres of soils with cultivation as their major land use are generally harvested as forage for feed for livestock. The computed carbohydrate values are higher than occur and the animal protein yield is lower than actually occur (see Lake County, page 141).

The major limiting factors in the Goose and Summer Lakes Basins are insufficient water supplies, the inability to drain the area and a short frost-free growing season. The closed basins will continue to supply significant animal protein supplies to other areas of the state and import most of their carbohydrate supplies.

KLAMATH RIVER DRAINAGE BASIN

The Klamath Basin is the tenth largest in the state, encompassing 3,476,800 acres, all of which are classified and included in this study (Appendix B, Tables B85 through B91). The basin is bounded on the west by the Rogue River Basin, on the south by the State of California, on the east by Goose and Summer Lakes Basin, on the north by the Deschutes River Basin and on the northwest by portions of both the Willamette and the Umpqua Rivers Basins. Table 20 shows the area of each of the four counties with soils in the basin (S.W.R.B., Klamath Basin, 1971).

Table 20. Areas of Counties Lying Within the Klamath River Drainage Basin, 1971

COUNTY	Total Area Sq. Mi.	Area Within Klamath Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Klamath	5,973	4,865	3,113,600	81.4	86.2
Lake	8,340	520	332,800	6.2	9.2
Jackson	2,817	250	160,000	8.9	4.4
Josephine	1,650	5	3,200	-	-
Basin Total		5,640	3,609,600		100.0

The basin's irregular boundaries nearly follow those of Klamath County. The climatic information and physiographic structure of the basin and the county are the same and may be reviewed on page of this text.

Sixty-eight different soil series and sub-series were inventoried (S.W.R.B., Appendix I-14, 1969). Two-thirds of the soils have forestry as their major land use and more than a half million acres (567,700) have range as their major land use. In 1964, 140,217 cattle and 40,381 sheep grazed the range, the open forest floors (S.W.R.B., Klamath Basin, 1971) and the 267,000 acres classified with pasture as their major land use. Hay, especially alfalfa, is extensively grown in the basin. The yield is good and the quality is the highest in the state. Eighty-eight thousand seven hundred forty-six acres of hay were harvested in 1964 (S.W.R.B., Klamath Basin, 1971).

Soils with cultivation as their major land use total 169,100 acres. The short growing season does not encourage a large variety of crops, but in 1969, 71,500 acres of cereal grains and 10,800 acres of potatoes were reported harvested by Klamath Basin farmers and ranchers (Atlas, Klamath County, 1973). Irrigation waters are plentiful and many grain crops are irrigated during the growing season. This increases the yield to above the state average and increases the straw harvest which is utilized by the stockgrowers.

Most irrigation waters are taken from the canals off of the Klamath Lake System, managed by the Bureau of Reclamation. The Klamath Basin Compact was entered jointly with the State of California in 1957 to facilitate the best possible use of waters in the upper Klamath River Basin. All of the land to be included under the Compact has not been placed into production but, if or when such a time arrives, there will be insufficient reliable water supplies to satisfy the agreement.

Carrying Capacity and Future Trends in the Klamath Basin

The population has increased from 46,780 in 1960 (S.W.R.B., Klamath Basin, 1971) to an estimated 49,300 in 1970 (U.S. Bureau of the Census, 1970). Population projections by the State Water Resources Board are: 1960 (actual - 46,780; year 1980 - 57,900; year 2000 - 64,800; year 2020 - 78,300; and for the year 2070 - 124,100 (S.W.R.B., Ultimate Needs, page 273, 1969). Computer calculations from this study show a potential carrying capacity for construction of 17,264 individuals for the present quality of life and of 22,175 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life they could provide 249,147 individuals with their annual dietary carbohydrate needs. For a standard but still acceptable quality of life, 290,109 individuals could be supplied their carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life they could provide 85,387 individuals with their dietary animal protein needs. For a standard quality of life, 179,317 individuals could be supplied their animal protein requirements.

The quantity of water available for future populations was determined by using the 1961 surface water data from River Station #115125 (Klamath River below Fall Creek near the Copco Dam). The State Water Resources Board did not have a minimum streamflow recommendation so 40 percent of the Fish Commission's recommended streamflow of 500 cubic feet per second was used as a reference quantity (S.W.R.B., Ultimate Needs, page 264, 1969). Between the first of May and the first of October the surface waterflow was not as high as either of the recommended minimum flows. There are no water supplies for future growth in the basin using the criterion guiding this study.

The discrepancy between present population numbers and those calculated for the carrying capacity for construction in the basin reflect the soil conditions in the population growth areas. A high water table exists in most soils near the urbanizing portions of the southern part of the basin. Municipal waste water systems should be utilized by the expanding population growth which would then be contained in the urban area. The fragile soils located high in the basin's watershed are not capable of supporting construction activities and should be maintained for vital watershed uses.

Carbohydrate calculations appear higher and animal protein production appears lower than is actually true. This discrepancy was produced by classifying soils as "cultivated", when they are generally used to grow hay.

Water supplies could be available for further growth if it was possible to include available groundwater supplies. However, groundwater supplies are not considered for future growth in this study because there are no long-term accurate data of the quantities available.

The Klamath Basin will continue to be one of the more active contributers to the state's carbohydrate and animal protein supplies.

ROGUE RIVER DRAINAGE BASIN

The Rogue River Basin is the 11th largest in the state, encompassing 3,000,000 acres of which 2,289,000 acres (86.3 percent) are classified and included in this study (Appendix B, Tables B92 through B98). It is bounded on the west by the South Coast Basin and at the mouth of the Rogue River by the Pacific Ocean, on the south by the State of California, on the east by the Klamath River Basin, and on the north by the Umpqua River Basin. All of Josephine, most of Jackson and portions of four other counties lie within its area (Table 21) (S.W.R.B., Rogue River Basin, 1959).

Table 21. Areas of Counties Lying Within the Rogue River Drainage Basin, 1959

COUNTY	Total Area Sq. Mi.	Area Within Rogue River Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Jackson	2,817	2,503	1,602,000	88.8	49.9
Josephine	1,650	1,645	1,052,000	100.0	32.8
Curry	1,629	533	341,000	32.7	10.6
Klamath	5,973	217	139,000	3.6	4.3
Douglas	5,089	113	72,000	2.2	2.2
Coos	1,627	2	1,000	-	-
Basin Total		5,013	3,207,000		100.0

The basin has many contrasts in climate, terrain and other factors which affect the potential carrying capacities of its soils. It is comprised of two mountain systems - the Cascades to the east, and the Klamath Mountains, through which the Rogue River has eroded its tortuous route to the Pacific Ocean. The Bear Creek Valley separates the two mountain ranges and has become the most productive portion of the basin. Elevations range from sea level at Gold Beach to more than 5,000 feet in the Cascades, and to 9,495 feet on Mount McLoughlin. Half of its soils lie above 3,700 feet. Most of the slopes are very steep. Less than 17 percent of the soils have slopes of less than 31 percent. Soils with forestry as their major land use occupy 71.7 percent of the basin's area and soften the appearance of the rugged mountainsides with their cover. Only small portions of the forest lands are grazed.

Annual precipitation varies from nearly 40 inches at the headwaters of the Rogue River in the Cascades, to less than 20 inches in the central valley, and to over 100 inches in the mountains overlooking the ocean. Less than ten percent of this moisture arrives between May and September, so the summer months are dry. Slides and floods are frequent occurrences in the wet winter months and low stream flows are common during the summer months.

Sixty-six different series and sub-series of soils were inventoried (S.W.R.B., Appendix I-15, 1969). Less than 70,000 of the 3,000,000 acres of soils are considered to have cultivation as their major land use while 341,200 acres (11.4 percent) have pastures as their major use. Most of the fields along the streams are used for hayland and pasture.

In 1970, an estimated 59,000 cattle and 8,000 sheep were reported by the basin's farmers and ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Most of these livestock herds are able to graze through the mild winters in the central basin areas.

The more fertile soils near Medford and Ashland are extensively planted to pears and other tree fruits. Some cereal grains are grown on the drier valley soils near Grants Pass and Central Point. These crops can be brought to harvest without extensive use of the limited supplies of irrigation waters.

Water is imported into the Bear Creek Valley from the Klamath River in order to maintain functional flows in the streams. Surface water for irrigation use is insufficient in nearly all areas of the basin. While consumptive use water rights are not usually a reliable measure of usage (because they are seldom used simultaneously), still, many streams have total consumptive legal water rights for more than ten times their minimum flow of average water years. The Applegate River sub-basin's water supplies are insufficient to irrigate any of its land adequately and much irrigable land is not developed at all. The same general water problems exist in the Illinois River sub-basin as in the Applegate.

Groundwater supplies are undependable and often non-existent during the late summer months. Most wells can provide water for domestic, but not for irrigation use. Rocks in the central and western basin regions are not good aquifers and rapidly drain the water from their areas.

Carrying Capacity and Future Trends in the Rogue River Basin

The basin's 1970 estimated population of 130,579 residents was more than 25 percent larger than the 1960 population in the basin (U.S. Bureau of the Census, 1970). Population projections for the basin by the State Water Resources Board are: year 1960 (actual) - 104,037; year 1980 - 146,300; year 2000 - 189,900; year 2020 - 247,200; and for the year 2070 - 584,900 (S.W.R.B., Ultimate Needs, page 294, 1969). Computer calculations from this study, using present patterns of land use in the basin, show a carrying capacity for construction to be 70,017 individuals for the present quality of life and for 89,933 individuals at a standard quality of life.

All soils with cultivation as their main land use were converted to the production of carbohydrates (wheat). For the present quality of life, the soils could provide 104,267 individuals with their dietary carbohydrate needs. For a standard but still acceptable quality of life, 121,409 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pastures as their major land use were converted to the production of animal protein (beef). For the present quality of life, the soils could provide 29,159 individuals with their dietary animal protein needs. For a standard quality of life, 61,235 individuals could be supplied their annual dietary animal protein requirements.

The major limiting factors of the Rogue River Basin are insufficient water supplies and a limited amount of good soils. Reservoirs are being constructed to retain the plentiful winter and spring water supplies, but the steep gradients of mountain streams which carry excessive loads of sediment are not conducive to long range reservoir use. Construction is also difficult in this mountainous area as slides and floods restrict building to the more level areas. Construction then becomes directly competitive with agricultural uses of the soils and could eventually consume most of the land close to urban centers.

The existing surplus water supplies were determined by evaluating flow data from River Station #143615 (Rogue River at Grants Pass) for the 1960 water year. The five summer months (May through September) and the annual streamflows were all less than the recommended minimum streamflows of the State Water Resources Board and the Oregon Fish Commission. While the surface water flows of the Applegate and the Illinois Rivers were not included in the calculations, their water supplies have been previously discussed in the text of this basin. There are no dependable water supplies available for supplying any significant increase in the basin's population.

The basin is already importing carbohydrate and animal protein supplies to provide for the present population. Rigorous comprehensive planning is necessary to protect and maintain an acceptable quality of life for the basin's residents.

UMPQUA RIVER DRAINAGE BASIN

The Umpqua River Basin is the seventh largest in the state, encompassing 3,600,000 acres of which 1,173,400 acres (32.6 percent) are classified and included in this study (Appendix B, Tables B99 through B105). It is bounded on the west by the Pacific Ocean and the South Coast Basin, on the south by the Rogue River Basin, on the east by the Klamath and Deschutes Rivers Basins and on the north by the Willamette River and Mid-Coast Basins. Its boundaries are almost exactly those of Douglas County in which the basin is considered to be contained. In order to avoid redundancy in the text, the description and data which describe the factors governing the carrying capacity of Douglas County will be used for the Umpqua River Basin (Douglas County, page 103).

Carrying Capacity and Future Trends in the Umpqua River Basin

The basin's 1970 estimated population of 71,743 was an increase of 25.5 percent over the 1960 population of 68,458 (U.S. Bureau of the Census, 1970). Population projections by the State Water Resources Board are: year 1960 (actual) - 68,458; year 1980 - 90,900; year 2000 - 110,700; year 2020 - 130,000; and for the year 2070 - 194,300 (S.W.R.B., Ultimate Needs, page 311, 1969). Computer calculations from this study, using present patterns of land use, show a carrying capacity for construction to be 8,006 individuals at the present quality of life and for 10,283 individuals at a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, the soils could provide 137,815 individuals with their dietary carbohydrate needs. For a standard but still acceptable quality of life, 160,473 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 15,459 individuals could be provided their dietary animal protein needs. For a standard quality of life, 32,466 individuals could be supplied their dietary animal protein requirements.

The quantity of carbohydrate dietary units calculated by the computer used the acres of soils with cultivation as their major land as the data base. At this time there are insufficient waters to irrigate these acres, and most of them are used to produce livestock forage. Consequently, the carbohydrate support units are higher than the actual production and the animal protein support units are lower. Residents in the basin will continue to import carbohydrate supplies and probably produce sufficient animal protein supplies for the present population.

The major limiting factor for the Umpqua River Basin is an unequal distribution of water supplies. The quantity of useable water available for future population growth was determined by calculating the surface water flow at River Station #143210 (Umpqua River at Elkton) for the 1966 water year. Surplus water exists in the river above the recommended minimum flow suggested by the Oregon Fish Commission (Appendix C,

Table C9) to supply 1,160,000 additional residents at the present quality of life and 1,930,000 individuals at a standard but still acceptable quality of life. The calculations consider only that quantity of water consumptively used by humans.

Reservoirs are presently in the planning stage or are being built, which will store water for irrigating soils in the South Umpqua area (U.S. Army Corps of Engineers, 1971). The major planned use of the new reservoirs is for storing irrigation water, so the carrying capacity of the water supplies will need to be recalculated after all of their uses are determined.

The carrying capacity for construction sites was considerably below the present population numbers. The basin's present and past pattern of land use has been an expansion of rural non-farm dwellings, which consumes large quantities of land. This practice was observed during the 1970 and 1974 on-site studies of the basin. Increasing populations can be accommodated by concentrating future growth near municipal water and waste water facilities.

SOUTH COAST DRAINAGE BASIN

The South Coast Basin is the 14th largest in the state, encompassing 1,910,400 acres of which 195,500 acres (10.2 percent) are classified and included in this study (Appendix B, Tables B106 through B112). It is bounded on the west by the Pacific Ocean, on the southeast (and is bisected by) the Rogue River Basin, and on the northeast and north by the Umpqua River Basin. Most of Coos and Curry Counties and a portion of Douglas County lie within its area (Table 22) (S.W.R.B., South Coast Basin, 1963). The basin is composed of many independent waterways which drain the Coast Range and flow directly into the Pacific. It extends about 145 miles along Oregon's southern coast and is about 44 miles wide at its longest east-west extension.

Table 22. Areas of Counties Lying Within the South Coast Drainage Basin, 1963

COUNTY	Total Area Sq. Mi.	Area Within South Coast Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Coos	1,627	1,598	1,022,700	98.2	53.6
Curry	1,629	1,126	720,600	69.2	37.7
Douglas	5,089	260	166,400	5.1	8.7
Basin Total		2,984	1,909,700		100.0

The humid climate is caused by the moderating influence of the Pacific Ocean and from the intensity of rainfall on the slopes of the Coast Range. Elevations range from sea level to more than 3,000 feet, with several mountain peaks rising to greater than 4,000 feet in elevation. The highest of these is Pearsall Peak (5,098 feet) near the Chetco River. The Coast Range forms an effective barrier for the rain-laden clouds which are propelled landward by nearly continuous ocean winds. Average annual precipitation varies from 60 to 80 inches along the coast to more than 120 inches on the crest of the Coast Range. The rains often fall in quantities of six to eight inches in a 24 hour period during the wet winter months. Most of the precipitation occurs between November and April. Summertime precipitation is light but evening coastal fogs, which may extend 20 or 30 miles up the river valleys, aid in keeping the relative humidity quite high.

Both summer and winter temperatures are mild, seldom dropping below 20 degrees in the mountains during the winter. Snow does accumulate on the mountain peaks during the winter months but usually melts before summer arrives. The large amounts of precipitation runoff drain rapidly down the steep stream gradients near the headwaters and move rapidly through the flat valleys to the coast. Flooding and slides are frequent occurrences during the winter and spring rainy seasons (U.S.D.A. Report, South Coast Drainage Basin, 1962).

The basin's pastured and cultivated soils have a 150 to 180 day frost-free growing season and most cold periods are brief. There is no true winter season, so grasses, herbs and other plant life grow throughout the year. The presence of continuous cover on the rain swept slopes is important in holding the loose, shallow soil in place. Minerals quickly leach and drain from sloping soils during the rainy season.

Fifty-five different soil series and sub-series were inventoried in the South Coast Basin (S.W.R.B., Appendix I-1, 17 and 18, 1969). The classified soils are mostly on bottomlands and terraces with a small amount on low-slope uplands. These include the areas of the basin suitable for agricultural development. Much of this acreage has some degree of suitability for cultivated crops or improved pasture production. The remainder of the basin is forested mountainous uplands. The 50,500 acres of Capability Class I and II soils produce well if care is taken to prevent erosion and if large quantities of fertilizer are applied. Only a few crops can assure an economic return large enough to encourage the expense of the fertilizer, which must be transported into the isolated area from distant points. Lily bulbs, clover and alfalfa are the basin's major crops where summer irrigation waters are available. Cranberries are grown in many coastal bogs. A few acres of berries, fruit and vegetables are produced for local markets, but the cool, foggy evenings are not conducive to rapid plant growth, nor to good fruit and vegetable production.

Most agricultural lands are used to support the large quantities of livestock which graze throughout the year close to the coast. An estimated 49,000 cattle and 56,000 sheep were reported by basin farmers in 1970 (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). The dominant use of the 66,300 acres of cultivated soils is for the production of forage. Another 77,400 acres of soils have pasture as their major land use. These soils are located on the terraces of the many streams and on the coastal plains.

Surface water supplies are limited during the late summer and early fall months. The basin's underlying rock and sedimentary materials are not good aquifers so streamflows are low during the dry season. Very few areas have sufficient late summer water supplies to adequately supply irrigation needs. Groundwater supplies are usually sufficient for domestic use but have historically proven undependable during low water years. Large quantities of groundwaters of poor quality have been found and others are suspected present in the coastal sand dunes. Their high mineral content limits most uses at this time (S.W.R.B., South Coast Basin, 1963).

Carrying Capacity and Future Trends in the South Coast Basin

The basin's population has grown slowly from its estimated 68,780 residents in 1960 to about 74,000 residents in 1970 (U.S. Bureau of the Census, 1970). Population projections by the State Water Resource Board are: year 1960 (actual) - 68,780; year 1980 - 85,700; year 2000 - 96,500; year 2020 - 109,200; and for the year 2070 - 212,500 (S.W.R.B., Ultimate Needs, page 330, 1969). Computer calculations from this study, using present patterns of land use in the basin, show a carrying capacity for construction to be 8,497 individuals for the present quality of life and 10,914 individuals at a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat) and, for the present quality of life, 43,767 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 50,962 individuals could be supplied their dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef) and, for the present quality of life, 5,300 individuals could be provided their dietary animal protein needs. For a standard quality of life, 11,130 individuals could be supplied their dietary animal protein requirements.

Computer calculations from this study show a wide variance between the construction capability of the classified soils and the present population which occupies the basin. The discrepancy was produced by an evaluation of the soil types on which construction occurs. Large populations could be supported in the basin if reliable water supplies of good quality were available and if adequate waste water disposal services were provided.

The large quantities of carbohydrates calculated by the study are not substantiated by on-site studies of the area. Nearly all of the soils classified as "cultivated" are used to produce forage for livestock. Therefore, the carbohydrate quantities actually produced should be very low and the animal protein quantities should be substantially higher if the soils were classified according to their actual use. Nevertheless, the quantity of carbohydrates and animal protein produced in the basin are insufficient to supply the present or future populations and must be imported.

Water supplies for future population growth was determined by combining the flows of several coastal streams. Only a few coastal streams have gauging stations at this time. The stations evaluated were:

River Station #143245	- West Fork of the Millicoma River near Allegany
River Station #143270	- North Fork of the Coquille River near Myrtle Point
River Station #143265	- Middle Fork of the Coquille River near Myrtle Point
River Station #143250	- South Fork of the Coquille River at Powers
River Station #143271.5	- Sixes River at Sixes
River Station #143273	- Elk River near Sixes

The 1967 water year was used as the reference year for calculations. The combined flows of these rivers did not meet the recommended minimum flow set by the Oregon Fish Commission for three consecutive months. Using these calculations, there are no excess surface water supplies available for future population growth. There are plentiful supplies of water available during the rainy season if arrangements are made to conserve them for the dry seasons. At this time, insufficient water supplied during a low water year could pose genuine hardship problems and an acceptable quality of life would be difficult to maintain.

MID-COAST DRAINAGE BASIN

The Mid-Coast Basin is the 16th largest in the state, encompassing 1,511,400 acres of which 129,000 acres (8.5 percent) are classified and included in this study (Appendix B, Tables B113 through B119). It is bounded on the west by the Pacific Ocean, on the south by the Umpqua River Basin, on the east by the Willamette River Basin and on the north by the North Coast Basin. Most of Lincoln County and portions of five other counties lie within its area (Table 23)(S.W.R.B., Mid-Coast Basin, 1965).

Table 23 . Areas of Counties Lying Within the Mid-Coast Drainage Basin, 1965

COUNTY	Total Area Sq. Mi.	Area Within Mid-Coast Basin			
		Sq. Mi.	Acres	% of County	% of Basin
Tillamook	1,139	14	9,100	1	1
Polk	740	100	64,000	13	4
Lincoln	998	983	629,000	98	41
Benton	668	184	117,900	28	8
Lane	4,610	991	634,000	21	42
Douglas	5,089	89	57,200	2	4
Basin Total		2,361	1,511,200		100

The basin is composed of many independent waterways which drain the Coast Range and flow directly into the Pacific. It is approximately 140 miles long and 30 miles wide.

This basin has a temperate, humid climate which is caused by the moderating influence of the Pacific Ocean and plentiful rainfall. The Coast Range Mountains pose an effective barrier to rain-laden clouds off the ocean, blocking and cooling them, causing them to deposit their loads. Rainfall is strongly influenced by elevation, increasing from 60 to 90 inches along the coast to as high as 180 inches on the Coast Range divide. Valsetz, a small town at the headwaters of the Siletz River, averages 124.6 inches of precipitation annually, the highest average annual precipitation of any town in the state (U.S. Department of Commerce, Weather Bureau, 1965). The excessive precipitation leaches minerals from the soils rapidly, leaving the soil in an acid, low nutrient condition. This makes them unsuitable for many agricultural crops unless the soil nutrients are replaced.

Forty-six different series and sub-series of soils were inventoried for the Mid-Coast Basin (S.W.R.B., Appendix I-1, 17 and 18, 1969). Thirty-one thousand seven hundred acres are classified with cultivation as their major land use and another 51,000 acres have pasture as their major land use. The rugged topography of the basin confines the farms to the narrow valley floors where flooding and drainage problems limit most soil use to hay and pasture production. Some cereal crops can be grown in the upper Siuslaw valley in Lane County. A few pasture and hay farms succeed on narrow and fragmented coastal plains where the slope is not excessive. The better-than-90-percent of unclassified basin soils are heavily forested with scattered areas where grazing can occur. Livestock in the basin included 17,100 cattle, 11,400 sheep, 2,700 goats and a few horses in 1965 (S.W.R.B., Mid-Coast Basin, 1965). Irrigation is necessary during the summer season, but is limited to terraced areas alongside streams.

Surface water supplies are seasonal and undependable. Steep stream gradients in the upper watersheds accelerate the movement of water from the large winter supplies, allowing it little time to sink through the quite impervious subsoil. Groundwater supplies are limited to some alluvial beds and coastal sand dune areas. Without the lateral flow of groundwater to the streams during the dry season, most have low to very low flows during the late summer and early fall months. Some towns which depend upon surface water for municipal supplies experience difficulty in meeting minimal needs during low water years. There are no major storage reservoirs on the larger streams and no evidence of plans for future water storage facilities.

Carrying Capacity and Future Trends in the Mid-Coast Basin

The estimated resident population was 35,900 in 1970 (U.S. Bureau of the Census, 1970) with a variable seasonal population present at all times of the year. Population projections by the State Water Resources Board for the basin are: year 1960 (actual) - 36,209; year 1980 - 50,000; year 2000 - 63,900; year 2020 - 81,200; and for the year 2070 - 191,400 (S.W.R.B., Ultimate Needs, page 347, 1969). Computer calculations from this study, using present patterns of land use in the basin, show a carrying capacity for construction to be 11,302 individuals at the present quality of life and 14,516 individuals at a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 44,690 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 52,038 individuals could be supplied their annual dietary carbohydrate requirements. All soils with hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 4,829 individuals could be provided their dietary animal protein needs. For a standard quality of life, 10,140 individuals could be supplied their dietary animal protein requirements.

The wide discrepancy between the present and future populations and the calculated carrying capacity for construction in the basin was caused by the evaluation of the makeup of the soils being used for construction. Coastal construction is continuing in a very narrow band on rocky headlands or stablized dune areas. Construction on these soils requires continuous and expensive maintenance of roads and buildings in order to maintain their presence. Soils in the narrow valleys along the streams are prone to flooding and have severe drainage problems when subjected to septic tank drainage field use.

Most soils classified with cultivation as their major land use do not grow cereal crops, which the computer calculated to produce carbohydrate (wheat) supplies for the residents. These soils are generally used to produce graze and forage for livestock. Consequently, the calculated carobhydrate supplies are much higher and the animal protein supplies are lower than actually are in evidence in the area. Residents in the basin presently import nearly all of their carbohydrate supplies and probably produce nearly sufficient animal protein supplies for their needs.

Water supplies for future populations were determined by combining the flows of several coastal streams. Only a few coastal streams have active gauging stations at this time. The streamflows evaluated were:

River Station #143065 - Alsea River near Tidewater for 1966

River Station #143066 - Drift Creek near Salado for 1961

River Station #143055 - Siletz River at Siletz for 1967

River Station #143076.45 - North Fork of the Siuslaw near Minerva for 1968.

The combined flows of these rivers did not meet the recommended minimum flows by either the State Water Resources Board or the Oregon Fish Commission. Using these calculations, there are no excess surface water supplies for future population growth. There are sufficient waters generated in the basin to meet all future needs if it were possible to store supplies during the rainy season for use during the dry seasons. However, good reservoir sites are few in the Coast Range, and there is no evidence at this time that any storage facilities are planned.

A moderate increase in the basin's population may be realized by concentrating the growth near existing or planned municipal water and waste water treatment facilities and by solving the problems associated with chronic water shortages. A continual expansion of use over the carrying capacity of this basin could result in a rapid decrease of the acceptability of the consequent quality of life.

THE STATE OF OREGON

Oregon was admitted as the thirty-third state to the Union on February 14, 1859. The name "Oregon" was first used in print by Jonathan Carver who spelled it "Oregan" in 1779. Robert Rogers, of the Rangers during the French - Indian wars, later spelled it "Ourigan". Thomas Jefferson used Carver's spelling during the negotiations of the Lousiana Purchase in 1803. Incomplete evidence surrounds the true origin of the name but the Indians called the Columbia River "Oregon", so it is surmised to have come from this usage (Meyers, 1973; Highsmith and Leverery, 1968). It is bounded on the west by the Pacific Ocean, on the south by the States of California and Nevada, on the east by the State of Idaho and on the north by the State of Washington and the Columbia River. Most of Oregon's waters drain into the Columbia River and its tributaries. Exceptions are the coastal streams which drain directly into the Pacific, the Klamath River Basin whose waters flow south and enter the Pacific Ocean near Requa, California, and the Goose and Summer Lakes Basin which has no outlet. Oregon is the tenth largest of the Union's 50 states, encompassing 61,641,600 acres of which 49,409,003 acres (80.2 percent) are classified and included in this study (Appendix B, Tables B120 through B126).

Oregon's climate varies from north to south but the greatest contrasts are found when tracing it from west to east. The greatest change is immediately east of the Cascade Mountains. The state lies in the path of prevailing westerly winds most of the year. Moisture is taken up in the air masses over the ocean by evaporation and moved inland by the winds. Most of the storms capable of propelling the saturated air masses inland arrive between October and March. As the laden clouds are forced to rise over the Coast Range, they are cooled to the point where heavy precipitation occurs. The average annual precipitation from the coastal shore to the crest of the Coast Range is from 70 to 125 inches a year. Some precipitation is deposited as snow on the higher peaks of the Coast Range or during a short portion of the winter, but most falls as rain, either as a gentle mist or as a torrential downpour. The coastal climate is moderated by the warmer rains and summer fogs so that extreme changes in temperatures are rare. The average frost-free growing period there is from 165 to 210 days.

The air masses, with their loads of moisture which have not been deposited on the coastal area, are propelled into the Willamette, Umpqua and Rogue River Basins. Precipitation diminishes from 40 - 60 inches annually in the Willamette River Basin, to 30 - 50 inches in the Umpqua River Basin, to 25 - 40 inches annually in the Rogue River Basin, which is the most distant from the coast of the three basins. The moderating effect of the moisture laden clouds has not been seriously effected as yet, and these three basins experience warm, dry summers and cool, wet winters. The southern basin, the Rogue, is the warmer, in the summer, of the basins, but has roughly the same winter temperatures. The Rogue River Basin lies more than 1,000 feet above the relative elevation of the other two basins.

The drier and cooler air masses strike the Cascade Mountains on their eastern journey and are forced higher where temperatures are even cooler than in the Coast Range. More than half of the remaining moisture is deposited in the Cascade Mountains as rain or snow. The average annual precipitation in the high Cascades is from 60 to 90 inches. The air masses continue eastward over central and eastern Oregon with few obstacles to cool them and cause more moisture to precipitate. A "rain shadow" develops along the eastern slopes of the Cascades, and most of central and eastern Oregon have an average annual precipitation of from eight to fourteen inches. The higher mountain ranges such as the Blues, Wallowas and the Steens, further cool the air masses and receive from 20 to 40 inches of precipitation a year on their higher elevations.

The land masses are on a high plateau in central and eastern Oregon, which ranges from 2,500 to 4,300 feet above sea level except for a narrow margin along the Columbia River. The absence of the moderating effects of moisture and the increase in elevation yields a frost-free growing period of from 60 to 105 days a year.

Past geological events control the climate in Oregon and the climate controls the vegetation. Many industries are based on the harvesting and processing of plant life. The great forests of hemlock, cedar and Douglas fir start from the ocean's edge, cover the Coast Range, and grow down in the valleys where they become sparse through the flood plain areas. Most of these forests have been cleared and the fertile soils on which they grew are used for agriculture. The forest cover becomes very dense again on the slopes and crest of the Cascade Mountains, covering all areas except the rocky cliffs and those soils which are above the timberline. On the eastern slopes of the Cascades the hemlock, cedar and Douglas fir forests yield to pine forests which can thrive in the lower precipitation areas of central and eastern Oregon. In isolated mountainous areas that are high enough to cool and precipitate the moisture from the clouds, the Cascade Range forests types still thrive. The pine forests require more than 15 inches of precipitation a year so they are dominant along the margins of the mountains and on elevated areas of the semi-arid plateau.

The drier Columbia Plateau Province, which makes up most of north-central Oregon, is underlain by layer upon layer of Columbia River lava. The lava is covered with soils formed from volcanic ash and fine silts deposited by past glacier-age winds. Native grasses cover most of the open areas and grow under the pines on their open forest floors. The grasses also thrive in the Great Basin Province of southeastern Oregon which has no drainage outlets of major size to ocean-bound streams.

Northeastern Oregon has the forest clad Blue and Wallowa Mountain Ranges and long sweeping plains sloping northward toward the Columbia and Snake Rivers. These plains are blanketed with soils formed from native materials and fine, wind deposited silts (loess). Native grasses thrive in this area and the majority of Oregon's best soils are found between the Boardman and Milton-Freewater area and on the flood plains of the Snake River near Ontario, on Oregon's extreme eastern boundary.

In south central Oregon, the lower portion of the Klamath River Basin once contained the Lower Klamath Lake, which has been drained. The former lake bottom contains large quantities of fertile, reclaimed soils.

The coastal plains and the margins of the forested areas in western Oregon are heavily grazed by livestock. Pastureland occupies many valley soils not suited for extensive agriculture. The three inland valleys are grazed along the margins, on the valley floor in many areas and on harvested croplands of the valley floor. Large numbers of livestock also graze the pine forest floors, semi-arid desertlands and loess blanketed plateaus of central and eastern Oregon. These soils are too shallow or too steep for agriculture to be economically feasible. In 1970, 1,593,000 cattle and 530,000 sheep were reported by Oregon's farmers and ranchers (O.S.U., Commodity Data Sheets, Cattle, Sheep, 1972). Many of these animals harvested the 3,030,965 acres of soils inventoried with pasture as their major land use. However, nearly 70 percent of the cattle graze the 22,395,500 acres of soils classified with range as their major land use. Most of these eastern Oregon soils are shallow, rocky, steep, arid, alkaline, or one described by nearly any other term that indicates a poor soil type. Yet, on these soils the natural grasses grow quickly in the spring, set seed and die back to the roots until the next growing season. The nutrients contained in the grass would be lost to human use if they were not harvested and transformed into animal protein by the grazing livestock. As cattle graze, they knock the dry seed loose and grind it into the soil with their sharp hooves - planting it for the next growing season. In a few area, range reseeding has been successful. This practice should be accelerated. In many areas, reseeding is not possible and careful range management is practiced by ranchers, Bureau of Land Management and Forest Service personnel.

Oregon's soil inventory included 584 soil series with 1,478 sub-series located at 2,808 different county locations (S.W.R.B., Appendices I-1 to 18; S.C.S., Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Washington and Yamhill Counties, 1970-73). The soils in each of Oregon's contrasting regions reflect the climate and geologic makeup of the area. Soils in the high rainfall area along the coast have had soluble basic chemicals leached from their makeup, are light in color, and are faintly to distinctly acid in nature. The inland valley soils are darker in color and are neutral to faintly acid. In central and eastern Oregon the soils are light in color and are from neutral to strongly alkaline. The alkaline characteristic was caused when basic elements such as calcium and magnesium came into the soil solution as precipitation was deposited. The basic elements were left in the tilth layer by the evaporation of the moisture by the sunny, low-humidity climate.

The combination of climate and the relief of the land has determined the soil types which are found in each area. The combination of the climate and the soil also determines the types of profitable agriculture. This creates regional differences, causing one region or another to have a surplus of wheat, of cattle, of wool, of dairy products, of hay, of potatoes, of fruits, of berries, of produce or of lumber. For each commodity produced from the soil, there is an opitmum set of conditions that suit it best. Deviations from these patterns of production result in crop failures due to drought, too much rain, frost, or sheet erosion where the soils themselves are lost. Consequently, each producing region in Oregon presently has a surplus of that commodity which it produces best and a deficiency of other necessities.

An illustration of the differences and similarities between the productive capabilities of the soils in semi-arid central and eastern Oregon and the humid portion of the state west of the Cascades can be seen in Table 24. Each region contains 18 of Oregon's 36 counties.

Table 24. Commodity Production by Region in Oregon

Commodity	Unit	West of the Cascades	East of the Cascades	State Total	Year
Cattle	head	478,000	1,115,000	1,593,000	1970
Sheep	head	347,300	182,700	530,000	1970
Hay	acres	262,800	782,700	428,700	1971
Wheat	acres	94,100	673,900	768,000	1971
Barley	acres	60,100	294,900	355,000	1971
Oats	acres	60,700	49,300	110,000	1971

(Compiled from O.S.U. Commodity Data Sheets, 1972-74)

Similar comparisons can be made for fruits, berries, potatoes, produce and other commodities. The closest comparison can be seen by examining the relative dollar value of all farm crops, livestock and livestock products sold in 1969. The total value sold in the state was $565,734,000. The area west of the Cascades sold $301,239,000 or 53.2 percent of the total and the area east of the Cascades sold 46.8 percent of the total (O.S.U., Commodity Data Sheets, 1972-74).

The major reason for the close similarity of the value of commodity production between the two sections of the state is that the quantities of good, productive soils are quite equally distributed. Soils in Capability Classes I through IV with only erosion or water problems as limiting factors consistently produce most of our food products. Other soils in the four classes have climatic limiting factors (short growing seasons, etc.) or internal soil conditions which limit their use (stony, excessive slope, etc.). These soils are valuable for pasture and range. The acreages listed in Table 25 do not reflect the quantities of soils removed from production by construction or by being fragmented into small acreages and removed from potential production. The rapid growth in the Willamette River Basin has removed a portion of the state's good soils from food production, but good planning procedures can minimize the quantities which will go out of production in the future. The good soils in central and eastern Oregon do not have the same threat of competition for their uses.

Table 25. Distribution of Capability Classes I through IV in Oregon by Acres

Capability Class	West of the Cascades	East of the Cascades	Total in Oregon
I	90,513	101,800	192,313
IIe	482,118	549,700	1,031,818
IIw	827,513	127,850	955,363
IIe + IIw	1,309,631	677,549	1,987,180
IIIe	990,642	1,858,000	2,848,642
IIIw	324,585	246,497	589,082
IVe	1,052,716	1,278,100	2,330,816
IVw	543,461	284,200	827,661
Total	4,311,555	4,474,135	8,785,690
Total all types of I, II, III, IV	4,656,150	18,720,135	23,376,285

An equalizing limiting factor for nearly all of Oregon's good soils is the lack of dependable water supplies for irrigation. The evaluation of soil locations by drainage basins is all important when considering this factor.

Most of the precipitation is intercepted by the higher elevations in the watersheds of the basins where it usually deposits as snow. In the Cascade Mountains, porous lava rocks saturate with moisture and slowly release it to augment flows in streams draining the upper watershed. Densely forested and reforesting areas compete actively for the water supplies and consume them via transpiration. Barren watershed areas lose their winter snowpacks and most of their water supplies drain off before summer arrives. The best water storage reservoir sites in the state are located in the long slopes of the western Cascades and in natural or man-made lakes perched high on the Cascades' eastern slopes. These capture and hold the spring and early summer surplus waters, preserving them for power generation, irrigation and/or to maintain consistent streamflows.

A critical use of reservoir stored water is maintenance of consistent streamflows in sufficient quantities to neutralize the waste loads generated by humans and their activities. Additional waste loads are contributed to the streams by the large numbers of livestock and animals native to Oregon. The River Basin Management Plans of the Department of Environmental Quality were developed for this purpose. The Willamette River waters benefit from the summer and fall releases of reservoir waters and can nearly accommodate the waste loads generated by the large population residing in the valley.

However, most of the state's mountains are composed of relatively impermeable rock and the dependency upon reservoir storage of water is even more critical. The Coast Range is composed of closely formed rock and is underlain by quite impermeable marine sediments. Streamflows from these mountains are high during the rainy season and dwindle to small trickles during the dry season. Stream gradients near the headwaters and the nature of the rock itself yields few good reservoir sites, and those are of small capacity. Soils to the west of the Coast Range are contained in a narrow, fragmented band along the coast and up the valleys of the streams. Soils to the east of the range suffer extreme droughty conditions most years.

The Klamath and Wallowa Ranges are old, granitic mountains. Their steep slopes lose topsoil readily and erosion yields reservoir-filling sediments. The quantities of good soils in the Rogue River, Grande Ronde River and Powder River Basins could be irrigated from reservoirs in the areas but the reservoir lives would be short. The Blue and Steens Mountains' watersheds contain few good reservoir sites near the good soils. Steep stream gradients in each range add to the difficulty of obtaining good reservoir sites of sufficient size to store significant quantities of water.

A vital part of all streamflow management procedures is to assure and sustain the health of the stream itself. Recommended minimum streamflows by the Oregon Wildlife Commission and the Oregon Fish Commission were established for that purpose. The maintenance of a well balanced aquatic community requires a specific streamflow which is unique to the needs of each stream. Ignoring the needs of the life of the stream diminishes and sometimes destroys its ability to neutralize the entering wastes.

The vast ranges of Oregon cover 22,395,500 acres or 36.4 percent of the state's area. Precipitation is light on these soils and they yield the moisture readily to the low-humidity air. Cloud cover is sparse in central and eastern Oregon and vast areas enjoy more than 300 days of sunshine each year. The high evaporation and transpiration rates of the soils and plants of the ranges quickly reduce the available moisture and native plants and grasses mature quickly. Most rivers and streams in central and eastern Oregon are in deep gorges and the subsurface water quickly drains from the root zone. Perched water tables abound on the plateaus and many have been exposed for stock ponds by ranchers and by B.L.M. and Forest Service personnel.

Groundwater supplies are also used on the ranges for livestock water and irrigating hay fields and pastures. The extent of its availability is unknown in most areas and wells are too scattered for underground sources to be charted. Alluvial beds underlying old streams yield the best groundwater supplies throughout the state. Usually, sufficient quantities can be found in all areas of the state for domestic and livestock supplies, but only a few locations yield sufficient quantities for irrigation uses. The specific areas with these supplies have been discussed in the County and Basin portions of this text.

Carrying Capacity and Future Trends in the State of Oregon

The population in Oregon has increased from 1,089,684 residents in 1940 to an estimated 2,183,270 residents in 1972 (Meyers, 1973). Population numbers have increased nearly two percent since the 1970 census survey listed 2,091,385 residents in the state. Population projections for the state by the State Water Resources Board are: year 1960 (actual) - 1,769,000; year 1980 - 2,455,000; year 2000 - 3,160,000; year 2020 - 4,121,000; and for the year 2070 - 8,865,000 (S.W.R.B., Ultimate Needs, Total of the Basins' Populations, 1969). Computer calculations from this study, using present patterns of land use, calculated a carrying capacity for construction to be 715,704 individuals for the present quality of life and 919,282 individuals for a standard quality of life.

All soils with cultivation as their major land use were converted to the production of carbohydrates (wheat). For the present quality of life, 5,573,550 individuals could be provided their dietary carbohydrate needs. For a standard but still acceptable quality of life, 6,489,900 individuals could be supplied their dietary carbohydrate requirements. All soils with range, hay or pasture as their major land use were converted to the production of animal protein (beef). For the present quality of life, 476,721 individuals could be provided their dietary animal protein needs. For a standard quality of life, 1,001,140 individuals could be supplied their dietary animal protein requirements.

The major competition for land use exists for soils that can be used either for construction activities or carbohydrate (wheat) production. The population increase in Oregon between the 1970 census survey and the 1972 population estimate (Meyers, 1973) was used as the present growth rate of Oregon's population. The increase was 91,885 individuals in the two year period or 125.78 individuals per day. The growth rate required 79.50 days for the population to increase by 10,000 individuals.

The computer program included a final set of instructions which simulated competition for land use. Simulation used only the cultivable soils in the final competition for land use. Some competition would exist for the use of soils with a major land use as pasture, hay, range and forests, but they were not considered in this study. The carrying capacity determination for the cultivated soils in this manner, for the present quality of life, was about 4,000,000 individuals. The period of time required for this population to be reached beyond the 1970 population of 2,091,385 individuals was 41.667 years. The year the carrying capacity was exceeded would be the year 2011 (Table 26).

The carrying capacity of the cultivated soils for a standard quality of life was about 4,800,000 individuals. The period of time required for this population to be reached beyond the 1970 population was 59.198 years. The year the carrying capacity was exceeded would be the year 2029 (Table 26). In other words, the state could gain 18 years of growth by sacrificing the present quality of life as defined in this study.

The locations of the population increases were not considered during the simulated competition for land use. However, the values given to the soils for their probability of encroachment would tend to concentrate a greater population near present urban areas. In actual practice, the continuous change of economic uses for Oregon's natural resources and the quality of life desired by the residents would govern in what manner the population would be distributed.

A discrepancy exists between the amount of animal protein (beef) production that was calculated and the amount most probably being produced. Many acres of cultivable soils are used to produce hay rather than cereal crops. In 1971, 1,050,000 harvested acres of hay were reported by Oregon's farmers and ranchers (O.S.U., Commodity Data Sheet, Hay, 1973). However, only 8,400 acres of soils were classified as

Table 26. Final Coordination of Data and Determination of the Carrying Capacities for Oregon

MODE OF CALCULATION	Carrying Capacities	
	Present Quality of Life	Standard Quality of Life
1. Construction fills only the suitable soils. No restrictions imposed by food or water	715,704 individuals	919,282 individuals
2. Maximum carbohydrate production by all the state's cultivable soils. No restrictions imposed by water or soils used for building sites except for #1 above.	5,573,550 individuals	6,489,900 individuals
3. Number of persons which could be housed if construction consumes cropland until the remaining cropland can barely feed the state's population.	4,005,700 individuals	4,809,280 individuals
4. Number of persons which the state's cropland could feed, in situation #3 above.	3,994,130 individuals	4,796,260 individuals
5. Difference between #3 and #4 above (measure of sensitivity of method).	11,570 individuals	13,020 individuals
6. Increase in number of building sites by the consumption of cultivated soils.	3,290,000 individuals	3,890,000 individuals
7. Quantity of land consumed by #3 above (equivalent acres).	950,810 acres	875,250 acres
8. Number of "10,000 individuals" increased during simulation	329	389
9. Number of "10,000 individuals" required to equal the 1970 Oregon population of 2,091,385 individuals.	137.568	117,210
10. Number of years beyond the 1970 population to attain #3 above.	41.667 years	59.198 years
11. Approximate year the carrying capacity would be exceeded	year 2011	year 2029

hayland in the inventory. The difference between the quantity of animal protein considered available for use and the actual quantity produced may not be considerable. Calculations from this study indicate that insufficient dietary animal protein is being produced in the state to support the present population and protein is being imported for consumption. Oregon has sufficient grazing lands to produce a considerable increase in animal protein production. Rangelands are being reclaimed but at an extremely slow rate. Most of the steep hillsides and brushy lands once grazed by sheep are not being harvested at this time. The numbers of sheep reported by ranchers and farmers were 1,675,000 head in 1940 and 530,000 head in 1970 (O.S.U., Commodity Data Sheet, Sheep, 1972). The primary reason for the decrease most frequently heard is the lack of dedicated sheepherders. Other reasons exist.

Fifteen of the 17 drainage basins studied were deficient in reliable water supplies during low water years. Unknown quantities of groundwater are presently used as a basis of population growth in many areas of the state. The quantity of water available for future population growth in Oregon was determined by summing the quantities available in each basin. Only two of the 17 major basins have a surplus of dependable water supplies at this time, the Umpqua and Willamette River Basins. Their quantities totaled water supplies sufficient for 2,152,186 additional individuals for the present quality of life and for 3,579,351 additional individuals for a standard quality of life (in addition to the state's population in 1967). The surplus waters at each of the stations where the measurements were made were some distance from the areas that could use the water to the greater advantage.

Sufficient precipitation is deposited on the state to support a larger population. Further population increases of residents who could anticipate having an acceptable quality of life will require a serious examination of low water years. This is Oregon's most critical limiting factor.

CHAPTER IV

DISCUSSION

Each of the counties and basins of the State of Oregon were discussed in the text of this study. Special attention was given to factors that could limit the productivity of the soils in each area. A human population carrying capacity was determined for building sites and dietary supplies of carbohydrates and animal proteins. Then, the combined country carrying capacities for the 36 counties that had been compiled in the computer were printed as the carrying capacity for the State of Oregon. Competition was permitted between construction and agriculture for the use of cultivated soils until an equilibrium was approached. The final population numbers were printed for two different qualities of life for Oregon's residents. Finally, periods of time were determined which projected approximate dates when the equilibriums would be approached. This ended the trial run which rigorously tested the quantitative approach for planning the use of resources to support human populations.

Neither the idea nor the approached is new. Ecologists have determined carrying capacities for old field communities (Golley, 1960), bog communities (Lindeman, 1942), springs (Odum, 1957), and others. These were called "energy dynamics" studies and demonstrated the flow of energy through small areas. Each study required a different type of inventory but a similar method of calculating the results. One factor was common to all of these and similar studies - the plant and animal participants of the drama could not purposely modify their environment.

Humans have actively modified their environment for many centuries. Recently, they have become more aware that fundamental food and water supply shortages were not as likely to curb population growths as much as they dramatically decreased the quality of life of the residents.

New methods for the arrangement of housing and supportive construction were presented and accepted (McHarg, 1969). Land use planning was initiated at the state level in Oregon (L.C.D.C., 1974). A coordinated approach by federal and state agencies studied methods to preserve our water supplies (E.P.A., 1972; D.E.Q., 1974). Many other studies accumulated more data about many subjects. Each study has organized their data to satisfy the goal. A series of atlases were compiled to present the data for the 36 Oregon counties (Atlases, 1973-74). There were from 50 to 70 different studies presented in each atlas, divided into numerous categories. Each study relates either directly or indirectly to the ability to produce food, conserve water, promote construction, and obtain the economic support to obtain the basic necessities of life and the quality of life enjoyed by the residents to the selected area.

The major objective of the present study was to present a quantitative method whereby some of the detailed studies could be used effectively to form a base from which effective planning may proceed. A secondary objective was to use the most reliable quantitative data available in sufficient depth to reveal any discrepancies or contradictions which may exist in the use of inventory data.

The study was conducted over a five year period, experienced several false starts and encompassed the assistance, and interest, of many dedicated individuals and agencies. The study also revealed more minor than major needs for refinement of data procurement methods.

An economic thrust is common among all inventories whether they be for agriculture, engineering or human resource use. Individuals in private enterprise that directly use Oregon's resources, are careful to keep within the boundaries of the specific limiting factors related to their activities. A large cattle rancher near Plush or Rome or Antelope has sections or townships of home range and Taylor grazing rights and does not intentionally overstock and overgraze either his own or the public lands. The carrying capacities of the ranges are carefully considered and described in animal units per month. The sheep rancher in Douglas or Klamath or Linn County is also aware of the physical, climatic and economic limits of the operation. Equally aware of the limiting factors is the grain rancher near Lexington or Aumsville, the orchardman near Parkdale or Pleasant Hill, or the produce farmer near Ontario or St. Paul. Each of these individuals contributes significantly to the statistics which make up our inventories of the numbers of cattle or sheep, the bushels of wheat or barley and the hundredweight of onions and pounds of berries. Yet, to ask each of the individual ranchers and farmers to ennumerate the exact amounts of real or chattel inventory is the same as asking how much money they have in the bank. The reported yield of products and the reported quantities of soils and irrigation waters necessary to produce them do not equal the actual events that occur in Oregon. Therefore, the incorrect data concerning herd sizes, crop yields and benifits gained from the capabilities of Oregon's soils may be grossly understated; hence, data are biased. These inventories are indications of past events and could not be directly utilized for determing a potential carrying capacity for a county, a basin or for the State of Oregon. It is a minor item in each individual case but multipled by the 29,063 farms reported in Oregon (U.S. Bureau of the Census, Census of Agriculture, 1969), the discrepancy of report becomes large. Furthermore, the census itself is a voluntary survey. Yet, these stastistics are being used for long-range planning by economists and administrators.

Another discrepancy in inventory identification was the improper identification of the actual land uses for specific crops. Carrying capacity calculations from this study will attract critcism when reviewing the abilities of the counties, basins and the state to supply building sites, carbohydrates and animal proteins. However, the discrepancy was created by the variety of factors used to differentiate between soils used for cultivation and those used for hay, pasture or range. One example illustrates the factors behind the discrepancies.

The soils data for Union County showed the presence of 240,100 acres of soils with a major land use for cultivation, the 1969 census reported 53,500 acres of small grains harvested (U.S. Bureau of the Census, Census of Agriculture, 1969) and O.S.U. reports only 56,700 acres of small grains harvested (O.S.U., Commodity Data Sheets, Wheat, Oats, Barley, 1969). The inventory showed no acreage with a major land use for hay or pasture and only 159,900 acres of range (12.3 percent of Union County's area). Yet, the 1969 census reported 41,400 acres of hay and the O.S.U. Commodity Data Sheets (1973) reported 35,200 acres of hay the same year. The data sheets also reported 45,000 cattle and 4,300 sheep in Union County in 1969 (O.S.U. Commodity Data Sheets, 1972). Another report listed 228,364 acres of grazing land in the county in 1964 (Oregon Department of Planning and Development, 1964). Onsite visits to the Grande Rhonde River Basin in 1971 and 1973 substantiated the small acreage of cultivated land used for raising crops, with equal or large total acreages of pasture and hayland. The county was actively in the livestock industry. A search into the past history of the area revealed it had always been an active producing county. Oliphant (1930) reported that, in 1880, the three large counties of northeastern Oregon contained 152,362 cattle and 724,997 sheep. These are fewer cattle but more sheep than are presently in approximately the same area.

The point is, the area is good animal protein producing country. Yet, calculations to determine the carrying capacity for dietary animal protein production in the county showed that it could sustain 388 individuals for the present quality of life and 815 individuals for a standard quality of life. An examination of the computer cards from which the calculations were made revealed 85,500 acres (53 percent of the rangeland) were composed of soils on very steep slopes and more than half of the remaining acreage was waste land. These soil factors would depress the long-range carrying capacity calculations of the soils for animal protein production, yet they are actually grazed. Nearly half of the calculated carrying capacity for animal proteins had been gained from forest land grazing.

Another discrepancy in the Union County computer cards was the absence of value of the 35,200 acres of soils harvested for hay in 1969. These soils were probably used for pasture after the hay crop was removed. Another efficient management practice of diversified ranchers in central and eastern Oregon is to graze the stubble and dry grass in the fields of harvested grain crops. None of the three contributions toward the production of animal proteins could be calculated, given the present classification of the soils.

The actual carrying capacity could only be calculated correctly if the real uses of the soils could be determined from on-site inspection. The program can be modified to account for simultaneous uses of soils such as grazing on stubble and others.

The two minor problems discussed were the inaccuracy of voluntary information from which inventory data can be compiled, and the need for proper identification of current land use. Neither are unsurmountable but each poses its unique problems.

Before this time the thought has likely occurred; "Why use this inventory?" or "A new inventory is necessary". The State Water Resource Board inventory is the only complete inventory of the State's soils. It is a good inventory, constructed by Oregon's most knowledgeable, professional soils researchers. Work has continued in most areas of the state since the 1969 publication. The true need is not for new and greater inventories but for an updating and refinement of data contained within existing work.

There are many methods of refining information about soil characteristics and use. However, the availability of water supplies must be incorporated with each definition of the use, in whichever method is selected. Two methods will be presented; each would yield reliable data for progressive planning.

The first method is a refinement of the data in the present inventory by the same methods by which they were originally compiled. In counties such as Lane, Marion, and others, considerable portions of the counties have already been reclassified. Most of the cultivated soils have been studied and mapped in detail. It is equally important that the soils used for pasture, range and hay production receive as careful an evaluation. The specific major use of the soil must be identified as cereal crops, produce for processing crops, hay crops, pasture, etc. The productivity of the soil must also be closely identified as 60 bushels of wheat per acre (this from records), three tons of alfalfa per acre, etc. The S.C.S. leaflets, OR-1-Soils, give a wide variety of these potential yields. However, the yield of the specific location must be identified.

This method of refining present data would place a heavy burden on the S.C.S. These personnel are already overburdened with the responsibility of updating general soil surveys and would need help.

Coordination of state and federal S.C.S. work is necessary where the state S.C.S. places crews in the field and assumes part of the responsibility.

The second method divides the responsibility between the S.C.S. and the county in which the soils are being identified. It has been in use for taxation purposes by the Yamhill County assessor's office for five years and most of its problems have been worked out (Sanders and Karr, 1975). Furthermore, the method of taxation has been accepted by the taxpayers and the county, as a flexible and ready method to regulate the tax base. By refining and computerizing the data, the county planning officials could have a rapid and accurate source of information from which to handle their day to day tasks.

The Yamhill County method utilizes the soil information code which defines the physical make-up of the soil. The code is routinely given to every soil type by the S.C.S. personnel. It includes soil depth, topsoil textures, soil permeability, type of underlying material, erosion potential, slope and modifiers for several of these characteristics (Appendix C, Fig. C3). Carl Sanders, the chief appraiser for the Yamhill County assessor's office, has given percentage of use values to the symbol components of four major characteristics which, when summed, give a capability of production for the soil type (Appendix C, Fig. C4). The modifiers of the soil found within the particular location are subtracted from the total percent value. Inclusions of other soils within the tax lot are handled separately. The tillable acres of a tax lot are taxed according to their potential use. Non-tillable acres found in building sites, roads, fence rows, ravines, gravel outcrops etc. are subtracted from the total acreage in the lot and taxed at forestland values. Percent values of soils at 95 percent and above are of the Capability Class I, values between 80.0 percent and 94.0 percent are of Class II soils, values between 50.0 percent and 79.9 percent are of Class III soils and below 50.0 percent values are of Capability Class IV soils. The method permits a wide variation within each capability class, which is characteristic among soils of the same series and sub-series.

The methods used to determine the assessable value of soils by evaluating their potential productivity in Yamhill County are very similar to the methods used in this study. In both instances the soil characteristics and the limiting factors associated with the soil type used those in S.C.S. identifications (Appendix C, fig. C3). The quantities and location for each soil type within a tax lot are carefully measure from aerial photographs by planimeter. The acreages of each soil type for the State Water Resources Board inventory were determined by means of a calibrated grid device or by planimeter.

There are other methods and combinations of methods of compiling an accurate inventory by which a carrying capacity for construction and nutrient satisfaction may be calculated. Whichever is selected, the results must be compiled in a manner that will allow it to be computerized. Other factors are necessary to evaluate when determining the carrying capacity for a particular quality of life. When those economic, social, psychologic and other carrying capacities have been determined within acceptable bounds.

This study used existing inventories of substances vital to human welfare to determine the human population carrying capacity for the State of Oregon. This method of using specific critical factors that would limit growth to decide the carrying capacity of a region or state is not new. Eugene K. Peterson, and his committee used the economy of the Pacific Northwest to determine the carrying capacity of the region (P.N.W.R.B.C., 1973). It was an office study that used the potential of the earning power of the region to determine the eventual stable population which could be continuously supported. Chester D Kylstra and Larry Peterson, with their committee from the University of Florida, presented a proposal to determine the carrying capacity of the State of Florida (Kylstra, 1974). Theirs was also an office study that proposed to use existing inventories of three limiting factors, water, electrical power and sewage processing capability, to determine the state's carrying capacity.

The limiting factors selected by these two studies were among others reviewed at the beginning of the present study in early 1970. The capabilities of Oregon's soils and water supplies to support the population was selected as most critical to the Welfare of the residents. Each of the three studies regarded the quality of life enjoyed by the residents of the study area as a fundamental right of each individual in the population. The Pacific Northwest study and this one included this subjective and somewhat intangible factor as part of the project. The Florida proposal ruled out the possibility of being able to calculate the quality of life of the residents within the scope of their project.

There are two basic methods by which population levels will be determined in an area. The first simply allows people to multiply or move into the area until conditions get so bad they leave or die at the same rate as the increase. This method ignores the quality of life of the residents and may be calculated on a biomass per square mile basis. The second method identifies the carrying capacity in advance with respect to some factors such as food, water, living space, etc. The second method is the only one which permits the quality of life of the inhabitants to be included when determining the carrying capacity of the area.

Two major factors favor the residents of Oregon in enabling them to select their method of population growth. First a great quantity of good quality soils of known production potential are in central and eastern Oregon, quite safe from being consumed by encroaching urban development. Climatic and economic factors favor the probability that the majority of Oregon's population will be concentrated west of the Cascades. The concentration of population in the three inland valleys and along the coast may cause apprehensions for some of the residents in that their selected life style may be threatened.

Second, the majority of Oregon's residents feel the need for some type of comprehensive planning for land use. In response to the desires of the citizens, laws have been passed and funds are available to assist in the planning process. Carrying capacity determinations cannot offer the answers to the many problems generated by planning procedures. However, they will illustrate the condition in which inventory data are presented and identify targets and dates of particular concern. They then serve as a framework within which long-range planning can suceed.

CHAPTER V

CONCLUSIONS

1. The methods used in this study for calculating a maximum population, consistent with certain economic and dietary qualities of life, is valid, flexible and apparently accurate, given reliable data.
2. Given existing data, the carrying capacity of the state is about 4.0 to 4.8 million people.
3. Data reliability can be improved by
    a) more accurate reporting of herd size and actual cropland uses.
    b) reassessment of some types of soils in relation to their best and most probable long-range use (e.g., support for construction, productivity with the quantity of water available, the true reliability of consumable water supplies, etc.).

CHAPTER VI

SUMMARY

1. A method was presented that permitted the potential use of each agricultural soil type in the State of Oregon to be equilibrated to the value of the state's best soil for a major productive use. The major land uses pursued were for cultivation, pasture, hay and range. An existing inventory of the state's soils and their characteristics was used to determine the location and quantities of soils for each county and major drainage basin. The quantities of soils for each of seven major limiting factors were compiled and included in appendices. Soils with a major land use of cultivation were evaluated for the production of wheat, relative to the limiting factors which governed their capabilities. The wheat was converted to carbohydrate satisfaction for two types of human diets. The same procedure was used to determine the equivalent capabilities of pasture, hay and range use soils to provide animal proteins and fats for human diets. The capabilities of soils were also evaluated in their ability to provide housing and supplemental construction for human needs. Water need satisfaction was determined to satisfy physiological and associated demands. The requirements for construction use, dietary carbohydrate, protein and fat, and water requirements were determined for the present and a standard quality of life. The human needs were converted into equivalent acre requirements for soils and cubic

feet per second for water requirements. Forests and forest products were considered economic resources and were not included in the study. Groundwater supplies were not sufficiently documented to be included. All soil data were entered on computer cards and the tabulations and calculations were determined by a computer.

2. Each of Oregon's 36 counties were discussed in relation to the capabilities of soils, the limiting factors involved and the availability of water supplies. A carrying capacity was calculated for construction and dietary need satisfaction for both qualities of life for each county. The major limiting factors for future population growths were discussed.
3. Each of the 17 major drainage basins was discussed in the same manner as the counties. Carrying capacities were calculated. The availability of water supplies for future population growth was determined for each basin. Fifteen of the 17 basins were determined to be water deficient areas during a reference water year of the 1960's.
4. The capabilities of the soils and water supplies to support present and future populations in the State of Oregon were discussed in the same manner as in the counties and basins. A carrying capacity was calculated. Water supplies were determined to be the major limiting factor.
5. Free competition for the use of cultivated soils for housing or for growing crops was simulated. Construction on cropland

was continued until the population of the state could barely be supported by the remaining cultivated soils. The carrying capacity for the present quality of life (a relatively high dietary and housing standard) was about 4,000,000 people. The projected date of reaching that population number was calculated to be about the year 2011. The carrying capacity for a standard quality of life (an adequate dietary and housing standard) was about 4,800,000 people. The projected date of the event would be about 2029.

6. In the discussion, discrepancies involved in the data used for the determinations were explained. Suggestions were presented which could refine date to be used for more precise determinations. The function of carrying capacity calculations uses as a quantitative framework within which comprehensive land use planning could proceed was discussed.

BIBLIOGRAPHY

Atlas. 1973-74. An atlas may be obtained for each of Oregon's 36 counties. Extension Service, Oregon State University. Corvallis, Oregon.

Aylroyd, W. R. and J. Doughty. 1970. Wheat in Human Nutrition. Food and Agriculture Organization of the United Nations, Rome.

Baldwin, E. M. 1959. Geology of Oregon. University of Oregon Cooperative Book Store, Eugene, Oregon.

Bartholomew, W. S. and R. Debow. 1970. Ground-Water Levels, 1967-1978. Groundwater Report No. 15. State Engineer's Office, Salem, Oregon.

Bennis, W. G. and E. H. Schein (ed). 1966. Essays of Douglas McGregor. Massachusetts Institute of Technology. Cambridge, Massachusetts. p. 8-9.

Bodhaine, G. L., B. L. Foxworthy, J. F. Santos, J. E. Cummans. 1963. The Role of Water in Shaping the Economy of the Pacific Northwest. Administrative Report for the Bonneville Power Administration. U. S. Department of the Interior, U. S. Geological Survey, Tacoma, Washington.

Borgstrom, G. 1965. The Hungry Planet. Collier Books. New York. p. 413-414.

____________. 1969. Too Many. Collier Books. New York. p. 158-9.

Brady, N. C. 1974. The Nature and Properties of Soils. 8th Edition. MacMillan Publishing Company, Inc. New York.

Burton, B. T. 1965. The Heinz Handbook of Nutrition. McGraw-Hill, New York. Chapter 5.

Carolan, W. B., Jr. 1963. Federal Land in Oregon. Masters Thesis. Oregon State University, Corvallis, Oregon. 31 numb. leaves.

Chaney, M. S. 1960. Nutrition. Houghton Mifflin Co. Boston. p. 491

Church, D. C. 1970. Personal Interview. Oregon State University Animal Science Department, Corvallis, Oregon.

Clackamas County. 1970. General Soil Map with Soil Interpretation for Land Use Planning. U. S. D. A. Soil Conservation Service and Oregon Agricultural Experiment Station, Corvallis, Oregon

D. E. Q. 1974. Department of Environmental Quality Water Quality Management Plans for Drainage Basins in Oregon. In draft. Portland, Oregon.

Department of Planning and Development. 1967. Summary Report. Oregon Comprehensive Statewide Planning Study. State of Oregon, Salem.

Doerksen, H. R. 1972. Columbia River Interstate Compact, Politics of Negotiation. Pullman, Washington.

E. P. A. 1972. Environmental Protection Agency. Enforcement of P.L. 92-500, Federal Water Pollution Control Ammendments of 1972. Washington, D.C.

Foxworthy, B. L., G. M. Hagenson and E. R. Hampton. 1964. Records of wells and springs, water levels and chemical quality of groundwater in the East Portland area. Oregon State Engineers Office, Salem, Oregon. p. 79.

Gerrard, F. 1951. Meat Technology. Leonard Hill Limited, London. p. 105.

Golley, F. B. 1960. Energy dynamics of a food chain in an old field community. Ecological Monographs 30:187-206.

Hampton, E. R. 1963. Records of wells, water levels and chemical quality of groundwater in the Molalla-Salem Slope Area, northern Willamette Valley, Oregon. State Engineers Office. Salem, Oregon. 174 p.

Highsmith, R. M., Jr. and J. M. Leverenz. 1968. Atlas of the Pacific Northwest. Oregon State University, Corvallis, Oregon. 168 p.

James, S. C. 1961. Techniques for Characterizing Oregon Soils for Agricultural Purposes in Terms of Physical and Economic Productivities. PhD Thesis, Corvallis, Oregon State University. 297 numb. leaves.

Kylstra, C. D., Ed. 1974. Carrying capacity project for Florida and its major regions involving natural systems inventory and comprehensive planning. State Carrying Capacity Committee. University of Florida, Gainesville, Florida.

L. C. D. C. 1974. Statewide goals and guidelines. Land Conservation and Development Commission. Salem, Oregon.

Lindeman, R. 1942. The trophic dynamic aspect of ecology. Ecology 23:399-418.

Loy, W. and R. B. Mitchener. 1972. An Agricultural Atlas of Lane County. Eugene, Oregon. 69 p.

Mc Guinness, C. L. 1963. The role of groundwater in the national water situation. Geological Survey Water Supply Paper No. 1800. U. S. Department of the Interior.

Mc Harg, I. L. 1969. Design with nature. The Natural History Press. New York. 198 p.

Meyers, C., ed. 1973. Oregon Blue Book. Secretary of State Office. Salem, Oregon. 328 p.

Odum, H. 1957. Trophic structure and productivity of Silver Springs, Florida. Ecological Monographs. 27:55-112.

Oliphant, J. O. 1930. The range cattle industry in the Oregon Country to 1890. PhD Thesis. Cambridge, Massachusetts, Harvard University. 328 numb. leaves.

Oregon Agri-Record. 1974. California Cattle in Oregon. State Department of Agriculture. Salem, Oregon 12 p.

Oregon Department of Planning and Development. 1964. Resources for Development. Salem, Oregon.

Oregon Fish Commission.* 1960-65. Basin Investigations. Portland, Oregon.

Oregonian. April 10, 1974. Broadman's 400 residents overwhelmed, pleased by sudden growth. The Oregonian. Portland, Oregon.

_________ July 24, 1974. Arlington Port Prods P. G. E. for N-Plant. The Oregonian. Portland, Oregon.

O. S. S. H. E. 1940. Physical and Economic Geography of Oregon. Oregon State Board of Higher Education. Eugene, Oregon. 203 p.

O. S. U. 1970-74. Commodity Data Sheets. Department of Agricultural Economics, Extension Service. Oregon State University, Corvallis.

PNWRBC. 1972. Comprehensive Framework Plans, Appendix XVI. Pacific Northwest River Basin Commission. Vancouver, Washington.

______. 1973. Ecology and the Economy. Pacific Northwest River Basins Commission. Vancouver, Washington. 105 p.

Price, J. F. 1971. The Science of Meat and Meat Products. W. H. Freeman & Company. p. 289.

S. C. S. 1973. Benton County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Corvallis, Oregon.

_______. 1973. Lane County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Eugene, Oregon.

_______. 1973. Linn County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Salem, Oregon.

_______. 1973. Multnomah County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Hillsboro, Oregon.

_______. 1973. Marion County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Salem, Oregon.

_______. 1973. Polk County. Unpublished inventory data copied from material completed but not released for public use. U. S. Department of Agriculture Soil Conservation Service, Salem, Oregon.

S. W. R. B. 1961. Deschutes River Basin. State Water Resources Board. Salem, Oregon. 188 p.

_________. 1967. Deschutes River Stream Flow Study. State Water Resources Board, Salem, Oregon.

_________. 1960. Grande Ronde River Basin. State Water Resources Board, Salem, Oregon. 187 p.

_________. 1965. Hood Basin. State Water Resources Board, Salem Oregon. 114 p.

_________. 1971. Klamath Basin. State Water Resources Board, Salem, Oregon. 288 p.

_________. 1962. John Day River Basin. State Water Resources Board, Salem, Oregon. 93 p.

_________. 1965. Lower Willamette River Basin. State Water Resources Board, Salem, Oregon. 148 p.

_________. 1967. Malheur Lake Basin. State Water Recources Board, Salem, Oregon. 110 p.

__________. 1965. Mid-Coast Basin. State Water Resources Board, Salem, Oregon. 122 p.

__________. 1963. Middle Willamette River Basin. State Water Resources Board, Salem, Oregon. 138 p.

__________. 1961. North Coast Basin. State Water Resources Board, Salem, Oregon. 142 p.

__________. 1967. Powder River Basin. State Water Resources Board, Salem, Oregon. 154 p.

__________. 1959. Rogue River Basin. State Water Resources Board, Salem, Oregon. 440 p.

__________. 1963. South Coast Basin. State Water Resources Board, Salem, Oregon. 125 p.

__________. 1968. Surface Water Gaging Stations. State Water Resources Board, Salem, Oregon.

__________. 1969. Ultimate Needs. A volume of the 1969 publication series with projected water needs for all basins. State Water Resources Board, Salem, Oregon. 397 p.

__________. 1963. Umatilla River Basin. State Water Resources Board, Salem, Oregon. 107 p.

__________. 1958. Umpqua River Basin. State Water Resources Board, Salem, Oregon. 200 p.

__________. 1961. Upper Willamette Basin. State Water Resources Board, Salem, Oregon. 186 p.

__________. 1964. Water Restrictions, John Day River Basin. State Water Resources Board. Salem, Oregon.

Sanders, C. A. and D. J. Karr. 1975. Quantitative Land Appraisals for Tax Assessment Use. Paper in progress.

Schaefer, O., M.D. 1971. When the Eskimo Comes to Town. Nutrition Today. 6 (6):11. Nov.-Dec.

Solbery, E. D. 1968. The Why and How of Rural Zoning. U. S. D. A. Agricultural Information Bulletin No. 196. Washington, D.C. 32 p.

State Highway Division. 1973. A complete set of detailed county highway maps were obtained from the State of Oregon Highway Division, Salem, Oregon.

Tornhave, W. H. 1925. Meat and Meat Products. J. P. Lipincott Company. Philadelphia. p. 182.

U. S. Army Corps of Engineers. 1971. Review Report on the Umpqua River and Tributaries, Oregon: Interim Report, South Umpqua River. Volume IV. U. S. Army Corps of Engineers. Portland, Oregon.

U. S. Bureau of Census. 1969. Census of Agriculture, Oregon. U. S. Government Printing Office, Washington, D. C. Vol I, Part 47.

U. S. Bureau of Census. 1970. Census of Oregon. U. S. Government Printing Office, Washington, D. C.

U. S. D. A. Report. 1962. South Coast Drainage Basin. U. S. D. A. Soil Conservation Service. Portland, Oregon. 120 p.

________________. 1964. Water and Related Land Resources for the Middle Coast Drainage Basin. Economic Research Service, Forest Service, Soil Conservation Service. M-3977. Portland, Oregon.

U. S. D. A. - S. C. S. 1967. National Handbook for Range and Related Grazing Lands. U. S. Government Printing Office, Washington, D. C. Paragraph 7.14. (Pamphlet 0-266-273)

________________. 1964. Sherman County, Oregon Soil Survey. U.S. Department of Agriculture Soil Conservation Service in Cooperation with Oregon Agricultural Experiment Station. Series 1959, No. 37.

U. S. Department of Commerce, National Oceanic and Atmospheric Administration. 1971. Climatological Data Annual Summary, 1971. Washington, D.C. 77(13).

U. S. Department of Commerce, Weather Bureau. 1965. Decennial Census of U. S. Climate, Supplement for 1951 through 1960. Oregon No. 86-31. Washington, D.C.

U. S. G. S. 1968. Water Resources Data for Oregon. Part 1, Surface Water Records. U. S. Department of Interior. Seattle, Washington.

Warren, Lucille. 1974. Water restrictions pondered by state. The Oregonian. April 11, 1974. Portland, Oregon.

Washington County. 1971. General Soil Map with Soil Interpretation for Land Use Planning. U. S. D. A. Soil Conservation Service and Oregon Agriculture Experiment Station. Hillsboro, Oregon.

Wheeler, C. L. 1965. Ground-Water Levels. State Engineers Office. Salem, Oregon.

Willamette Basin Task Force. 1969. Major Existing and Authorized Storage Reservoirs, Willamette Basin. Pacific Northwest River Basins Commission. Appendix B, Hydrology, Vancouver, Washington.

Yamhill County. 1970. General Soil Map with Soil Interpretation for Land Use Planning. U. S. D. A. Soil Conservation Service and Oregon Agricultural Experiment Station. McMinnville, Oregon.

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APPENDICES

APPENDIX A

COUNTY DATA

BAKER COUNTY

1,973,760 acres　　　1,691,100 acres classified (85.7%)

TABLE A1. MAJOR LAND USE (in acres)

Major Land Use	Basin 9	% County Soils	% State Class
Cultivated (C)	182,000	9.3	2.8
Pasture (P)	10,800	1.0	-
C + P	192,800	9.8	2.0
Forests (F)	550,700	28.1	3.5
Range (R)	944,300	48.2	4.2
F + R	1,495,000	76.3	3.9
Hay (H)	-	-	-
C + P + H	192,800	9.8	2.0
Water Shed	3,300	-	-
P + R	955,100	48.7	3.8
Nonclassified [N]	[268,580]	[13.7]	[2.2]
F + [N]	[819,280]	[41.8]	[2.9]

TABLE A2. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 9	% County Soils	% State Class
Excellent (E)	11,900	1.0	1.0
Good (G)	168,200	8.6	3.9
E + G	180,100	9.2	3.2
Fair (F)	125,600	6.4	2.0
E + G + F	305,700	15.6	2.6
Poor (P)	80,900	4.1	1.7
E + G + F + P	386,600	19.7	2.3
Nonirrigable (N)	1,304,500		
Nonclassified [N]	[1,573,080]	[80.3]	[3.5]

TABLE A3. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 9	% County Soils	% State Class
I	-	-	-
IIe	4,800	-	0.5
IIw	24,900	1.3	2.6
IIe + IIw	29,700	1.5	1.5
IIs	16,100	1.0	6.2
IIc	7,100	-	1.0
Total II	52,900	2.7	1.7
I + IIe + IIw	29,700	1.5	1.4
Total I + II	52,900	2.7	1.6
IIIe	65,300	3.3	2.3
IIIw	39,600	2.0	6.7
IIIe + IIIw	104,900	5.3	3.0
IIIs	96,800	4.9	6.5
IIIc	-	-	-
Total III	201,700	10.2	2.9
I + IIe + IIw + IIIe + IIIw	134,600	6.8	2.4
Total I+II+III	254,600	11.7	2.2
IVe	54,500	2.8	2.3
IVw	12,900	1.0	1.6
IVe + IVw	67,400	3.4	2.1
IVs	94,800	4.8	1.7
IVc	-	-	-
Total IV	162,200	8.2	1.2
I+IIe+IIw+IIIe + IIIw+IVe+IVw	202,000	10.2	2.3
Total I+II+III+IV	416,800	19.9	1.7
VIe	162,300	8.2	3.8
VIw	-	-	-
VIs	334,700	17.0	5.3
VIc	-	-	-
Total VI	497,000	25.2	3.8
VIIe	433,700	22.0	6.9
VIIw	-	-	-
VIIs	324,800	16.4	5.1
VIIc	18,800	1.0	26.6
Total VII	777,300	39.4	6.1
Total VI + VII + Nonclassified	1,556,960	78.9	4.1

TABLE A4. AVERAGE ELEVATION (hundreds of feet)

Elevation	Basin 9	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18	-	-	
18 - 21	16,300	1.0	
21 - 24	4,900	-	
Total 0 - 24	21,200	1.1	
24 - 27	13,800	1.0	
27 - 30	203,100	10.4	
Total 0 - 30	238,100	12.1	
30 - 33	528,900	27.0	
33 - 36	84,400	4.3	
Total 0 - 36	851,400	43.4	
36 - 39	449,300	22.9	
Total 0 - 39	1,300,700	66.4	
39 - 42	182,600	9.3	
Total 0 - 42	1,483,300	75.7	
42 - 45	22,200	1.1	
Total 0 - 45	1,505,500	76.8	
45 - 48	18,800	1.0	
Total 0 - 48	1,524,300	77.8	
48 - 51	39,700	2.0	
Total 0 - 51	1,564,000	79.8	
51 - 54	127,100	6.5	
Total 0 - 54	1,691,100		
54 - 57			
57 - 60			
Total 0 - 60	1,691,100		

TABLE A5. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 9	% County Soils	% State Class
0 - 3	126,100	6.4	2.0
4 - 7	148,200	7.6	2.6
Total 0 - 7	274,300	14.0	2.3
8 - 12	119,600	6.1	1.0
Total 0 - 12	393,900	20.1	1.7
13 - 20	162,500	8.3	2.8
Total 0 - 20	556,400	28.3	1.9
21 - 30	-	-	-
Total 0 - 30	556,400	28.3	1.9
31 - 99	1,134,700	71.7	

TABLE A6. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 9	% County Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	14,900	1.0	1.0
SL + MD	14,900	1.0	-
Severe (SV)	43,600	2.2	1.0
SL + MD + SV	58,500	3.0	1.0
Very Severe (VS)	1,632,600	83.3	4.1
Nonclassified (NC)	268,580		
NC + VS	1,901,180	97.0	3.7

TABLE A7. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 9	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135	958,900	48.9	
105 - 120	158,600	8.1	
Over 105	1,117,500	57.0	
90 - 105	532,600	27.2	
Over 90	1,650,100	84.2	
75 - 90	41,000	2.1	
Over 75	1,691,100		
60 - 75			
Over 60	-	-	-
45 - 60			
Over 45	-	-	-
30 - 45			
Over 30	-	-	-
0 - 30			

BENTON COUNTY

427,520 acres 319,019 acres classified (74.6%)

TABLE A8. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	102,697	3,500	106,197	24.8	1.6
Pasture (P)	73,379	300	73,679	17.2	2.4
C + P			179,876	42.0	1.9
Forests (F)	136,795	-	136,795	32.0	1.0
Range (R)	-	-	-	-	-
F + R			136,795	32.0	-
Hay (H)	-	-	-	-	-
C + P + H			179,876	42.0	1.9
Water Shed	2,348	-	2,348	1.0	-
P + R			73,679	17.2	-
Nonclassified [N]			[108,501]	[25.4]	[1.0]
F + [N]			[245,296]	[57.4]	[1.0]

TABLE A9. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	42,451	3,800	46,251	10.8	3.1
Good (G)	31,865	-	31,865	7.4	1.0
E + G			78,116	18.2	1.4
Fair (F)	50,004	-	50,004	11.7	1.0
E + G + F			128,120	29.9	1.1
Poor (P)	61,228	-	61,228	14.3	1.3
E + G + F + P			189,348	44.3	1.1
Nonirrigable (N)	129,671	-	129,671		
Nonclassified [N]			[238,172]	[55.7]	[1.0]

TABLE A10. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
I	2,428	-	2,428	1.0	1.3
IIe	14,327	2,800	17,127	4.0	1.6
IIw	50,061	1,000	51,061	11.9	5.3
IIe + IIw			68,190	16.0	
IIs	8,852	-	8,852	2.1	3.4
IIc	-	-	-	-	-
Total II	73,240	3,800	79,468	2.6	2.6
I + IIe + IIw			70,620	16.5	3.2
Total I + II			81,900	19.2	2.5
IIIe	31,894	-	31,894		1.1
IIIw	16,426	-	16,426		2.8
IIIe + IIIw			48,320	11.3	1.4
IIIs	924	-	924	-	-
IIIc	-	-	-	-	-
Total III	49,244	-	49,244	11.5	1.0
I + IIe + IIw + IIIe + IIIw			118,940	27.8	2.1
Total I+II+III			131,140	30.7	1.3
IVe	73,568	-	73,568	17.2	3.2
IVw	24,194	-	24,194	5.6	2.9
IVe + IVw			97,760	22.9	3.1
IVs	188	-	188	-	-
IVc	-	-	-	-	-
Total IV	97,950	-	97,950	22.9	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			216,700	50.7	2.3
Total I+II+III+IV			229,090	53.6	1.0
VIe	55,636	-	55,636	13.0	1.3
VIw	-	-	-	-	-
VIs	6,344	-	6,344	1.5	-
VIc	-	-	-	-	-
Total VI	61,980	-	61,980	14.5	-
VIIe	6,137	-	6,137	1.4	-
VIIw	1,513	-	1,513	-	16.2
VIIs	22,727	-	22,727	5.3	-
VIIc	-	-	-	-	-
Total VII	30,377	-	30,377	7.1	-
Total VI + VII + Nonclassified			198,430	46.4	1.0

TABLE A11. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	67,849	3,500	71,349	16.7	
3 - 6	43,846	300	44,146	10.3	
6 - 9	94,311	-	94,311	22.1	
Total 0 - 9			209,806	49.1	
9 - 12	57,385	-	57,385	13.4	
Total 0 - 12			267,191	62.5	
12 - 15	504	-	504	-	
Total 0 - 15			267,695	62.6	
15 - 18	26,348	-	26,348	6.2	
Total 0 - 18			294,043	68.8	
18 - 21	3,427	-	3,427	1.0	
21 - 24	7,596	-	7,596	1.8	
Total 0 - 24			305,066	71.4	
24 - 27	13,953	-	13,953	3.3	
27 - 30	-	-	-	-	
Total 0 - 30			319,019	74.7	
30 - 33					
33 - 36					
Total 0 - 36			-	-	
36 - 39					
Total 0 - 39			-	-	
39 - 42					
Total 0 - 42			-	-	
42 - 45					
Total 0 - 45			-	-	
45 - 48					
Total 0 - 48			-	-	
48 - 51					
Total 0 - 51			-	-	
51 - 54					
Total 0 - 54			-	-	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A12. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	102,507	3,800	106,307	24.9	
4 - 7	9,613	-	9,613	2.2	
Total 0 - 7			115,920	27.1	1.0
8 - 12	27,450	-	27,450	6.4	
Total 0 - 12			143,370	33.5	1.0
13 - 20	60,284	-	60,284	14.1	
Total 0 - 20			203,654	47.6	1.0
21 - 30	-	-	-	-	
Total 0 - 30			203,654	47.6	1.0
31 - 99	115,365	-	115,365	52.4	

TABLE A13. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	17,730	2,500	20,230	4.7	2.0
Moderate (MD)	2,921	-	2,921	1.0	-
SL + MD			23,151	5.4	1.0
Severe (SV)	102,937	300	103,237	24.1	1.8
SL + MD + SV			126,388	29.5	1.3
Very Severe (VS)	191,631	1,000	192,631	45.0	1.0
Nonclassified (NC)			108,501		
NC + VS			301,132	70.5	1.0

TABLE A14. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210	18,192	-	18,192	4.2	
180 - 195	283,061	1,300	284,361	66.5	
165 - 180	13,966	2,500	16,466	3.8	
150 - 165					
Over 150			319,019	74.6	
135 - 150					
120 - 135					
105 - 120					
Over 105			-		
90 - 105					
Over 90			-		
75 - 90					
Over 75			-		
60 - 75					
Over 60			-		
45 - 60					
Over 45			-		
30 - 45					
Over 30			-		
0 - 30					

CLACKAMAS COUNTY

1,209,600 acres 672,310 acres classified (55.6%)

TABLE A15. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	305,160	25.3	4.8
Pasture (P)	122,305	10.1	4.0
C + P	427,465	35.4	4.5
Forests (F)	244,545	20.3	1.6
Range (R)	-	-	-
F + R	244,545	20.3	1.0
Hay (H)	-	-	-
C + P + H	427,465	35.4	4.5
Water Shed	300	-	-
P + R	122,305	10.1	-
Nonclassified [N]	[535,370]	[44.3]	[4.4]
F + [N]	[779,915]	[64.6]	[2.8]

TABLE A16. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	59,920	5.0	4.3
Good (G)	232,950	19.3	4.1
E + G	292,870	24.3	5.2
Fair (F)	104,545	8.6	1.6
E + G + F	397,415	32.9	3.3
Poor (P)	67,050	5.6	1.4
E + G + F + P	464,465	38.5	2.8
Nonirrigable (N)	207,845		
Nonclassified [N]	[743,215]	[61.5]	[1.6]

TABLE A17. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	11,375	1.0	5.9
IIe	112,930	9.3	6.0
IIw	95,145	7.9	10.0
IIe + IIw	208,075	17.2	10.5
IIs	2,700	-	1.0
IIc	-	-	-
Total II	210,775	17.4	6.8
I + IIe + IIw	219,450	18.1	10.1
Total I + II	222,150	18.4	6.7
IIIe	121,065	10.0	4.2
IIIw	35,365	2.9	6.0
IIIe + IIIw	156,435	12.9	4.5
IIIs	21,950	1.8	1.5
IIIc	-	-	-
Total III	178,380	14.7	2.6
I + IIe + IIw + IIIe + IIIw	375,885	31.1	6.7
Total I+II+III	400,530	33.1	3.9
IVe	71,740	5.9	3.1
IVw	5,125	-	1.0
IVe + IVw	76,860	6.4	2.4
IVs	2,300	-	-
IVc	-	-	-
Total IV	79,165	6.5	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	452,745	37.4	5.2
Total I+II+III+IV	479,695	39.6	2.0
VIe	158,220	13.1	3.8
VIw	-	-	-
VIs	24,495	2.0	-
VIc	-	-	-
Total VI	182,715	15.1	1.4
VIIe	8,675	1.0	-
VIIw	-	-	-
VIIs	1,125	-	-
VIIc	-	-	-
Total VII	9,900	1.0	-
Total VI + VII + Nonclassified	429,905	35.5	1.1

TABLE A18. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	164,570	13.6	
3 - 6	46,330	3.8	
6 - 9	156,740	13.0	
Total 0 - 9	367,640	30.4	
9 - 12	117,030	9.7	
Total 0 - 12	484,670	40.1	
12 - 15	22,780	1.9	
Total 0 - 15	507,450	42.0	
15 - 18	52,735	4.4	
Total 0 - 18	560,185	46.4	
18 - 21	300	-	
21 - 24	-	-	
Total 0 - 24	560,485	46.4	
24 - 27	52,525	4.3	
27 - 30	-	-	
Total 0 - 30	613,010	50.8	
30 - 33	-	-	
33 - 36	59,300	4.9	
Total 0 - 36	672,310	55.7	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A19. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	139,365	11.5	
4 - 7	211,315	17.5	
Total 0 - 7	350,680	29.0	3.0
8 - 12	63,765	5.3	
Total 0 - 12	414,445	34.3	1.8
13 - 20	140,420	11.6	
Total 0 - 20	554,865	45.9	1.9
21 - 30	-	-	
Total 0 - 30	554,865	45.9	1.9
31 - 99	117,445	54.1	

TABLE A20. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	36,000	3.0	3.6
Moderate (MD)	100,270	8.3	3.4
SL + MD	136,270	11.3	3.5
Severe (SV)	248,210	20.6	4.3
SL + MD + SV	384,480	31.9	4.0
Very Severe (VS)	287,830	23.8	1.0
Nonclassified (NC)	535,370		
NC + VS	823,200	76.2	1.6

TABLE A21. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	
195 - 210	20,370	1.7	
180 - 195	482,180	39.9	
165 - 180	24,800	2.0	
150 - 165	144,960	12.0	
Over 150	672,310		
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

CLATSOP COUNTY

524,800 acres — 81,800 acres classified (15.6%)

TABLE A22. MAJOR LAND USE (in acres)

Major Land Use	Basin 1	% County Soils	% State Class
Cultivated (C)	16,800	3.2	-
Pasture (P)	49,400	9.4	1.6
C + P	66,200	12.6	1.0
Forests (F)	15,600	3.0	-
Range (R)	-	-	-
F + R	15,600	3.0	-
Hay (H)	-	-	-
C + P + H	66,200	12.6	1.0
Water Shed	-	-	-
P + R	49,400	9.4	-
Nonclassified [N]	[443,000]	[84.4]	[3.6]
F + [N]	[458,600]	[87.4]	[1.6]

TABLE A23. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 1	% County Soils	% State Class
Excellent (E)	9,500	1.8	1.0
Good (G)	28,900	5.5	1.0
E + G	38,400	7.3	1.0
Fair (F)	9,600	1.8	-
E + G + F	48,000	9.1	-
Poor (P)	20,600	3.9	-
E + G + F + P	68,600	13.1	-
Nonirrigable (N)	13,200		
Nonclassified [N]	[456,200]	[86.9]	[1.0]

TABLE A24. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 1	% County Soils	% State Class
I	-	-	-
IIe	600	-	-
IIw	17,400	3.3	1.8
IIe + IIw	18,000	3.4	1.0
IIs	-	-	-
IIc	-	-	-
Total II	18,000	3.4	1.0
I + IIe + IIw	18,000	3.4	1.0
Total I + II	18,000	3.4	1.0
IIIe	2,000	-	-
IIIw	12,400	2.4	2.1
IIIe + IIIw	14,400	2.7	-
IIIs	-	-	-
IIIc	-	-	-
Total III	14,400	2.7	-
I + IIe + IIw + IIIe + IIIw	32,400	6.2	1.0
Total I+II+III	32,400	6.2	-
IVe	-	-	-
IVw	30,100	5.7	3.6
IVe + IVw	30,100	5.7	1.0
IVs	-	-	-
IVc	-	-	-
Total IV	30,100	5.7	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	62,500	11.9	-
Total I+II+III+IV	62,500	11.9	-
VIe	12,400	2.4	-
VIw	1,900	-	-
VIs	-	-	-
VIc	-	-	-
Total VI	14,300	2.7	-
VIIe	5,000	1.0	-
VIIw	-	-	-
VIIs	-	-	-
VIIc	-	-	-
Total VII	5,000	1.0	-
Total VI + VII + Nonclassified	462,300	88.1	1.2

TABLE A25. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 1	% County Soils	% State Class
0 - 3	49,800	9.5	
3 - 6	18,800	3.6	
6 - 9	-	-	
Total 0 - 9	68,600	13.1	
9 - 12	-	-	
Total 0 - 12	68,600	13.1	
12 - 15	-	-	
Total 0 - 15	68,600	13.1	
15 - 18	8,200	1.6	
Total 0 - 18	76,800	14.7	
18 - 21	5,000	1.0	
21 - 24	-	-	
Total 0 - 24	81,800	15.7	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60			

TABLE A26. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 1	% County Soils	% State Class
0 - 3	44,400	8.5	
4 - 7	23,300	4.4	
Total 0 - 7	67,700	12.9	1.0
8 - 12	1,300	-	
Total 0 - 12	69,000	13.1	-
13 - 20	-	-	
Total 0 - 20	69,000	13.1	-
21 - 30	-	-	
Total 0 - 30	69,000	13.1	-
31 - 99	12,800	86.9	

TABLE A27. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 1	% County Soils	% State Class
Slight (SL)	2,600	-	-
Moderate (MD)	-	-	-
SL + MD	2,600	-	-
Severe (SV)	15,600	3.0	-
SL + MD + SV	18,200	3.5	-
Very Severe (VS)	63,600	12.1	-
Nonclassified (NC)	443,000		
NC + VS	506,600	96.5	1.0

TABLE A28. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 1	% County Soils	% State Class
Over 210	-	-	
195 - 210	-	-	
180 - 195	66,000	12.6	
165 - 180	10,800	2.0	
150 - 165	-	-	
Over 150	76,800	14.6	
135 - 150	-	-	
120 - 135	5,000	1.0	
105 - 120	-	-	
Over 105	81,800		
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

COLUMBIA COUNTY

413,400 acres　　202,300 acres classified (48.9%)

TABLE A29. MAJOR LAND USE (in cares)

Major Land Use	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	33,500	44,300	77,800	18.8	1.2
Pasture (P)	25,100	67,000	92,100	22.3	3.0
C + P			169,900	41.1	1.8
Forests (F)	31,000	1,400	32,400	7.8	-
Range (R)	-	-	-	-	-
F + R			32,400	7.8	-
Hay (H)	-	-	-	-	-
C + P + H			169,900	41.1	1.8
Water Shed	-	-	-	-	-
P + R			92,100	22.3	-
Nonclassified [N]			[211,100]	[51.1]	[1.7]
F + [N]			[243,500]	[58.9]	[1.0]

TABLE A30. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	1,600	7,900	9,500	2.3	1.0
Good (G)	14,400	8,800	23,200	5.6	1.0
E + G			32,700	7.9	1.0
Fair (F)	16,900	39,600	56,500	13.7	1.0
E + G + F			89,200	21.6	1.0
Poor (P)	1,200	53,200	54,400	13.2	1.2
E + G + F + P			143,600	34.8	1.0
Nonirrigable (N)	55,500	3,200	58,700		
Nonclassified [N]			[269,800]	[65.2]	[1.0]

TABLE A31. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
I	200	-	200	-	-
IIe	7,300	600	7,900	1.9	1.0
IIw	16,000	17,500	33,500	8.1	3.5
IIe + IIw			41,400	10.0	2.1
IIs	500	300	800	-	-
IIc	-	-	-	-	-
Total II	23,800	18,400	42,200	10.2	1.4
I + IIe + IIw			41,600	10.1	1.9
Total I + II			42,400	10.2	1.3
IIIe	5,600	61,100	66,700	16.1	2.3
IIIw	1,600	5,200	6,800	1.6	1.2
IIIe + IIIw			73,500	17.8	2.1
IIIs	1,700	200	1,900	-	-
IIIc	-	-	-	-	-
Total III	8,900	66,500	75,400	18.2	1.1
I + IIe + IIw + IIIe + IIIw			115,100	27.8	2.0
Total I+II+III			117,800	28.5	1.1
IVe	30,400	2,000	32,400	7.8	1.4
IVw	100	15,800	15,900	3.8	1.9
IVe + IVw			48,300	11.7	1.5
IVs	-	-	-	-	-
IVc	-	-	-	-	-
Total IV	30,500	17,800	48,300	11.7	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw			163,400	39.5	1.8
Total I+II+III+IV			166,100	40.2	1.0
VIe	21,000	4,000	25,000	6.0	1.0
VIw	-	5,400	5,400	1.3	1.4
VIs	100	-	100	-	-
VIc	-	-	-	-	-
Total VI	21,100	9,400	30,500	7.4	-
VIIe	2,800	600	3,400	1.0	-
VIIw	-	-	-	-	-
VIIs	2,300	-	2,300	1.0	-
VIIc	-	-	-	-	-
Total VII	5,100	600	5,700	1.4	-
Total VI + VII + Nonclassified			247,300	59.8	1.0

TABLE A32. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	15,300	38,400	53,700	13.0	
3 - 6	12,900	11,300	24,200	5.8	
6 - 9	38,200	26,700	64,900	15.7	
Total 0 - 9			142,800	34.5	
9 - 12	7,200	35,700	42,900	10.4	
Total 0 - 12			185,700	44.9	
12 - 15	900	-	900	-	
Total 0 - 15			186,600	45.1	
15 - 18	11,700	-	11,700	2.8	
Total 0 - 18			198,300	48.0	
18 - 21	-	600	600	-	
21 - 24	600	-	600	-	
Total 0 - 24			199,500	48.2	
24 - 27	2,800	-	2,800	1.0	
27 - 30	-	-	-	-	
Total 0 - 30			202,300	48.9	
30 - 33					
33 - 36					
Total 0 - 36	-	-	-	-	
36 - 39					
Total 0 - 39	-	-	-	-	
39 - 42					
Total 0 - 42	-	-	-	-	
42 - 45					
Total 0 - 45	-	-	-	-	
45 - 48					
Total 0 - 48	-	-	-	-	
48 - 51					
Total 0 - 51	-	-	-	-	
51 - 54					
Total 0 - 54	-	-	-	-	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A33. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	19,200	47,300	66,500	16.1	
4 - 7	9,000	6,300	15,300	3.7	
Total 0 - 7			81,800	19.8	1.0
8 - 12	4,800	55,300	60,100	14.5	
Total 0 - 12			141,900	34.3	1.0
13 - 20	1,500	2,000	3,500	1.0	
Total 0 - 20			145,400	35.2	1.0
21 - 30	-	-	-	-	
Total 0 - 30			145,400	35.2	1.0
31 - 99	55,100	1,800	56,900	64.8	

TABLE A34. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	2,800	3,000	5,800	1.4	1.0
Moderate (MD)	800	-	800	-	-
SL + MD			6,600	1.6	-
Severe (SV)	48,900	27,000	75,900	18.4	1.3
SL + MD + SV			82,500	20.0	1.0
Very Severe (VS)	37,100	82,700	119,800	29.0	
Nonclassified (NC)			211,100		
NC + VS			330,900	80.0	1.0

TABLE A35. AVERAGE FROST FREE PERIOD (32°F, by days)

Days	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	-
195 - 210	-	-	-	-	-
180 - 195	88,200	109,600	197,800	47.8	
165 - 180	1,400	2,500	3,900	1.0	
150 - 165	-	-	-	-	-
Over 150			201,700	48.7	
135 - 150					
120 - 135	-	600	600	-	
105 - 120	-	-	-	-	-
Over 105			202,300		
90 - 105					
Over 90	-	-	-	-	-
75 - 90					
Over 75	-	-	-	-	-
60 - 75					
Over 60	-	-	-	-	-
45 - 60					
Over 45	-	-	-	-	-
30 - 45					
Over 30	-	-	-	-	-
0 - 30					

COOS COUNTY

1,031,040 acres — 134,400 acres classified (13.0%)

TABLE A36. MAJOR LAND USE (in acres)

Major Land Use	Basin 17	% County Soils	% State Class
Cultivated (C)	34,900	3.4	1.0
Pasture (P)	66,400	6.4	2.2
C + P	101,300	9.8	1.1
Forests (F)	33,100	3.2	-
Range (R)	-	-	-
F + R	33,100	3.2	-
Hay (H)	-	-	-
C + P + H	101,300	9.8	1.1
Water Shed	-	-	-
P + R	66,400	6.4	-
Nonclassified [N]	[896,640]	[87.0]	[7.4]
F + [N]	[929,740]	[90.2]	[3.3]

TABLE A37. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 17	% County Soils	% State Class
Excellent (E)	11,900	1.2	1.0
Good (G)	15,900	1.5	-
E + G	27,800	2.7	-
Fair (F)	55,300	5.4	1.0
E + G + F	83,100	8.1	1.0
Poor (P)	25,000	2.4	1.0
E + G + F + P	108,100	10.5	1.0
Nonirrigable (N)	26,300		
Nonclassified [N]	[922,940]	[89.5]	[2.0]

TABLE A38. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 17	% County Soils	% State Class
I	-	-	-
IIe	22,300	2.2	2.2
IIw	9,100	1.0	1.0
IIe + IIw	31,400	3.1	1.6
IIs	-	-	-
IIc	-	-	-
Total II	31,400	3.1	1.0
I + IIe + IIw	31,400	3.1	1.4
Total I + II	31,400	3.1	1.0
IIIe	16,400	1.6	0.6
IIIw	18,500	1.8	3.1
IIIe + IIIw	34,900	3.4	1.0
IIIs	-	-	-
IIIc	-	-	-
Total III	34,900	3.4	1.0
I + IIe + IIw + IIIe + IIIw	66,300	6.4	1.2
Total I+II+III	66,300	6.4	1.0
IVe	2,300	-	0.1
IVw	28,300	2.7	3.4
IVe + IVw	30,600	3.0	1.0
IVs	-	-	-
IVc	-	-	-
Total IV	30,600	3.0	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	96,900	9.4	1.1
Total I+II+III+IV	96,900	9.4	-
VIe	2,800	-	-
VIw	11,200	1.1	2.9
VIs	-	-	-
VIc	-	-	-
Total VI	14,000	1.4	-
VIIe	22,500	2.2	-
VIIw	1,000	-	10.7
VIIs	-	-	-
VIIc	-	-	-
Total VII	23,500	2.3	-
Total VI + VII + Nonclassified	934,140	90.6	2.4

TABLE A39. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 17	% County Soils	% State Class
0 - 3	83,100	8.0	
3 - 6	33,100	3.2	
6 - 9	-	-	
Total 0 - 9	116,200	11.2	
9 - 12	-	-	
Total 0 - 12	116,200	11.2	
12 - 15	300	-	
Total 0 - 15	116,500	11.3	
15 - 18	-	-	
Total 0 - 18	116,500	11.3	
18 - 21	17,900	1.7	
21 - 24	-	-	
Total 0 - 24	134,400	13.0	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A40. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 17	% County Soils	% State Class
0 - 3	69,200	6.7	
4 - 7	8,500	1.0	
Total 0 - 7	77,700	7.5	1.0
8 - 12	26,400	2.6	
Total 0 - 12	104,100	10.1	-
13 - 20	9,600	1.0	
Total 0 - 20	113,700	11.0	-
21 - 30	-	-	
Total 0 - 30	113,700	11.0	-
31 - 99	20,700	89.0	

TABLE A41. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 17	% County Soils	% State Class
Slight (SL)	11,800	1.1	1.2
Moderate (MD)	2,300	-	-
SL + MD	14,100	1.4	-
Severe (SV)	29,700	2.9	1.0
SL + MD + SV	43,800	4.3	-
Very Severe (VS)	90,600	8.8	-
Nonclassified (NC)	896,640		
NC + VS	987,240	95.7	1.9

TABLE A42. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 17	% County Soils	% State Class
Over 210	1,800	-	-
195 - 210	300	-	-
180 - 195	97,500	9.4	
165 - 180	16,900	1.6	
150 - 165	-	-	
Over 150	116,500	11.0	
135 - 150	-	-	
120 - 135	17,900	1.7	
105 - 120	-	-	
Over 105	134,400		
90 - 105			
Over 90	-	-	-
75 - 90			
Over 75	-	-	-
60 - 75			
Over 60	-	-	-
45 - 60			
Over 45	-	-	-
30 - 45			
Over 30	-	-	-
0 - 30			

CROOK COUNTY

1,907,200 acres   1,869,000 acres classified (98.0%)

TABLE A43. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	71,000	-	71,000	3.7	1.1
Pasture (P)	44,400	-	44,400	2.3	1.5
C + P			115,400	6.0	1.2
Forests (F)	396,400	14,000	410,400	21.5	2.6
Range (R)	1,249,400	1,500	1,250,900	65.6	5.6
F + R			1,661,300	87.1	4.4
Hay (H)	3,600	-	3,600	-	42.8
C + P + H			119,000	6.2	1.2
Water Shed	88,700	-	88,700	4.6	5.0
P + R			1,295,300	67.9	5.1
Nonclassified [N]			[38,200]	[2.0]	-
F + [N]			[448,600]	[23.5]	[1.6]

TABLE A44. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	49,700	-	49,700	2.6	3.6
Good (G)	140,300	-	140,300	7.4	3.3
E + G			190,000	10.0	3.4
Fair (F)	114,400	-	114,400	6.0	1.8
E + G + F			304,400	16.0	2.5
Poor (P)	293,400	-	293,400	15.4	6.3
E + G + F + P			597,800	31.4	3.6
Nonirrigable (N)	1,255,700	15,500	1,271,200		
Nonclassified [N]			[1,309,400]	[68.6]	[2.9]

TABLE A45. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	-	-	-	-	-
IIw	-	-	-	-	-
IIe + IIw	-	-	-	-	-
IIs	2,700	-	2,700	-	1.0
IIc	95,500	-	95,500	5.0	11.0
Total II	98,200	-	98,200	5.1	3.1
I + IIe + IIw	-	-	-	-	-
Total I + II			98,200	5.1	3.0
IIIe	59,500	-	59,500	3.1	2.1
IIIw	11,800	-	11,800	0.6	2.0
IIIe + IIIw			71,300	3.7	2.1
IIIs	16,800	-	16,800	1.0	1.1
IIIc	176,300	-	176,300	9.2	8.7
Total III	264,400	-	264,400	13.9	3.8
I + IIe + IIw + IIIe + IIIw			71,300	3.7	1.3
Total I+II+III			362,600	19.0	3.5
IVe	6,300	-	6,300	-	-
IVw	3,600	-	3,600	-	-
IVe + IVw			9,900	1.0	-
IVs	352,500	-	352,500	18.5	6.3
IVc	170,600	-	170,600	8.9	3.9
Total IV	533,000	-	533,000	27.9	4.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw			81,200	4.2	1.0
Total I+II+III+IV			895,600	47.0	3.8
VIe	37,500	-	37,500	2.0	1.0
VIw	1,500	-	1,500	-	-
VIs	288,200	-	288,200	15.1	4.6
VIc	154,900	-	154,900	8.1	6.8
Total VI	482,100	-	482,100	25.3	3.6
VIIe	114,300	11,100	125,400	6.6	2.0
VIIw	-	-	-	-	-
VIIs	320,800	1,500	322,300	16.9	5.1
VIIc	40,700	2,900	43,600	2.3	61.8
Total VII	475,800	15,500	491,300	25.8	3.8
Total VI + VII + Nonclassified			1,011,600	53.0	2.6

TABLE A46. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6					
6 - 9					
Total 0 - 9	-	-	-	-	
9 - 12					
Total 0 - 12	-	-	-	-	
12 - 15					
Total 0 - 15	-	-	-	-	
15 - 18					
Total 0 - 18	-	-	-	-	
18 - 21					
21 - 24					
Total 0 - 24	-	-	-	-	
24 - 27					
27 - 30					
Total 0 - 30	-	-	-	-	
30 - 33	263,800	-	263,800	13.8	
33 - 36	153,500	-	153,500	8.0	
Total 0 - 36			417,300	21.8	
36 - 39	69,800	-	69,800	3.6	
Total 0 - 39			487,100	25.4	
39 - 42	402,500	1,500	404,000	21.2	
Total 0 - 42			891,100	46.7	
42 - 45	320,900	14,000	334,900	17.6	
Total 0 - 45			1,226,000	64.3	
45 - 48	322,600	-	322,600	16.9	
Total 0 - 45			1,548,600	81.2	
48 - 51	236,000	-	236,000	12.4	
Total 0 - 51			1,784,600	93.6	
51 - 54	84,400	-	84,400	4.4	
Total 0 - 54			1,869,000	98.0	
54 - 57	-	-	-	-	
57 - 60	-	-	-	-	
Total 0 - 60	-	-	-	-	

TABLE A47. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	129,400	-	129,400	6.8	
4 - 7	132,300	-	132,300	6.9	
Total 0 - 7			261,700	13.7	2.2
8 - 12	534,800	-	534,800	28.0	
Total 0 - 12			796,500	41.7	3.4
13 - 20	320,400	1,000	321,400	16.8	
Total 0 - 20			1,117,900	58.5	3.8
21 - 30	-	-	-	-	
Total 0 - 30			1,117,900	58.5	3.8
31 - 99	736,600	14,500	751,100	41.5	

TABLE A48. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	46,400	-	46,400	2.4	4.6
Moderate (MD)	127,800	-	127,800	6.7	4.4
SL + MD			174,200	9.1	4.4
Severe (SV)	154,800	-	154,800	8.1	2.7
SL + MD + SV			329,000	17.2	3.4
Very Severe (VS)	1,524,500	15,500	1,540,000	80.7	3.9
Nonclassified (NC)			38,200		
NC + VS			1,678,200	82.8	3.2

TABLE A49. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	-
195 - 210					
180 - 195					
165 - 180					
150 - 165					
Over 150	-	-	-	-	-
135 - 150					
120 - 135					
105 - 120					
Over 105	-	-	-	-	-
90 - 105	311,200	-	311,200	16.3	5.5
Over 90			311,200	16.3	
75 - 90	866,800	-	866,800	45.4	6.2
Over 75			1,178,000	61.7	
60 - 75	191,400	-	191,400	10.0	7.8
Over 60			1,369,400	71.7	
45 - 60	213,600	1,500	215,100	11.3	11.1
Over 45			1,584,500	83.0	
30 - 45	141,100	11,100	152,200	8.0	4.6
Over 30			1,736,700	91.1	
0 - 30	129,400	2,900	132,300	6.9	2.6

CURRY COUNTY

1,038,080 acres 56,800 acres classified (5.5%)

TABLE A50. MAJOR LAND USE (in acres)

Major Land Use	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	300	27,600	27,900	2.7	-
Pasture (P)	1,500	7,400	8,900	1.0	-
C + P			36,800	3.5	-
Forests (F)	7,000	13,000	20,000	1.9	-
Range (R)	-	-	-	-	-
F + R			20,000	-	-
Hay (H)	-	-	-	-	-
C + P + H			36,800	3.5	-
Water SHed	-	-	-	-	-
P + R			8,900	1.0	-
Nonclassified [N]			[981,280]	[94.5]	[8.0]
F + [N]			[1,001,280]	[96.4]	[3.6]

TABLE A51. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	300	10,500	10,800	1.0	1.0
Good (G)	-	7,200	7,200	1.0	-
E + G			18,000	1.7	-
Fair (F)	1,400	18,000	19,400	1.9	-
E + G + F			37,400	3.6	-
Poor (P)	-	6,500	6,500	1.0	-
E + G + F + P			43,900	4.2	-
Nonirrigable (N)	7,100	5,800	12,900		
Nonclassified [N]			[994,180]	[95.8]	[2.2]

TABLE A52. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	300	13,700	14,000	1.3	1.4
IIw	300	4,800	5,100	1.0	1.0
IIe + IIw			19,100	1.8	1.0
IIs	-	-	-	-	-
IIc	-	-	-	-	-
Total II	600	18,500	19,100	1.8	1.0
I + IIe + IIw			19,100	1.8	1.0
IIIe	-	7,100	7,100	1.0	-
IIIw	-	5,700	5,700	1.0	1.0
IIIe + IIIw			12,800	1.2	-
IIIs	-	-	-	-	-
IIIc	-	-	-	-	-
Total III	-	12,800	12,800	1.2	-
I + IIe + IIw + IIIe + IIIw			31,900	3.1	1.0
Total I+II+III			31,900	3.1	-
IVe	-	1,400	1,400	-	-
IVw	1,100	2,300	3,400	-	-
IVe + IVw			4,800	-	-
IVs	-	-	-	-	-
IVc	-	-	-	-	-
Total IV	1,100	3,700	4,800	-	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw			36,700	3.5	-
Total I+II+III+IV			36,700	3.5	-
VIe	-	2,800	2,800	-	-
VIw	-	3,500	3,500	-	1.0
VIs	-	-	-	-	-
VIc	-	-	-	-	-
Total VI	-	6,300	6,300	1.0	-
VIIe	6,600	6,000	12,600	1.2	-
VIIw	-	-	-	-	-
VIIs	500	700	1,200	-	-
VIIc	-	-	-	-	-
Total VII	7,100	6,700	13,800	1.3	-
Total VI + VII + Nonclassified			1,001,380	96.5	2.6

TABLE A53. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	300	34,800	35,100	3.4	
3 - 6	1,900	11,600	13,500	1.3	
6 - 9	-	-	-	-	
Total 0 - 9			48,600	4.7	
9 - 12	-	-	-	-	
Total 0 - 12			48,600	4.7	
12 - 15	6,200	200	6,400	1.0	
Total 0 - 15			55,000	5.3	
15 - 18	-	-	-	-	
Total 0 - 18			55,000	5.3	
18 - 21	-	1,400	1,400	-	
21 - 24	-	-	-	-	
Total 0 - 24			56,400	5.4	
24 - 27	-	-	-	-	
27 - 30	400	-	400	-	
Total 0 - 30			56,800	5.4	
30 - 33					
33 - 36					
Total 0 - 36	-	-	-	-	
36 - 39					
Total 0 - 39	-	-	-	-	
39 - 42					
Total 0 - 42	-	-	-	-	
42 - 45					
Total 0 - 45	-	-	-	-	
45 - 48					
Total 0 - 48	-	-	-	-	
48 - 51					
Total 0 - 51	-	-	-	-	
51 - 54					
Total 0 - 54	-	-	-	-	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A54. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	1,900	23,000	24,900	2.4	
4 - 7	-	16,900	16,900	1.6	
Total 0 - 7			41,800	4.0	-
8 - 12	300	1,500	1,800	-	
Total 0 - 12			43,600	4.2	-
13 - 20	-	1,800	1,800	-	
Total 0 - 20			45,400	4.4	-
21 - 30	-	-	-	-	
Total 0 - 30			45,400	4.4	-
31 - 99	6,600	4,800	11,400	95.6	

TABLE A55. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	12,400	12,400	1.2	1.2
Moderate (MD)	-	1,200	1,200	-	-
SL + MD			13,600	1.3	-
Severe (SV)	300	11,100	11,400	1.1	-
SL + MD + SV			25,000	2.4	-
Very Severe (VS)	8,500	23,300	31,800	3.1	-
Nonclassified (NC)			981,280		
NC + VS			1,013,080	97.6	2.0

TABLE A56. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 15	Basin 17	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	200	200	-	
195 - 210	6,600	200	6,800	1.0	
180 - 195	1,700	29,300	31,000	3.0	
165 - 180	500	16,900	17,400	1.7	
150 - 165	-	-	-	-	
Over 150			55,400	5.3	
135 - 150	-	-	-	-	
120 - 135	-	1,400	1,400	-	
105 - 120	-	-	-	-	
Over 105			56,800		
90 - 105					
Over 90	-	-	-	-	
75 - 90					
Over 75	-	-	-	-	
60 - 75					
Over 60	-	-	-	-	
45 - 60					
Over 45	-	-	-	-	
30 - 45					
Over 30	-	-	-	-	
0 - 30					

DESCHUTES COUNTY

1,938,280 acres   1,652,800 acres classified (85.3%)

TABLE A57. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	3,000	-	3,000	-	-
Pasture (P)	9,900	-	9,900	-	-
C + P			12,900	1.0	-
Forests	669,900	60,400	730,300	37.7	4.6
Range (R)	695,700	125,700	821,400	42.4	3.7
F + R			1,551,700	80.1	4.1
Hay (H)	-	-	-	-	-
C + P + H			12,900	1.0	-
Water Shed	86,900	1,300	88,200	4.6	5.0
P + R			831,300	42.9	3.3
Nonclassified [N]			[285,380]	[14.7]	[2.3]
F + [N]			[1,015,680]	[52.4]	[3.6]

TABLE A58. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	3,000	-	3,000	-	-
Good (G)	210,800	22,300	233,100	12.0	5.4
E + G			236,100	12.2	4.2
Fair (F)	103,200	1,200	104,400	5.4	1.6
E + G + F			340,500	17.6	2.8
Poor (P)	149,600	9,100	158,700	8.2	3.4
E + G + F + P			499,200	25.8	3.0
Nonirrigable (N)	998,800	154,800	1,153,600		
Nonclassified [N]			[1,438,080]	[74.2]	[3.2]

TABLE A59. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	-	-	-	-	-
IIw	-	-	-	-	-
IIe + IIw	-	-	-	-	-
IIs	-	-	-	-	-
IIc	4,000	-	4,000	-	-
Total II	4,000	-	4,000	-	-
I + IIe + IIw	-	-	-	-	-
Total I + II			4,000	-	-
IIIe	286,700	20,000	306,700	15.8	10.7
IIIw	9,900	-	9,900	1.0	1.7
IIIe + IIIw			316,600	16.3	9.2
IIIs	7,800	9,100	16,900	1.0	1.1
IIIc	65,100	43,800	108,900	5.6	5.4
Total III	369,500	72,900	442,400	22.8	6.4
I + IIe + IIw + IIIe + IIIw			316,600	16.3	5.6
Total I+II+III			446,400	23.0	4.3
IVe	2,100	-	2,100	-	-
IVw	-	-	-	-	-
IVe + IVw			2,100	-	-
IVs	38,600	1,200	39,800	2.0	1.0
IVc	552,000	62,700	614,700	31.7	14.1
Total IV	592,700	63,900	656,600	33.9	5.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			318,700	16.4	3.6
Total I+II+III+IV			1,103,000	56.9	4.7
VIe	126,000	36,300	162,300	8.4	3.8
VIw	-	-	-	-	-
VIs	56,000	-	56,000	2.9	1.0
VIc	71,700	6,800	78,500	4.0	3.5
Total VI	253,700	43,100	296,800	15.3	2.2
VIIe	22,700	800	23,500	1.2	-
VIIw	-	-	-	-	-
VIIs	222,800	6,700	229,500	11.8	3.6
VIIc	-	-	-	-	-
Total VII	245,500	7,500	253,000	13.0	2.0
Total VI + VII + Nonclassified			834,280	43.1	2.2

TABLE A60. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6					
6 - 9					
Total 0 - 9	-	-	-	-	
9 - 12					
Total 0 - 12	-	-	-	-	
12 - 15					
Total 0 - 15	-	-	-	-	
15 - 18					
Total 0 - 18	-	-	-	-	
18 - 21					
21 - 24					
Total 0 - 24	-	-	-	-	
24 - 27					
27 - 30					
Total 0 - 30	-	-	-	-	
30 - 33	145,200	-	145,200	7.5	
33 - 36	222,200	-	222,200	11.5	
Total 0 - 36			367,400	19.0	
36 - 39					
Total 0 - 39			367,400	19.0	
39 - 42	207,100	-	207,100	10.7	
Total 0 - 42			574,500	29.7	
42 - 45	20,900	76,000	96,900	5.0	
Total 0 - 45			671,400	34.7	
45 - 48	202,400	51,000	253,400	13.1	
Total 0 - 48			924,800	47.8	
48 - 51	7,300	-	7,300	-	
Total 0 - 51			932,100	48.1	
51 - 54	660,300	60,400	720,700	37.2	
Total 0 - 54			1,652,800	85.3	
54 - 57					
57 - 60					
Total 0 - 60					

TABLE A61. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	131,500	3,500	135,000	7.0	
4 - 7	549,200	36,500	585,700	30.2	
Total 0 - 7			720,700	37.2	6.1
8 - 12	539,300	138,500	677,800	35.0	
Total 0 - 12			1,398,500	72.2	6.0
13 - 20	51,200	-	51,200	2.6	
Total 0 - 20			1,449,700	74.8	5.0
21 - 30	-	-	-	-	
Total 0 - 30			1,449,700	74.8	4.9
31 - 99	194,200	8,900	203,100	25.2	

TABLE A62. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	1,000	-	1,000	-	-
Moderate (MD)	9,700	2,300	12,000	1.0	-
SL + MD			13,000	1.0	-
Severe (SV)	226,700	20,000	246,700	12.7	4.2
SL + MD + SV			259,700	13.4	2.7
Very Severe (VS)	1,228,000	165,100	1,393,100	71.9	3.5
Nonclassified (NC)			285,380		
NC + VS			1,678,480	86.6	3.2

TABLE A63. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 13	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	-
195 - 210					
180 - 195					
165 - 180					
150 - 165					
Over 150	-	-	-	-	-
135 - 150					
120 - 135					
105 - 120					
Over 105	-	-	-	-	-
90 - 105	9,500	-	9,500	-	-
Over 90			9,500	-	-
75 - 90	552,200	125,700	677,900	35.0	4.8
Over 75			687,400	35.5	
60 - 75	4,500	-	4,500	-	-
Over 60			691,900	35.7	
45 - 60	152,000	-	152,000	7.8	7.8
Over 45			843,900	43.5	
30 - 45	-	-	-	-	-
Over 30			843,900	43.5	
0 - 30	747,200	61,700	808,900	41.8	16.1

DOUGLAS COUNTY

3,239,680 acres

1,255,600 acres classified (38.8%)

TABLE A64. MAJOR LAND USE (in acres)

Major Land Use	Basin 15	Basin 16	Basin 17	Basin 18
Cultivated (C)	-	178,500	3,800	700
Pasture (P)	-	266,100	3,600	3,600
C + P				
Forests (F)	51,100	728,800	5,700	13,700
Range (R)	-	-	-	-
F + R				
Hay (H)	-	-	-	-
C + P + H				
Water Shed	-	-	-	-
P + R				
Nonclassified [N]				
F + [N]				

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	183,000	5.6	2.8
Pasture (P)	273,300	8.4	9.0
C + P	456,300	14.0	4.8
Forests (F)	799,300	24.7	5.1
Range (R)	-	-	-
F + R	799,300	24.7	2.1
Hay (H)	-	-	-
C + P + H	456,300	14.0	4.8
Water Shed	-	-	-
P + R	273,300	8.3	1.1
Nonclassified [N]	[1,983,440]	[61.2]	[16.3]
F + [N]	[2,782,740]	[85.9]	[10.0]

TABLE A65. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 15	Basin 16	Basin 17	Basin 18
Excellent (E)	-	34,700	300	700
Good (G)	-	69,700	4,500	300
E + G				
Fair (F)	9,900	58,400	5,400	7,700
E + G + F				
Poor (P)	2,500	107,200	400	6,100
E + G + F + P				
Nonirrigable (N)	38,700	903,400	2,500	3,200
Nonclassified [N]				

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	35,700	1.1	2.6
Good (G)	74,500	2.3	1.7
E + G	110,200	3.4	1.9
Fair (F)	81,400	2.5	1.3
E + G + F	191,600	5.9	1.6
Poor (P)	116,200	3.6	2.5
E + G + F + P	307,800	9.5	1.8
Nonirrigable (N)	947,800		
Nonclassified [N]	[2,931,240]	[90.5]	[6.5]

TABLE A66. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 15	Basin 16	Basin 17	Basin 18
I	-	-	-	-
IIe	-	10,900	-	6,800
IIw	-	41,700	600	700
IIe + IIw				
IIs	-	2,200	-	-
IIc	-	-	-	-
Total II	-	54,800	600	7,500
I + IIe + IIw				
Total I + II				
IIIe	-	72,700	4,700	2,500
IIIw	-	29,000	600	300
IIIe + IIIw				
IIIs	-	32,300	-	-
IIIc	-	-	-	-
Total III	-	134,000	5,300	2,800
I + IIe + IIw + IIIe + IIIw				
Total I+II+III				
IVe	-	112,500	700	-
IVw	-	46,600	4,000	1,100
IVe + IVw				
IVs	-	4,200	-	-
IVc	-	-	-	-
Total IV	-	163,300	4,700	1,100
I+IIe+IIw+IIIe + IIIw+IVe+IVw				
Total I+II+III+IV				
VIe	37,400	108,400	-	4,400
VIw	9,900	-	300	-
VIs	-	3,700	-	-
VIc	-	-	-	-
Total VI	47,300	112,100	300	4,400
VIIe	3,800	709,200	2,200	2,200
VIIw	-	-	-	-
VIIs	-	-	-	-
VIIc	-	-	-	-
Total VII	3,800	709,200	2,200	2,200
Total VI + VII + Nonclassified				

TABLE A66. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	17,700	1.0	1.7
IIw	43,000	1.3	4.5
IIe + IIw	60,700	1.9	3.0
IIs	2,200	-	1.0
IIc	-	-	-
Total II	62,900	1.9	2.0
I + IIe + IIw	60,700	1.9	2.8
Total I + II	62,900	1.9	1.9
IIIe	79,900	2.5	2.8
IIIw	29,900	1.0	5.1
IIIe + IIIw	109,800	3.4	3.2
IIIs	32,300	1.0	2.2
IIIc	-	-	-
Total III	142,100	4.4	2.0
I + IIe + IIw + IIIe + IIIw	170,500	5.3	3.0
Total I+II+III	205,000	6.3	2.0
IVe	113,200	3.5	4.8
IVw	51,700	1.6	6.2
IVe + IVw	164,900	5.1	5.2
IVs	4,200	-	-
IVc	-	-	-
Total IV	169,100	5.2	1.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	335,400	10.4	3.8
Total I+II+III+IV	374,100	11.5	1.6
VIe	150,200	4.6	2.4
VIw	10,200	-	2.6
VIs	3,700	-	-
VIc	-	-	-
Total VI	164,100	5.1	1.2
VIIe	717,400	22.0	11.4
VIIw	-	-	-
VIIs	-	-	-
VIIc	-	-	-
Total VII	717,400	22.0	5.6
Total VI + VII + Nonclassified	2,865,580	88.4	7.5

TABLE A67. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 15	Basin 16	Basin 17	Basin 18
0 - 3	-	61,300	2,600	5,600
3 - 6	-	161,900	-	10,200
6 - 9	-	63,100	2,900	-
Total 0 - 9				
9 - 12	-	418,700	-	-
Total 0 - 12				
12 - 15	-	2,800	-	-
Total 0 - 15				
15 - 18	-	121,800	-	-
Total 0 - 18				
18 - 21	-	54,900	7,600	2,200
21 - 24	-	283,800	-	-
Total 0 - 24				
24 - 27	-	-	-	-
27 - 30	33,900	2,000	-	-
Total 0 - 30				
30 - 33	-	-	-	-
33 - 36	-	-	-	-
Total 0 - 36				
36 - 39	-	3,100	-	-
Total 0 - 39				
39 - 42	-	-	-	-
Total 0 - 42				
42 - 45	5,200	-	-	-
Total 0 - 45				
45 - 48	-	-	-	-
Total 0 - 48				
48 - 51	-	-	-	-
Total 0 - 51				
51 - 54	12,000	-	-	-
Total 0 - 54				
54 - 57	-	-	-	-
57 - 60	-	-	-	-
Total 0 - 60				

TABLE A67. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	69,500	2.1	
3 - 6	172,100	5.3	
6 - 9	66,000	2.0	
Total 0 - 9	307,600	9.5	
9 - 12	418,700	12.9	
Total 0 - 12	726,300	22.4	
12 - 15	2,800	-	
Total 0 - 15	729,100	22.5	
15 - 18	121,800	3.8	
Total 0 - 18	850,900	26.3	
18 - 21	64,700	2.0	
21 - 24	283,800	8.8	
Total 0 - 24	1,199,400	37.1	
24 - 27	-	-	
27 - 30	35,900	1.1	
Total 0 - 30	1,235,300	38.1	
30 - 33	-	-	
33 - 36	-	-	
Total 0 - 36	1,235,300	38.1	
36 - 39	3,100	-	
Total 0 - 39	1,238,400	38.2	
39 - 42	-	-	
Total 0 - 42	1,238,400	38.2	
42 - 45	5,200	-	
Total 0 - 45	1,243,600	38.4	
45 - 48	-	-	
Total 0 - 48	1,243,600	38.4	
48 - 51	-	-	
Total 0 - 51	1,243,600	38.4	
51 - 54	12,000	-	
Total 0 - 54	1,255,600	38.8	
54 - 57	-	-	
57 - 60	-	-	
Total 0 - 60	-	-	

TABLE A68. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 15	Basin 16	Basin 17	Basin 18
0 - 3	-	75,500	5,500	4,500
4 - 7	9,900	73,200	3,300	1,000
Total 0 - 7				
8 - 12	-	57,000	1,400	6,800
Total 0 - 12				
13 - 20	3,500	52,100	400	2,500
Total 0 - 20				
21 - 30	-	-	-	-
Total 0 - 30				
31 - 99	37,700	915,600	2,500	3,200

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	85,500	2.6	
4 - 7	87,400	2.7	
Total 0 - 7	172,900	5.3	1.4
8 - 12	65,200	2.0	
Total 0 - 12	238,100	3.8	1.0
13 - 20	58,500	1.8	
Total 0 - 20	296,600	10.1	1.0
21 - 30	-	-	
Total 0 - 30	296,600	10.1	1.0
31 - 99	959,000	89.9	

TABLE A69. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 15	Basin 16	Basin 17	Basin 18
Slight (SL)	-	10,600	-	-
Moderate (MD)	9,900	7,900	-	-
SL + MD				
Severe (SV)	24,700	224,200	-	9,600
SL + MD + SV				
Very Severe (VS)	16,500	930,700	13,100	8,400
Nonclassified (NC)				
NC + VS				

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	10,600	-	1.0
Moderate (MD)	17,800	1.0	-
SL + MD	28,400	1.0	1.0
Severe (SV)	258,500	8.0	4.4
SL + MD + SV	286,900	8.8	2.9
Very Severe (VS)	968,700	29.9	2.4
Nonclassified (NC)	1,983,440		
NC + VS	2,952,140	91.2	5.7

TABLE A70. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 15	Basin 16	Basin 17	Basin 18
Over 210	-	1,700	300	-
195 - 210	-	181,400	-	-
180 - 195	-	558,900	10,600	15,800
165 - 180	-	112,000	-	-
150 - 165	-	30,200	-	-
Over 150				
135 - 150	-	283,800	-	-
120 - 135	-	2,300	2,200	2,200
105 - 120	-	3,100	-	-
Over 105				
90 - 105	-	-	-	-
Over 90				
75 - 90	33,900	-	-	-
Over 75				
60 - 75	-	-	-	-
Over 60				
45 - 60	-	-	-	-
Over 45				
30 - 45	5,200	-	-	-
Over 30				
0 - 30	12,000	-	-	-

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	2,000	-	-
195 - 210	181,400	5.6	
180 - 195	585,300	18.1	
165 - 180	112,000	3.4	
150 - 165	30,200	1.0	
Over 150	910,900	28.1	
135 - 150	283,800	8.8	
120 - 135	6,700	-	
105 - 120	3,100	-	
Over 105	1,204,500	37.2	
90 - 105	-	-	
Over 90	1,204,500	37.2	
75 - 90	33,900	1.0	
Over 75	1,238,400	38.2	
60 - 75	-	-	
Over 60	1,238,400	38.2	
45 - 60	-	-	
Over 45	1,238,400	38.2	
30 - 45	5,200	-	
Over 30	1,243,600	38.4	
0 - 30	12,000	-	

GILLIAM COUNTY

775,040 acres

789,500 acres classified (101.9%)

TABLE A71. MAJOR LAND USE (in acres)

Major Land Use	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	353,200	73,000	426,200	55.0	6.6
Pasture (P)	-	-	-	-	-
C + P			426,200	55.0	4.5
Forests (F)	43,100	3,100	46,200	6.0	-
Range (R)	284,100	33,000	317,100	40.9	1.4
F + R			363,300	46.9	1.0
Hay (H)	-	-	-	-	-
C + P + H			426,200	55.0	4.5
Water Shed	-	-	-	-	-
P + R			317,100	40.9	1.2
Nonclassified [N]			-	-	-
F + [N]					

TABLE A72. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	11,000	6,100	17,100	2.2	1.2
Good (G)	166,300	27,400	193,700	25.0	4.5
E + G			210,800	27.2	3.7
Fair (F)	147,000	36,700	183,700	23.7	2.9
E + G + F			394,500	50.9	3.3
Poor (P)	15,200	11,700	26,900	3.5	1.0
E + G + F + P			421,400	54.4	2.5
Nonirrigable (N)	340,900	27,200	368,100		
Nonclassified [N]			[353,000]	[45.6]	[1.0]

TABLE A73. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
I	11,000	5,800	16,800	2.2	8.7
IIe	31,400	20,400	51,800	6.7	5.0
IIw	1,500	1,600	3,100	-	-
IIe + IIw			54,900	7.1	2.8
IIs	-	-	-	-	-
IIc	36,300	5,700	42,100	5.4	4.8
Total II	69,200	27,700	96,900	12.5	3.1
I + IIe + IIw			71,700	9.3	3.3
Total I + II			113,700	14.7	3.4
IIIe	115,500	24,400	139,900	18.1	4.9
IIIw	2,700	2,700	5,400	1.0	1.0
IIIe + IIIw			145,300	18.7	4.2
IIIs	26,700	3,500	30,200	3.9	2.0
IIIc	1,700	-	1,700	-	-
Total III	146,600	30,600	177,200	22.9	2.5
I + IIe + IIw + IIIe + IIIw			217,000	28.0	3.8
Total I+II+III			290,900	37.5	2.8
IVe	130,300	2,600	132,900	17.1	5.7
IVw	-	-	-	-	-
IVe + IVw			132,900	17.1	4.2
IVs	3,400	6,000	9,400	1.2	-
IVc	-	-	-	-	-
Total IV	133,700	8,600	142,300	18.4	1.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw			349,900	45.1	4.0
Total I+II+III+IV			433,200	55.9	1.8
VIe	4,400	15,300	19,700	2.5	-
VIw	-	-	-	-	-
VIs	142,200	16,800	159,000	20.5	2.5
VIc	33,600	-	33,600	4.3	1.5
Total VI	180,200	32,100	212,300	27.4	1.6
VIIe	900	-	900	-	-
VIIw	-	-	-	-	-
VIIs	138,800	4,300	143,100	18.5	2.2
VIIc	-	-	-	-	-
Total VII	139,700	4,300	144,000	18.6	1.1
Total VI + VII + Nonclassified			341,840	44.1	1.0

TABLE A74. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6	10,200	16,700	26,900	3.5	
6 - 9	130,700	27,900	158,600	20.5	
Total 0 - 9			185,500	24.0	
9 - 12	2,300	1,600	3,900	1.0	
Total 0 - 12			189,400	24.4	
12 - 15	68,300	17,800	86,100	11.1	
Total 0 - 15			275,500	35.5	
15 - 18	73,600	35,900	109,500	14.1	
Total 0 - 18			385,000	49.6	
18 - 21	118,900	2,800	121,700	15.7	
21 - 24	30,600	-	30,600	4.0	
Total 0 - 24			537,300	69.4	
24 - 27	157,200	3,100	160,300	20.7	
27 - 30	67,200	3,300	70,500	9.1	
Total 0 - 30			768,100	99.2	
30 - 33	1,100	-	1,100	-	
33 - 36	500	-	500	-	
Total 0 - 36			769,700	99.4	
36 - 39	12,400	-	12,400	-	
Total 0 - 39			782,100	100.0	
39 - 42	-	-	-	-	
Total 0 - 42			782,100	100.0	
42 - 45	-	-	-	-	
Total 0 - 45			782,100	100.0	
45 - 48	7,100	-	7,100	-	
Total 0 - 48			789,200	100.0	
48 - 51	300	-	300	-	
Total 0 - 51			789,500	100.0	
51 - 54					
Total 0 - 54			-	-	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A75. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	18,200	22,200	40,400	5.2	
4 - 7	154,200	19,600	173,800	22.4	
Total 0 - 7			214,200	27.6	1.8
8 - 12	177,800	42,900	220,700	28.5	
Total 0 - 12			434,900	56.1	1.9
13 - 20	12,200	9,600	21,800	2.8	
Total 0 - 20			456,700	58.9	1.6
21 - 30	-	-	-	-	
Total 0 - 30			456,700	58.9	1.5
31 - 99	318,000	14,800	332,800	41.1	

TABLE A76. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	-
Moderate (MD)	137,500	54,100	191,600	24.7	6.6
SL + MD			191,600	24.7	4.9
Severe (SV)	120,200	26,000	146,200	18.9	2.5
SL + MD + SV			337,800	43.6	3.5
Very Severe (VS)	422,700	29,000	451,700	58.3	1.1
Nonclassified (NC)			-		
NC + VS			436,600	56.4	1.0

TABLE A77. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210	-	-	-	-	
180 - 195	-	16,500	16,500	2.1	
165 - 180	88,600	18,400	107,000	13.8	
150 - 165	196,500	63,300	259,800	33.5	
Over 150			383,300	49.5	
135 - 150	130,300	4,500	134,800	17.4	
120 - 135	243,600	3,100	246,700	31.8	
105 - 120	-	-	-	-	
Over 105			764,800	98.8	
90 - 105	3,200	3,300	6,500	1.0	
Over 90			771,300	99.6	
75 - 90	7,400	-	7,400	1.0	
Over 75			778,700	100.0	
60 - 75	10,800	-	10,800	1.4	
Over 60			789,500		
45 - 60					
Over 45			-	-	
30 - 45					
Over 30			-	-	
0 - 30	-	-	-	-	

GRANT COUNTY

2,900,480 acres 1,399,200 acres classified (48.2%)

TABLE A78. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 6	Basin 12
Cultivated (C)	-	98,500	-
Pasture (P)	-	2,700	16,600
C + P			
Forests (F)	13,600	477,900	1,200
Range (R)	26,200	719,800	36,400
F + R			
Hay (H)	-	4,800	-
C + P + H			
Water Shed	-	1,500	-
P + R			
Nonclassified [N]			
F + [N]			

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated	98,500	3.4	1.5
Pasture (P)	19,300	1.0	1.0
C + P	117,800	4.1	1.2
Forests (F)	492,700	16.9	3.1
Range (R)	782,400	27.0	3.5
F + R	1,275,100	44.0	3.3
Hay (H)	4,800	-	57.1
C + P + H	122,600	4.2	1.2
Water Shed	1,500	-	-
P + R	801,700	27.6	3.2
Nonclassified [N]	[1,501,280]	[51.8]	[12.3]
F + [N]	[1,993,980]	[68.7]	[7.1]

TABLE A79. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 6	Basin 12
Excellent (E)	-	1,500	-
Good (G)	-	30,800	18,800
E + G			
Fair (F)	1,700	111,900	26,000
E + G + F			
Poor (P)	12,400	202,900	6,200
E + G + F + P			
Nonirrigable (N)	25,700	958,100	3,200
Nonclassified [N]			

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	1,500	-	-
Good (G)	49,600	1.7	1.2
E + G	51,100	1.8	1.0
Fair (F)	139,600	4.8	2.2
E + G + F	190,700	6.6	1.6
Poor (P)	221,500	7.6	4.7
E + G + F + P	412,200	14.2	2.5
Nonirrigable (N)	987,000		
Nonclassified [N]	[2,488,280]	[85.8]	[5.5]

TABLE A80. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 6	Basin 12
I	-	-	-
IIe	-	-	-
IIw	-	3,800	-
IIe + IIw			
IIs	-	-	-
IIc	-	-	25,300
Total II	-	3,800	25,300
I + IIe + IIw			
Total I + II			
IIIe	-	35,600	-
IIIw	-	2,100	-
IIIe + IIIw			
IIIs	-	-	-
IIIc	1,000	40,000	19,700
Total III	1,000	77,700	19,700
I + IIe + IIw + IIIe + IIIw			
Total I+II+III			
IVe	-	4,800	-
IVw	-	8,500	-
IVe + IVw			
IVs	3,200	60,500	3,100
IVc	25,500	146,000	4,900
Total IV	28,700	219,800	8,000
I+IIe+IIw+IIIe + IIIw+IVe+IVw			
Total I+II+III+IV			
VIe	-	126,000	-
VIw	-	6,600	-
VIs	4,100	250,700	1,200
VIc	6,000	173,900	-
Total VI	10,100	557,400	1,200
VIIe	-	85,200	-
VIIw	-	-	-
VIIs	-	361,300	-
VIIc	-	-	-
Total VII	-	446,500	-
Total VI + VII + Nonclassified			

TABLE A80. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	-	-	-
IIw	3,800	-	-
IIe + IIw	3,800	-	-
IIs	-	-	-
IIc	25,300	1.0	2.9
Total II	29,100	1.0	1.0
I + IIe + IIw	3,800	-	-
Total I + II	29,100	1.0	1.0
IIIe	35,600	1.2	1.2
IIIw	2,100	-	-
IIIe + IIIw	37,700	1.3	1.1
IIIs	-	-	-
IIIc	60,700	2.1	3.0
Total III	98,400	3.4	1.4
I + IIe + IIw + IIIe + IIIw	41,500	1.4	1.0
Total I+II+III	127,500	4.4	1.2
IVe	4,800	-	-
IVw	8,500	-	1.0
IVe + IVw	13,300	-	-
IVs	66,800	2.3	1.2
IVc	176,400	6.1	4.0
Total IV	256,500	8.8	2.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	54,800	1.9	1.0
Total I+II+III+IV	384,000	13.2	1.6
VIe	126,000	4.3	2.9
VIw	6,600	-	1.7
VIs	256,000	8.8	4.0
VIc	179,900	6.2	8.0
Total VI	578,700	20.0	4.4
VIIe	85,200	2.9	1.4
VIIw	-	-	-
VIIs	361,300	12.4	5.7
VIIc	-	-	-
Total VII	446,500	15.3	3.5
Total VI + VII + Nonclassified	2,643,980	91.2	6.9

TABLE A81. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 6	Basin 12
0 - 3	-	-	-
3 - 6			
6 - 9			
Total 0 - 9	-	-	-
9 - 12			
Total 0 - 12	-	-	-
12 - 15			
Total 0 - 15	-	-	-
15 - 18			
Total 0 - 18	-	-	-
18 - 21	-	35,100	-
21 - 24	-	18,100	-
Total 0 - 24			
24 - 27	-	3,800	-
27 - 30	-	17,800	-
Total 0 - 30			
30 - 33	-	146,700	-
33 - 36	-	56,700	-
Total 0 - 36			
36 - 39	-	482,500	-
Total 0 - 39			
39 - 42	-	106,400	19,700
Total 0 - 42			
42 - 45	1,400	50,100	-
Total 0 - 45			
45 - 48	14,500	94,600	33,300
Total 0 - 48			
48 - 51	10,300	100,800	-
Total 0 - 51			
51 - 54	13,600	192,600	1,200
Total 0 - 54			
54 - 57			
57 - 60			
Total 0 - 60	-	-	-

TABLE A81. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-
3 - 6			
6 - 9			
Total 0 - 9	-	-	-
9 - 12			
Total 0 - 12	-	-	-
12 - 15			
Total 0 - 15	-	-	-
15 - 18			
Total 0 - 18	-	-	-
18 - 21	35,100	1.2	
21 - 24	18,100	1.0	
Total 0 - 24	53,200	1.8	
24 - 27	3,800	-	
27 - 30	17,800	1.0	
Total 0 - 30	74,800	2.6	
30 - 33	146,700	5.0	
33 - 36	56,700	2.0	
Total 0 - 36	278,200	9.6	
36 - 39	482,500	16.6	
Total 0 - 39	760,700	26.2	
39 - 42	126,100	4.3	
Total 0 - 42	886,100	30.6	
42 - 45	51,500	1.8	
Total 0 - 45	938,300	32.4	
45 - 48	142,400	4.9	
Total 0 - 48	1,080,700	37.3	
48 - 51	111,100	3.8	
Total 0 - 51	1,191,800	41.1	
51 - 54	207,400	7.2	
Total 0 - 54	1,399,200	48.3	
54 - 57			
57 - 60			
Total 0 - 60	-	-	-

TABLE A82. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 6	Basin 12
0 - 3	-	36,800	22,800
4 - 7	-	63,200	27,300
Total 0 - 7			
8 - 12	12,800	205,200	2,100
Total 0 - 12			
13 - 20	16,800	393,200	-
Total 0 - 20			
21 - 30	-	-	-
Total 0 - 30			
31 - 99	10,200	606,800	2,000

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	59,600	2.0	
4 - 7	90,500	3.1	
Total 0 - 7	150,100	5.1	1.3
8 - 12	220,100	7.6	
Total 0 - 12	370,200	12.7	1.6
13 - 20	410,000	14.1	
Total 0 - 20	780,200	26.8	2.7
21 - 30	-	-	
Total 0 - 30	780,200	26.8	2.6
31 - 99	619,000	73.2	

TABLE A83. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 6	Basin 12
Slight (SL)	-	-	-
Moderate (MD)	-	27,400	6,000
SL + MD			
Severe (SV)	3,600	104,600	27,300
SL + MD + SV			
Very Severe (VS)	36,200	1,173,200	20,900
Nonclassified (NC)			
NC + VS			

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	33,400	1.2	1.1
SL + MD	33,400	1.2	1.0
Severe (SV)	135,500	4.7	2.3
SL + MD + SV	168,900	5.8	1.7
Very Severe (VS)	1,230,300	42.4	3.1
Nonclassified (NC)	1,501,280		
NC + VS	2,731,580	94.2	5.3

TABLE A84. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 6	Basin 12
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150	-	48,800	-
120 - 135	-	39,000	-
105 - 120	-	234,400	-
Over 105			
90 - 105	-	316,800	22,800
Over 90			
75 - 90	25,100	284,000	28,500
Over 75			
60 - 75	4,300	70,100	-
Over 60			
45 - 60	10,400	304,900	-
Over 45			
30 - 45	-	7,200	2,900
Over 30			
0 - 30	-	-	-

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150	48,800	1.7	-
120 - 135	39,000	1.3	-
105 - 120	234,400	8.1	-
Over 105	322,200	11.1	
90 - 105	339,600	11.7	6.0
Over 90	661,800	22.8	
75 - 90	337,600	11.6	2.4
Over 75	999,400	34.4	
60 - 75	74,400	2.6	3.0
Over 60	1,073,800	37.0	
45 - 60	315,300	10.9	16.2
Over 45	1,389,100	47.9	
30 - 45	10,100	-	-
Over 30	1,399,200		
0 - 30	-	-	-

HARNEY COUNTY

6,484,480 acres

5,778,900 acres classified (89.1%)

TABLE A85. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 10	Basin 12	Basin 13
Cultivated (C)	-	-	-	-
Pasture (P)	-	36,300	289,800	700
C + P				
Forests (F)	5,000	2,100	2,000	-
Range (R)	34,000	668,000	3,918,500	367,100
F + R				
Hay (H)	-	-	-	-
C + P + H				
Water Shed	-	33,200	408,300	13,900
P + R				
Nonclassified [N]				
F + [N]				

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	-	-	-
Pasture (P)	326,800	5.0	10.8
C + P	326,800	5.0	3.4
Forests (F)	9,100	-	-
Range (R)	4,987,600	76.9	22.3
F + R	4,996,700	77.1	13.1
Hay (H)	-	-	-
C + P + H	326,800	5.0	3.4
Water Shed	455,400	7.0	25.7
P + R	5,314,400	82.0	20.9
Nonclassified [N]	[704,940]	[10.9]	[5.8]
F + [N]	[714,040]	[11.0]	[2.6]

TABLE A86. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 10	Basin 12	Basin 13
Excellent (E)	-	28,700	102,200	700
Good (G)	-	19,000	568,200	41,700
E + G				
Fair (F)	9,600	55,800	589,700	30,300
E + G + F				
Poor (P)	7,500	24,400	429,900	1,100
E + G + F + P				
Nonirrigable (N)	21,900	611,700	2,928,600	307,900
Nonclassified [N]				

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	131,600	2.0	9.5
Good (G)	628,900	9.7	14.7
E + G	760,500	11.7	13.4
Fair (F)	685,400	10.6	10.8
E + G + F	1,445,900	22.3	12.1
Poor (P)	462,900	7.1	9.9
E + G + F + P	1,908,800	29.4	11.4
Nonirrigable	3,870,100		
Nonclassified [N]	[4,575,040]	[70.6]	[10.2]

TABLE A87. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 10	Basin 12	Basin 13
I	-	-	-	-
IIe	-	-	-	-
IIw	-	-	-	-
IIe + IIw				
IIs	-	-	-	-
IIc	-	63,400	152,200	700
Total II	-	63,400	152,200	700
I + IIe + IIw				
Total I + II				
IIIe	-	-	-	-
IIIw	-	-	-	-
IIIe + IIIw				
IIIs	-	5,700	506,400	9,500
IIIc	3,900	72,000	522,800	45,100
Total III	3,900	77,700	1,029,200	54,600
I + IIe + IIw + IIIe + IIIw				
Total I+II+III				
IVe	-	2,600	-	-
IVw	-	-	-	-
IVe + IVw				
IVs	2,900	158,900	1,332,700	170,500
IVc	18,900	67,200	848,700	115,400
Total IV	21,800	228,700	2,181,400	285,900
I+IIe+IIw+IIIe + IIIw+IVe+IVw				
Total I+II+III+IV				
VIe	-	3,800	-	-
VIw	-	-	-	-
VIs	12,500	186,000	522,300	18,000
VIc	800	81,700	148,600	8,600
Total VI	13,300	271,500	670,900	26,600
VIIe	-	-	26,700	-
VIIw	-	-	-	-
VIIs	-	98,300	558,200	13,900
VIIc	-	-	-	-
Total VII	-	98,300	584,900	13,900
Total VI + VII + Nonclassified				

TABLE A87. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	-	-	-
IIw	-	-	-
IIe + IIw	-	-	-
IIs	-	-	-
IIc	216,300	3.3	24.9
Total II	216,300	3.3	6.9
I + IIe + IIw	-	-	-
Total I + II	216,300	3.3	6.5
IIIe	-	-	-
IIIw	-	-	-
IIIe + IIIw	-	-	-
IIIs	521,600	8.0	35.2
IIIc	643,800	9.9	31.6
Total III	1,165,400	18.0	16.7
I + IIe + IIw + IIIe + IIIw	-	-	-
Total I+II+III	1,381,700	21.3	13.4
IVe	2,600	-	-
IVw	-	-	-
IVe + IVw	2,600	-	-
IVs	1,665,000	25.7	29.7
IVc	1,050,200	16.2	24.2
Total IV	2,717,800	41.9	20.7
I+IIe+IIw+IIIe + IIIw+IVe+IVw	2,600	-	-
Total I+II+III+IV	4,099,500	63.2	17.5
VIe	3,800	-	-
VIw	-	-	-
VIs	738,800	11.4	11.7
VIc	239,700	3.7	10.6
Total VI	982,300	15.1	7.4
VIIe	26,700	-	-
VIIw	-	-	-
VIIs	670,400	10.3	10.5
VIIc	-	-	-
Total VII	697,100	10.7	5.5
Total VI + VII + Nonclassified	2,384,980	36.8	6.2

TABLE A88. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 10	Basin 12	Basin 13
0 - 3	-	-	-	-
3 - 6				
6 - 9				
Total 0 - 9	-	-	-	-
9 - 12				
Total 0 - 12	-	-	-	-
12 - 15				
Total 0 - 15	-	-	-	-
15 - 18				
Total 0 - 18	-	-	-	-
18 - 21				
21 - 24				
Total 0 - 24	-	-	-	-
24 - 27				
27 - 30				
Total 0 - 30	-	-	-	-
30 - 33				
33 - 36				
Total 0 - 36	-	-	-	-
36 - 39				
Total 0 - 39	-	-	-	-
39 - 42	-	166,700	1,446,400	-
Total 0 - 42				
42 - 45	1,600	130,300	727,100	175,000
Total 0 - 45				
45 - 48	21,200	197,500	1,849,200	197,900
Total 0 - 48				
48 - 51	11,200	245,100	532,200	8,800
Total 0 - 51				
51 - 54	5,000	-	62,700	-
Total 0 - 54				
54 - 57				
57 - 60				
Total 0 - 60	-	-	-	-

TABLE A88. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18			
18 - 21			
21 - 24			
Total 0 - 24	-	-	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42	1,613,100	24.9	
Total 0 - 42	1,613,100	24.9	
42 - 45	1,034,000	15.9	
Total 0 - 45	2,647,100	40.8	
45 - 48	2,265,800	34.9	
Total 0 - 48	4,912,900	75.8	
48 - 51	797,300	12.3	
Total 0 - 51	5,710,200	88.1	
51 - 54	67,700	1.0	
Total 0 - 54	5,777,900	89.1	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A89. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 10	Basin 12	Basin 13
0 - 3	-	43,600	1,132,200	49,500
4 - 7	1,600	37,400	330,000	21,700
Total 0 - 7				
8 - 12	17,400	206,900	1,880,400	267,700
Total 0 - 12				
13 - 20	19,200	162,700	440,800	20,300
Total 0 - 20				
21 - 30	-	-	-	-
Total 0 - 30				
31 - 99	800	289,000	835,200	22,500

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	1,225,300	18.0	
4 - 7	390,700	6.0	
Total 0 - 7	1,616,000	24.0	13.6
8 - 12	2,372,400	36.6	
Total 0 - 12	3,988,400	61.5	17.2
13 - 20	643,000	9.9	
Total 0 - 20	4,631,400	71.4	15.9
21 - 30	-	-	
Total 0 - 30	4,631,400	71.4	15.6
31 - 99	1,147,500	28.6	

TABLE A90. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 10	Basin 12	Basin 13
Slight (SL)	-	29,600	146,800	700
Moderate (MD)	-	124,900	220,000	40,000
SL + MD				
Severe (SV)	3,200	24,100	353,800	200
SL + MD + SV				
Very Severe (VS)	35,800	561,000	3,898,000	340,800
Nonclassified (NC)				
NC + VS				

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	177,100	2.7	17.6
Moderate (MD)	384,900	5.9	13.2
SL + MD	562,000	8.6	14.3
Severe (SV)	381,300	5.9	6.6
SL + MD + SV	943,300	14.5	9.7
Very Severe (VS)	4,835,600	74.6	12.2
Nonclassified (NC)	704,940		
NC + VS	5,540,540	85.5	10.7

TABLE A91. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 10	Basin 12	Basin 13
Over 210	-	-	-	-
195 - 210				
180 - 195				
165 - 180				
150 - 165				
Over 150	-	-	-	-
135 - 150				
120 - 135				
105 - 120				
Over 105	-	-	-	-
90 - 105	-	176,100	871,100	11,400
Over 90				
75 - 90	27,700	280,900	2,837,600	355,900
Over 75				
60 - 75	4,900	131,800	343,000	500
Over 60				
45 - 60	6,400	114,300	162,000	-
Over 45				
30 - 45	-	-	2,200	-
Over 30				
0 - 30	-	36,500	402,700	13,900

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	-
90 - 105	1,058,600	16.3	18.7
Over 90	1,058,600	16.3	
75 - 90	3,502,100	54.0	25.0
Over 75	4,560,700	70.3	
60 - 75	480,200	7.4	19.5
Over 60	5,040,900	77.7	
45 - 60	282,700	4.4	14.5
Over 45	5,323,600	82.1	
30 - 45	2,200	-	-
Over 30	5,325,800	82.1	
0 - 30	453,100	7.0	9.0

HOOD RIVER COUNTY

338,560 acres

290,800 acres classified (85.9%)

TABLE A92. MAJOR LAND USE (in acres)

Major Land Use	Basin 4	% County Soils	% State Class
Cultivated (C)	27,400	8.1	-
Pasture (P)	4,500	1.3	-
C + P	31,900	9.4	-
Forests (F)	252,900	74.7	1.6
Range (R)	6,000	1.8	-
F + R	258,900	64.5	1.0
Hay (H)	-	-	-
C + P + H	31,900	9.4	-
Water Shed	-	-	-
P + R	10,500	3.1	-
Nonclassified [N]	[47,760]	[14.1]	-
F + [N]	[300,660]	[88.8]	[1.1]

TABLE A93. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 4	% County Soils	% State Class
Excellent (E)	5,500	1.6	-
Good (G)	14,300	4.2	-
E + G	19,800	5.8	-
Fair (F)	11,600	3.4	-
E + G + F	31,400	9.2	-
Poor (P)	8,600	2.5	-
E + G + F + P	40,000	11.7	-
Nonirrigable (N)	250,800		
Nonclassified [N]	[298,560]	[88.3]	[1.0]

TABLE A94. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 4	% County Soils	% State Class
I	-	-	-
IIe	14,100	4.2	1.4
IIw	-	-	-
IIe + IIw	14,100	4.2	1.0
IIs	-	-	-
IIc	-	-	-
Total II	14,100	4.2	-
I + IIe + IIw	14,100	4.2	1.0
Total I + II	14,100	4.2	-
IIIe	12,500	3.7	-
IIIw	700	-	-
IIIe + IIIw	13,200	3.9	-
IIIs	1,700	1.0	-
IIIc	-	-	-
Total III	14,900	4.4	-
I + IIe + IIw + IIIe + IIIw	27,300	8.1	1.0
Total I+II+III	29,000	8.6	-
IVe	3,200	-	-
IVw	3,100	-	-
IVe + IVw	6,300	-	-
IVs	3,500	-	-
IVc	-	-	-
Total IV	9,800	-	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	33,600		
Total I+II+III+IV	38,800	11.5	-
VIe	142,800	42.2	3.3
VIw	-	-	-
VIs	1,300	-	-
VIc	-	-	-
Total VI	144,100	42.6	1.1
VIIe	78,400	23.2	1.2
VIIw	-	-	-
VIIs	29,500	8.7	-
VIIc	-	-	-
Total VII	107,900	31.9	1.0
Total VI + VII + Nonclassified	299,760	88.5	1.0

TABLE A95. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 4	% County Soils	% State Class
0 - 3	-	-	
3 - 6	2,800	1.0	
6 - 9	14,600	4.3	
Total 0 - 9	17,400	5.1	
9 - 12	2,800	1.0	
Total 0 - 12	20,200	6.0	
12 - 15	4,100	1.2	
Total 0 - 15	24,300	7.2	
15 - 18	16,600	4.9	
Total 0 - 18	40,900	12.1	
18 - 21	1,700	1.0	
21 - 24	9,600	2.8	
Total 0 - 24	52,200	15.4	
24 - 27	176,100	52.0	
27 - 30	-	-	
Total 0 - 30	228,300	67.4	
30 - 33	-	-	
33 - 36	41,800	12.3	
Total 0 - 36	270,100	79.8	
36 - 39	-	-	
Total 0 - 39	270,100	79.8	
39 - 42	20,700	6.1	
Total 0 - 42	290,800	85.9	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A96. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 4	% County Soils	% State Class
0 - 3	5,500	1.6	
4 - 7	10,900	3.2	
Total 0 - 7	16,400	4.8	
8 - 12	17,000	5.0	
Total 0 - 12	33,400	9.8	
13 - 20	6,200	1.8	
Total 0 - 20	39,600	11.6	
21 - 30	11,100	3.3	
Total 0 - 30	50,700	14.9	
31 - 99	240,100	85.1	

TABLE A97. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 4	% County Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	16,000	4.7	1.0
SL + MD	16,000	4.7	
Severe (SV)	99,100	29.3	1.7
SL + MD + SV	115,100	34.0	1.2
Very Severe (VS)	175,700	51.9	
Nonclassified (NC)	47,760		
NC + VS	223,460	66.0	

TABLE A98. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 4	% County Soils	% State Class
Over 210	-	-	-
195 - 210	-	-	-
180 - 195	18,800	5.6	
165 - 180	2,800	1.0	
150 - 165	-	-	
Over 150	21,600	6.4	
135 - 150	-	-	
120 - 135	25,200	7.4	
105 - 120	68,700	20.3	
Over 105	115,500	34.1	
90 - 105	-	-	
Over 90	115,500	34.1	
75 - 90	88,400	27.1	1.0
Over 75	203,900	60.2	
60 - 75	-	-	
Over 60	203,900	60.2	
45 - 60	105,500	31.2	5.4
Over 45			
30 - 45			
Over 30	-	-	
0 - 30			

JACKSON COUNTY

1,802,880 acres 1,536,900 acres classified (85.2%)

TABLE A99. MAJOR LAND USE (in acres)

Major Land Use	Basin 15	% County Soils	% State Class
Cultivated (C)	35,700	2.0	1.0
Pasture (P)	267,400	14.8	8.8
C + P	303,100	16.8	3.2
Forests (F)	1,208,700	67.1	7.7
Range (R)	22,100	1.2	-
F + R	1,230,800	68.3	3.2
Hay (H)	-	-	-
C + P + H	303,100	16.8	3.2
Water Shed	3,000	-	-
P + R	289,500	16.1	1.1
Nonclassified [N]	[265,340]	[14.7]	[2.2]
F + [N]	[1,465,040]	[81.3]	[5.2]

TABLE A100. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 15	% County Soils	% State Class
Excellent (E)	19,300	1.1	1.4
Good (G)	23,100	1.3	1.0
E + G	42,400	2.4	1.0
Fair (F)	197,300	10.9	3.1
E + G + F	239,700	13.3	2.0
Poor (P)	111,100	6.2	2.4
E + G + F + P	350,800	19.5	2.1
Nonirrigable (N)	1,186,100		
Nonclassified [N]	[1,451,440]	[80.5]	[3.2]

TABLE A101. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 15	% County Soils	% State Class
I	8,800	1.0	4.6
IIe	13,100	1.0	1.3
IIw	4,000	-	-
IIe + IIw	17,100	1.0	
IIs	10,000	1.0	3.9
IIc	-	-	-
Total II	27,100	1.5	1.0
I + IIe + IIw	25,900	1.4	1.2
Total I + II	35,900	2.0	1.1
IIIe	71,600	4.0	2.5
IIIw	300	-	-
IIIe + IIIw	71,900	4.0	2.1
IIIs	6,000	-	-
IIIc	-	-	-
Total III	77,900	4.3	1.1
I + IIe + IIw + IIIe + IIIw	97,800	5.4	1.7
Total I+II+III	113,800	6.3	1.1
IVe	40,000	2.2	1.7
IVw	47,000	2.6	5.7
IVe + IVw	87,000	4.8	2.8
IVs	23,600	1.3	-
IVc	-	-	-
Total IV	110,600	6.1	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	184,800	10.2	2.1
Total I+II+III+IV	224,400	12.4	1.0
VIe	406,500	22.5	9.4
VIw	55,900	3.1	14.4
VIs	-	-	-
VIc	-	-	-
Total VI	462,400	25.6	3.5
VIIe	802,600	44.5	12.7
VIIw	-	-	-
VIIs	47,500	2.6	1.0
VIIc	-	-	-
Total VII	850,100	47.1	6.7
Total VI + VII + Nonclassified	1,578,480	87.6	4.1

TABLE A102. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 15	% County Soils	% State Class
0 - 3	16,500	1.0	
3 - 6	10,400	1.0	
6 - 9	47,600	2.6	
Total 0 - 9	74,500	4.1	
9 - 12	11,200	1.0	
Total 0 - 12	85,700	4.8	
12 - 15	47,700	2.6	
Total 0 - 15	133,400	7.4	
15 - 18	27,000	1.5	
Total 0 - 18	160,400	8.9	
18 - 21	213,000	11.8	
21 - 24	261,700	14.5	
Total 0 - 24	635,100	35.2	
24 - 27	-	-	
27 - 30	118,800	6.6	
Total 0 - 30	753,900	41.8	
30 - 33	-	-	
33 - 36	90,400	5.0	
Total 0 - 36	844,300	46.8	
36 - 39	114,700	6.4	
Total 0 - 39	959,000	53.2	
39 - 42	22,100	1.2	
Total 0 - 42	981,100	54.4	
42 - 45	420,800	23.3	
Total 0 - 45	1,401,900	77.8	
45 - 48	3,000	-	
Total 0 - 48	1,404,900	78.0	
48 - 51	-	-	
Total 0 - 51	1,404,900	78.0	
51 - 54	74,300	4.1	
Total 0 - 54	1,479,200	82.1	
54 - 57	56,200	3.1	
57 - 60	1,500	-	
Total 0 - 60	1,536,900	85.2	

TABLE A103. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 15	% County Soils	% State Class
0 - 3	101,000	5.6	
4 - 7	91,700	5.1	
Total 0 - 7	192,700	10.7	1.6
8 - 12	76,000	4.2	
Total 0 - 12	268,700	14.9	1.2
13 - 20	90,300	5.0	
Total 0 - 20	359,000	19.9	1.2
21 - 30	-	-	
Total 0 - 30	359,000	19.9	1.2
31 - 99	1,177,900	80.1	

TABLE A104. SEPTIC TANK FILTER FIELD LIMITATION (by acre)

Limitation	Basin 15	% County Soils	% State Class
Slight (SL)	8,800	-	1.0
Moderate (MD)	55,900	3.1	1.9
SL + MD	64,700	3.6	1.6
Severe (SV)	312,100	17.3	5.4
SL + MD + SV	376,800	20.9	3.9
Very Severe (VS)	1,160,100	64.4	2.9
Nonclassified (NC)	265,340		
NC + VS	1,425,440	79.1	2.7

TABLE A105. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 15	% County Soils	% State Class
Over 210	-	-	-
195 - 210	-	-	-
180 - 195	73,600	4.1	
165 - 180	176,800	9.8	
150 - 165	123,000	6.8	
Over 150	373,400	20.7	
135 - 150	261,700	14.5	
120 - 135	-	-	
105 - 120	114,700	6.4	
Over 105	749,800	41.6	
90 - 105	90,400	5.0	1.6
Over 90	840,200	46.6	
75 - 90	271,400	15.0	1.9
Over 75	1,111,600	61.6	
60 - 75	22,100	1.2	1.0
Over 60	1,133,700	62.9	
45 - 60	-	-	
Over 45	1,133,700	62.9	
30 - 45	324,400	18.0	9.9
Over 30	1,458,100	80.9	
0 - 30	78,800	4.4	1.6

JEFFERSON COUNTY

1,148,160 acres 1,014,400 acres classified (88.4%)

TABLE A106. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	230,200	-	230,200	20.0	3.6
Pasture (P)	-	-	-	-	-
C + P			230,200	20.0	2.4
Forests (F)	123,700	4,000	127,700	11.2	1.0
Range (R)	451,300	134,600	585,900	51.0	2.6
F + R			713,600	62.2	1.9
Hay (H)	-	-	-	-	-
C + P + H			230,200	20.0	2.4
Water Shed	70,600		70,600	6.1	4.0
P + R			585,900	51.0	2.3
Nonclassified [N]			[133,760]	[11.6]	[1.1]
F + [N]			[261,460]	[22.8]	[1.0]

TABLE A107. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	17,200	-	17,200	1.5	1.2
Good (G)	125,500	-	125,500	10.9	2.9
E + G			142,700	12.4	2.5
Fair (F)	97,400	-	97,400	8.5	1.5
E + G + F			240,100	20.9	2.0
Poor (P)	104,600	1,200	105,800	9.2	2.2
E + G + F + P			345,900	30.1	2.1
Nonirrigable (N)	531,100	137,400	668,500		
Nonclassified [N]			[802,260]	[69.9]	[1.8]

TABLE A108. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
I	1,700	-	1,700	-	1.0
IIe	5,200	-	5,200	-	1.0
IIw	-	-	-	-	-
IIIe + IIIw			5,200	-	-
IIs	19,400	-	19,400	1.7	7.5
IIc	17,000	-	17,000	1.5	2.0
Total II	41,600	-	41,600	3.6	1.3
I + IIe + IIw			6,900	1.0	-
Total I + II			43,300	3.8	1.3
IIIe	165,900	400	166,300	14.5	5.8
IIIw	-	-	-	-	-
IIIe + IIIw			166,300	14.5	4.8
IIIs	1,000	-	1,000	-	-
IIIc	15,000	-	15,000	1.3	1.0
Total III	181,900	400	182,300	15.9	2.6
I + IIe + IIw + IIIe + IIIw			173,200	15.1	3.1
Total I+II+III			225,600	19.6	2.2
IVe	73,500	-	73,500	6.4	7.8
IVw	-	-	-	-	-
IVe + IVw			73,500	6.4	2.3
IVs	46,300	-	46,300	4.1	1.0
IVc	2,800	-	2,800	-	-
Total IV	122,600	-	122,600	10.7	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			246,700	21.5	2.8
Total I+II+III+IV			348,200	30.3	1.5
VIe	68,800	-	68,800	6.0	1.6
VIw	-	-	-	-	-
VIs	91,600	8,100	99,700	8.7	1.6
VIc	33,000	2,500	35,500	3.1	1.6
Total VI	193,400	10,600	204,000	17.8	1.5
VIIe	138,400	18,800	157,200	13.7	2.5
VIIw	-	-	-	-	-
VIIs	191,200	108,000	299,200	26.0	4.7
VIIc	5,000	800	5,800	1.0	8.2
Total VII	334,600	127,600	462,200	40.2	3.6
Total VI + VII + Nonclassified			799,960	69.7	2.1

TABLE A109. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	-
3 - 6					
6 - 9					
Total 0 - 9	-	-	-	-	-
9 - 12					
Total 0 - 12	-	-	-	-	-
12 - 15					
Total 0 - 15	-	-	-	-	-
15 - 18					
Total 0 - 18	-	-	-	-	-
18 - 21	41,100	6,900	48,100	4.2	
21 - 24	151,800	0	151,800	13.2	
Total 0 - 24			199,900	17.4	
24 - 27	49,000	400	49,400	4.3	
27 - 30	191,300	-	191,300	16.7	
Total 0 - 30			440,500	38.4	
30 - 33	50,900	49,600	100,500	8.8	
33 - 36	189,000	15,600	204,600	17.8	
Total 0 - 36			745,600	64.9	
36 - 39	-	-	-	-	
Total 0 - 39			745,600	64.9	
39 - 42	49,900	59,600	109,500	9.5	
Total 0 - 42			855,100	74.4	
42 - 45	49,700	6,500	56,200	4.9	
Total 0 - 45			911,300	79.3	
45 - 48	76,300	-	76,300	6.6	
Total 0 - 48			987,600	86.0	
48 - 51	2,400	-	2,400	-	
Total 0 - 51			990,000	86.2	
51 - 54	24,400	-	24,400	2.1	
Total 0 - 54			1,014,400	88.3	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A110. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	27,600	-	26,600	2.4	
4 - 7	164,900	-	164,900	14.4	
Total 0 - 7			192,500	16.8	1.6
8 - 12	218,600	1,600	220,200	19.2	
Total 0 - 12			412,700	36.0	1.8
13 - 20	47,800	-	47,800	4.2	
Total 0 - 20			460,500	40.2	1.6
21 - 30	1,000	-	1,000	-	
Total 0 - 30			461,500	40.2	1.6
31 - 99	415,900	137,000	552,900	59.7	

TABLE A111. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	1,700	-	1,700	-	-
Moderate (MD)	68,900	-	68,900	6.0	2.4
SL + MD			70,600	6.1	1.8
Severe (SV)	202,900	-	202,900	17.7	3.5
SL + MD + SV			273,500	23.8	2.8
Very Severe (VS)	602,300	138,600	740,900	64.5	1.9
Nonclassified (NC)			133,760		
NC + VS			874,660	76.2	1.7

TABLE A112. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	-
195 - 210					
180 - 195					
165 - 180					
150 - 165					
Over 150	-	-	-	-	-
135 - 150					
120 - 135					
105 - 120					
Over 105	-	-	-	-	-
90 - 105	241,900	56,900	298,800	26.0	5.3
Over 90			298,800	26.0	
75 - 90	167,100	2,500	169,600	14.8	1.2
Over 75			468,400	40.8	
60 - 75	330,900	15,600	346,500	30.2	14.1
Over 60			814,900	71.0	
45 - 60	12,500	59,600	72,100	6.3	3.7
Over 45			887,000	77.3	
30 - 45	23,400	3,200	26,600	2.3	1.0
Over 30			913,600	79.6	
0 - 30	100,000	800	100,800	8.8	2.0

JOSEPHINE COUNTY

1,040,000 acres 978,900 acres classified (94.1%)

TABLE A113. MAJOR LAND USE (in acres)

Major Land Use	Basin 15	% County Soils	% State Class
Cultivated (C)	33,100	3.2	1.0
Pasture (P)	72,300	7.0	2.4
C + P	105,400	10.2	1.1
Forests (F)	873,500	84.0	5.5
Range (R)	-	-	-
F + R	873,500	84.0	2.3
Hay (H)	-	-	-
C + P + H	105,400	10.2	1.1
Water Shed	-	-	-
P + R	72,300	7.0	-
Nonclassified [N]	[61,100]	[5.9]	[1.0]
F + [N]	[934,600]	[89.9]	[3.3]

TABLE A114. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 15	% County Soils	% State Class
Excellent (E)	20,900	2.0	1.5
Good (G)	34,400	3.3	1.0
E + G	55,300	5.3	1.0
Fair (F)	38,000	3.6	1.0
E + G + F	93,300	8.9	1.0
Poor (P)	12,100	1.2	-
E + G + F + P	105,400	10.1	1.0
Nonirrigable (N)	873,500		
Nonclassified [N]	[934,600]	[89.9]	[2.1]

TABLE A115. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 15	% County Soils	% State Class
I	7,300	1.0	3.8
IIe	13,600	1.3	1.0
IIw	-	-	-
IIe + IIw	13,600	1.3	1.0
IIs	5,400	1.0	2.1
IIc	-	-	-
Total II	19,000	1.8	1.0
I + IIe + IIw	20,900	2.0	1.0
Total I + II	26,300	2.5	1.0
IIIe	6,800	1.0	-
IIIw	1,000	-	-
IIIe + IIIw	7,800	1.0	-
IIIs	34,600	3.3	2.3
IIIc	-	-	-
Total III	42,400	4.1	1.0
I + IIe + IIw + IIIe + IIIw	28,700	2.8	1.0
Total I+II+III	68,700	6.6	1.0
IVe	-	-	-
IVw	2,200	-	-
IVe + IVw	2,200	-	-
IVs	30,700	3.0	1.0
IVc	-	-	-
Total IV	32,900	3.2	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	30,900	3.0	-
Total I+II+III+IV	101,600	9.8	-
VIe	142,500	13.7	3.3
VIw	-	-	-
VIs	3,800	-	-
VIc	-	-	-
Total VI	146,300	14.1	1.1
VIIe	720,100	69.2	11.4
VIIw	-	-	-
VIIs	10,900	1.0	-
VIIc	-	-	-
Total VII	731,000	70.2	5.7
Total VI + VII + Nonclassified	938,400	90.2	2.4

TABLE A116. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 15	% County Soils	% State Class
0 - 3	7,100	1.0	
3 - 6	11,400	1.1	
6 - 9	-	-	
Total 0 - 9	18,500	1.8	
9 - 12	-	-	
Total 0 - 12	18,500	1.8	
12 - 15	29,300	2.8	
Total 0 - 15	47,800	4.6	
15 - 18	68,500	6.6	
Total 0 - 18	116,300	11.2	
18 - 21	-	-	
21 - 24	497,300	47.8	
Total 0 - 24	613,600	59.0	
24 - 27	-	-	
27 - 30	-	-	
Total 0 - 30	613,600	59.0	
30 - 33	-	-	
33 - 36	-	-	
Total 0 - 36	613,600	59.0	
36 - 39	222,800	21.4	
Total 0 - 39	836,400	80.4	
39 - 42	-	-	
Total 0 - 42	836,400	80.4	
42 - 45	142,500	13.7	
Total 0 - 45	978,900	94.1	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A117. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 15	% County Soils	% State Class
0 - 3	54,500	5.2	
4 - 7	20,700	2.0	
Total 0 - 7	75,200	7.2	1.0
8 - 12	35,000	3.4	
Total 0 - 12	110,200	10.6	
13 - 20	6,100	1.0	
Total 0 - 20	116,300	11.2	-
21 - 30	-	-	
Total 0 - 30	116,300	11.2	
31 - 99	862,600	88.8	

TABLE A118. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 15	% County Soils	% State Class
Slight (SL)	20,400	2.0	2.0
Moderate (MD)	3,800	-	-
SL + MD	24,200	2.3	1.0
Severe (SV)	25,400	2.4	-
SL + MD + SV	49,600	4.7	1.0
Very Severe (VS)	929,300	89.4	2.3
Nonclassified (NC)	61,100		
NC + VS	990,400	95.3	1.9

TABLE A119. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 15	% County Soils	% State Class
Over 210	-	-	
195 - 210	-	-	
180 - 195	7,600	1.0	
165 - 180	75,200	7.2	
150 - 165	33,500	3.2	
Over 150	116,300	11.2	
135 - 150	497,300	47.8	
120 - 135	-	-	
105 - 120	222,800	21.4	
Over 105	836,400	80.4	
90 - 105	-	-	
Over 90	836,400	80.4	
75 - 90	142,500	13.7	1.0
Over 75	978,900		
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

KLAMATH COUNTY

3,822,720 acres 4,606,600 acres classified (120.5%)

TABLE A120. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 13	Basin 14	Basin 15
Cultivated (C)	-	2,000	169,100	-
Pasture (P)	5,200	1,500	267,000	-
C + P				
Forests (F)	445,600	655,800	2,321,000	9,900
Range (R)	-	-	567,700	-
F + R				
Hay (H)	-	-	-	-
C + P + H				
Water Shed	6,400	-	152,000	3,400
P + R				
Nonclassified [N]				
F + [N]				

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	171,100	4.5	2.7
Pasture (P)	273,700	7.2	9.0
C + P	444,800	11.7	4.7
Forests (F)	3,432,300	89.8	21.8
Range (R)	567,700	14.8	2.5
F + R	4,000,000	104.6	10.5
Hay (H)	-	-	-
C + P + H	444,800	11.7	4.7
Water Shed	161,800	4.2	9.1
P + R	841,400	22.0	3.3
Nonclassified [N]	-	-	-
F + [N]			

TABLE A121. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 13	Basin 14	Basin 15
Excellent (E)	-	-	42,400	-
Good (G)	-	3,500	139,700	-
E + G				
Fair (F)	5,200	-	741,800	3,800
E + G + F				
Poor (P)	39,600	-	52,000	2,200
E + G + F + P				
Nonirrigable (N)	412,400	655,800	2,500,900	7,300
Nonclassified [N]				

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	42,400	1.1	3.1
Good (G)	143,200	3.7	3.3
E + G	185,600	4.8	3.3
Fair (F)	750,800	19.6	11.9
E + G + F	936,400	24.4	7.8
Poor (P)	93,800	2.4	2.0
E + G + F + P	1,030,200	26.8	6.2
Nonirrigable (N)	3,576,400		
Nonclassified [N]	[2,791,880]	[73.2]	[6.2]

TABLE A122. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 13	Basin 14	Basin 15
I	-	-	-	-
IIe	-	-	28,400	-
IIw	-	-	-	-
IIe + IIw				
IIs	-	-	-	-
IIc	-	-	21,700	-
Total II	-	-	50,100	-
I + IIe + IIw				
Total I + II				
IIIe	-	-	46,400	-
IIIw	5,200	2,000	63,700	-
IIIe + IIIw				
IIIs	-	-	61,000	-
IIIc	-	-	6,600	-
Total III	5,200	2,000	177,700	-
I + IIe + IIw + IIIe + IIIw				
Total I+II+III				
IVe	-	-	45,700	-
IVw	-	1,500	207,600	-
IVe + IVw				
IVs	-	-	5,500	-
IVc	355,000	82,800	19,400	-
Total IV	355,000	84,300	278,200	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw				
Total I+II+III+IV				
VIe	600	-	933,800	6,700
VIw	-	-	260,800	1,300
VIs	2,500	-	-	-
VIc	90,000	23,400	497,400	-
Total VI	93,100	23,400	1,692,000	8,000
VIIe	-	549,600	700,700	1,900
VIIw	-	-	-	-
VIIs	3,900	-	578,100	3,400
VIIc	-	-	-	-
Total VII	3,900	549,600	1,278,800	5,300
Total VI + VII + Nonclassified				

TABLE A122. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	28,400	1.0	2.8
IIw	-	-	-
IIe + IIw	28,400	1.0	1.4
IIs	-	-	-
IIc	21,700	1.0	2.5
Total II	50,100	1.3	1.6
I + IIe + IIw	28,400	1.0	1.3
Total I + II	50,100	1.3	1.5
IIIe	46,400	1.2	1.6
IIIw	70,900	1.8	12.0
IIIe + IIIw	117,300	3.1	3.4
IIIs	61,000	1.6	4.1
IIIc	6,600	-	-
Total III	184,900	4.8	2.6
I + IIe + IIw + IIIe + IIIw	145,700	3.8	2.6
Total I+II+III	235,000	6.1	2.3
IVe	45,700	1.2	2.0
IVw	209,100	5.5	25.3
IVe + IVw	254,800	6.7	8.1
IVs	5,500	-	-
IVc	457,200	12.0	10.5
Total IV	717,500	18.8	5.5
I+IIe+IIw+IIIe + IIIw+IVe+IVw	400,500	10.5	4.6
Total I+II+III+IV	952,500	24.9	4.1
VIe	941,100	20.4	21.8
VIw	262,100	5.7	67.4
VIs	2,500	-	-
VIc	610,800	13.2	27.0
Total VI	1,816,500	39.4	13.7
VIIe	1,252,200	27.2	19.8
VIIw	-	-	-
VIIs	585,400	12.7	9.2
VIIc	-	-	-
Total VII	1,837,600	39.9	14.4
Total VI + VII + Nonclassified	3,654,100	79.3	9.5

TABLE A123. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 13	Basin 14	Basin 15
0 - 3	-	-	-	-
3 - 6				
6 - 9				
Total 0 - 9	-	-	-	-
9 - 12				
Total 0 - 12	-	-	-	-
12 - 15				
Total 0 - 15	-	-	-	-
15 - 18				
Total 0 - 18	-	-	-	-
18 - 21				
21 - 24				
Total 0 - 24	-	-	-	-
24 - 27				
27 - 30				
Total 0 - 30	-	-	-	-
30 - 33				
33 - 36				
Total 0 - 36	-	-	-	-
36 - 39				
Total 0 - 39	-	-	-	-
39 - 42	-	-	96,100	-
Total 0 - 42				
42 - 45	-	-	496,400	4,700
Total 0 - 45				
45 - 48	11,600	3,500	345,200	3,400
Total 0 - 48				
48 - 51	-	-	252,700	-
Total 0 - 51				
51 - 54	445,600	117,700	1,646,800	2,300
Total 0 - 54				
54 - 57	-	538,100	603,100	1,900
57 - 60	-	-	-	-
Total 0 - 60				

TABLE A123. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18	-	-	
18 - 21			
21 - 24			
Total 0 - 24	-	-	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42	96,100	2.5	
Total 0 - 42	96,100	2.5	
42 - 45	501,100	13.1	
Total 0 - 45	597,200	15.6	
45 - 48	363,700	9.5	
Total 0 - 48	960,900	25.1	
48 - 51	252,700	6.6	
Total 0 - 51	1,213,600	31.7	
51 - 54	2,212,400	57.9	
Total 0 - 54	3,426,000	89.6	
54 - 57	1,143,100	29.9	
57 - 60			
Total 0 - 60	4,569,100		

TABLE A124. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 13	Basin 14	Basin 15
0 - 3	130,700	3,500	674,600	-
4 - 7	150,600	-	501,100	3,800
Total 0 - 7				
8 - 12	58,000	82,800	-	-
Total 0 - 12				
13 - 20	63,200	-	27,900	5,100
Total 0 - 20				
21 - 30	-	-	530,500	-
Total 0 - 30				
31 - 99	54,700	573,000	1,742,700	4,400

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	808,800	21.2	
4 - 7	655,500	17.2	
Total 0 - 7	1,464,300	38.4	12.3
8 - 12	140,800	3.7	
Total 0 - 12	1,605,100	42.1	6.9
13 - 20	96,200	2.5	
Total 0 - 20	1,701,300	44.6	5.8
21 - 30	530,500	13.9	
Total 0 - 30	2,231,800	58.4	7.5
31 - 99	2,374,800	41.6	

TABLE A125. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 13	Basin 14	Basin 15
Slight (SL)	-	-	64,400	-
Moderate (MD)	-	-	151,900	1,300
SL + MD				
Severe (SV)	39,200	-	148,400	1,000
SL + MD + SV				
Very Severe (VS)	418,000	659,300	3,112,100	11,000
Nonclassified (NC)				
NC + VS				

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	64,400	1.7	6.4
Moderate (MD)	153,200	4.0	5.2
SL + MD	217,600	5.7	5.5
Severe (SV)	188,600	4.9	3.2
SL + MD + SV	406,200	10.6	4.2
Very SEvere (VS)	4,200,400	1.1	10.6
Nonclassified (NC)	-		
NC + VS	3,415,880	89.4	6.6

TABLE A126. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 13	Basin 14	Basin 15
Over 210	-	-	-	-
195 - 210				
180 - 195				
165 - 180				
150 - 165				
Over 150	-	-	-	-
135 - 150				
120 - 135				
105 - 120	-	-	154,200	-
Over 105				
90 - 105	-	-	400,000	-
Over 90				
75 - 90	-	-	-	-
Over 75				
60 - 75	-	-	13,400	-
Over 60				
45 - 60	5,200	-	1,100	-
Over 45				
30 - 45	-	541,600	1,140,000	6,600
Over 30				
0 - 30	452,000	117,700	1,768,100	6,700

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120	154,200	4.0	
Over 105	154,200	4.0	
90 - 105	400,000	10.5	7.1
Over 90	554,200	14.5	
75 - 90	-	-	
Over 75	554,200	14.5	
60 - 75	13,400	-	1.0
Over 60	567,600	14.8	
45 - 60	6,300	-	-
Over 45	573,900	15.0	
30 - 45	1,688,200	44.2	51.6
Over 30	2,262,100	59.2	
0 - 30	2,344,500	61.3	46.8

LAKE COUNTY

5,292,800 acres 4,679,700 acres classified (88.4%)

TABLE A127. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 12	Basin 13
Cultivated (C)	-	-	132,500
Pasture (P)	-	2,600	156,600
C + P			
Forests (F)	23,500	-	546,300
Range (R)	45,500	556,900	2,952,700
F + R			
Hay (H)	-	-	-
C + P + H			
Water Shed	-	8,600	254,500
P + R			
Nonclassified [N]			
F + [N]			

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	132,500	2.5	2.1
Pasture (P)	159,200	3.0	5.2
C + P	291,700	5.5	3.1
Forests (F)	569,800	10.7	3.6
Range (R)	3,555,100	67.2	15.9
F + R	4,124,900	77.9	10.8
Hay (H)	-	-	-
C + P + H	291,700	5.5	3.1
Water Shed	263,100	5.0	14.8
P + R	3,714,300	70.2	14.6
Nonclassified [N]	[612,400]	[11.6]	[5.0]
F + [N]	[1,182,200]	[22.3]	[4.2]

TABLE A128. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 12	Basin 13
Excellent (E)	-	1,100	13,900
Good (G)	-	10,100	191,000
E + G			
Fair (F)	9,600	34,000	560,900
E + G + F			
Poor (P)	2,100	51,100	460,400
E + G + F + P			
Nonirrigable (N)	57,300	471,800	2,816,400
Nonclassified [N]			

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	15,000	-	1.1
Good (G)	201,100	3.8	4.7
E + G	216,100	4.1	3.8
Fair (F)	604,500	11.4	9.6
E + G + F	820,600	15.5	6.8
Poor (P)	513,600	9.7	11.0
E + G + F + P	1,334,200	25.2	8.0
Nonirrigable (N)	3,345,500		
Nonclassified [N]	[3,957,960]	[74.8]	[8.8]

TABLE A129. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 12	Basin 13
I	-	-	-
IIe	-	-	41,100
IIw	-	-	43,900
IIe + IIw			
IIs	-	-	-
IIc	-	1,100	13,900
Total II	-	1,100	98,900
I + IIe + IIw			
Total I + II			
IIIe	-	-	19,800
IIIw	-	-	19,200
IIIe + IIIw			
IIIs	-	11,100	124,500
IIIc	13,900	16,400	543,500
Total III	13,900	27,500	707,000
I + IIe + IIw + IIIe + IIIw			
Total I+II+III			
IVe	-	-	118,500
IVw	-	-	39,800
IVe + IVw			
IVs	-	311,700	533,800
IVc	54,100	156,100	790,800
Total IV	54,100	467,800	1,482,900
I+IIe+IIw+IIIe + IIIw+IVe+IVw			
Total I+II+III+IV			
VIe	400	-	361,100
VIw	-	-	-
VIs	-	27,700	630,500
VIc	600	29,300	92,900
Total VI	1,000	57,000	1,084,500
VIIe	-	-	184,200
VIIw	-	-	-
VIIs	-	14,700	485,100
VIIc	-	-	-
Total VII	-	14,700	669,300
Total VI + VII + Nonclassified			

TABLE A129. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	41,100	1.0	4.0
IIw	43,900	1.0	4.6
IIe + IIw	85,000	1.6	4.3
IIs	-	-	-
IIc	15,000	-	1.7
Total II	100,000	1.9	3.2
I + IIe + IIw	85,000	1.6	3.9
Total I + II	100,000	1.9	3.0
IIIe	19,800	-	1.0
IIIw	19,200	-	3.2
IIIe + IIIw	39,000	1.0	1.0
IIIs	135,600	2.6	9.2
IIIc	573,800	10.8	28.2
Total III	748,400	14.1	10.7
I + IIe + IIw + IIIe + IIIw	124,000	2.3	2.2
Total I+II+III	848,400	16.0	8.3
IVe	118,500	2.2	5.1
IVw	39,800	1.0	4.8
IVe + IVw	158,300	3.0	5.0
IVs	845,500	16.0	15.1
IVc	1,001,000	18.9	23.0
Total IV	2,004,800	37.9	15.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	282,300	5.3	3.2
Total I+II+III+IV	2,853,200	53.9	12.2
VIe	361,500	6.8	8.4
VIw	-	-	-
VIs	658,200	12.4	10.4
VIc	122,800	2.3	5.4
Total VI	1,142,500	21.6	8.6
VIIe	184,200	3.5	2.9
VIIw	-	-	-
VIIs	499,800	9.4	7.8
VIIc	-	-	-
Total VII	684,000	12.9	5.4
Total VI + VII + Nonclassified	2,439,600	46.1	6.4

TABLE A130. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 12	Basin 13
0 - 3	-	-	-
3 - 6			
6 - 9			
Total 0 - 9	-	-	-
9 - 12			
Total 0 - 12	-	-	-
12 - 15			
Total 0 - 15	-	-	-
15 - 18			
Total 0 - 18	-	-	-
18 - 21			
21 - 24			
Total 0 - 24	-	-	-
24 - 27			
27 - 30			
Total 0 - 30	-	-	-
30 - 33			
33 - 36			
Total 0 - 36	-	-	-
36 - 39			
Total 0 - 39	-	-	-
39 - 42			
Total 0 - 42	-	-	-
42 - 45	15,100	254,600	1,370,800
Total 0 - 45			
45 - 48	30,400	191,400	1,358,000
Total 0 - 48			
48 - 51	-	91,700	434,800
Total 0 - 51			
51 - 54	23,500	3,800	398,400
Total 0 - 54			
54 - 57	-	-	176,300
57 - 60	-	-	144,200
Total 0 - 60			

TABLE A130. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18	-	-	
18 - 21			
21 - 24			
Total 0 - 24	-	-	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45	1,640,500	30.1	
Total 0 - 45	1,640,500	30.1	
45 - 48	1,579,800	29.9	
Total 0 - 48	3,220,300	60.8	
48 - 51	526,500	9.9	
Total 0 - 51	3,746,800	70.7	
51 - 54	425,700	8.0	
Total 0 - 54	4,172,500	78.7	
54 - 57	176,300	3.3	
57 - 60	144,200	2.7	
Total 0 - 60	4,493,000		

TABLE A131. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 12	Basin 13
0 - 3	-	39,600	594,400
4 - 7	19,600	22,000	439,400
Total 0 - 7			
8 - 12	38,500	436,600	1,882,500
Total 0 - 12			
13 - 20	1,500	35,300	439,100
Total 0 - 20			
21 - 30	-	-	-
Total 0 - 30			
31 - 99	9,400	34,600	687,200

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	634,000	12.0	
4 - 7	481,000	9.1	
Total 0 - 7	1,115,000	21.1	9.4
8 - 12	2,357,600	44.5	
Total 0 - 12	3,472,600	65.6	15.0
13 - 20	475,900	9.0	
Total 0 - 20	3,948,500	74.6	13.6
21 - 30	-	-	
Total 0 - 30	3,948,500	74.6	13.3
31 - 99	731,200	25.4	

TABLE A132. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 12	Basin 13
Slight (SL)	-	1,100	123,600
Moderate (MD)	-	3,100	50,900
SL + MD			
Severe (SV)	8,800	15,600	243,200
SL + MD + SV			
Very Severe (VS)	60,200	548,300	3,624,900
Nonclassified (NC)			
NC + VS			

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	124,700	2.4	12.4
Moderate (MD)	54,000	1.0	1.8
SL + MD	178,700	3.4	4.5
Severe (SV)	267,600	5.0	4.6
SL + MD + SV	446,300	8.4	4.6
Very Severe (VS)	4,233,400	80.0	10.7
Nonclassified (NC)	612,400		
NC + VS	4,845,800	91.6	9.3

TABLE A133. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 12	Basin 13
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	-
90 - 105	900	20,400	556,800
Over 90			
75 - 90	35,800	442,500	1,799,900
Over 75			
60 - 75	8,800	42,900	402,100
Over 60			
45 - 60	-	27,700	159,400
Over 45			
30 - 45	-	26,600	594,400
Over 30			
0 - 30	23,500	8,000	530,000

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	-
90 - 105	578,100	10.9	10.2
Over 90	578,100	10.9	
75 - 90	2,278,200	43.0	16.2
Over 75	2,856,300	53.9	
60 - 75	453,800	8.6	18.4
Over 60	3,310,100	62.5	
45 - 60	187,100	3.5	9.6
Over 45	3,497,200	66.0	
30 - 45	621,000	11.7	19.0
Over 30	4,118,200	77.8	
0 - 30	561,500	10.6	11.2

LANE COUNTY

2,926,720 acres 2,384,238 acres classified (81.5%)

TABLE A134. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	195,290	14,300	209,590	7.2	3.3
Pasture (P)	275,800	17,100	292,900	10.0	9.7
C + P			502,490	17.2	5.3
Forests (F)	1,866,448	11,600	1,878,048	64.4	11.9
Range (R)	-	-	-	-	-
F + R			1,878,048	64.4	4.9
Hay (H)	-	-	-	-	-
C + P + H			502,490	17.2	5.3
Water Shed	3,700		3,700	-	-
P + R			292,900	10.0	1.2
Nonclassified [N]			[534,162]	[18.3]	[4.4]
F + [N]			[2,412,210]	[82.6]	[8.6]

TABLE A135. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	77,205	12,800	90,005	3.1	6.5
Good (G)	70,435	4,000	74,435	2.6	1.7
E + G			164,440	5.7	2.9
Fair (F)	203,050	5,300	208,350	7.1	3.3
E + G + F			372,790	12.8	3.1
Poor (P)	425,930	7,400	433,330	14.8	9.2
E + G + F + P			806,120	27.6	4.8
Nonirrigable (N)	1,564,618	13,500	1,578,118		
Nonclassified [N]			[2,112,280]	[72.4]	[4.7]

TABLE A136. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
I	2,850	-	2,850	-	1.5
IIe	67,100	500	67,600	2.3	6.5
IIw	52,960	12,700	65,660	2.2	6.9
IIe + IIw			133,200	4.6	6.7
IIs	57,890	-	57,890	2.0	22.4
IIc	-	-	-	-	-
Total II	177,950	13,200	191,090	6.5	6.1
I + IIe + IIw			136,050	4.6	6.2
Total I + II			193,940	6.6	5.9
IIIe	163,860	300	164,160	5.6	5.7
IIIw	33,660	3,300	36,960	1.3	6.3
IIIe + IIIw			201,120	6.9	5.8
IIIs	1,800	-	1,800	-	-
IIIc	-	-	-	-	-
Total III	199,320	3,600	202,920	6.9	2.9
I + IIe + IIw + IIIe + IIIw			337,170	11.5	6.0
Total I+II+III			396,860	13.6	3.9
IVe	387,038	-	387,038	13.2	16.6
IVw	63,570	5,500	69,070	2.4	8.3
IVe + IVw			456,108	15.6	14.4
IVs	-	-	-	-	-
IVc	-	-	-	-	-
Total IV	450,608	5,500	456,108	15.6	3.5
I+IIe+IIw+IIIe + IIIw+IVe+IVw			743,280	27.1	9.0
Total I+II+III+IV			852,970	29.1	3.6
VIe	292,182	11,300	303,482	10.4	7.0
VIw	4,000	-	4,000	-	1.0
VIs	281,748	-	281,748	9.6	4.4
VIc	-	-	-	-	-
Total VI	577,930	11,300	589,230	20.1	4.4
VIIe	468,572	8,800	477,372	16.3	7.6
VIIw	-	600	600	-	6.4
VIIs	464,008	-	464,008	15.8	7.3
VIIc	-	-	-	-	-
Total VII	932,580	9,400	941,980	32.2	7.4
Total VI + VII + Nonclassified			2,073,750	70.8	5.4

TABLE A137. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	56,740	25,500	82,240	2.8	
3 - 6	178,660	4,300	182,960	6.3	
6 - 9	450,490	1,500	451,990	15.5	
Total 0 - 9			717,190	24.6	
9 - 12	69,340	-	69,340	2.4	
Total 0 - 12			786,530	27.0	
12 - 15	-	-	-	-	
Total 0 - 15			786,530	27.0	
15 - 18	594,656	2,700	597,356	20.5	
Total 0 - 18			1,383,886	47.5	
18 - 21	-	9,000	9,000	-	
21 - 24	252,028	-	252,028	8.6	
Total 0 - 24			1,644,914	56.4	
24 - 27	318,024	-	318,024	10.9	
27 - 30	293,620	-	293,620	10.6	
Total 0 - 30			2,256,558	77.3	
30 - 33	-	-	-	-	
33 - 36	-	-	-	-	
Total 0 - 36			2,256,558	77.3	
36 - 39	-	-	-	-	
Total 0 - 39			2,256,558	77.3	
39 - 42	127,680	-	127,680	4.4	
Total 0 - 42			2,384,238	81.7	
42 - 45					
Total 0 - 45			-	-	
45 - 48					
Total 0 - 48			-	-	
48 - 51					
Total 0 - 51			-	-	
51 - 54					
Total 0 - 54			-	-	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A138. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	222,270	26,600	248,870	8.5	
4 - 7	36,320	3,100	39,420	1.4	
Total 0 - 7			288,290	9.9	2.4
8 - 12	84,450	2,0-0	86,450	3.0	
Total 0 - 12			374,740	12.9	1.6
13 - 20	811,718	-	811,718	27.8	
Total 0 - 20			1,186,458	40.7	4.1
21 - 30	-	-	-	-	
Total 0 - 30			1,186,458	40.7	4.9
31 - 99	1,186,480	11,300	1,197,780	59.3	

TABLE A139. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	15,950	100	16,050	1.0	1.6
Moderate (MD)	-	400	400	-	-
SL + MD			16,450	1.0	-
Severe (SV)	533,130	100	533,230	18.3	9.2
SL + MD + SV			549,680	18.8	5.6
Very Severe (VS)	1,792,158	42,400	1,834,558	62.9	4.6
Nonclassified (NC)			534,162		
NC + VS			2,368,720	81.2	4.6

TABLE A140. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	Basin 18	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	600	600	-	
195 - 210	63,190	-	63,190	2.2	
180 - 195	1,546,232	30,800	1,577,032	54.0	
165 - 180	207,716	2,800	210,516	7.2	
150 - 165	800	-	800	-	
Over 150			1,852,138	63.5	
135 - 150	-	-	-	-	
120 - 135	102,000	8,800	110,800	3.8	
105 - 120	-	-	-	-	
Over 105			1,962,938	67.3	
90 - 105	-	-	-	-	
Over 90			1,962,938	67.3	
75 - 90	-	-	-	-	
Over 75			1,962,938	67.3	
60 - 75	-	-	-	-	
Over 60			1,962,938	67.3	
45 - 60	293,620	-	293,620	10.1	15.1
Over 45			2,256,558	77.4	
30 - 45	127,680	-	127,680	4.4	3.9
Over 30			2,384,238		
0 - 30	-	-	-	-	

LINCOLN COUNTY

630,400 acres 64,200 acres classified (10.2%)

TABLE A141. MAJOR LAND USE (in acres)

Major Land Use	Basin 18	% County Soils	% State Class
Cultivated (C)	13,200	2.1	-
Pasture (P)	30,000	4.8	1.0
C + P	43,200	6.9	-
Forests (F)	21,000	3.6	-
Range (R)	-	-	-
F + R	21,000	3.6	-
Hay (H)	-	-	-
C + P + H	43,200	6.9	-
Water Shed	-	-	-
P + R	30,000	4.8	-
Nonclassified [N]	[566,200]	[89.8]	[4.6]
F + [N]	[587,200]	[93.1]	[2.1]

TABLE A142. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 18	% County Soils	% State Class
Excellent (E)	15,400	2.4	1.1
Good (G)	17,500	2.8	-
E + G	32,900	5.2	1.0
Fair (F)	11,600	1.8	-
E + G + F	44,500	7.0	-
Poor (P)	8,000	1.3	-
E + G + F + P	52,500	8.3	-
Nonirrigable (N)	11,700		
Nonclassified [N]	[577,900]	[91.7]	[1.3]

TABLE A143. LAND CAPABILITY (by classes and subclasses in acres)

Classes Subclasses	Basin 18	% County Soils	% State Class
I	-	-	-
IIe	7,900	1.2	1.0
IIw	6,600	1.0	1.0
IIe + IIw	14,500	2.3	1.0
IIs	-	-	-
IIc	-	-	-
Total II	14,500	2.3	-
I + IIe + IIw	14,500	2.3	1.0
Total I + II	14,500	2.3	-
IIIe	20,600	3.3	1.0
IIIw	5,600	1.0	1.0
IIIe + IIIw	26,200	4.2	1.0
IIIs	-	-	-
IIIc	-	-	-
Total III	26,200	4.2	-
I + IIe + IIw + IIIe + IIIw	40,700	6.4	1.0
Total I+II+III	40,700	6.4	-
IVe	1,200	-	-
IVw	10,600	1.7	1.3
IVe + IVw	11,800	1.9	-
IVs	-	-	-
IVc	-	-	-
Total IV	11,800	1.9	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	52,500	8.3	1.0
Total I+II+III+IV	52,500	8.3	-
VIe	1,300	-	-
VIw	900	-	-
VIs	-	-	-
VIc	-	-	-
Total VI	2,200	-	-
VIie	9,100	1.4	-
VIIw	400	-	4.3
VIIs	-	-	-
VIIc	-	-	-
Total VII	9,500	1.5	-
Total VI + VII + Nonclassified	577,900	91.7	1.5

TABLE A144. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 18	% County Soils	% State Class
0 - 3	31,400	5.0	
3 - 6	25,900	4.1	
6 - 9	-	-	
Total 0 - 9	57,300	9.1	
9 - 12	-	-	
Total 0 - 12	57,300	9.1	
12 - 15	-	-	
Total 0 - 15	57,300	9.1	
15 - 18	300	-	
Total 0 - 18	57,600	9.1	
18 - 21	6,600	1.0	
21 - 24	-	-	
Total 0 - 24	64,200		
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A145. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 18	% County Soils	% State Class
0 - 3	30,700	4.9	
4 - 7	11,900	1.9	
Total 0 - 7	42,600	6.8	-
8 - 12	10,500	1.7	
Total 0 - 12	53,100	8.5	-
13 - 20	1,400	-	
Total 0 - 20	54,500	8.6	-
21 - 30	-	-	
Total 0 - 30	54,500	8.6	-
31 - 99	9,700	91.4	

TABLE A146. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 18	% County Soils	% State Class
Slight (SL)	6,300	1.0	1.0
Moderate (MD)	500	-	-
SL + MD	6,800	1.1	-
Severe (SV)	24,000	3.8	-
SL + MD + SV	30,800	4.9	-
Very Severe (VS)	33,400	5.3	-
Nonclassified (NC)	566,200		
NC + VS	599,600	95.1	1.2

TABLE A147. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 18	% County Soils	% State Class
Over 210	3,700	1.0	
195 - 210	-	-	
180 - 195	47,300	7.5	
165 - 180	6,600	1.0	
150 - 165	-	-	
Over 150	57,600	9.1	
135 - 150	-	-	
120 - 135	6,600	1.0	
105 - 120	-	-	
Over 105	64,200		
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

LINN COUNTY

1,468,160 acres 956,350 acres classified (65.1%)

TABLE A148. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	266,150	18.2	4.1
Pasture (P)	284,600	19.4	9.4
C + P	550,750	37.6	5.8
Forests (F)	403,050	27.5	2.6
Range (R)	-	-	-
F + R	403,050	27.5	1.0
Hay (H)	-	-	-
C + P + H	550,750	37.6	5.8
Water Shed	2,550	-	-
P + R	284,600	19.4	1.1
Nonclassified [N]	[507,970]	[34.7]	[4.2]
F + [N]	[911,020]	[62.2]	[3.2]

TABLE A149. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	103,500	7.1	7.5
Good (G)	101,400	6.9	2.4
E + G	204,900	14.0	3.6
Fair (F)	173,000	11.8	2.7
E + G + F	377,900	25.8	3.2
Poor (P)	174,450	11.9	3.7
E + G + F + P	552,350	37.7	3.3
Nonirrigable (N)	404,000		
Nonclassified [N]	[911,970]	[62.3]	[2.0]

TABLE A150. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	15,900	1.1	8.3
IIe	38,450	2.6	3.7
IIw	104,850	7.1	11.0
IIe + IIw	143,300	9.8	7.2
IIs	40,500	2.8	15.6
IIc	-	-	-
Total II	183,300	12.5	5.9
I + IIe + IIw	159,200	10.8	7.3
Total I + II	199,700	13.6	6.0
IIIe	110,800	7.5	3.9
IIIw	37,600	2.6	6.4
IIIe + IIIw	148,400	10.1	4.3
IIIs	-	-	-
IIIc	-	-	-
Total III	148,400	10.1	2.1
I + IIe + IIw + IIIe + IIIw	307,600	21.0	5.5
Total I+II+III	348,100	23.7	3.4
IVe	107,450	7.3	4.6
IVw	150,450	10.2	18.2
IVe + IVw	257,900	17.6	8.2
IVs	-	-	-
IVc	-	-	-
Total IV	257,900	17.6	2.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	565,500	38.5	6.4
Total I+II+III+IV	608,000	41.4	2.6
VIe	84,900	5.8	2.0
VIw	1,000	-	-
VIs	104,600	7.1	1.6
VIc	-	-	-
Total VI	190,500	13.0	1.4
VIIe	100,550	6.8	1.6
VIIw	-	-	-
VIis	59,300	4.0	1.0
VIIc	-	-	-
Total VII	159,850	10.9	1.2
Total VI + VII + Nonclassified	860,160	58.6	2.2

TABLE A151. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	204,050	13.9	
3 - 6	164,650	11.2	
6 - 9	218,650	14.9	
Total 0 - 9	587,350	40.1	
9 - 12	20,250	1.4	
Total 0 - 12	607,600	41.5	
12 - 15	9,550	1.0	
Total 0 - 15	617,150	42.1	
15 - 18	149,700	10.2	
Total 0 - 18	766,850	52.4	
18 - 21	-	-	
21 - 24	53,550	3.6	
Total 0 - 24	820,400	56.0	
24 - 27	69,150	4.7	
27 - 30	-	-	
Total 0 - 30	889,550	60.7	
30 - 33	-	-	
33 - 36	-	-	
Total 0 - 36	889,550	60.7	
36 - 39	-	-	
Total 0 - 39	889,550	60.7	
39 - 42	66,800	4.6	
Total 0 - 42	956,350	65.3	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A152. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	353,550	24.1	
4 - 7	18,200	1.2	
Total 0 - 7	371,750	25.3	3.1
8 - 12	61,050	4.2	
Total 0 - 12	432,800	29.5	1.9
13 - 20	167,400	11.4	
Total 0 - 20	600,200	40.9	2.1
21 - 30	1,000	-	
Total 0 - 30	601,200	41.0	2.0
31 - 99	355,150	59.0	

TABLE A153. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	50,450	3.4	5.0
Moderate (MD)	7,700	1.0	-
SL + MD	58,150	4.0	1.5
Severe (SV)	342,900	23.4	5.9
SL + MD + SV	401,050	27.4	4.1
Very Severe (VS)	555,300	37.9	1.4
Nonclassified (NC)	507,970		
NC + VS	1,063,270	72.6	2.0

TABLE A154. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	
195 - 210	65,800	4.5	
180 - 195	732,600	50.0	
165 - 180	67,900	4.6	
150 - 165	-	-	
Over 150	866,300	59.2	
135 - 150	-	-	
120 - 135	23,250	1.6	
105 - 120	-	-	
Over 105	889,550	60.7	
90 - 105	-	-	
Over 90	889,550	60.7	
75 - 90	-	-	
Over 75	889,550	60.7	
60 - 75	-	-	
Over 60	889,550	60.7	
45 - 60	-	-	
Over 45	889,550	60.7	
30 - 45	66,800	4.6	2.0
Over 30	956,350		
0 - 30			

MALHEUR COUNTY

6,316,800 acres

6,131,000 acres classified (97.0%)

TABLE A155. MAJOR LAND USE (in acres)

Major Land Use	Basin 10	Basin 11	Basin 12
Cultivated (C)	315,300	70,900	-
Pasture (P)	34,900	65,900	9,800
C + P			
Forests (F)	17,200	-	-
Range (R)	1,662,300	3,340,300	237,500
F + R			
Hay (H)	-	-	-
C + P + H			
Water Shed	96,000	257,200	23,700
P + R			
Nonclassified [N]			
F + [N]			

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	386,200	6.1	6.0
Pasture (P)	110,600	1.8	3.6
C + P	496,800	7.9	5.2
Forests (F)	17,200	-	-
Range (R)	5,240,100	83.0	23.4
F + R	5,257,300	83.2	13.8
Hay (H)	-	-	-
C + P + H	496,800	7.9	5.2
Water Shed	376,900	6.0	21.3
P + R	5,350,700	84.7	21.0
Nonclassified [N]	[185,800]	[2.9]	[1.5]
F + [N]	[203,000]	[3.2]	[1.0]

TABLE A156. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 10	Basin 11	Basin 12
Excellent (E)	75,200	77,400	6,500
Good (G)	137,500	107,600	20,600
E + G			
Fair (F)	209,900	473,100	69,000
E + G + F			
Poor (P)	165,900	417,800	16,700
E + G + F + P			
Nonirrigable (N)	1,537,200	2,658,400	158,200
Nonclassified [N]			

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	159,100	2.5	11.5
Good (G)	265,700	4.2	6.2
E + G	424,800	6.7	7.5
Fair (F)	752,000	11.9	11.9
E + G + F	1,176,800	18.6	9.8
Poor (P)	600,400	9.5	12.8
E + G + F + P	1,777,200	28.1	10.7
Nonirrigable (N)	4,353,800		
Nonclassified [N]	[4,539,600]	[71.9]	[10.1]

TABLE A157. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 10	Basin 11	Basin 12
I	-	-	-
IIe	47,400	11,400	-
IIw	-	-	-
IIe + IIw			
IIs	46,400	13,600	-
IIc	87,600	113,000	9,100
Total II	181,400	138,000	9,100
I + IIe + IIw			
Total I + II			
IIIe	46,700	-	-
IIIw	21,500	4,200	-
IIIe + IIIw			
IIIs	150,400	210,500	9,500
IIIc	51,700	294,200	59,300
Total III	270,300	508,900	68,800
I + IIe + IIw + IIIe + IIIw			
Total I+II+III			
IVe	19,600	7,600	-
IVw	-	-	-
IVe + IVw			
IVs	310,600	1,207,500	43,900
IVc	89,700	518,000	40,400
Total IV	419,900	1,733,100	84,300
I+IIe+IIw+IIIe + IIIw +IVe+IVw			
Total I+II+III+IV			
VIe	20,800	3,600	-
VIw	-	-	-
VIs	367,200	642,000	55,500
VIc	109,400	236,600	4,000
Total VI	497,400	882,200	59,500
VIIe	31,100	-	3,300
VIIw	-	-	-
VIIs	725,600	472,100	46,000
VIIc	-	-	-
Total VII	756,700	472,100	49,300
Total VI + VII + Nonclassified			

TABLE A157. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-
IIe	58,800	1.0	5.7
IIw	-	-	-
IIe + IIw	58,800	1.0	2.9
IIs	60,000	1.0	23.2
IIc	209,700	3.3	24.1
Total II	328,500	5.2	10.5
I + IIe + IIw	57,800	1.0	2.6
Total I + II	328,500	5.2	9.9
IIIe	46,700	1.0	1.6
IIIw	25,700	-	4.4
IIIe + IIIw	72,400	1.1	2.1
IIIs	370,400	5.9	25.0
IIIc	405,200	6.4	19.9
Total III	848,000	13.4	12.2
I + IIe + IIw + IIIe + IIIw	130,200	2.1	2.3
Total I+II+III	1,176,500	18.6	11.4
IVe	27,200	-	1.2
IVw	-	-	-
IVe + IVw	27,200	-	1.0
IVs	1,562,000	24.7	27.9
IVc	648,100	10.2	14.9
Total IV	2,237,300	35.4	17.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw	157,400	2.5	1.8
Total I+II+III+IV	3,413,800	54.0	14.6
VIe	24,400	-	1.0
VIw	-	-	-
VIs	1,064,700	16.8	16.8
VIc	350,000	5.5	15.5
Total VI	1,439,100	22.9	10.9
VIIe	34,400	1.0	1.0
VIIw	-	-	-
VIIs	1,243,700	19.7	19.5
VIIc	-	-	-
Total VII	1,278,100	20.2	10.0
Total VI + VII + Nonclassified	2,903,000	46.0	7.6

TABLE A158. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 10	Basin 11	Basin 12
0 - 3	-	-	-
3 - 6			
6 - 9			
Total 0 - 9	-	-	-
9 - 12			
Total 0 - 12	-	-	-
12 - 15			
Total 0 - 15	-	-	-
15 - 18			
Total 0 - 18	-	-	-
18 - 21	40,200	4,200	-
21 - 24	89,800	56,200	-
Total 0 - 24			
24 - 27	106,700	9,400	-
27 - 30	35,900	1,100	-
Total 0 - 30			
30 - 33	328,300	-	-
33 - 36	236,800	22,100	-
Total 0 - 36			
36 - 39	49,500	65,900	-
Total 0 - 39			
39 - 42	558,200	1,278,300	41,900
Total 0 - 42			
42 - 45	162,000	529,300	51,600
Total 0 - 45			
45 - 48	299,300	1,494,300	140,800
Total 0 - 48			
48 - 51	219,000	270,900	36,700
Total 0 - 51			
51 - 54	-	2,600	-
Total 0 - 54			
54 - 57			
57 - 60			
Total 0 - 60	-	-	-

TABLE A158. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18	-	-	
18 - 21	44,400	1.0	
21 - 24	146,000	2.3	
Total 0 - 24	190,300	3.0	
24 - 27	116,100	1.8	
27 - 30	37,000	1.0	
Total 0 - 30	343,500	5.4	
30 - 33	328,300	5.2	
33 - 36	258,900	4.1	
Total 0 - 36	930,700	14.7	
36 - 39	115,400	1.8	
Total 0 - 30	1,046,100	16.6	
39 - 42	1,878,400	29.7	
Total 0 - 42	2,924,500	46.3	
42 - 45	742,900	11.8	
Total 0 - 45	3,667,400	58.0	
45 - 48	1,934,400	30.6	
Total 0 - 48	5,601,800	88.7	
48 - 51	526,600	8.3	
Total 0 - 51	6,128,400	97.0	
51 - 54	2,600	-	
Total 0 - 54	6,131,000		
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A159. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 10	Basin 11	Basin 12
0 - 3	198,700	233,100	42,400
4 - 7	302,900	413,000	53,500
Total 0 - 7			
8 - 12	380,300	1,623,000	46,100
Total 0 - 12			
13 - 20	330,100	646,700	70,300
Total 0 - 20			
21 - 30	-	-	-
Total 0 - 30			
31 - 99	913,700	818,500	58,700

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	474,200	7.5	
4 - 7	769,400	12.2	
Total 0 - 7	1,243,600	19.7	10.5
8 - 12	2,049,400	32.4	
Total 0 - 12	3,293,000	52.1	14.2
13 - 20	1,047,100	16.6	
Total 0 - 20	4,340,100	68.7	14.9
21 - 30	-	-	
Total 0 - 30	4,340,100	68.2	14.6
31 - 99	1,790,900	31.8	

TABLE A160. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 10	Basin 11	Basin 12
Slight (SL0	59,300	89,900	9,100
Moderate (MD)	214,100	106,700	16,800
SL + MD			
Severe (SV)	52,900	95,300	19,000
SL + MD + SV			
Very Severe (VS)	1,799,400	3,442,400	226,100
Nonclassified (NC)			
NC + VS			

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	158,300	2.5	15.7
Moderate (MD)	337,600	5.3	11.6
SL + MD	495,900	7.8	12.6
Severe (SV)	167,200	2.6	2.9
SL + MD + SV	663,100	10.4	6.8
Very Severe (VS)	5,467,900	86.6	13.8
Nonclassified (NC)	185,800		
NC + VS	5,653,700	89.6	10.9

TABLE A161. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 10	Basin 11	Basin 12
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180	-	14,800	-
150 - 165	197,300	55,000	-
Over 150			
135 - 150	42,200	1,100	-
120 - 135	584,500	-	-
105 - 120	38,700	-	-
Over 105			
90 - 105	260,900	559,100	19,800
Over 90			
75 - 90	746,400	2,592,900	192,300
Over 75			
60 - 75	104,200	101,100	35,500
Over 60			
45 - 60	53,800	37,900	-
Over 45			
30 - 45	-	-	-
Over 30			
0 - 30	97,700	372,400	23,400

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180	14,800	-	
150 - 165	252,300	4.0	
Over 150	267,100	4.2	
135 - 150	43,300	1.0	
120 - 135	584,500	9.2	
105 - 120	38,700	1.0	
Over 105	933,600	14.8	
90 - 105	839,800	13.3	14.9
Over 90	1,773,400	28.1	
75 - 90	3,531,600	55.9	25.2
Over 75	5,305,000	84.0	
60 - 75	240,800	3.8	9.8
Over 60	5,545,800	87.8	
45 - 60	91,700	1.4	4.7
Over 45	5,637,500	89.2	
30 - 45	-	-	
Over 30	5,637,500	89.2	
0 - 30	493,500	7.8	9.8

MARION COUNTY

750,720 acres

532,856 acres classified (71.0%)

TABLE A162. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	251,567	33.5	3.9
Pasture (P)	123,996	16.5	4.1
C + P	375,563	50.0	4.0
Forests (F)	141,973	18.9	1.0
Range (R)	-	-	-
F + R	141,973	18.9	-
Hay (H)	-	-	-
C + P + H	375,563	50.0	4.0
Water Shed	15,320	2.0	1.0
P + R	123,996	16.5	-
Nonclassified [N]	[217,864]	[29.0]	[1.8]
F + [N]	[359,837]	[47.9]	[1.3]

TABLE A163. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	133,439	17.8	9.7
Good (G)	100,543	13.4	2.3
E + G	233,982	31.2	4.1
Fair (F)	104,764	14.0	1.6
E + G + F	338,746	45.2	2.8
Poor (P)	48,059	6.4	1.0
E + G + F + P	386,805	51.6	2.3
Nonirrigable (N)	146,051		
Nonclassified [N]	[363,915]	[48.4]	[1.0]

TABLE A164. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	9,730	1.3	5.0
IIe	67,831	9.0	6.6
IIw	150,802	20.1	15.8
IIe + IIw	218,630	29.1	11.0
IIs	5,640	1.0	2.2
IIc	-	-	-
Total II	224,273	29.9	7.2
I + IIe + IIw	228,360	30.4	10.5
Total I + II	234,000	31.2	7.1
IIIe	67,873	9.0	2.4
IIIw	31,691	4.2	5.4
IIIe + IIIw	99,560	13.3	2.9
IIIs	6,451	1.0	-
IIIc	-	-	-
Total III	106,015	14.1	1.5
I + IIe + IIw + IIIe + IIIw	327,920	43.7	5.8
Total I+II+III	340,020	45.3	3.3
IVe	35,105	4.7	1.5
IVw	38,797	5.2	4.7
IVe + IVw	73,900	9.8	2.3
IVs	-	-	-
IVc	-	-	-
Total IV	73,902	9.8	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	401,820	53.5	4.6
Total I+II+III+IV	413,920	55.1	1.8
VIe	63,417	8.4	1.5
VIw	720	-	-
VIs	18,724	2.5	-
VIc	-	-	-
Total VI	82,861	10.9	1.0
VIIe	23,415	3.1	-
VIIw	-	-	-
VIIs	12,660	1.7	-
VIIc	-	-	-
Total VII	36,075	4.8	-
Total VI + VII + Nonclassified	336,800	44.9	1.0

TABLE A165. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	212,028	28.2	
3 - 6	45,155	6.0	
6 - 9	126,935	16.9	
Total 0 - 9	384,118	51.2	
9 - 12	2,790	-	
Total 0 - 12	386,908	51.5	
12 - 15	-	-	
Total 0 - 15	386,908	51.5	
15 - 18	66,863	8.9	
Total 0 - 18	453,771	60.4	
18 - 21	720	-	
21 - 24	49,670	6.6	
Total 0 - 24	504,161	67.2	
24 - 27	-	-	
27 - 30	-	-	
Total 0 - 30	504,161	67.2	
30 - 33	-	-	
33 - 36	-	-	
Total 0 - 36	504,161	67.2	
36 - 39	-	-	
Total 0 - 39	504,161	67.2	
39 - 42	28,695	3.8	
Total 0 - 42	532,856	71.0	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A166. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	241,280	32.1	
4 - 7	61,384	8.2	
Total 0 - 7	302,664	40.3	2.5
8 - 12	44,578	5.9	
Total 0 - 12	347,242	46.2	1.5
13 - 20	64,033	8.5	
Total 0 - 20	411,275	54.7	1.4
21 - 30	6,338	1.0	
Total 0 - 30	417,613	55.6	1.4
31 - 99	115,243	44.4	

TABLE A167. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	84,321	11.2	8.4
Moderate (MD)	9,577	1.3	-
SL + MD	93,898	12.5	2.4
Severe (SV)	182,164	24.3	3.1
SL + MD + SV	276,062	36.8	2.8
Very Severe (VS)	256,794	34.2	1.0
Nonclassified (NC)	217,864		
NC + VS	474,658	63.2	1.0

TABLE A168. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	-
195 - 210	-	-	
180 - 195	500,651	66.7	
165 - 180	3,510	-	
150 - 165	-	-	
Over 150	504,161	67.2	
135 - 150	-	-	
120 - 135	-	-	
105 - 120	-	-	
Over 105	504,161	67.2	
90 - 105	-	-	
Over 90	504,161	67.2	
75 - 90	-	-	
Over 75	504,161	67.2	
60 - 75	-	-	
Over 60	504,161	67.2	
45 - 60	-	-	
Over 45	504,161	67.2	
30 - 45	28,695	3.8	1.0
Over 30	532,856		
0 - 30	-	-	

MORROW COUNTY

1,317,760 acres — 1,192,700 acres classified (90.5%)

TABLE A169. MAJOR LAND USE (in acres)

Major Land Use	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	49,200	579,500	628,700	47.7	9.8
Pasture (P)	-	2,900	2,900	-	-
C + P			631,600	47.9	6.7
Forests (F)	31,200	49,900	81,100	6.1	1.0
Range (R)	27,400	452,600	480,000	36.4	2.1
F + R			561,100	42.6	1.5
Hay (H)	-	-	-	-	-
C + P + H			631,600	47.9	6.7
Water Shed	-	-	-	-	-
P + R			482,900	36.6	1.9
Nonclassified [N]			[125,060]	[9.5]	[1.0]
F + [N]			[206,160]	[15.6]	[1.0]

TABLE A170. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	-	26,000	26,000	2.0	1.9
Good (G)	22,000	248,800	270,800	20.6	6.3
E + G			296,800	22.6	5.2
Fair (F)	17,000	355,900	372,900	28.3	5.9
E + G + F			669,700	50.9	5.6
Poor (P)	16,300	84,100	100,400	7.6	2.1
E + G + F + P			770,100	58.5	4.6
Nonirrigable (N)	52,500	370,100	422,600		
Nonclassified [N]			[547,060]	[41.5]	[1.2]

TABLE A171. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
I	-	29,300	29,300	2.2	15.2
IIe	-	154,400	154,400	11.7	15.0
IIw	-	8,800	8,800	1.0	1.0
IIe + IIw			163,200	12.4	8.2
IIs	-	-	-	-	-
IIc	1,700	10,000	11,700	1.0	1.3
Total II	1,700	173,200	174,900	13.3	5.6
I + IIe + IIw			192,500	14.6	8.8
Total I + II			204,200	15.5	6.2
IIIe	32,000	139,000	171,000	13.0	6.0
IIIw	-	-	-	-	-
IIIe + IIIw			171,000	13.0	5.0
IIIs	-	-	-	-	-
IIIc	1,000	3,100	4,100	-	-
Total III	33,000	142,100	175,100	13.3	2.5
I + IIe + IIw + IIIe + IIIw			363,500	27.6	6.4
Total I+II+III			379,300	28.8	3.7
IVe	10,800	216,500	227,300	17.2	9.8
IVw	-	-	-	-	-
IVe + IVw			227,300	17.2	9.8
IVs	3,600	150,800	154,400	11.7	2.8
IVc	6,600	19,500	26,100	2.0	1.0
Total IV	21,000	386,800	407,800	30.9	3.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw			590,800	44.8	6.7
Total I+II+III+IV			787,100	59.7	3.4
VIe	4,400	84,600	89,000	6.8	2.1
VIw	-	-	-	-	-
VIs	31,900	172,300	204,200	15.5	3.2
VIc	9,400	23,000	32,400	2.4	1.4
Total VI	45,700	279,900	325,600	24.7	2.5
VIIe	5,200	16,600	21,800	1.6	-
VIIw	-	-	-	-	-
VIIc	-	-	-	-	-
Total VII	6,400	73,600	80,000	6.0	1.0
Total VI + VII + Nonclassified			530,660	40.3	1.4

TABLE A172. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6	-	158,600	158,600	12.0	
6 - 9	-	157,900	157,900	12.0	
Total 0 - 9			316,500	24.0	
9 - 12	-	19,500	19,500	1.5	
Total 0 - 12			336,000	25.5	
12 - 15	-	27,800	27,800	2.1	
Total 0 - 15			363,800	27.6	
15 - 18	-	202,300	202,300	15.4	
Total 0 - 18			566,100	43.0	
18 - 21	19,800	124,800	144,600	11.0	
21 - 24	1,500	32,100	33,600	2.5	
Total 0 - 24			744,300	56.5	
24 - 27	9,600	125,200	134,800	10.2	
27 - 30	34,100	128,600	162,700	12.3	
Total 0 - 30			1,041,800	79.0	
30 - 33	-	-	-	-	
33 - 36	-	-	-	-	
Total 0 - 36			1,041,800	79.0	
36 - 39	9,000	66,100	75,100	5.7	
Total 0 - 39			1,116,900	84.7	
39 - 42	1,800	-	1,800	-	
Total 0 - 42			1,118,700	84.9	
42 - 45	800	8,400	9,200	1.0	
Total 0 - 45			1,127,900	85.6	
45 - 48	7,800	21,000	28,800	2.2	
Total 0 - 48			1,156,700	87.8	
48 - 51	15,200	12,600	27,800	2.1	
Total 0 - 51			1,184,500	89.9	
51 - 54	8,200	-	8,200	1.0	
Total 0 - 54			1,192,700	90.5	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A173. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	1,900	139,800	141,700	10.8	
4 - 7	23,600	341,600	365,200	27.7	
Total 0 - 7			506,900	38.5	4.3
8 - 12	30,800	245,200	276,000	20.9	
Total 0 - 12			782,900	59.4	3.4
13 - 20	11,800	49,300	61,100	4.6	
Total 0 - 20			844,000	64.0	2.9
21 - 30	-	300	300	-	
Total 0 - 30			844,300	64.1	2.8
31 - 99	39,700	308,700	348,400	35.9	

TABLE A174. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	-
Moderate (MD)	2,600	293,800	296,400	22.5	10.1
SL + MD			296,400	22.5	7.5
Severe (SV)	9,600	329,500	339,100	25.7	5.8
SL + MD + SV			635,500	48.2	6.3
Very Severe (VS)	95,600	461,600	557,200	42.3	1.4
Nonclassified (NC)			125,060		
NC + VS			682,260	51.8	1.3

TABLE A175. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210	-	-	-	-	
180 - 195	-	36,800	36,800	2.8	
165 - 180	-	112,600	112,600	8.5	
150 - 165	-	413,400	413,400	31.4	
Over 150			562,800	42.7	
135 - 150	28,900	173,400	202,300	15.4	
120 - 135	36,100	233,100	269,200	20.4	
105 - 120	-	400	400	-	
Over 105			1,034,700	78.5	
90 - 105	7,800	30,700	38,500	2.9	1.0
Over 90			1,073,200	81.4	
75 - 90	22,900	42,000	64,900	4.9	
Over 75			1,138,100	86.3	
60 - 75	1,200	42,500	43,700	3.3	1.8
Over 60			1,181,800	89.7	
45 - 60	10,900	-	10,900	1.0	1.0
Over 45			1,192,700		
30 - 45					
Over 30	-	-	-	-	
0 - 30	-	-	-	-	

MULTNOMAH COUNTY

271,360 acres 201,350 acres classified (74.2%)

TABLE A176. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	96,000	35.4	1.5
Pasture (P)	73,000	26.9	2.4
C + P	169,000	62.3	1.8
Forests (F)	28,850	10.6	-
Range (R)	-	-	-
F + R	28,850	10.6	-
Hay (H)	-	-	-
C + P + H	169,000	62.3	1.8
Water Shed	3,500	1.3	-
P + R	73,000	26.9	-
Nonclassified [N]	[70,010]	[25.8]	[1.0]
F + [N]	[98,860]	[36.4]	-

TABLE A177. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	13,250	4.9	1.0
Good (G)	101,500	37.4	2.4
E + G	114,750	42.3	2.0
Fair (F)	23,150	8.5	-
E + G + F	137,900	50.8	1.2
Poor (P)	12,100	4.4	-
E + G + F + P	150,000	55.2	1.0
Nonirrigable (N)	51,350		
Nonclassified [N]	[121,360]	[44.7]	-

TABLE A178. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	13,250	4.9	6.9
IIe	24,550	9.0	2.4
IIw	32,390	11.9	3.4
IIe + IIw	56,940	21.0	2.9
IIs	6,000	2.2	2.3
IIc	-	-	-
Total II	62,940	23.2	2.0
I + IIe + IIw	70,190	25.9	3.2
Total I + II	76,190	28.1	2.3
IIIe	22,550	8.3	1.0
IIIw	12,960	4.8	2.2
IIIe + IIIw	35,510	13.1	1.0
IIIs	25,800	9.5	1.7
IIIc	-	-	-
Total III	61,310	22.6	1.0
I + IIe + IIw + IIIe + IIIw	105,700	39.0	1.9
Total I+II+III	137,500	50.7	1.3
IVe	14,700	5.4	1.0
IVw	1,300	1.0	-
IVe + IVw	16,000	5.9	1.0
IVs	-	-	-
IVc	-	-	-
Total IV	16,000	5.9	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	121,700	44.8	1.4
Total I+II+III+IV	153,500	56.6	1.0
VIe	42,100	15.5	1.0
VIw	-	-	-
VIs	3,150	1.2	-
VIc	-	-	-
Total VI	45,250	16.7	-
VIIe	500	-	-
VIIw	1,150	1.0	12.3
VIIs	950	-	-
VIIc	-	-	-
Total VII	2,600	1.0	-
Total VI + VII + Nonclassified	117,860	43.4	-

TABLE A179. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	38,850	14.3	
3 - 6	92,200	34.0	
6 - 9	37,950	14.0	
Total 0 - 9	169,000	62.3	
9 - 12	16,100	5.9	
Total 0 - 12	185,100	68.2	
12 - 15	-	-	
Total 0 - 15	185,100	68.2	
15 - 18	16,000	5.9	
Total 0 - 18	201,100	74.1	
18 - 21	-	-	
21 - 24	-	-	
Total 0 - 24	201,100	74.1	
24 - 27	250	-	
27 - 30	-	-	
Total 0 - 30	201,350	74.2	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A180. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	66,250	24.4	
4 - 7	53,850	19.8	
Total 0 - 7	120,100	44.2	1.0
8 - 12	22,250	8.2	
Total 0 - 12	142,350	52.4	1.0
13 - 20	22,600	8.3	
Total 0 - 20	164,950	60.7	1.0
21 - 30	-	-	
Total 0 - 30	164,950	60.7	1.0
31 - 99	36,400	39.2	

TABLE A181. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	14,350	5.3	1.4
Moderate (MD)	17,550	6.5	1.0
SL + MD	31,900	11.8	1.0
Severe (SV)	88,000	32.4	1.5
SL + MD + SV	119,900	44.2	1.2
Very Severe (VS)	81,450	30.0	-
Nonclassified (NC)	70,010		
NC + VS	151,460	55.8	

TABLE A182. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	
195 - 210	-	-	
180 - 195	177,250	65.3	
165 - 180	18,300	6.7	
150 - 165	5,550	2.0	
Over 150	201,100	74.1	
135 - 150	-	-	
120 - 135	250	-	
105 - 120	-	-	
Over 105	201,350		
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

POLK COUNTY

472,960 455,590 acres classified (96.3%)

TABLE A183. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	157,915	33.4	2.4
Pasture (P)	71,075	15.0	2.3
C + P	228,990	48.4	2.4
Forests (F)	226,200	47.8	1.4
Range (R)	-	-	-
F + R	226,200	47.8	-
Hay (H)	-	-	-
C + P + H	228,990	48.4	2.4
Water Shed	400	-	-
P + R	71,075	15.0	
Nonclassified [N]	[17,370]	[3.7]	-
F + [N]	[243,570]	[51.5]	[1.0]

TABLE A184. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	59,450	12.6	4.3
Good (G)	31,965	6.8	1.0
E + G	91,415	19.4	1.6
Fair (F)	68,675	14.5	1.1
E + G + F	160,090	33.9	1.3
Poor (P)	66,200	14.0	1.4
E + G + F + P	226,290	47.9	1.4
Nonirrigable (N)	229,300		
Nonclassified [N]	[246,670]	[52.1]	[1.0]

TABLE A185. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	98,865	20.9	
3 - 6	72,925	15.4	
6 - 9	91,350	19.3	
Total 0 - 9	263,140	55.6	
9 - 12	17,950	3.8	
Total 0 - 12	281,090	59.4	
12 - 15	6,000	1.3	
Total 0 - 15	287,090	60.7	
15 - 18	122,500	25.9	
Total 0 - 18	409,590	86.6	
18 - 21	4,150	1.0	
21 - 24	10,000	2.1	
Total 0 - 24	423,740	89.6	
24 - 27	31,850	6.7	
27 - 30	-	-	
Total 0 - 30	455,590	96.3	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A186. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	2,800	1.0	1.4
IIe	26,050	5.5	2.5
IIw	54,975	11.6	5.8
IIe + IIw	81,030	17.1	4.1
IIs	9,200	1.9	3.6
IIc	-	-	-
Total II	90,225	19.1	2.9
I + IIe + IIw	83,830	17.7	3.8
Total I + II	93,020	19.7	2.8
IIIe	44,190	9.3	1.5
IIIw	23,150	4.9	3.9
IIIe + IIIw	67,340	14.2	2.0
IIIs	-	-	-
IIIc	-	-	-
Total III	67,340	14.2	1.0
I + IIe + IIw + IIIe + IIIw	151,170	32.0	2.7
Total I+II+III	160,360	33.9	1.6
IVe	66,375	14.0	2.8
IVw	20,525	4.3	2.5
IVe + IVw	86,900	18.4	2.8
IVs	-	-	-
IVc	-	-	-
Total IV	86,900	18.4	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	238,070	50.3	2.7
Total I+II+III+IV	247,260	52.3	1.0
VIe	110,600	23.4	2.6
VIw	1,000	-	-
VIs	23,900	5.0	-
VIc	-	-	-
Total VI	135,500	28.6	1.0
VIIe	32,725	6.9	1.0
VIIw	-	-	-
VIIs	40,100	8.5	1.0
VIIc	-	-	-
Total VII	72,825	15.4	1.0
Total VI + VII + Nonclassified	225,700	47.7	1.0

TABLE A187. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	114,650	24.2	
4 - 7	5,350	1.1	
Total 0 - 7	120,000	25.3	1.0
8 - 12	49,965	10.6	
Total 0 - 12	169,965	35.9	1.0
13 - 20	103,025	21.8	
Total 0 - 20	272,990	57.7	1.0
21 - 30	-	-	
Total 0 - 30	272,990	57.7	1.0
31 - 99	182,600	42.3	

TABLE A188. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	18,575	3.9	1.8
Moderate (MD)	4,025	1.0	-
SL + MD	22,600	4.8	1.0
Severe (SV)	121,175	25.6	2.1
SL + MD + SV	143,775	30.4	1.5
Very Severe (VS)	311,815	65.9	1.0
Nonclassified (NC)	17,370		
NC + VS	329,185	69.6	1.0

TABLE A189. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	-
195 - 210	10,025	2.1	
180 - 195	334,165	70.6	
165 - 180	106,800	22.6	
150 - 165	4,600	1.0	
Over 150	455,590	96.3	
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

SHERMAN COUNTY

531,200 acres 527,700 acres classified (99.3%)

TABLE A190. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	136,600	185,400	322,000	60.8	5.0
Pasture (P)	-	-	-	-	-
C + P			322,000	60.8	3.4
Forests (F)	7,000	6,800	13,800	2.6	-
Range (R)	91,400	100,500	191,900	36.2	1.0
F + R			205,700	38.8	-
Hay (H)	-	-	-	-	-
C + P + H			322,000	60.8	3.4
Water Shed	-	-	-	-	-
P + R			191,900	36.2	1.0
Nonclassified [N]			[1,580]	-	-
F + [N]			[15,380]	[2.9]	-

TABLE A191. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	-	3,500	3,500	1.0	-
Good (G)	72,900	125,100	198,000	37.4	4.6
E + G			201,500	38.1	3.6
Fair (F)	46,800	53,400	100,200	18.9	1.6
E + G + F			301,700	57.0	2.5
Poor (P)	16,900	3,400	20,300	3.8	-
E + G + F + P			322,000	60.8	1.9
Nonirrigable (N)	98,400	107,300	205,700		
Nonclassified [N]			[207,280]	[39.2]	-

TABLE A192. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	-	7,900	7,900	1.5	1.0
IIw	-	-	-	-	-
IIe + IIw			7,900	1.5	-
IIs	-	-	-	-	-
IIc	20,200	57,500	77,700	14.6	8.9
Total II	20,200	65,400	85,600	16.1	2.7
I + IIe + IIw			7,900	1.5	-
Total I + II			85,600	16.1	2.6
IIIe	94,700	50,600	145,300	27.4	5.1
IIIw	-	-	-	-	-
IIIe + IIIw			145,300	27.4	4.2
IIIs	-	-	-	-	-
IIIc	-	-	-	-	-
Total III	94,700	50,600	145,300	27.4	2.1
I + IIe + IIw + IIIe + IIIw			153,200	28.8	2.7
Total I+II+III			230,900	43.5	2.2
IVe	62,700	71,400	134,100	25.2	5.8
IVw	-	-	-	-	-
IVe + IVw			134,100	25.2	4.2
IVs	1,400	-	1,400	-	-
IVc	-	24,900	24,900	4.7	1.0
Total IV	64,100	96,300	160,400	30.2	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			287,300	54.1	3.3
Total I+II+III+IV			391,300	73.7	1.7
VIe	-	-	-	-	-
VIw	-	-	-	-	-
VIs	-	36,900	36,900	6.9	1.0
VIc	-	-	-	-	-
Total VI	-	36,900	36,900	6.9	-
VIIe	-	-	-	-	-
VIIw	-	-	-	-	-
VIIs	56,000	43,500	99,500	18.7	1.6
VIIc	-	-	-	-	-
Total VII	56,000	43,500	99,500	18.7	1.0
Total VI + VII + Nonclassified			139,900	26.3	-

TABLE A193. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6	-	-	-	-	
6 - 9	14,700	28,500	43,200	8.2	
Total 0 - 9			43,200	8.2	
9 - 12	-	-	-	-	
Total 0 - 12			43,200	8.2	
12 - 15	91,300	101,700	193,000	36.5	
Total 0 - 15			236,200	44.6	
15 - 18	-	15,700	15,700	3.0	
Total 0 - 18			251,900	47.6	
18 - 21	32,500	36,900	69,400	13.1	
21 - 24	1,800	8,200	10,000	1.9	
Total 0 - 24			331,300	62.6	
24 - 27	94,700	101,700	196,400	37.1	
27 - 30	-	-	-	-	
Total 0 - 30					
30 - 33					
33 - 36					
Total 0 - 36	-	-	-	-	
36 - 39					
Total 0 - 39	-	-	-	-	
39 - 42					
Total 0 - 42	-	-	-	-	
42 - 45					
Total 0 - 45	-	-	-	-	
45 - 48					
Total 0 - 48	-	-	-	-	
48 - 51					
Total 0 - 51	-	-	-	-	
51 - 54					
Total 0 - 54	-	-	-	-	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A194. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	3,500	3,500	1.0	
4 - 7	63,200	114,500	177,700	33.6	
Total 0 - 7			181,200	34.2	1.5
8 - 12	89,500	90,200	179,700	34.0	
Total 0 - 12			360,900	68.2	1.6
13 - 20	16,900	3,400	20,300	3.8	
Total 0 - 20			381,200	72.0	1.3
21 - 30	4,000	700	4,700	1.0	
Total 0 - 30			385,900	72.9	1.3
31 - 99	61,400	80,400	141,800	27.1	

TABLE A195. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	-
Moderate (MD)	81,900	116,700	198,600	37.5	6.8
SL + MD			198,600	37.5	5.0
Severe (SV)	62,700	69,400	132,100	25.0	2.3
SL + MD + SV			330,700	62.5	3.4
Very Severe (VS)	90,400	106,600	197,000	37.2	-
Nonclassified (NC)			1,580		
NC + VS			198,580	37.5	-

TABLE A196. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210					
180 - 195					
165 - 180	-	-	-	-	
150 - 165	106,000	145,900	251,900	47.6	
Over 150			251,900	47.6	
135 - 150	32,500	36,900	69,400	13.1	
120 - 135	94,700	101,700	196,400	37.1	
105 - 120	-	-	-	-	
Over 105			517,700	97.8	
90 - 105	-	-	-	-	
Over 90			517,700	97.8	
75 - 90	1,800	8,200	10,000	1.9	
Over 75			527,700		
60 - 75					
Over 60	-	-	-	-	
45 - 60					
Over 45	-	-	-	-	
30 - 45					
Over 30	-	-	-	-	
0 - 30					

TILLAMOOK COUNTY

713,600 65,300 acres classified (9.2%)

TABLE A197. MAJOR LAND USE (in acres)

Major Land Use	Basin 1	% County Soils	% State Class
Cultivated (C)	20,900	2.9	-
Pasture (P)	40,400	5.7	1.3
C + P	61,300	8.6	1.0
Forests (F)	4,000	1.0	-
Range (R)	-	-	-
F + R	4,000	1.0	-
Hay (H)	-	-	-
C + P + H	61,300	8.6	1.0
Water Shed	-	-	-
P + R	40,400	5.7	-
Nonclassified [N]	[648,300]	[90.8]	[5.3]
F + [N]	[652,300]	[91.4]	[2.3]

TABLE A198. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 1	% County Soils	% State Class
Excellent (E)	17,400	2.4	1.2
Good (G)	19,700	2.8	-
E + G	37,100	5.2	1.0
Fair (F)	7,300	1.0	-
E + G + F	44,400	6.2	-
Poor (P)	10,100	1.4	-
E + G + F + P	54,500	7.6	-
Nonirrigable (N)	10,800		
Nonclassified [N]	[659,100]	[92.4]	[1.5]

TABLE A199. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 1	% County Soils	% State Class
I	-	-	-
IIe	6,400	1.0	1.0
IIw	8,500	1.2	1.0
IIe + IIw	14,900	2.1	1.0
IIs	-	-	-
IIc	-	-	-
Total II	14,900	2.1	-
I + IIe + IIw	14,900	2.1	1.0
Total I + II	14,900	2.1	-
IIIe	9,300	1.3	-
IIIw	6,600	1.0	1.1
IIIe + IIIw	15,900	2.2	-
IIIs	-	-	-
IIIc	-	-	-
Total III	15,900	2.2	-
I + IIe + IIw + IIIe + IIIw	30,800	4.3	1.0
Total I+II+III	30,800	4.3	-
IVe	1,200	-	-
IVw	19,800	2.8	2.4
IVe + IVw	21,000	2.9	1.0
IVs	-	-	-
IVc	-	-	-
Total IV	21,000	2.9	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	51,800	7.2	1.0
Total I+II+III+IV	51,800	7.2	-
VIe	-	-	-
VIw	2,700	-	1.0
VIs	-	-	-
VIc	-	-	-
Total VI	2,700	-	-
VIIe	7,400	1.0	-
VIIw	3,400	-	36.3
VIIs	-	-	-
VIIc	-	-	-
Total VII	10,800	1.5	-
Total VI + VII + Nonclassified	661,800	92.7	1.7

TABLE A200. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 1	% County Soils	% State Class
0 - 3	41,500	5.8	
3 - 6	16,700	2.3	
6 - 9	-	-	
Total 0 - 9	58,200	8.1	
9 - 12	-	-	
Total 0 - 12	58,200	8.1	
12 - 15	2,500	-	
Total 0 - 15	60,700	8.5	
15 - 18	800	-	
Total 0 - 18	61,500	8.6	
18 - 21	3,800	1.0	
21 - 24	-	-	
Total 0 - 24	65,300	9.1	
24 - 27			
27 - 30			
Total 0 - 30	-	-	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A201. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 1	% County Soils	% State Class
0 - 3	48,800	6.8	
4 - 7	7,400	1.0	
Total 0 - 7	56,200	7.8	-
8 - 12	800	-	
Total 0 - 12	57,000	8.0	-
13 - 20	2,600	-	
Total 0 - 20	59,600	8.4	-
21 - 30	-	-	
Total 0 - 30	59,600	8.4	
31 - 99	5,700	91.6	

TABLE A202. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 1	% County Soils	% State Class
Slight (SL)	8,400	1.2	1.0
Moderate (MD)	1,000	-	-
SL + MD	9,400	1.3	-
Severe (SV)	9,000	1.3	-
SL + MD + SV	18,400	2.6	-
Very Severe (VS)	46,900	6.6	-
Nonclassified (NC)	648,300		
NC + VS	695,200	97.4	1.3

TABLE A203. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 1	% County Soils	% State Class
Over 210	7,500	1.0	
195 - 210	-	-	
180 - 195	44,800	6.3	
165 - 180	9,200	1.3	
150 - 165	-	-	
Over 150	61,500	8.7	
135 - 150	-	-	
120 - 135	3,800	1.0	
105 - 120	-	-	
Over 105	65,300		
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

UMATILLA COUNTY

2,067,840 acres

1,791,300 acres classified (86.6%)

TABLE A204. MAJOR LAND USE (in acres)

Major Land Use	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	5,500	798,900	804,400	39.0	12.5
Pasture (P)	-	6,800	6,800	-	-
C + P			811,200	39.3	8.6
Forests (F)	15,900	289,500	305,400	14.8	1.9
Range (R)	48,200	626,500	674,700	32.7	3.0
F + R			980,100	47.5	2.6
Hay (H)	-	-	-	-	-
C + P + H			811,200	39.3	8.6
Water Shed	-	-	-	-	-
P + R			681,500	33.0	2.7
Nonclassified [N]			[270,780]	[13.1]	[2.2]
F + [N]			[576,180]	[27.9]	[2.1]

TABLE A205. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	-	101,000	101,000	4.9	7.3
Good (G)	-	268,800	268,800	13.0	6.3
E + G			369,800	17.9	6.5
Fair (F)	10,200	401,200	411,400	20.0	6.5
E + G + F			781,200	37.9	6.5
Poor (P)	17,800	233,800	251,600	12.2	5.4
E + G + F + P			1,032,800	50.1	6.2
Nonirrigable (N)	41,600	716,900	758,500		
Nonclassified [N]			[1,029,280]	[49.9]	[2.3]

TABLE A206. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
I	-	31,600	31,600	1.5	16.4
IIe	-	155,200	155,200	7.5	15.0
IIw	-	13,300	13,300	1.0	1.4
IIe + IIw			168,500	8.1	8.5
IIs	-	8,700	8,700	-	3.4
IIc	-	66,200	66,200	3.2	7.6
Total II	-	243,400	243,400	11.8	7.8
I + IIe + IIw			200,100	9.7	9.2
Total I + II			275,000	13.3	8.3
IIIe	600	321,700	322,300	15.6	11.3
IIIw	-	6,700	6,700	-	1.1
IIIe + IIIw			329,000	15.9	9.5
IIIs	-	46,100	46,100	2.2	3.1
IIIc	-	1,100	1,100	-	-
Total III	600	375,600	376,200	18.2	5.4
I + IIe + IIw + IIIe + IIIw			529,100	25.6	9.4
Total I+II+III			651,200	31.5	6.3
IVe	-	189,000	189,000	9.1	8.1
IVw	-	-	-	-	-
IVe + IVw			189,000	9.7	6.0
IVs	13,700	375,200	388,900	18.8	6.9
IVc	5,500	3,800	9,300	-	-
Total IV	19,200	568,000	587,200	28.4	4.5
I+IIe+IIw+IIIe + IIIw+IVe+IVw			718,100	34.7	8.2
Total I+II+III+IV			1,238,400	59.9	5.3
VIe	1,600	101,000	102,600	5.0	2.4
VIw	1,500	-	1,500	-	-
VIs	4,300	190,500	194,800	9.4	3.1
VIc	10,600	58,300	68,900	3.3	3.0
Total VI	18,000	349,800	367,800	17.8	2.8
VIIe	1,200	97,500	98,700	4.8	1.6
VIIw	-	-	-	-	-
VIIs	30,600	55,800	86,400	4.2	1.4
VIIc	-	-	-	-	-
Total VII	31,800	153,300	185,100	9.0	1.4
Total VI + VII + Nonclassified			829,440	40.1	2.2

TABLE A207. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6	-	125,300	125,300	6.1	
6 - 9	-	62,100	62,100	3.0	
Total 0 - 9			187,400	9.1	
9 - 12	-	65,700	65,700	3.2	
Total 0 - 12			253,100	12.3	
12 - 15	-	327,300	327,300	15.9	
Total 0 - 15			580,400	28.2	
15 - 18	-	201,000	201,000	9.7	
Total 0 - 18			781,400	37.9	
18 - 21	-	88,600	88,600	4.3	
21 - 24	-	9,000	9,000	-	
Total 0 - 24			879,000	42.6	
24 - 27	-	90,900	90,900	4.4	
27 - 30	-	193,700	193,700	9.4	
Total 0 - 30			1,163,600	56.4	
30 - 33					
33 - 36					
Total 0 - 36			1,163,600	56.4	
36 - 39	20,100	351,500	371,600	18.0	
Total 0 - 39			1,535,200	74.4	
39 - 42	36,500	5,700	42,200	2.0	
Total 0 - 42			1,577,400	76.4	
42 - 45	6,100	2,800	8,900	-	
Total 0 - 45			1,586,300	76.9	
45 - 48	2,500	51,800	54,300	2.6	
Total 0 - 48			1,640,600	79.5	
48 - 51	4,400	146,300	150,700	6.3	
Total 0 - 51			1,791,300	85.8	
51 - 54					
Total 0 - 54			-	-	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A208. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	7,000	208,200	215,200	10.4	
4 - 7	8,000	321,100	329,100	16.0	
Total 0 - 7			544,300	26.4	4.6
8 - 12	16,400	464,500	480,900	23.3	
Total 0 - 12			1,025,200	59.7	4.4
13 - 20	33,000	149,600	182,600	8.8	
Total 0 - 20			1,207,800	58.6	4.2
21 - 30	-	5,100	5,100	-	
Total 0 - 30			1,212,900	58.8	4.1
31 - 99	5,200	573,200	578,400	41.2	

TABLE A209. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	
Moderate (MD)	-	536,700	536,700	26.0	18.4
SL + MD			536,700	26.0	13.6
Severe (SV)	5,500	182,300	187,800	9.1	3.2
SL + MD + SV			724,500	25.1	7.4
Very Severe (VS)	64,100	1,002,700	1,066,800	51.7	2.7
Nonclassified (NC)			270,780		
NC + VS			1,337,580	64.9	2.6

TABLE A210. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 6	Basin 7	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210	-	-	-	-	
180 - 195	-	57,300	57,300	2.8	
165 - 180	-	83,400	83,400	4.0	
150 - 165	-	682,500	682,500	33.1	
Over 150			823,200	39.9	
135 - 150	-	175,500	175,500	8.5	
120 - 135	-	120,500	120,500	5.8	
105 - 120	-	36,200	36,200	1.8	
Over 105			1,155,400	56.0	
90 - 105	18,600	132,200	150,800	7.3	2.7
Over 90			1,306,200	63.3	
75 - 90	8,800	200,900	209,700	10.2	1.5
Over 75			1,515,900	73.5	
60 - 75	13,600	233,200	246,800	12.0	10.0
Over 60			1,762,700	85.5	
45 - 60	28,600	-	28,600	1.4	1.5
Over 45			1,791,300		
30 - 45					
Over 30			-	-	
0 - 30					

UNION COUNTY

1,300,480 acres

1,256,100 acres classified (96.6%)

TABLE A211. MAJOR LAND USE (in acres)

Major Land Use	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	200,100	40,000	240,100	18.5	3.7
Pasture (P)	-	-	-	-	-
C + P			240,100	18.5	2.5
Forests (F)	762,800	46,900	809,700	62.3	5.1
Range (R)	123,800	36,100	159,900	12.3	1.0
F + R			969,600	74.6	2.5
Hay (H)	-	-	-	-	-
C + P + H			240,100	18.5	2.5
Water Shed	46,400	-	46,400	3.6	2.6
P + R			159,900	12.3	1.0
Nonclassified [N]			[44,380]	[3.4]	-
F + [N]			[854,080]	[65.7]	[3.0]

TABLE A212. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	27,300	-	27,300	2.1	2.0
Good (G)	86,400	22,600	109,000	8.4	2.5
E + G			136,300	10.5	2.4
Fair (F)	72,800	4,300	77,100	5.9	1.2
E + G + F			213,400	16.4	1.8
Poor (P)	42,500	33,000	75,500	5.8	1.6
E + G + F + P			288,900	22.2	1.7
Nonirrigable (N)	904,100	63,100	967,200		
Nonclassified [N]			[1,011,580]	[77.8]	[2.2]

TABLE A213. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	17,900	-	17,900	1.4	1.7
IIw	15,500	9,700	25,200	1.9	2.6
IIe + IIw			43,100	3.3	2.2
IIs	-	2,800	2,800	-	1.1
IIc	-	-	-	-	-
Total II	33,400	12,500	45,900	3.5	1.5
I + IIe + IIw			43,100	3.3	2.0
Total I + II			45,900	3.5	1.4
IIIe	30,000	9,500	39,500	3.0	1.4
IIIw	61,800	2,100	63,900	4.9	10.8
IIIe + IIIw			103,400	8.0	3.0
IIIs	20,000	1,100	21,100	1.6	1.4
IIIc	1,400	-	1,400	-	-
Total III	113,200	12,700	125,900	9.7	1.8
I + IIe + IIw + IIIe + IIIw			146,500	11.3	2.6
Total I+II+III			171,800	13.2	1.7
IVe	30,500	4,600	35,100	2.7	1.5
IVw	6,800	-	6,800	1.0	1.0
IVe + IVw			41,900	3.2	1.3
IVs	38,200	5,000	43,200	3.3	1.0
IVc	-	3,500	3,500	-	-
Total IV	75,500	13,100	88,600	6.8	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			188,400	14.5	2.1
Total I+II+III+IV			260,400	20.0	1.1
VIe	22,200	11,100	33,300	2.6	1.0
VIw	12,400	-	12,400	1.0	3.2
VIs	470,300	21,600	491,900	37.8	7.8
VIc	94,400	-	94,400	7.2	4.2
Total VI	599,300	32,700	632,000	48.6	4.8
VIIe	261,300	43,100	304,400	23.4	4.8
VIIw	-	-	-	-	-
VIIs	50,400	8,900	59,300	4.6	1.0
VIIc	-	-	-	-	-
Total VII	311,700	52,000	363,700	28.0	2.8
Total VI + VII + Nonclassified			1,040,080	80.0	2.7

TABLE A214. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6					
6 - 9					
Total 0 - 9	-	-	-	-	
9 - 12					
Total 0 - 12	-	-	-	-	
12 - 15					
Total 0 - 15	-	-	-	-	
15 - 18					
Total 0 - 18	-	-	-	-	
18 - 21	-	2,100	2,100	-	
21 - 24	15,500	9,200	24,700	1.9	
Total 0 - 24			26,800	2.1	
24 - 27	5,500	-	5,500	-	
27 - 30	165,600	500	166,100	12.8	
Total 0 - 30			198,400	15.2	
30 - 33	22,400	42,600	65,000	5.0	
33 - 36	76,300	15,300	91,600	7.0	
Total 0 - 36			355,000	27.3	
36 - 39	315,500	48,300	363,800	28.0	
Total 0 - 39			718,800	55.3	
39 - 42	13,600	1,200	14,800	1.1	
Total 0 - 42			733,600	56.4	
42 - 45	-	300	300	-	
Total 0 - 45			733,900	56.4	
45 - 48	64,500	-	64,500	5.0	
Total 0 - 48			798,400	61.4	
48 - 51	436,500	-	436,500	33.6	
Total 0 - 51			1,234,900	95.0	
51 - 54	17,700	3,500	21,200	1.6	
Total 0 - 54			1,256,100	96.6	
54 - 57					
57 - 60					
Total 0 - 60	-	-	-	-	

TABLE A215. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	130,500	15,200	145,700	11.2	
4 - 7	44,300	14,800	59,100	4.5	
Total 0 - 7			204,800	15.7	1.7
8 - 12	75,000	10,900	85,900	6.6	
Total 0 - 12			290,700	22.3	1.2
13 - 20	137,900	28,200	166,100	12.8	
Total 0 - 20			456,800	35.1	1.6
21 - 30	-	-	-	-	
Total 0 - 30			456,800	35.1	1.5
31 - 99	745,400	53,900	799,300	64.9	

TABLE A216. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	-
Moderate (MD)	25,600	-	25,600	2.0	1.0
SL + MD			25,600	2.0	1.0
Severe (SV)	19,500	17,100	36,600	2.8	1.0
SL + MD + SV			62,200	4.8	1.0
Very Severe (VS)	1,088,000	105,900	1,193,900	91.8	3.0
Nonclassified (NC)			44,380		
NC + VS			1,238,280	95.2	2.4

TABLE A217. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 8	Basin 9	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210					
180 - 195					
165 - 180					
150 - 165					
Over 150	-	-	-	-	
135 - 150	183,500	-	183,500	14.1	
120 - 135	43,900	74,900	118,800	9.1	
105 - 120	5,700	1,200	6,900	1.0	
Over 105			309,200	23.8	
90 - 105	299,700	43,100	342,800	26.4	6.1
Over 90			652,000	50.2	
75 - 90	513,400	300	513,700	39.5	3.7
Over 75			1,165,700	89.7	
60 - 75	22,800	-	22,800	1.8	1.0
Over 60			1,188,500	91.4	
45 - 60	17,700	3,500	21,200	1.6	1.1
Over 45			1,209,700	93.0	
30 - 45	46,400	-	46,400	3.8	1.4
Over 30			1,256,100		
0 - 30	-	-	-	-	

WALLOWA COUNTY

2,033,920 acres　　　　1,786,500 acres classified (87.8%)

TABLE A218. MAJOR LAND USE (in acres)

Major Land Use	Basin 8	% County Soils	% State Class
Cultivated (C)	95,100	4.7	1.5
Pasture (P)	1,500	-	-
C + P	96,600	4.7	1.0
Forests (F)	1,077,700	53.0	6.8
Range (R)	459,600	22.6	2.0
F + R	1,537,300	75.6	4.0
Hay (H)	-	-	-
C + P + H	96,600	4.7	1.0
Water Shed	152,600	7.5	8.6
P + R	461,100	22.7	1.8
Nonclassified [N]	[247,420]	[12.2]	[2.0]
F + [N]	[1,325,120]	[65.2]	[4.7]

TABLE A219. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 8	% County Soils	% State Class
Excellent (E)	6,600	-	-
Good (G)	39,700	2.0	1.0
E + G	46,300	2.3	1.0
Fair (F)	238,200	11.7	3.8
E + G + F	284,500	14.0	2.4
Poor (P)	47,400	2.3	1.0
E + G + F + P	331,900	16.3	2.0
Nonirrigable (N)	1,454,600		
Nonclassified [N]	[1,702,020]	[83.7]	[3.8]

TABLE A220. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 8	% County Soils	% State Class
I	-	-	-
IIe	-	-	-
IIw	-	-	-
IIe + IIw	-	-	-
IIs	-	-	-
IIc	-	-	-
Total II	-	-	-
I + IIe + IIw	-	-	-
Total I + II	-	-	-
IIIe	-	-	-
IIIw	-	-	-
IIIe + IIIw	-	-	-
IIIs	28,700	1.4	1.9
IIIc	21,100	1.0	1.0
Total III	49,800	2.4	1.0
I + IIe + IIw + IIIe + IIIw	-	-	-
Total I+II+III	49,800	2.4	1.0
IVe	25,600	1.2	1.1
IVw	-	-	-
IVe + IVw	25,600	1.2	1.0
IVs	218,900	10.8	3.9
IVc	55,100	2.7	1.6
Total IV	299,600	14.7	2.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	25,600	1.2	-
Total I+II+III+IV	349,400	17.2	1.5
VIe	36,700	1.8	1.0
VIw	1,500	-	-
VIs	715,600	35.2	11.3
VIc	108,500	5.3	4.8
Total VI	862,300	42.4	6.5
VIIe	361,900	17.8	5.7
VIIw	-	-	-
VIIs	212,900	10.5	3.3
VIIc	-	-	-
Total VII	574,800	28.3	4.5
Total VI + VII + Nonclassified	1,684,520	82.8	4.4

TABLE A221. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 8	% County Soils	% State Class
0 - 3	-	-	
3 - 6			
6 - 9			
Total 0 - 9	-	-	
9 - 12			
Total 0 - 12	-	-	
12 - 15			
Total 0 - 15	-	-	
15 - 18			
Total 0 - 18	-	-	
18 - 21	-	-	
21 - 24	60,300	3.0	
Total 0 - 24	60,300	3.0	
24 - 27	-	-	
27 - 30	26,200	1.3	
Total 0 - 30	86,500	4.3	
30 - 33	110,500	5.4	
33 - 36	177,800	8.7	
Total 0 - 36	374,800	18.4	
36 - 39	531,400	26.1	
Total 0 - 39	906,200	44.5	
39 - 42	105,000	5.2	
Total 0 - 42	1,011,200	49.7	
42 - 45	30,800	1.5	
Total 0 - 45	1,042,000	51.2	
45 - 48	132,500	6.5	
Total 0 - 48	1,174,500	57.7	
48 - 51	612,000	30.1	
Total 0 - 51	1,786,500	87.8	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A222. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 8	% County Soils	% State Class
0 - 3	62,000	3.0	
4 - 7	149,100	7.3	
Total 0 - 7	211,100	10.3	1.8
8 - 12	122,900	6.0	
Total 0 - 12	334,000	16.3	1.4
13 - 20	136,100	6.7	
Total 0 - 20	470,100	23.1	1.6
21 - 30	-	-	
Total 0 - 30	470,100	23.1	1.6
31 - 99	1,316,400	76.9	

TABLE A223. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 8	% County Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	20,400	1.0	1.0
SL + MD	20,400	1.0	1.0
Severe (SV)	63,100	3.1	1.1
SL + MD + SV	83,500	4.1	1.0
Very Severe (VS)	1,703,000	83.7	4.3
Nonclassified (NC)	247,420		
NC + VS	1,950,420	95.9	3.8

TABLE A224. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 8	% County Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135	100,500	4.9	
105 - 120	26,200	1.3	
Over 105	126,700	6.2	
90 - 105	408,000	20.0	7.2
Over 90	534,700	26.3	
75 - 90	908,100	44.6	6.5
Over 75	1,442,800	70.9	
60 - 75	178,300	8.8	7.2
Over 60	1,621,100	79.7	
45 - 60	12,800	1.0	1.0
Over 45	1,633,900	80.3	
30 - 45	152,600	7.5	4.7
Over 30	1,786,500		
0 - 30	-	-	

WASCO COUNTY

1,527,680 acres 1,315,200 acres classified (86.1%)

TABLE A225. MAJOR LAND USE (in acres)

Major Land Use	Basin 4	Basin 5	Basin 6
Cultivated (C)	161,100	201,100	800
Pasture (P)	1,000	-	-
C + P			
Forests (F)	91,300	82,900	-
Range (R)	91,700	534,000	124,800
F + R			
Hay (H)	-	-	-
C + P + H			
Water Shed	-	26,500	-
P + R			
Nonclassified [N]			
F + [N]			

Major Land Use	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	363,000	23.8	5.7
Pasture (P)	1,000	-	-
C + P	364,000	23.9	3.8
Forests (F)	174,200	11.4	1.1
Range (R)	750,500	49.2	3.4
F + R	924,700	60.6	2.4
Hay (H)	-	-	-
C + P + H	364,000	23.9	3.8
Water Shed	26,500	1.7	1.5
P + R	751,500	49.3	3.0
Nonclassified [N]	[209,280]	[13.7]	[1.7]
F + [N]	[383,480]	[25.2]	[1.4]

TABLE A226. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 4	Basin 5	Basin 6
Excellent (E)	-	2,600	-
Good (G)	51,900	124,300	200
E + G			
Fair (F)	76,900	111,200	1,800
E + G + F			
Poor (P)	40,000	131,100	20,000
E + G + F + P			
Nonirrigable (N)	176,300	475,300	103,600
Nonclassified [N]			

Suitability Class	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	2,600	-	-
Good (G)	176,400	11.6	4.1
E + G	179,000	11.7	3.2
Fair (F)	189,900	12.4	3.0
E + G + F	368,900	24.2	3.1
Poor (P)	191,100	12.5	4.1
E + G + F + P	560,000	36.7	3.4
Nonirrigable (N)	755,200		
Nonclassified [N]	[964,480]	[63.3]	[2.1]

TABLE A227. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 4	Basin 5	Basin 6
I	-	22,400	-
IIe	9,500	-	-
IIw	-	-	200
IIe + IIw			
IIs	-	-	-
IIc	3,600	56,800	-
Total II	13,100	56,800	200
I + IIe + IIw			
Total I + II			
IIIe	81,500	169,500	23,000
IIIw	-	6,500	200
IIIe + IIIw			
IIIs	-	-	400
IIIc	-	2,200	-
Total III	81,500	178,200	23,600
I + IIe + IIw + IIIe + IIIw			
Total I+II+III			
IVe	89,200	103,900	-
IVw	-	-	-
IVe + IVw			
IVs	-	17,900	4,800
IVc	-	1,600	-
Total IV	89,200	123,400	4,800
I+IIe+IIw+IIIe + IIIw+IVe+IVw			
Total I+II+III+IV			
VIe	49,300	69,700	-
VIw	-	-	-
VIs	2,900	223,600	47,200
VIc	-	4,000	-
Total VI	52,200	297,300	47,200
VIIe	29,600	21,900	7,400
VIIw	-	-	-
VIIs	79,500	144,500	42,400
VIIc	-	-	-
Total VII	109,100	166,400	49,800
Total VI + VII + Nonclassified			

TABLE A227. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL IN COUNTY	% County Soils	% State Class
I	22,400	1.5	11.6
IIe	9,500	1.0	1.0
IIw	200	-	-
IIe + IIw	9,700	1.0	1.0
IIs	-	-	-
IIc	60,400	4.0	6.9
Total II	70,100	4.6	6.9
I + IIe + IIw	32,100	2.1	1.5
Total I + II	92,500	6.0	2.8
IIIe	274,000	17.9	9.6
IIIw	6,700	-	1.1
IIIe + IIIw	280,700	18.4	8.1
IIIs	400	-	-
IIIc	2,200	-	-
Total III	283,300	18.5	4.1
I + IIe + IIw + IIIe + IIIw	312,800	20.5	5.6
Total I+II+III	375,800	24.6	3.6
IVe	193,100	12.6	8.3
IVw	-	-	-
IVe + IVw	193,100	12.6	6.1
IVs	22,700	1.5	-
IVc	1,600	-	-
Total IV	217,400	14.2	1.6
I+IIe+IIw+IIIe + IIIw+IVe+IVw	505,900	33.1	5.8
Total I+II+III+IV	593,200	38.8	2.5
VIe	119,000	7.8	2.8
VIw	-	-	-
VIs	273,700	17.9	4.3
VIc	4,000	-	-
Total VI	396,700	26.0	3.0
VIIe	58,900	3.8	1.0
VIIw	-	-	-
VIIs	266,400	17.4	4.2
VIIc	-	-	-
Total VII	325,300	21.2	2.6
Total VI + VII + Nonclassified	934,480	61.2	2.4

TABLE A228. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 4	Basin 5	Basin 6
0 - 3	-	-	-
3 - 6	3,300	-	-
6 - 9	14,900	-	-
Total 0 - 9			
9 - 12	-	-	400
Total 0 - 12			
12 - 15	94,500	6,400	-
Total 0 - 15			
15 - 18	-	11,100	11,100
Total 0 - 18			
18 - 21	24,700	155,400	17,400
21 - 24	132,300	213,300	10,400
Total 0 - 24			
24 - 27	75,400	258,400	21,800
27 - 30	-	28,200	-
Total 0 - 30			
30 - 33	-	29,500	37,300
33 - 36	-	98,600	8,800
Total 0 - 36			
36 - 39	-	-	-
Total 0 - 39			
39 - 42	-	10,200	18,400
Total 0 - 42			
42 - 45	-	1,800	-
Total 0 - 45			
45 - 48	-	29,700	-
Total 0 - 48			
48 - 51	-	1,900	-
Total 0 - 51			
51 - 54			
Total 0 - 54	-	-	-
54 - 57			
57 - 60			
Total 0 - 60	-	-	-

TABLE A228 . AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	
3 - 6	3,300	-	
6 - 9	14,900	1.0	
Total 0 - 9	18,200	1.2	
9 - 12	400	-	
Total 0 - 12	18,600	1.2	
12 - 15	100,900	6.6	
Total 0 - 15	119,500	7.8	
15 - 18	22,200	1.4	
Total 0 - 18	141,700	9.2	
18 - 21	197,500	13.0	
21 - 24	356,000	23.4	
Total 0 - 24	695,200	45.6	
24 - 27	355,600	23.3	
27 - 30	28,200	1.8	
Total 0 - 30	1,079,000	70.8	
30 - 33	66,800	4.4	
33 - 36	107,400	7.0	
Total 0 - 36	1,253,200	82.2	
36 - 39	-	-	
Total 0 - 39	1,253,200	82.2	
39 - 42	28,600	1.9	
Total 0 - 42	1,281,800	84.1	
42 - 45	1,800	-	
Total 0 - 45	1,283,600	84.2	
45 - 48	29,700	1.9	
Total 0 - 48	1,313,300	86.1	
48 - 51	1,900	-	
Total 0 - 51	1,315,200	86.3	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A229. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 4	Basin 5	Basin 6
0 - 3	17,200	25,000	600
4 - 7	31,100	100,500	7,800
Total 0 - 7			
8 - 12	79,500	336,000	25,500
Total 0 - 12			
13 - 20	48,200	77,900	4,800
Total 0 - 20			
21 - 30	64,000	-	-
Total 0 - 30			
31 - 99	105,100	305,100	86,900

Slope %	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	42,800	2.8	
4 - 7	139,400	9.1	
Total 0 - 7	182,200	11.9	1.5
8 - 12	441,000	28.9	
Total 0 - 12	623,200	40.8	2.7
13 - 20	130,900	8.6	
Total 0 - 20	754,100	49.4	2.6
21 - 30	64,000	4.2	
Total 0 - 30	818,100	53.6	2.8
31 - 99	497,100	46.4	

TABLE A230. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 4	Basin 5	Basin 6
Slight (SL)	-	22,400	-
Moderate (MD)	104,800	64,300	-
SL + MD			
Severe (SV)	117,100	139,100	21,000
SL + MD + SV			
Very Severe (VS)	123,200	618,700	104,600
Nonclassified (NC)			
NC + VS			

Limitation	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	22,400	1.5	2.2
Moderate (MD)	169,100	11.1	5.8
SL + MD	191,500	12.6	4.9
Severe (SV)	277,200	18.2	4.8
SL + MD + SV	468,700	30.8	4.8
Very Severe	846,500	55.5	2.1
Nonclassified (NC)	209,280		
NC + VS	1,055,780	69.2	2.0

TABLE A231. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 4	Basin 5	Basin 6
Over 210	-	-	-
195 - 210	-	-	-
180 - 195	4,900	-	-
165 - 180	3,300	-	-
150 - 165	61,100	6,400	-
Over 150			
135 - 150	36,200	254,400	29,100
120 - 135	175,400	333,800	24,500
105 - 120	39,700	-	-
Over 105			
90 - 105	-	55,100	37,300
Over 90			
75 - 90	24,500	127,800	7,500
Over 75			
60 - 75	-	40,300	8,800
Over 60			
45 - 60	-	-	18,400
Over 45			
30 - 45	-	200	-
Over 30			
0 - 30	-	26,500	-

Days	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	
195 - 210	-	-	
180 - 195	4,900	-	
165 0 180	3,300	-	
150 - 165	67,500	4.4	
Over 150	75,700	5.0	
135 - 150	319,700	21.0	
120 - 135	533,700	35.0	
105 - 120	39,700	2.6	
Over 105	968,800	63.5	
90 - 105	92,400	6.1	1.6
Over 90	1,061,200	69.6	
75 - 90	159,800	10.5	1.1
Over 75	1,221,000	80.1	
60 - 75	49,100	3.2	2.0
Over 60	1,270,100	83.3	
45 - 60	18,400	1.2	1.0
Over 45	1,288,500	84.5	
30 - 45	200	-	-
Over 30	1,288,700	84.5	
0 - 30	26,500	1.7	1.0

WASHINGTON COUNTY

458,240 acres

431,630 acres classified (94.2%)

TABLE A232. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	209,260	400	209,660	45.8	3.3
Pasture (P)	61,550	400	61950	13.5	2.0
C + P			271,610	59.3	2.9
Forests (F)	157,640	-	157,640	34.4	1.0
Range (R)	-	-	-	-	-
F + R			157,640	34.4	-
Hay (H)	-	-	-	-	-
C + P + H			271,610	59.3	2.9
Water Shed	2,380	-	2,380	1.0	-
P + R			61,950	13.5	-
Nonclassified [N]			[26,610]	[5.8]	-
F + [N]			[184,250]	[40.2]	[1.0]

TABLE A233. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	47,900	200	48,100	10.5	3.5
Good (G)	83,300	600	83,900	18.3	2.0
E + G			132,000	28.8	2.3
Fair (F)	79,450	-	79,450	17.3	1.2
E + G + F			211,450	46.1	1.8
Poor (P)	51,960	-	51,960	11.3	1.1
E + G + F + P			263,410	57.4	1.6
Nonirrigable (N)	168,220	-	168,220		
Nonclassified [N]			[194,830]	[42.5]	-

TABLE A234. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
I	8,750	-	8,750	1.9	4.5
IIe	15,920	-	15,920	3.5	1.5
IIw	78,390	400	78,790	17.2	8.2
IIe + IIw			94,710	20.7	4.8
IIs	-	-	-	-	-
IIc	-	-	-	-	-
Total II	94,310	400	94,710	20.7	3.0
I + IIe + IIw			103,460	22.6	4.7
Total I + II			103,460	22.6	3.1
IIIe	77,650	-	77,650	16.9	2.7
IIIw	25,590	400	25,990	5.7	4.4
IIIe + IIIw			103,640	22.6	3.0
IIIs	1,100	-	1,100	-	-
IIIc	-	-	-	-	-
Total III	104,340	400	104,740	22.8	1.5
I + IIe + IIw + IIIe + IIIw			207,100	45.2	3.7
Total I+II+III			208,200	45.4	2.0
IVe	46,100	-	46,100	10.1	2.0
IVw	17,110	-	17,110	3.7	2.1
IVe + IVw			63,210	13.8	2.0
IVs	1,300	-	1,300	-	-
IVc	-	-	-	-	-
Total IV	64,510	-	64,510	14.1	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			270,310	59.0	3.1
Total I+II+III+IV			272,710	59.5	1.2
VIe	131,450	-	131,450	28.7	3.0
VIw	-	-	-	-	-
VIs	18,830	-	18,830	4.1	-
VIc	-	-	-	-	-
Total VI	150,280	-	150,280	32.8	1.1
VIIe	3,140	-	3,140	1.0	-
VIIw	300	-	300	-	3.2
VIIs	5,200	-	5,200	1.1	-
VIIc	-	-	-	-	-
Total VII	8,640	-	8,640	1.9	-
Total VI + VII + Nonclassified			185,530	40.5	-

TABLE A235. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	139,050	800	139,850	30.5	
3 - 6	16,330	-	16,330	3.6	
6 - 9	142,030	-	142,030	31.0	
Total 0 - 9			298,210	65.1	
9 - 12	6,890	-	6,890	1.5	
Total 0 - 12			305,100	66.6	
12 - 15	77,050	-	77,050	16.8	
Total 0 - 15			382,150	83.4	
15 - 18	49,080	-	49,080	10.7	
Total 0 - 18			431,230	94.1	
18 - 21	-	-	-	-	
21 - 24	-	-	-	-	
Total 0 - 24			431,240	94.1	
24 - 27	400	-	400	-	
27 - 30	-	-	-	-	
Total 0 - 30			431,630	94.2	
30 - 33					
33 - 36					
Total 0 - 36			-	-	
36 - 39					
Total 0 - 39			-	-	
39 - 42					
Total 0 - 42			-	-	
42 - 45					
Total 0 - 45			-	-	
45 - 48					
Total 0 - 48			-	-	
48 - 51					
Total 0 - 51			-	-	
51 - 54					
Total 0 - 54			-	-	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A236. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	112,790	600	113,390	24.7	
4 - 7	47,310	200	47,510	10.4	
Total 0 - 7			160,900	35.1	1.4
8 - 12	45,540	-	45,540	9.9	
Total 0 - 12			206,440	45.0	1.0
13 - 20	97,500	-	97,500	21.3	
Total 0 - 20			303,940	66.3	1.0
21 - 30	-	-	-	-	
Total 0 - 30			303,940	66.3	1.0
31 - 99	127,690	-	127,690	33.7	

TABLE A237. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	42,490	-	42,490	9.3	4.2
Moderate (MD)	34,950	-	34,950	7.6	1.2
SL + MD			77,440	16.9	2.0
Severe (SV)	161,620	-	161,620	35.3	2.8
SL + MD + SV			239,060	52.2	2.4
Very Severe (VS)	191,770	800	192,570	42.0	-
Nonclassified (NC)			26,610		
NC + VS			219,180	47.8	-

TABLE A238. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	Basin 1	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210	10,200	-	10,200	2.2	
180 - 195	291,620	800	292,420	63.8	
165 - 180	128,610	-	128,610	28.1	
150 - 165	-	-	-	-	
Over 150			431,230	94.1	
135 - 150	-	-	-	-	
120 - 135	400	-	400	-	
105 - 120	-	-	-	-	
Over 105			431,630		
90 - 105					
Over 90			-	-	
75 - 90					
Over 75			-	-	
60 - 75					
Over 60			-	-	
45 - 60					
Over 45			-	-	
30 - 45					
Over 30			-	-	
0 - 30					

WHEELER COUNTY

1,092,480 acres

880,700 acres classified (80.6%)

TABLE A239. MAJOR LAND USE (in acres)

Major Land Use	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Cultivated (C)	-	25,800	25,800	2.4	-
Pasture (P)	-	-	-	-	-
C + P			25,800	2.4	-
Forests (F)	28,300	227,900	256,200	23.4	1.6
Range (R)	17,100	581,200	598,300	54.8	2.7
F + R			854,500	78.2	2.2
Hay (H)	-	-	-	-	-
C + P + H			25,800	2.4	-
Water Shed	400	-	400	-	-
P + R			598,300	54.8	2.4
Nonclassified [N]			[211,780]	[19.4]	[1.7]
F + [N]			[467,980]	[42.8]	[1.7]

TABLE A240. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Excellent (E)	-	-	-	-	-
Good (G)	-	12,500	12,500	1.0	-
E + G			12,500	1.1	-
Fair (F)	2,200	27,400	29,600	2.7	-
E + G + F			42,100	3.8	-
Poor (P)	8,500	64,600	73,100	6.7	1.6
E + G + F + P			115,200	10.5	1.0
Nonirrigable (N)	35,100	730,400	765,500		
Nonclassified [N]			[1,207,680]	[89.5]	[2.7]

TABLE A241. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
I	-	-	-	-	-
IIe	-	700	700	-	-
IIw	-	4,700	4,700	-	-
IIe + IIw			5,400	1.0	-
IIs	-	-	-	-	-
IIc	-	-	-	-	-
Total II	-	5,400	5,400	1.0	-
I + IIe + IIw			5,400	1.0	-
Total I + II			5,400	1.0	-
IIIe	-	17,200	17,200	1.6	1.0
IIIw	-	1,900	1,900	-	-
IIIe + IIIw			19,100	1.7	-
IIIs	-	-	-	-	-
IIIc	-	12,000	12,000	1.1	1.0
Total III	-	31,000	31,000	2.8	-
I + IIe + IIw + IIIe + IIIw			24,500	2.2	-
Total I+II+III			36,500	3.3	-
IVe	-	2,600	2,600	-	-
IVw	-	400	400	-	-
IVe + IVw			3,000	-	-
IVs	5,800	12,500	18,300	1.7	-
IVc	5,600	98,700	104,300	9.5	2.4
Total IV	11,400	114,200	125,600	11.5	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw			27,500	2.5	-
Total I+II+III+IV			162,100	14.8	1.0
VIe	5,100	22,600	27,700	2.5	1.0
VIw	-	200	200	-	-
VIs	12,200	234,300	246,500	22.6	3.9
VIc	5,500	142,500	148,000	13.5	6.5
Total VI	22,800	399,600	422,400	38.7	3.2
VIIe	1,700	99,100	100,800	9.2	1.6
VIIw	-	-	-	-	-
VIIs	7,500	185,500	193,000	17.7	3.0
VIIc	2,400	-	2,400	-	3.4
Total VII	11,600	284,600	296,200	27.1	2.3
Total VI + VII + Nonclassified			930,380	85.2	2.4

TABLE A242. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	-	-	-	
3 - 6					
6 - 9					
Total 0 - 9			-	-	
9 - 12					
Total 0 - 12			-	-	
12 - 15					
Total 0 - 15			-	-	
15 - 18	-	1,000	1,000	-	
Total 0 - 18			1,000	-	
18 - 21	-	116,500	116,500	10.7	
21 - 24	-	42,200	42,200	3.9	
Total 0 - 24			159,700	14.6	
24 - 27	-	8,600	8,600	1.0	
27 - 30	-	7,100	7,100	1.0	
Total 0 - 30			175,400	16.0	
30 - 33	-	103,400	103,400	9.5	
33 - 36	-	72,300	72,300	6.6	
Total 0 - 36			351,100	32.1	
36 - 39	-	165,500	165,500	15.1	
Total 0 - 39			516,600	47.2	
39 - 42	-	14,700	14,700	1.3	
Total 0 - 42			531,300	48.6	
42 - 45	21,800	70,600	92,400	8.4	
Total 0 - 45			623,700	57.0	
45 - 48	4,900	49,500	54,400	5.0	
Total 0 - 48			678,100	62.0	
48 - 51	9,400	88,600	98,000	9.0	
Total 0 - 51			776,100	71.0	
51 - 54	9,700	94,900	104,600	9.6	
Total 0 - 54			880,700	80.6	
54 - 57					
57 - 60					
Total 0 - 60			-	-	

TABLE A243. SLOPE OF SOIL (acres by percent slope)

Slope 5	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
0 - 3	-	6,700	6,700	1.0	
4 - 7	-	15,300	15,300	1.4	
Total 0 - 7			22,000	2.0	-
8 - 12	11,900	53,800	65,700	6.0	
Total 0 - 12			87,700	8.0	-
13 - 20	14,300	132,300	146,600	13.4	
Total 0 - 20			234,300	21.4	1.0
21 - 30	-	-	-	-	
Total 0 - 30			234,300	21.4	1.0
31 - 99	19,600	626,800	646,400	78.6	

TABLE A244. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Slight (SL)	-	-	-	-	-
Moderate (MD)	-	7,000	7,000	1.0	-
SL + MD			7,000	1.0	-
Severe (SV)	-	52,200	52,200	4.8	1.0
SL + MD + SV			59,200	5.4	1.0
Very Severe (VS)	45,800	775,700	821,500	75.2	2.1
Nonclassified (NC)			211,780		
NC + VS			1,033,280	94.6	2.0

TABLE A245. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 5	Basin 6	TOTAL IN COUNTY	% County Soils	% State Class
Over 210	-	-	-	-	
195 - 210					
180 - 195					
165 - 180					
150 - 165					
Over 150			-	-	
135 - 150					
120 - 135	-	133,300	133,300	12.2	
105 - 120	-	143,200	143,200	13.1	
Over 105			276,500	25.3	
90 - 105	-	152,900	152,900	14.0	2.7
Over 90			429,400	39.3	
75 - 90	13,900	203,700	217,600	19.9	1.6
Over 75			647,000	59.2	
60 - 75	-	79,700	79,700	7.3	3.2
Over 60			726,700	66.5	
45 - 60	22,300	107,900	130,200	11.9	6.7
Over 45			856,900	78.4	
30 - 45	6,800	14,200	21,000	1.9	1.0
Over 30			877,900	80.4	
0 - 30	2,800	-	2,800	-	-

YAMHILL COUNTY

453,760 acres

426,260 acres classified (93.9%)

TABLE A246. MAJOR LAND USE (in acres)

Major Land Use	Basin 2	% County Soils	% State Class
Cultivated (C)	169,330	37.3	2.6
Pasture (P)	55,860	12.8	1.8
C + P	225,190	49.6	2.4
Forests (F)	197,930	43.6	1.2
Range (P)	-	-	-
F + R	197,930	43.6	1.0
Hay (H)	-	-	-
C + P + H	225,190	49.6	2.4
Water Shed	3,140	1.0	-
P + R	55,860	12.3	-
Nonclassified [N]	[27,500]	[6.1]	-
F + [N]	[225,430]	[49.7]	[1.0]

TABLE A247. IRRIGATION SUITABILITY (in acres)

Suitability Class	Basin 2	% County Soils	% State Class
Excellent (E)	55,890	12.3	4.0
Good (G)	39,760	8.8	1.0
E + G	95,650	21.1	1.7
Fair (F)	41,110	9.0	1.0
E + G + F	136,760	30.1	1.1
Poor (P)	78,220	17.2	1.7
E + G + F + P	214,980	47.3	1.3
Nonirrigable (N)	211,280		
Nonclassified [N]	[238,780]	[52.7]	[1.0]

TABLE A248. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	Basin 2	% County Soils	% State Class
I	7,130	1.6	3.7
IIe	8,060	1.8	1.0
IIw	66,650	14.7	7.0
IIe + IIw	74,710	16.5	3.8
IIs	-	-	-
IIc	-	-	-
Total II	74,710	16.5	2.4
I + IIe + IIw	81,840	18.0	3.8
Total I + II	81,840	18.0	2.5
IIIe	70,060	15.4	2.4
IIIw	17,640	3.9	3.0
IIIe + IIIw	87,700	19.3	2.5
IIIs	400	-	-
IIIc	-	-	-
Total III	88,100	19.4	1.3
I + IIe + IIw + IIIe + IIIw	169,540	37.4	3.0
Total I+II+III	169,940	37.4	1.6
IVe	58,940	13.0	2.5
IVw	7,890	1.7	1.0
IVe + IVw	66,830	14.7	2.1
IVs	-	-	-
IVc	-	-	-
Total IV	66,830	14.7	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	236,370	52.1	2.7
Total I+II+III+IV	236,770	52.2	1.0
VIe	153,440	33.8	3.6
VIw	4,570	1.0	1.2
VIs	13,170	2.9	-
VIc	-	-	-
Total VI	171,180	37.7	1.3
VIIe	6,970	1.5	-
VIIw	1,000	-	10.7
VIIs	10,340	2.3	-
VIIc	-	-	-
Total VII	18,310	4.0	-
Total VI + VII + Nonclassified	216,990	47.8	1.0

TABLE A249. AVERAGE ELEVATION (by hundreds of feet)

Elevation	Basin 2	% County Soils	% State Class
0 - 3	117,500	25.9	
3 - 6	68,720	15.1	
6 - 9	110,890	24.4	
Total 0 - 9	297,110	65.5	
9 - 12	3,140	1.0	
Total 0 - 12	300,250	66.2	
12 - 15	40,910	9.0	
Total 0 - 15	341,160	75.2	
15 - 18	84,490	18.6	
Total 0 - 18	425,650	93.8	
18 - 21	-	-	
21 - 24	-	-	
Total 0 - 24	425,650	93.8	
24 - 27	610	-	
27 - 30	-	-	
Total 0 - 30	426,260	93.9	
30 - 33			
33 - 36			
Total 0 - 36	-	-	
36 - 39			
Total 0 - 39	-	-	
39 - 42			
Total 0 - 42	-	-	
42 - 45			
Total 0 - 45	-	-	
45 - 48			
Total 0 - 48	-	-	
48 - 51			
Total 0 - 51	-	-	
51 - 54			
Total 0 - 54	-	-	
54 - 57			
57 - 60			
Total 0 - 60	-	-	

TABLE A250. SLOPE OF SOIL (acres by percent slope)

Slope %	Basin 2	% County Soils	% State Class
0 - 3	63,320	14.0	
4 - 7	46,570	10.3	
Total 0 - 7	109,890	24.3	1.0
8 - 12	37,880	8.3	
Total 0 - 12	147,770	32.6	1.0
13 - 20	121,470	26.8	
Total 0 - 20	269,240	59.4	1.0
21 - 30	-	-	
Total 0 - 30	269,240	59.4	1.0
31 - 99	157,020	40.6	

TABLE A251. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	Basin 2	% County Soils	% State Class
Slight (SL)	41,530	9.2	4.1
Moderate (MD)	13,440	3.0	-
SL + MD	54,970	12.2	1.4
Severe (SV)	138,060	30.4	2.4
SL + MD + SV	193,030	42.6	2.0
Very Severe (VS)	233,230	51.4	1.0
Nonclassified (NC)	27,500		
NC + VS	260,730	57.4	1.0

TABLE A252. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	Basin 2	% County Soils	% State Class
Over 210	-	-	-
195 - 210	-	-	-
180 - 195	290,250	64.0	
165 - 180	135,400	29.8	
150 - 165	-	-	
Over 150	425,650	93.8	
135 - 150	-	-	
120 - 135	610	-	
105 - 120	-	-	
Over 105	426,260		
90 - 105			
Over 90	-	-	
75 - 90			
Over 75	-	-	
60 - 75			
Over 60	-	-	
45 - 60			
Over 45	-	-	
30 - 45			
Over 30	-	-	
0 - 30			

APPENDIX B

DRAINAGE BASIN

AND

STATE OF OREGON

DATA

DRAINAGE BASIN #1 - NORTH COAST DRAINAGE BASIN

1,731,200 acres — 260,600 acres classified (15.0%)

TABLE B1. MAJOR LAND USE (in acres)

Major Land Use	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	16,800	20.4		44,300	53.8	
Pasture (P)	49,400	31.4		67,000	42.6	
C + P	66,200	27.6		111,300	46.4	
Forests (F)	15,600	74.3		1,400	6.7	
Range (R)	-	-		-	-	
F + R	15,600	74.3		1,400	6.7	
Hay (H)	-	-		-	-	
C + P + H	66,200	27.6		111,300	46.4	
Water Shed	-	-		-	-	
P + R	49,400	31.4		67,000	42.6	

Major Land Use	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	20,900	25.4		400	-	
Pasture (P)	40,400	25.7		400	-	
C + P	61,300	25.6		800	-	
Forests (F)	4,000	19.0		-	-	
Range (R)	-	-		-	-	
F + R	4,000	19.0		-	-	
Hay (H)	-	-		-	-	
C + P + H	61,300	25.6		800	-	
Water Shed	-	-		-	-	
P + R	40,400	25.7		400	-	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	82,400	4.8	1.3
Pasture (P)	157,200	9.1	5.2
C + P	239,600	13.8	2.5
Forests (F)	21,000	1.2	-
Range (R)	-	-	-
F + R	21,000	1.2	-
Hay (H)	-	-	-
C + P + H	239,600	13.8	2.5
Water Shed	-	-	-
P + R	157,200	9.1	1.0

TABLE B2. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Excellent (E)	9,500	27.1		7,900	22.6	
Good (G)	28,900	49.8		8,800	15.2	
E + G	38,400	41.3		16,700	18.0	
Fair (F)	9,600	17.0		39,600	70.1	
E + G + F	48,000	32.1		56,300	37.6	
Poor (P)	20,600	24.6		53,200	63.4	
E + G + F + P	68,600	29.4		109,500	46.9	
Nonirrigable (N)	13,200	48.5		3,200	11.8	

Suitability Class	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
Excellent (E)	17,400	49.7		200	-	
Good (G)	19,700	34.0		600	1.0	
E + G	37,100	39.9		800	1.0	
Fair (F)	7,300	12.9		-	-	
E + G + F	44,400	29.7		800	1.0	
Poor (P)	10,100	12.0		-	-	
E + G + F + P	54,500	23.4		800	-	
Nonirrigable (N)	10,800	39.7		-	-	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	35,000	2.0	2.5
Good (G)	58,000	3.4	1.4
E + G	93,000	5.4	1.6
Fair (F)	56,500	3.3	1.0
E + G + F	149,500	8.7	1.2
Poor (P)	83,900	4.8	1.8
E + G + F + P	233,400	13.5	1.4
Nonirrigable (N)	27,200	1.6	-
N + [N]	[1,497,800]	[86.5]	[3.3]

TABLE B3. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	600	7.9		600	7.9	
IIw	17,400	39.7		17,500	39.7	
IIe + IIw	18,000	35.0		18,100	35.0	
IIs	-	-		300	-	
IIc	-	-		-	-	
Total II	18,000	35.0		18,400	35.0	
I + IIe + IIw	18,000	35.0		18,100	35.0	
Total I + II	18,000	35.0		18,400	35.0	
IIIe	2,000	2.8		61,100	84.4	
IIIw	12,400	50.4		5,200	21.1	
IIIe + IIIw	14,400	14.8		66,300	68.4	
IIIs	-	-		200	-	
IIIc	-	-		-	-	
Total III	14,400	14.8		66,500	68.4	
I + IIe + IIw + IIIe + IIIw	32,400	21.8		84,400	56.9	
Total I+II+III	32,400	21.8		84,900	57.1	
IVe	-	-		2,000	62.5	
IVw	30,100	45.8		15,800	24.0	
IVe + IVw	30,100	43.7		17,800	25.8	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	30,100	43.7		17,800	25.8	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	62,500	28.8		102,200	47.0	
Total I+II+III+IV	62,500	28.8		102,700	47.0	
VIe	12,400	75.6		4,000	24.4	
VIw	1,900	19.0		5,400	54.0	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	14,300	54.2		9,400	35.6	
VIIe	5,000	38.5		600	4.6	
VIIw	-	-		-	-	
VIIs	-	-		-	-	
VIIc	-	-		-	-	
Total VII	5,000	30.5		600	3.6	

TABLE B3. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	6,400	84.2		-	-	
IIw	8,500	19.4		400	1.0	
IIe + IIw	14,900	29.0		400	1.0	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	14,900	29.0		400	1.0	
I + IIe + IIw	14,900	29.0		400	1.0	
Total I + II	14,900	29.0		400	1.0	
IIIe	9,300	12.8		-	-	
IIIw	6,600	27.8		400	1.6	
IIIe + IIIw	15,900	16.4		400	-	
IIIs	-	-		-	-	
IIIc	-	-		-	-	
Total III	15,900	16.4		400	-	
I + IIe + IIw + IIIe + IIIw	30,800	20.8		800	-	
Total I+II+III	30,800	20.8		800	-	
IVe	1,200	37.5		-	-	
IVw	19,800	30.2		-	-	
IVe + IVw	21,000	30.5		-	-	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	21,000	30.5		-	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	51,800	23.8		800	-	
Total I+II+III+IV	51,800	23.8		800	-	
VIe	-	-		-	-	
VIw	2,700	27.0		-	-	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	2,700	10.2		-	-	
VIIe	7,400	56.9		-	-	
VIIw	3,400	100.0		-	-	
VIIs	-	-		-	-	
VIIc	-	-		-	-	
Total VII	10,800	65.9		-	-	

TABLE B3. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	7,600	-	-
IIw	43,800	2.5	4.6
IIe + IIw	51,400	3.0	2.6
IIs	300	-	-
IIc	-	-	-
Total II	51,700	3.0	1.6
I + IIe + IIw	51,400	3.0	2.4
Total I + II	51,700	3.0	1.6
IIIe	72,400	4.2	2.5
IIIw	24,600	1.4	4.2
IIIe + IIIw	97,000	5.6	2.8
IIIs	200	-	-
IIIc	-	-	-
Total III	97,200	5.6	1.4
I + IIe + IIw + IIIe + IIIw	148,400	8.6	2.6
Total I+II+III	148,900	8.6	1.4
IVe	3,200	-	-
IVw	65,700	3.8	7.9
IVe + IVw	68,900	4.0	2.2
IVs	-	-	-
IVc	-	-	-
Total IV	68,900	4.0	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	217,300	12.6	2.5
Total I+II+III+IV	217,800	12.6	1.0
VIe	16,400	1.0	-
VIw	10,000	-	2.6
VIs	-	-	-
VIc	-	-	-
Total VI	26,400	1.5	-
VIIe	13,000	-	-
VIIw	3,400	-	36.3
VIIs	-	-	-
VIIc	-	-	-
Total VII	16,400	1.0	-

TABLE B4. AVERAGE ELEVATION (by hundreds of feet)

Elevation	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
0 - 3	49,800	38.4		38,400	29.6	
3 - 6	18,800	29.5		11,300	23.7	
6 - 9	-	-		26,700	100.0	
Total 0 - 9	68,600	33.6	4.0	76,400	37.4	4.4
9 - 12	-	-		35,700	100.0	
Total 0 - 12	68,600	27.6	4.0	112,100	46.8	6.5
12 - 15	-	-		-	-	
Total 0 - 15	68,600	27.3	4.0	112,100	46.3	6.5
15 - 18	8,200	91.1		-	-	
Total 0 - 18	76,800	30.6		112,100	44.6	
18 - 21	5,000	53.2		600	6.4	
Total 0 - 21	81,800			112,700		

Elevation	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
0 - 3	41,500	32.0		-	-	
3 - 6	16,700	35.1		800	1.7	
6 - 9	-	-		-	-	
Total 0 - 9	58,200	28.5	3.4	800		
9 - 12	-	-				
Total 0 - 12	58,200	24.3	3.4			
12 - 15	2,500	100.0				
Total 0 - 15	60,700	25.1	3.5			
15 - 18	800	9.9				
Total 0 - 18	61,500	24.5				
18 - 21	3,800	40.4				
Total 0 - 21	65,300					

TABLE B4. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	129,700	7.5	8.5
3 - 6	47,600	2.7	3.4
6 - 9	26,700	1.5	1.3
Total 0 - 9	204,000	11.8	4.1
9 - 12	35,700	2.1	4.1
Total 0 - 12	239,700	13.8	4.1
12 - 15	2,500	-	-
Total 0 - 15	242,200	14.0	3.6
15 - 18	9,000	1.0	-
Total 0 - 18	251,200	14.5	2.8
18 - 21	9,400	1.0	1.0
Total 0 - 21	260,600		

TABLE B5. SLOPE OF SOIL (acres by percent slope)

Slope %	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
0 - 3	44,400	31.5		47,300	33.5	
4 - 7	23,300	62.6		6,300	16.9	
Total 0 - 7	67,700	38.0		53,600	30.1	
8 - 12	1,300	2.3		55,300	96.3	
Total 0 - 12	69,000	29.3		108,900	46.2	
13 - 20	-	-		2,000	43.5	
Total 0 - 20	69,000	28.7	4.0	110,900	46.2	6.4
21 - 30	-	-		-	-	
Total 0 - 30	69,000	28.7	4.0	110,900	46.2	6.4
31 - 99	12,800			1,800		

Slope %	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
0 - 3	48,800	34.6		600	-	
4 - 7	7,400	19.9		200	-	
Total 0 - 7	56,200	31.5		800	-	
8 - 12	800	1.4		-	-	
Total 0 - 12	57,000	24.2		800	-	
13 - 20	2,600	56.5		-	-	
Total 0 - 20	59,600	24.8	3.4	800	-	
21 - 30	-	-		-	-	
Total 0 - 30	59,600	24.8	3.4	800	-	
31 - 99	5,700			-		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	141,100	8.2	2.2
4 - 7	37,200	2.1	1.0
Total 0 - 7	178,300	10.3	1.5
8 - 12	57,400		1.0
Total 0 - 12	235,700	13.6	1.0
13 - 20	4,600		-
Total 0 - 20	240,300	13.9	1.0
21 - 30	-	-	-
Total 0 - 30	240,300	13.9	1.0
31 - 99	20,300		

TABLE B6. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Slight (SL)	2,600	18.6		3,000	21.4	
Moderate (MD)	-	-		-	-	
SL + MD	2,600	17.3		3,000	20.0	
Severe (SV)	15,600	30.2		27,000	52.3	
SL + MD + SV	18,200	27.3		30,000	45.0	
Very Severe (VS)	63,600	32.8		82,700	42.6	

Limitation	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
Slight (SL)	8,400	60.0		-	-	
Moderate (MD)	1,000	100.0		-	-	
SL + MD	9,400	62.7		-	-	
Severe (SV)	9,000	17.4		-	-	
SL + MD + SV	18,400	27.6		-	-	
Very Severe (VS)	46,900	24.2		800	-	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	14,000	1.0	1.4
Moderate (MD)	1,000	-	-
SL + MD	15,000	1.0	-
Severe (SV)	51,600	3.0	1.0
SL + MD + SV	66,600	3.8	
Very Severe (VS)	194,000	11.2	
Nonclassified (NC)	1,470,600		
NC + VS	1,664,600	96.2	3.2

TABLE B7. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	CLATSOP COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	66,000	29.8	3.8	109,600	49.5	6.3
165 - 180	10,800	48.0	1.0	2,500	11.1	-
150 - 165	-	-	-	-	-	-
Over 150	76,800	30.6	4.4	112,100	44.6	6.5
135 - 150	-	-	-	-	-	-
120 - 135	5,000	53.2	-	600	6.4	-
105 - 120	-	-	-	-	-	-
Over 105	81,800			112,700		
90 - 105						
Over 90	-	-	-	-	-	-
0 - 90	-	-	-	-	-	-

Days	TILLAMOOK COUNTY	% Basin Class	% Basin Soils	WASHINGTON COUNTY	% Basin Class	% Basin Soils
Over 210	7,500	100.0	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	44,800	20.2	2.6	800	-	-
165 - 180	9,200	40.9	1.0	-	-	-
150 - 165	-	-	-	-	-	-
Over 150	61,500	24.5	3.6	800	-	-
135 - 150	-	-	-			
120 - 135	3,800	40.4	-			
105 - 120	-	-	-			
Over 105	65,300			-	-	-
90 - 105						
Over 90	-	-	-	-	-	-
0 - 90	-	-	-	-	-	-

TABLE B7. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	7,500	-	47.5
195 - 210	-	-	-
180 - 195	221,200	12.8	3.7
165 - 180	22,500	1.3	1.5
150 - 165	-	-	-
Over 150	251,200	14.5	2.5
135 - 150	-	-	-
120 - 135	9,400	-	1.0
105 - 120			
Over 105	260,600		
90 - 105			
Over 90	-	-	-
0 - 90	-	-	-

DRAINAGE BASIN #2 - WILLAMETTE RIVER DRAINAGE BASIN

7,700,000 acres 6,421,603 acres classified (83.4%)

TABLE B8. MAJOR LAND USE (in acres)

Major Land Use	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	209,260	11.7		96,000	5.4	
Pasture (P)	61,550	3.7		73,000	4.4	
C + P	270,810	7.8		169,000	4.9	
Forests (F)	157,640	4.6		28,850	1.0	
Range (R)	-	-		-	-	
F + R	-	-		-	-	
Hay (H)	-	-		-	-	
C + P + H	270,810	7.8		169,000	4.9	
Water Shed	2,380	-		3,500	-	
P + R	61,550	3.7		73,000	4.4	

Major Land Use	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	251,567	14.1		169,330	9.5	
Pasture (P)	123,996	7.4		55,860	3.4	
C + P	375,563	10.9		225,190	6.5	
Forests (F)	141,973	4.1		197,930	5.8	
Range (R)	-	-		-	-	
F + R	-	-		-	-	
Hay (H)	-	-		-	-	
C + P + H	375,563	10.9		225,190	6.5	
Water Shed	15,320	-		3,140	-	
P + R	123,996	7.4		55,860	3.4	

Major Land Use	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	159,915	8.9		102,697	5.7	
Pasture (P)	71,075	4.3		73,379	4.4	
C + P	230,990	6.7		176,076	5.1	
Forests (F)	226,200	6.6		136,795	4.0	
Range (R)	-	-		-	-	
F + R	-	-		-	-	
Hay (H)	-	-		-	-	
C + P + H	230,990	6.7		176,076	5.1	
Water Shed	400	-		2,348	-	
P + R	71,075	4.3		73,379	4.4	

TABLE B8. MAJOR LAND USE (in acres) Cont.

Major Land Use	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	266,150	14.9		195,290	10.9	
Pasture (P)	284,600	17.1		275,800	16.5	
C + P	550,750	15.9		471,090	13.6	
Forests (F)	403,050	11.8		1,866,448	54.3	
Range (R)	-	-		-	-	
F + R	-	-		-	-	
Hay (H)	-	-		-	-	
C + P + H	550,750	15.9		471,090	13.6	
Water Shed	2,550	-		3,700	-	
P + R	284,600	17.1		275,800	16.5	

Major Land Use	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	305,160	17.1		33,500	1.9	
Pasture (P)	122,305	7.3		25,100	1.5	
C + P	427,465	12.4		58,600	1.7	
Forests (F)	244,545	7.1		31,000	1.0	
Range (R)	-	-		-	-	
F + R	-	-		-	-	
Hay (H)	-	-		-	-	
C + P + H	427,465	12.4		58,600	1.7	
Water Shed	300	-		-	-	
P + R	122,305	7.3		25,100	1.5	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	1,788,869	23.2	27.8
Pasture (P)	1,166,650	15.2	38.5
C + P	2,955,519	38.4	31.3
Forests (F)	3,434,431	44.6	21.8
Range (R)	-	-	-
F + R	3,434,431	11.6	21.8
Hay (H)	-	-	-
C + P + H	2,955,519	38.4	31.3
Water Shed	33,638	-	1.9
P + R	1,166,650	15.2	38.5

TABLE B9. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
Excellent (E)	47,900	8.0	-	13,250	2.2	-
Good (G)	83,300	10.3	1.0	101,500	12.6	1.3
E + G	131,200	9.3	1.7	114,750	8.2	1.5
Fair (F)	79,450	9.2	1.0	23,150	2.7	-
E + G + F	210,650	9.3	2.7	137,900	6.1	1.8
Poor (P)	51,960	5.1	1.0	12,100	1.2	-
E + G + F + P	262,610	8.1	3.4	150,000	4.6	1.9
Nonirrigable (N)	168,220	5.3	2.2	51,350	1.6	1.0

Suitability Class	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
Excellent (E)	133,430	22.4	1.8	55,890	9.4	1.0
Good (G)	100,543	12.4	1.3	39,760	4.9	-
E + G	233,982	16.7	3.0	95,650	6.8	1.2
Fair (F)	104,764	12.1	1.3	41,110	4.8	-
E + G + F	338,746	14.9	4.4	136,760	6.0	1.8
Poor (P)	48,059	4.9	-	78,220	7.9	1.0
E + G + F + P	386,805	11.9	5.0	214,980	6.6	2.8
Nonirrigable (N)	146,051	4.6	1.9	211,280	6.7	2.7

Suitability Class	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Excellent (E)	59,450	10.0	1.0	42,451	7.1	-
Good (G)	31,965	4.0	-	31,865	3.9	-
E + G	91,415	6.5	1.2	74,316	5.3	1.0
Fair (F)	68,675	7.9	1.0	50,004	5.8	-
E + G + F	160,090	7.0	2.1	124,320	5.5	1.6
Poor (P)	66,200	6.7	1.0	61,228	6.2	1.0
E + G + F + P	226,290	7.0	2.9	185,548	5.7	2.4
Nonirrigable (N)	229,300	7.2	3.0	129,671	4.1	1.7

TABLE B9. IRRIGATION SUITABILITY (in acres) Cont.

Suitability Class	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
Excellent (E)	103,500	17.4	1.3	77,205	13.0	1.0
Good (G)	101,400	12.5	1.3	70,435	8.7	1.0
E + G	204,900	14.6	2.7	147,640	10.5	1.9
Fair (F)	173,000	20.0	2.2	203,050	23.5	2.6
E + G + F	377,900	16.7	4.9	350,690	15.5	4.6
Poor (P)	174,450	17.7	2.3	425,930	43.2	5.5
E + G + F + P	552,350	17.0	7.2	776,620	23.9	10.1
Nonirrigable (N)	404,000	12.8	5.2	1,564,618	49.4	20.3

Suitability Class	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Excellent (E)	59,920	10.1	1.0	1,600	-	-
Good (G)	232,950	28.8	3.0	14,400	1.8	-
E + G	292,870	20.9	3.8	16,000	1.1	-
Fair (F)	104,545	12.1	1.4	16,900	2.0	-
E + G + F	397,415	17.5	5.2	32,900	1.4	-
Poor (P)	67,050	6.8	1.0	1,200	-	-
E + G + F + P	464,465	14.3	6.0	34,100	1.0	-
Nonirrigable (N)	207,845	6.6	2.7	55,500	1.8	1.0

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	594,605	7.7	43.0
Good (G)	808,718	10.5	18.9
E + G	1,403,323	18.0	24.8
Fair (F)	864,648	11.2	13.7
E + G + F	2,267,971	29.4	18.9
Poor (P)	986,397	12.8	21.1
E + G + F + P	3,254,368	42.3	19.5
Nonirrigable (N)	3,167,835		
N + [N]	[4,454,632]	[57.7]	[9.9]

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
I	8,750	11.8		13,250	17.8	
IIe	15,920	4.2		24,550	6.4	
IIw	78,390	11.2		32,390	4.6	
IIe + IIw	94,310	8.7		56,940	5.2	
IIs	-	-		6,000	4.6	
IIc	-	-		-	-	
Total II	94,310	7.8		62,940	5.2	
I + IIe + IIw	103,060	8.9		70,190	6.0	
Total I + II	103,060	8.0		76,190	5.9	
IIIe	77,650	10.8		22,550	3.2	
IIIw	25,590	10.8		12,960	5.5	
IIIe + IIIw	103,240	10.8		35,510	3.7	
IIIs	1,100	1.8		25,800	42.9	
IIIc	-	-		-	-	
Total III	104,340	10.3		61,310	6.1	
I + IIe + IIw + IIIe + IIIw	206,300	9.8		105,700	5.0	
Total I+II+III	207,400	9.0		137,500	6.0	
IVe	46,100	5.2		14,700	1.6	
IVw	17,110	5.2		1,300	-	
IVe + IVw	63,210	5.2		16,000	1.3	
IVs	1,300	34.3		-	-	
IVc	-	-		-	-	
Total IV	64,510	5.3		16,000	1.3	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	269,510	8.1		121,700	3.6	
Total I+II+III+IV	271,910	7.7		153,500	4.4	
VIe	131,450	11.8		42,100	3.8	
VIw	-	-		-	-	
VIs	18,830	3.8		3,150	1.0	
VIc	-	-		-	-	
Total VI	150,280	9.3		45,250	2.8	
VIIe	3,140	-		500	-	
VIIw	300	7.6		1,150	29.0	
VIIs	5,200	1.0		950	-	
VIIc	-	-		-	-	
Total VII	8,640	1.0		2,600	-	

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
I	9,730	13.1		7,150	9.6	
IIe	67,830	17.7		8,060	2.1	
IIw	150,800	21.5		66,650	9.5	
IIe + IIw	218,630	20.2		74,710	6.9	
IIs	5,640	4.3		-	-	
IIc	-	-		-	-	
Total II	224,270	18.4		74,710	6.1	
I + IIe + IIw	228,360	19.7		81,840	7.1	
Total I + II	234,000	18.1		81,840	6.3	
IIIe	67,870	9.5		70,060	9.8	
IIIw	31,690	13.4		17,640	7.5	
IIIe + IIIw	99,560	10.5		87,700	9.2	
IIIs	6,450	10.7		400	-	
IIIc	-	-		-	-	
Total III	106,020	10.5		88,100	8.7	
I + IIe + IIw + IIIe + IIIw	327,920	15.5		169,540	8.0	
Total I+II+III	340,020	14.8		169,940	7.4	
IVe	35,100	3.9		58,940	6.6	
IVw	38,800	11.8		7,890	2.4	
IVe + IVw	73,900	6.0		66,830	5.5	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	73,900	6.0		66,830	5.4	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	401,820	12.1		236,370	7.1	
Total I+II+III+IV	413,920	11.7		236,770	6.7	
VIe	63,417	5.7		153,440	13.8	
VIw	720	6.4		4,570	40.5	
VIs	18,724	3.8		13,170	2.7	
VIc	-	-		-	-	
Total VI	82,861	5.1		171,180	10.6	
VIIe	23,415	3.6		6,970	1.1	
VIIw	-	-		1,000	25.2	
VIIs	12,660	2.0		10,340	1.7	
VIIc	-	-		-	-	
Total VII	36,075	2.8		18,310	1.4	

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
I	2,800	3.8		2,430	3.1	
IIe	26,050	6.8		14,327	3.7	
IIw	54,980	7.8		50,061	7.1	
IIe + IIw	81,030	7.5		68,190	6.3	
IIs	9,200	7.0		8,850	6.7	
IIc	-	-		-	-	
Total II	90,220	7.4		73,238	6.0	
I + IIe + IIw	83,830	7.2		70,620	6.1	
Total I + II	93,020	7.2		75,668	5.9	
IIIe	44,190	6.2		31,890	4.4	
IIIw	23,150	9.8		16,430	7.0	
IIIe + IIIw	67,340	7.1		48,320	5.1	
IIIs	-	-		920	1.5	
IIIc	-	-		-	-	
Total III	67,340	6.6		49,240	4.9	
I + IIe + IIw + IIIe + IIIw	151,170	7.2		118,940	5.6	
Total I+II+III	160,360	7.0		124,908	5.4	
IVe	66,380	7.4		73,570	8.2	
IVw	20,520	6.2		24,190	7.4	
IVe + IVw	86,900	7.1		97,760	8.0	
IVs	-	-		190	5.0	
IVc	-	-		-	-	
Total IV	86,900	7.1		97,950	8.0	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	238,070	7.1		216,700	6.5	
Total I+II+III+IV	247,260	7.0		222,858	6.3	
VIe	110,600	9.9		55,636	5.0	
VIw	1,000	8.8		-	-	
VIs	23,900	4.8		6,344	1.3	
VIc	-	-		-	-	
Total VI	135,500	8.4		61,980	3.8	
VIIe	32,725	5.0		6,137	1.0	
VIIw	-	-		1,513	38.2	
VIIs	40,100	6.5		22,727	3.7	
VIIc	-	-		-	-	
Total VII	72,825	5.7		30,377	2.4	

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
I	15,900	21.4		2,850	3.8	
IIe	38,450	10.1		67,100	17.5	
IIw	104,850	14.9		52,960	7.5	
IIe + IIw	143,300	13.2		120,060	11.1	
IIs	40,500	30.8		57,890	44.1	
IIc	-	-		-	-	
Total II	183,800	15.1		177,950	14.6	
I + IIe + IIw	159,200	13.7		122,910	10.6	
Total I + II	199,700	15.5		180,800	14.0	
IIIe	110,800	15.5		163,860	22.9	
IIIw	37,600	16.0		33,660	14.3	
IIIe + IIIw	148,400	15.6		197,520	20.8	
IIIs	-	-		1,800	3.0	
IIIc	-	-		-	-	
Total III	148,400	14.7		199,320	19.7	
I + IIe + IIw + IIIe + IIIw	307,600	14.6		320,430	15.2	
Total I+II+III	348,100	15.1		380,120	16.5	
IVe	107,450	12.0		387,038	43.4	
IVw	150,450	45.7		63,570	19.3	
IVe + IVw	257,900	21.1		450,608	36.9	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	259,900	21.2		450,608	36.8	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	565,500	17.0		771,038	23.1	
Total I+II+III+IV	608,000	17.2		830,728	23.6	
VIe	84,900	7.6		292,182	26.2	
VIw	1,000	8.8		4,000	35.4	
VIs	104,600	21.1		281,748	56.9	
VIc	-	-		-	-	
Total VI	190,500	11.8		577,930	35.7	
VIIe	100,550	15.4		468,572	71.7	
VIIw	-	-		-	-	
VIIs	59,300	9.6		464,008	75.0	
VIIc	-	-		-	-	
Total VII	159,850	12.5		932,580	73.1	

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
I	11,375	15.3		200	-	
IIe	112,930	29.5		7,300	1.9	
IIw	95,145	13.5		16,000	2.3	
IIe + IIw	208,075	19.2		23,300	2.1	
IIs	2,700	2.0		500	-	
IIc	-	-		-	-	
Total II	210,775	17.3		23,800	2.0	
I + IIe + IIw	219,450	18.9		23,500	2.0	
Total I + II	222,150	17.2		24,000	2.0	
IIIe	121,070	16.9		5,600	1.0	
IIIw	35,365	15.0		1,600	1.0	
IIIe + IIIw	156,435	16.4		7,200	1.0	
IIIs	21,950	36.5		1,700	3.0	
IIIc	-	-		-	-	
Total III	178,380	17.6		8,900	1.0	
I + IIe + IIw + IIIe + IIIw	375,885	17.8		30,700	1.4	
Total I+II+III	400,530	17.4		32,900	1.4	
IVe	71,740	8.0		30,400	3.4	
IVw	5,120	1.6		100	-	
IVe + IVw	76,860	6.3		30,500	2.5	
IVs	2,300	60.7		-	-	
IVc	-	-		-	-	
Total IV	79,165	6.5		30,500	2.5	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	452,745	13.6		61,200	1.8	
Total I+II+III+IV	479,695	13.6		63,400	1.8	
VIe	158,220	14.2		21,000	1.9	
VIw	-	-		-	-	
VIs	24,495	5.0		100	-	
VIc	-	-		-	-	
Total VI	182,715	11.3		21,100	1.3	
VIIe	8,675	1.3		2,800	-	
VIIw	-	-		-	-	
VIIs	1,225	-		2,300	-	
VIIc	-	-		-	-	
Total VII	9,900	1.0		5,100	-	

TABLE B10. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	74,413	1.0	38.7
IIe	382,518	5.0	37.1
IIw	702,223	9.1	73.5
IIe + IIw	1,084,741	14.1	54.6
IIs	131,282	1.7	50.7
IIc	-	-	-
Total II	1,216,023	15.8	39.0
I + IIe + IIw	1,159,154	15.0	53.2
Total I + II	1,290,436	16.8	39.0
IIIe	715,542	9.3	25.0
IIIw	235,682	3.1	40.0
IIIe + IIIw	951,224	12.4	27.6
IIIs	60,125	1.0	4.0
IIIc	-	-	-
Total III	1,011,349	13.1	14.5
I + IIe + IIw + IIIe + IIIw	2,110,378	27.4	37.5
Total I+II+III	2,301,785	29.9	22.4
IVe	891,416	11.6	38.2
IVw	329,061	4.3	39.8
IVe + IVw	1,220,477	15.8	38.6
IVs	3,788	-	-
IVc	-	-	-
Total IV	1,224,265	15.9	9.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	3,330,855	43.2	37.9
Total I+II+III+IV	3,526,050	45.8	15.1
VIe	1,112,945	14.4	25.8
VIw	11,290	-	2.9
VIs	495,061	6.4	7.8
VIc	-	-	-
Total VI	1,619,296	21.0	12.2
VIIe	653,484	8.5	10.4
VIIw	3,963	-	42.3
VIIs	618,810	8.0	9.7
VIIc	-	-	-
Total VII	1,276,257	16.6	10.0

TABLE B11. AVERAGE ELEVATION (by hundreds of feet)

Elevation	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
0 - 3	139,050	12.5		38,850	3.5	
3 - 6	16,330	2.2		92,200	12.4	
6 - 9	142,030	9.7		37,950	2.6	
Total 0 - 9	297,410	8.9	3.9	169,000	5.1	2.2
9 - 12	6,890	2.2		16,100	5.1	
Total 0 - 12	304,300	8.8	4.0	185,100	5.1	2.4
12 - 15	77,050	48.8		-	-	
Total 0 - 15	381,350	10.0	5.0	185,100	4.9	2.4
15 - 18	49,080	4.2		16,000	1.4	
Total 0 - 18	430,430	8.6	5.6	201,100	4.0	2.6
18 - 21	-	-		-	-	
21 - 24	-	-		-	-	
Total 0 - 24	430,430	8.0	5.6	201,100	3.8	2.6
24 - 27	400	-		250	-	
27 - 30	-	-		-	-	
Total 0 - 30	430,830	7.0	5.6	201,350	3.3	2.6
30 - 33						
33 - 36						
Total 0 - 36	-	-	-	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42						
Total 0 - 42	-	-	-	-	-	-

TABLE B11. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
0 - 3	212,028	19.1		117,500	10.5	
3 - 6	45,155	6.1		68,720	9.3	
6 - 9	126,935	8.6		110,890	7.6	
Total 0 - 9	384,118	11.6	5.0	297,110	8.9	3.8
9 - 12	2,790	1.0		3,140	1.0	
Total 0 - 12	386,908	10.6	5.0	300,250	8.2	3.9
12 - 15	-	-		40,910	25.9	
Total 0 - 15	386,908	10.2	5.0	341,160	9.0	4.4
15 - 18	66,863	5.7		84,490	7.2	
Total 0 - 18	453,771	9.1	5.9	425,650	8.6	5.5
18 - 21	720	8.4		-	-	
21 - 24	49,670	13.3		-	-	
Total 0 - 24	504,161	9.4	6.5	425,650	7.9	5.5
24 - 27	-	-		610	-	
27 - 30	-	-		-	-	
Total 0 - 30	504,161	8.2	6.5	426,260	6.9	5.5
30 - 33	-	-				
33 - 36	-	-				
Total 0 - 36	504,161	8.1	6.5	-	-	-
36 - 39	-	-				
Total 0 - 39	504,161	8.1	6.5	-	-	-
39 - 42	28,695	12.8				
Total 0 - 42	532,856	13.9	6.9	426,260	6.9	5.5

TABLE B11. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
0 - 3	98,865	8.9		67,849	6.1	
3 - 6	72,925	9.8		43,846	5.9	
6 - 9	91,350	6.2		94,311	6.4	
Total 0 - 9	263,140	7.9	3.4	206,006	6.2	2.7
9 - 12	17,950	5.6		57,385	18.0	
Total 0 - 12	281,090	7.7	3.6	263,391	7.2	3.4
12 - 15	6,000	3.8		504	-	
Total 0 - 15	287,090	7.6	3.7	263,895	6.9	3.4
15 - 18	122,500	10.4		26,348	2.2	
Total 0 - 18	409,590	8.2	5.3	290,243	5.8	3.8
18 - 21	4,150	48.2		3,427	39.8	
21 - 24	10,000	2.7		7,596	2.0	
Total 0 - 24	423,740	7.9	5.5	301,266	5.6	3.9
24 - 27	31,850	6.5		13,953	2.8	
27 - 30	-	-		-	-	
Total 0 - 30	455,590	7.4	5.9	315,219	5.1	4.1
30 - 33						
33 - 36						
Total 0 - 36	-	-	-	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42						
Total 0 - 42	455,590	7.4	5.9	315,219	5.1	4.1

TABLE B11. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
0 - 3	204,050	18.3		56,740	5.1	
3 - 6	164,650	22.2		178,660	24.1	
6 - 9	218,650	14.9		450,490	30.7	
Total 0 - 9	587,350	17.7	7.6	685,890	20.6	8.9
9 - 12	20,250	6.4		69,340	21.8	
Total 0 - 12	607,600	16.7	7.9	755,230	20.7	9.8
12 - 15	9,550	6.0		-	-	
Total 0 - 15	617,150	16.2	8.0	755,230	19.9	9.8
15 - 18	149,700	12.8		594,656	50.6	
Total 0 - 18	766,850	15.4	10.0	1,349,886	27.1	17.5
18 - 21	-	-		-	-	
21 - 24	53,550	14.3		252,028	67.5	
Total 0 - 24	820,400	15.3	10.6	1,601,914	29.9	20.8
24 - 27	69,150	14.1		318,024	65.0	
27 - 30	-	-		293,620	100.0	
Total 0 - 30	889,550	14.5	11.6	2,213,558	36.0	28.7
30 - 33	-	-		-	-	
33 - 36	-	-		-	-	
Total 0 - 36	889,550	14.4	11.6	2,213,558	35.7	28.7
36 - 39	-	-		-	-	
Total 0 - 39	889,550	14.4	11.6	2,213,558	35.7	28.7
39 - 42	66,800	29.9		127,680	57.2	
Total 0 - 42	956,350	25.0	12.4	2,341,238	61.1	30.4

TABLE B11. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
0 - 3	164,570	14.8		15,300	1.4	
3 - 6	46,330	6.2		12,900	1.7	
6 - 9	156,740	10.7		38,200	2.6	
Total 0 - 9	367,640	11.0	4.8	66,400	2.0	1.0
9 - 12	117,030	36.8		7,200	2.3	
Total 0 - 12	484,670	13.3	6.3	73,600	2.0	1.0
12 - 15	22,780	14.4		900	1.0	
Total 0 - 15	507,450	13.4	6.6	74,500	2.0	1.0
15 - 18	52,735	4.5		11,700	1.0	
Total 0 - 18	560,185	11.3	7.3	86,200	1.7	1.1
18 - 21	300	3.5		-	-	
21 - 24	-	-		600	-	
Total 0 - 24	560,485	10.5	7.3	86,800	1.6	1.1
24 - 27	52,525	10.7		2,800	1.0	
27 - 30	-	-		-	-	
Total 0 - 30	613,010	10.0	8.0	89,600	1.4	1.2
30 - 33	-	-				
33 - 36	59,300	100.0				
Total 0 - 36	672,310	10.8	8.7	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42						
Total 0 - 42	672,310	10.8	8.7	89,600	1.4	1.2

TABLE B11. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	1,114,802	14.5	73.4
3 - 6	741,716	9.6	53.9
6 - 9	1,467,546	19.0	71.2
Total 0 - 9	3,324,064	43.2	67.1
9 - 12	318,075	4.1	36.3
Total 0 - 12	3,642,139	47.3	62.5
12 - 15	157,694	2.0	16.0
Total 0 - 15	3,799,833	49.3	55.7
15 - 18	1,174,072	15.2	59.5
Total 0 - 18	4,973,905	64.6	56.6
18 - 21	8,597	-	1.0
21 - 24	373,444	4.8	16.1
Total 0 - 24	5,355,946	69.6	43.5
24 - 27	489,562	6.4	27.2
27 - 30	293,620	3.8	18.9
Total 0 - 30	6,139,128	79.7	39.2
30 - 33	-	-	-
33 - 36	59,300	1.0	3.6
Total 0 - 36	6,198,428	80.5	32.4
36 - 39	-	-	-
Total 0 - 39	6,198,428	80.5	28.0
39 - 42	223,175	2.9	4.4
Total 0 - 42	3,830,444	49.7	14.1

TABLE B12. SLOPE OF SOIL (acres by percent slope)

Slope %	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
0 - 3	112,790	7.8		66,250	4.6	
4 - 7	47,310	9.5		53,850	10.8	
Total 0 - 7	160,100	8.3	2.1	120,100	6.2	1.6
8 - 12	45,540	10.3		22,250	5.0	
Total 0 - 12	205,640	8.6	2.7	142,350	6.0	1.8
13 - 20	97,500	6.1		22,600	1.4	
Total 0 - 20	303,140	7.6	3.9	164,950	4.2	2.1
21 - 30	-	-		-	-	
Total 0 - 30	303,140	7.6		164,950	4.2	
31 - 99	127,690			36,400		

Slope %	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
0 - 3	241,280	16.8		63,320	4.4	
4 - 7	61,384	12.3		46,570	9.3	
Total 0 - 7	302,664	15.6	3.9	109,890	5.7	1.4
8 - 12	44,578	10.1		37,880	8.6	
Total 0 - 12	347,242	14.6	4.5	147,770	6.2	1.9
13 - 20	64,033	4.0		121,470	7.6	
Total 0 - 20	411,275	10.4	5.3	269,240	6.8	3.5
21 - 30	6,338	86.4		-	-	
Total 0 - 30	417,613	10.5		269,240	6.8	
31 - 99	115,243			157,020		

Slope %	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
0 - 3	114,650	8.0		102,507	7.1	
4 - 7	5,350	1.1		9,613	1.9	
Total 0 - 7	120,000	6.2	1.6	112,120	5.8	1.4
8 - 12	49,965	11.3		27,450	6.2	
Total 0 - 12	169,965	7.2	2.2	139,570	5.9	1.8
13 - 20	103,025	6.5		60,284	3.8	
Total 0 - 20	272,990	6.9	3.5	199,854	5.0	2.6
21 - 30	-	-		-	-	
Total 0 - 30	272,990	6.8		199,854	5.0	
31 - 99	182,600			115,365		

TABLE B12. SLOPE OF SOIL (acres by percent slope) Cont.

Slope %	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
0 - 3	353,550	24.6		222,270	15.5	
4 - 7	18,200	3.6		36,320	7.3	
Total 0 - 7	371,750	19.2	4.8	258,590	13.4	3.4
8 - 12	61,050	13.8		84,450	19.1	
Total 0 - 12	432,800	18.2	5.6	343,040	14.4	
13 - 20	167,400	10.5		811,718	51.0	
Total 0 - 20	600,200	15.1	7.8	1,154,758	29.1	15.0
21 - 30	1,000	13.6		-	-	
Total 0 - 30	601,200	15.1		1,154,758	29.0	
31 - 99	355,150			1,186,480		

Slope %	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
0 - 3	139,365	9.7		19,200	1.3	
4 - 7	211,315	42.4		9,000	1.8	
Total 0 - 7	350,680	18.1	4.6	28,200	1.4	-
8 - 12	63,765	14.4		4,800	1.1	
Total 0 - 12	414,445	17.4	5.4	33,000	1.4	-
13 - 20	140,420	8.8		1,500	-	
Total 0 - 20	554,865	14.0	7.2	34,500	1.0	-
21 - 30	-	-		-	-	
Total 0 - 30	554,865	14.0		34,500	1.0	
31 - 99	117,445			55,100		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	1,435,182		22.9
4 - 7	498,912		8.7
Total 0 - 7	1,934,094	25.1	16.3
8 - 12	441,728		3.9
Total 0 - 12	2,375,822	30.8	10.2
13 - 20	1,589,950		27.0
Total 0 - 20	3,965,772	51.5	13.6
21 - 30	7,338		1.2
Total 0 - 30	3,973,110	51.6	13.4
31 - 99	2,448,493		

TABLE B13. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
Slight (SL)	42,490	13.1		14,350	4.4	
Moderate (MD)	34,950	18.3		17,550	9.2	
SL + MD	77,440	15.0		31,900	6.2	
Severe (SV)	161,620	8.2		88,000	4.5	
SL + MD + SV	239,060	9.6		119,900	4.8	
Very Severe (VS)	191,770	4.9		81,450	2.1	

Limitation	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
Slight (SL)	84,321	26.0		41,530	12.8	
Moderate (MD)	9,577	5.0		13,440	7.0	
SL + MD	93,898	18.2		54,970	10.7	
Severe (SV)	182,164	9.3		138,060	7.0	
SL + MD + SV	276,062	11.1		193,030	7.8	
Very Severe (VS)	256,794	6.5		233,230	5.9	

Limitation	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Slight (SL)	18,575	5.7		17,730	5.5	
Moderate (MD)	4,025	2.1		2,921	1.5	
SL + MD	22,600	4.4		20,651	4.0	
Severe (SV)	121,175	6.2		102,937	5.2	
SL + MD + SV	143,775	5.8		123,588	5.0	
Very Severe (VS)	311,815	7.9		191,631	4.9	

TABLE B13. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre) Cont.

Limitation	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
Slight (SL)	50,450	15.6		15,950	4.9	
Moderate (MD)	7,700	4.0		-	-	
SL + MD	58,150	11.3		15,950	3.1	
Severe (SV)	342,900	17.4		533,130	27.1	
SL + MD + SV	401,050	16.2		549,080	22.1	
Very Severe (VS)	555,300	14.1		1,792,158	45.5	

Limitation	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Slight (SL)	36,000	11.1		2,800	1.0	
Moderate (MD)	100,270	52.4		800	-	
SL + MD	136,270	26.4		3,600	1.0	
Severe (SV)	248,210	12.6		48,900	2.5	
SL + MD + SV	384,480	15.5		52,500	2.1	
Very Severe (VS)	287,830	7.3		37,100	1.0	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	324,196	4.2	32.2
Moderate (MD)	191,233	2.5	6.5
SL + MD	515,429	6.7	13.1
Severe (SV)	1,967,096	25.5	33.9
SL + MD + SV	2,482,525	32.2	25.5
Very Severe (VS)	3,939,078	51.2	9.9
Non-classified (NC)	1,278,397		
NC + VS	5,217,475	67.8	10.0

TABLE B14. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	WASHINGTON COUNTY	% Basin Class	% Basin Soils	MULTNOMAH COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	10,200	5.4	-	-	-	-
180 - 195	291,620	6.2	3.8	177,250	3.8	2.3
165 - 180	128,610	18.2	1.7	18,300	2.6	-
150 - 165	-	-	-	5,550	3.6	-
Over 150	430,430	7.4	5.6	201,100	3.5	2.6
135 - 150	-	-	-	-	-	-
120 - 135	400	-	-	250	-	-
105 - 120	-	-	-	-	-	-
Over 105	430,830			301,350		
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	MARION COUNTY	% Basin Class	% Basin Soils	YAMHILL COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	500,651	10.6	6.5	290,250	6.1	3.8
165 - 180	3,510	-	-	135,400	19.1	1.8
150 - 165	-	-	-	-	-	-
Over 150	504,161	8.7	6.5	425,650	7.4	5.5
135 - 150	-	-	-	-	-	-
120 - 135	-	-	-	610	-	-
105 - 120	-	-	-	-	-	-
Over 105	-	-	-	426,260	-	-
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45	28,695	12.8	-			
Over 30	532,856	-	-	-	-	-
0 - 30						

TABLE B14. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	POLK COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	10,025	5.3	-	18,192	9.7	-
180 - 195	334,165	7.1	4.3	283,061	6.0	3.7
165 - 180	106,800	15.1	1.4	13,966	2.0	-
150 - 165	4,600	3.0	-	-	-	-
Over 150	455,590	7.9	5.9	315,219	5.4	4.1
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	LINN COUNTY	% Basin Class	% Basin Soils	LANE COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	65,800	35.0	1.0	63,190	7.2	1.0
180 - 195	732,600	15.5	9.5	1,546,232	32.7	20.1
165 - 180	67,900	9.6	1.0	207,716	29.3	2.7
150 - 165	-	-	-	800	-	-
Over 150	866,300	15.0	11.2	1,817,938	31.5	23.6
135 - 150	-	-	-	-	-	-
120 - 135	23,250	18.4	-	102,000	80.6	1.3
105 - 120	-	-	-	-	-	-
Over 105	889,550			1,919,936		
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60				293,620	100.0	3.8
Over 45	-	-	-	2,213,556		
30 - 45	66,800	29.9	1.0	127,680	57.2	1.6
Over 30	956,350			2,341,236		
0 - 30						

TABLE B14. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	CLACKAMAS COUNTY	% Basin Class	% Basin Soils	COLUMBIA COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	20,370	10.8	-	-	-	-
180 - 195	482,180	10.2	6.3	88,200	1.9	1.1
165 - 180	24,800	3.5	-	1,400	-	-
150 - 165	144,960	93.0	1.9	-	-	-
Over 150	672,310	11.6	8.7	89,600	1.6	1.2
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210	187,777	2.4	49.9
180 - 195	4,725,669	61.4	79.3
165 - 180	708,402	9.2	48.4
150 - 165	155,910	2.0	6.9
Over 150	5,777,758	75.0	57.3
135 - 150	-	-	-
120 - 135	126,510	1.6	3.6
105 - 120			
Over 105	5,904,268		
90 - 105			
Over 90	-	-	-
75 - 90			
Over 75	-	-	-
60 - 75			
Over 60	-	-	-
45 - 60	293,620	3.8	15.1
Over 45	6,197,888		
30 - 45	223,175	2.9	6.8
Over 30	6,421,063		
0 - 30			

DRAINAGE BASIN #4 - HOOD RIVER DRAINAGE BASIN

654,400 acres | 635,900 acres classified (97.2%)

TABLE B15. MAJOR LAND USE (in acres)

Major Land Use	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	27,400	14.5		161,100	85.5	
Pasture (P)	4,500	81.8		1,000	18.2	
C + P	31,900	16.4		162,000	83.6	
Forests (F)	252,900	73.5		91,300	26.5	
Range (R)	6,000	6.2		91,700	93.8	
F + R	258,900	58.6		183,000	41.4	
Hay (H)	-	-		-	-	
C + P + H	31,900	16.4		162,000	83.6	
Water Shed	-	-		-	-	
P + R	10,500			92,700		

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	188,500	28.8	2.9
Pasture (P)	5,500	1.0	-
C + P	194,000	29.6	2.0
Forests (F)	344,200	52.6	2.2
Range (R)	97,700	14.9	-
F + R	441,900	67.5	1.2
Hay (H)	-	-	-
C + P + H	194,000	29.6	2.0
Water Shed	-	-	-
P + R	103,200	15.8	-

TABLE B16. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Excellent (E)	5,500	100.0	0.8	-	-	-
Good (G)	14,300	21.6	2.2	51,900	78.4	7.9
E + G	19,800	27.6	3.0	51,900	72.4	7.9
Fair (F)	11,600	13.1	1.8	76,900	76.9	11.7
E + G + F	31,400	19.6	4.8	128,800	80.4	19.7
Poor (P)	8,600	17.7	1.3	40,000	82.3	6.1
E + G + F + P	40,000	19.2	6.1	168,800	80.8	25.8
Nonirrigable (N)	250,800	58.7	38.3	176,300	41.3	26.9

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	5,500	1.0	-
Good (G)	66,200	10.0	1.5
E + G	71,700	11.0	1.3
Fair (F)	88,500	13.5	1.4
E + G + F	160,200	24.5	1.3
Poor (P)	48,600	7.4	1.0
E + G + F + P	208,800	31.9	1.2
Nonirrigable (N)	427,100		
N + [N]	[445,700]	[68.1]	[1.0]

TABLE B17. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	14,100	59.7		9,500	40.3	
IIw	-	-		-	-	
IIe + IIw	14,100	59.7		9,500	40.3	
IIs	-	-		-	-	
IIc	-	-		3,600	100.0	
Total II	14,100	51.8		13,100	48.2	
I + IIe + IIw	14,100	59.7		9,500	40.3	
Total I + II	14,100	51.8		13,100	48.2	
IIIe	12,500	13.3		81,500	86.7	
IIIw	700	100.0		-	-	
IIIe + IIIw	13,200	13.9		81,500	86.1	
IIIs	1,700	100.0		-	-	
IIIc	-	-		-	-	
Total III	14,900	15.4		81,500	84.6	
I + IIe + IIw + IIIe + IIIw	27,300	23.1		91,000	76.9	
Total I+II+III	29,000	23.5		94,600	76.5	
IVe	3,200	3.5		89,200	96.5	
IVw	3,100	100.0		-	-	
IVe + IVw	6,300	6.6		89,200	93.4	
IVs	3,500	100.0		-	-	
IVc	-	-		-	-	
Total IV	9,800	9.9		89,200	90.1	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	33,600	15.7		180,200	84.3	
Total I+II+III+IV	38,800	17.4		183,800	82.6	
VIe	142,800	74.3		49,300	25.7	
VIw	-	-		-	-	
VIs	1,300	31.0		2,900	69.0	
VIc	-	-		-	-	
Total VI	144,100	73.4		52,200	26.6	
VIIe	78,400	72.6		29,600	27.4	
VIIw	-	-		-	-	
VIIs	29,500	27.1		79,500	72.9	
VIIc	-	-		-	-	
Total VII	107,900	49.7		109,100	50.3	

TABLE B17. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	23,600	3.6	2.3
IIw	-	-	-
IIe + IIw	23,600	3.6	1.2
IIs	-	-	-
IIc	3,600	-	-
Total II	27,200	4.2	1.0
I + IIe + IIw	23,600	3.6	1.1
Total I + II	27,200	4.2	1.0
IIIe	94,000	14.4	3.3
IIIw	700	-	-
IIIe + IIIw	94,700	14.5	2.7
IIIs	1,700	-	-
IIIc	-	-	-
Total III	96,400	14.7	1.4
I + IIe + IIw + IIIe + IIIw	118,300	18.1	2.1
Total I+II+III	123,600	18.9	1.2
IVe	92,400	14.1	4.0
IVw	3,100	-	-
IVe + IVw	95,500	14.6	3.0
IVs	3,500	-	-
IVc	-	-	-
Total IV	99,000	15.1	1.0
I+IIe+IIw+IIIe + IIIw+IVe+IVw	213,800	32.7	2.4
Total I+II+III+IV	222,600	34.0	1.0
VIe	192,100	29.4	4.5
VIw	-	-	-
VIs	4,200	-	-
VIc	-	-	-
Total VI	196,300	29.5	1.5
VIIe	108,000	16.5	1.7
VIIw	-	-	-
VIIs	109,000	16.6	1.7
VIIc	-	-	-
Total VII	217,000	33.2	1.7

TABLE B18. AVERAGE ELEVATION (by hundreds of feet)

Elevation	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-		-	-	
3 - 6	2,800	45.9		3,300	54.1	
6 - 9	14,600	49.5		14,900	50.5	
Total 0 - 9	17,400	48.9	2.6	18,200	51.1	2.8
9 - 12	2,800	100.0		-	-	
Total 0 - 12	20,200	52.6	3.1	18,200	47.4	2.8
12 - 15	4,100	4.2		94,500	95.8	
Total 0 - 15	24,300	17.7	3.7	112,700	82.3	17.2
15 - 18	16,600	100.0		-	-	
Total 0 - 18	40,900	26.6	6.2	112,700	73.4	17.2
18 - 21	1,700	6.4		24,700	93.6	
21 - 24	9,600	6.8		132,300	93.2	
Total 0 - 24	52,200	16.2	8.0	269,700	83.8	41.2
24 - 27	176,100	70.1		75,400	29.9	
27 - 30	-	-		-	-	
Total 0 - 30	228,300	39.8	34.9	345,100	60.2	52.7
30 - 33	-	-		-	-	
33 - 36	41,800	100.0		-	-	
Total 0 - 36	270,100	43.9	41.3	-	-	-
36 - 39	-	-				
Total 0 - 39	270,100	43.9	41.3	-	-	-
39 - 42	20,700					
Total 0 - 42	290,800	45.7	44.4	345,100	60.2	52.7

TABLE B18. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	-	-	-
3 - 6	6,100	1.0	-
6 - 9	29,500	4.5	1.4
Total 0 - 9	35,600	5.4	1.0
9 - 12	2,800	-	-
Total 0 - 12	38,400	5.9	1.0
12 - 15	98,600	15.1	10.0
Total 0 - 15	137,000	20.9	2.0
15 - 18	16,600	2.5	1.0
Total 0 - 18	153,600	23.5	1.7
18 - 21	26,400	4.0	2.2
21 - 24	141,900	21.7	6.1
Total 0 - 24	321,900	49.2	2.6
24 - 27	251,500	38.4	14.0
27 - 30	-	-	-
Total 0 - 30	573,400	87.6	3.6
30 - 33	-	-	-
33 - 36	41,800	6.4	2.6
Total 0 - 36	615,200	94.0	3.2
36 - 39	-	-	-
Total 0 - 39	615,200	94.0	2.8
39 - 42	20,700	3.2	-
Total 0 - 42	635,900	97.2	2.3

TABLE B19. SLOPE OF SOIL (acres by percent slope)

Slope %	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
0 - 3	5,500	24.2		17,200	75.8	
4 - 7	10,900	26.0		31,100	74.0	
Total 0 - 7	16,400	25.3	2.5	48,300	74.7	7.4
8 - 12	17,000	17.6		79,500	82.4	
Total 0 - 12	33,400	20.7	5.1	127,800	79.3	19.5
13 - 20	6,200	11.4		48,200	88.6	
Total 0 - 20	39,600	18.4	6.0	176,000	81.6	26.9
21 - 30	11,100	14.8		64,000	85.2	
Total 0 - 30	50,700	17.4	7.7	240,000	82.6	36.7
31 - 99	240,100			105,100		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	22,700	-	-
4 - 7	42,000	-	1.0
Total 0 - 7	64,700	9.9	1.0
8 - 12	96,500	-	1.0
Total 0 - 12	161,200	24.6	1.0
13 - 20	54,400	-	1.0
Total 0 - 20	215,600	32.9	1.0
21 - 30	75,100	-	12.0
Total 0 - 30	290,700	44.4	1.0
31 - 99	345,200		

TABLE B20. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	16,000	13.2		104,800	86.8	
SL + MD	16,000	13.2		104,800	86.5	
Severe (SV)	99,100	45.8		117,100	54.2	
SL + MD + SV	115,100	34.2		221,900	65.8	
Very Severe (VS)	175,700	58.8		123,200	41.2	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	120,800	18.4	4.1
SL + MD	120,800	18.4	3.1
Severe (SV)	216,200	33.0	3.7
SL + MD + SV	337,000	51.5	3.5
Very Severe (VS)	298,900	45.7	1.0
Nonclassified (NC)	18,600		
NC + VS	317,500	48.5	1.0

TABLE B21. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	HOOD RIVER COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	18,800	79.3	2.9	4,900	20.7	1.0
165 - 180	2,800	45.9	-	3,300	54.1	-
150 - 165	-	-	-	61,100	100.0	2.7
Over 150	21,600	23.8	3.3	69,300	76.2	10.6
135 - 150	-	-	-	36,200	100.0	5.5
120 - 135	25,200	12.6	3.8	175,400	87.4	26.8
105 - 120	68,700	63.4	10.5	39,700	36.6	6.1
Over 105	115,500	26.5	17.6	320,600	73.5	49.0
90 - 105	-	-	-	-	-	-
Over 90	115,500	26.5	17.6	320,600	73.5	49.0
75 - 90	88,400	78.3	13.5	24,500	21.7	3.7
Over 75	203,900	100.0	31.2	559,000		
60 - 75	-	-	-			
Over 60	-	-	-	-	-	-
45 - 60	86,900	100.0	13.3			
Over 45						
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210	-	-	-
180 - 195	23,700	3.6	-
165 - 180	6,100	-	1.0
150 - 165	61,100	9.3	2.7
Over 150	90,900	13.9	1.0
135 - 150	36,200	5.5	1.6
120 - 135	200,600	30.6	5.7
105 - 120	108,400	16.6	8.7
Over 105	436,100	66.6	2.6
90 - 105	-	-	-
Over 90	436,100	66.6	1.9
75 - 90	112,900	17.2	1.0
Over 75	559,000	85.0	2.1
60 - 75	-	-	-
Over 60	-	-	-
45 - 60	86,900	13.3	4.5
Over 45			
30 - 45			
Over 30	-	-	-
0 - 30			

DRAINAGE BASIN #5 - DESCHUTES RIVER DRAINAGE BASIN

6,500,000 acres 5,925,000 acres classified (91.2%)

TABLE B22. MAJOR LAND USE (in acres)

Major Land Use	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	136,600	21.3		201,100	31.3	
Pasture (P)	-	-		-	-	
C + P	136,600	19.5		201,100	28.7	
Forests (F)	7,000	-		82,900	4.6	
Range (R)	91,400	2.9		534,000	17.0	
F + R	98,400	2.0		616,900	12.5	
Hay (H)	-	-		-	-	
C + P + H	136,600	19.4		201,100	28.5	
Water Shed	-	-		26,500	9.5	
P + R	91,400	2.8		534,000	16.7	

Major Land Use	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	230,200	35.9		3,000	-	
Pasture (P)	-	-		9,900	16.6	
C + P	230,200	32.8		12,900	1.8	
Forests (F)	123,700	6.9		669,900	37.4	
Range (R)	451,300	14.4		605,700	22.1	
F + R	575,000	11.6		1,365,600	27.7	
Hay (H)	-	-		-	-	
C + P + H	230,200	32.6		12,900	1.8	
Water Shed	70,600	25.2		86,900	31.1	
P + R	451,300	14.1		705,600	22.0	

Major Land Use	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	71,000	11.1		-	-	
Pasture (P)	44,400	74.6		5,200	8.7	
C + P	115,400	16.4		5,200	1.0	
Forests (F)	396,400	22.1		445,600	24.9	
Range (R)	1,249,400	39.7		-	-	
F + R	1,645,800	33.3		445,600	9.0	
Hay (H)	3,600	100.0		-	-	
C + P + H	119,000	16.9		5,200	1.0	
Water Shed	88,700	31.7		6,400	2.3	
P + R	1,293,800	40.4		5,200	-	

TABLE B22. MAJOR LAND USE (in acres) Cont.

Major Land Use	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		-	-	
Pasture (P)	-	-		-	-	
C + P	-	-		-	-	
Forests (F)	13,600	1.0		28,300	1.6	
Range (R)	26,200	1.0		17,100	-	
F + R	39,800	1.0		45,400	1.0	
Hay (H)	-	-		-	-	
C + P + H	-	-		-	-	
Water Shed	-	-		400	-	
P + R	26,200	1.0		17,100	1.0	

Major Land Use	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		-	-	
Pasture (P)	-	-		-	-	
C + P	-	-		-	-	
Forests (F)	5,000	-		23,500	1.3	
Range (R)	34,000	1.1		45,500	1.4	
F + R	39,000	1.0		69,000	1.4	
Hay (H)	-	-		-	-	
C + P + H	-	-		-	-	
Water Shed	-	-		-	-	
P + R	34,000	1.1		45,500	1.4	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	641,900	9.9	10.0
Pasture (P)	59,500	1.0	2.0
C + P	701,400	10.8	7.4
Forests (F)	1,791,400	27.6	11.4
Range (R)	3,144,600	48.4	14.0
F + R	4,936,000	75.9	12.9
Hay (H)	3,600	-	42.8
C + P + H	705,000	10.8	7.4
Water Shed	279,500	4.3	15.8
P + R	3,204,100	49.3	12.6

TABLE B23. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-	-	2,600	3.6	-
Good (G)	72,900	10.8	1.1	124,300	18.4	1.9
E + G	72,900	9.8	1.1	129,900	17.4	2.0
Fair (F)	46,800	9.3	1.0	111,200	22.2	1.7
E + G + F	119,700	9.6	1.8	238,100	19.1	3.7
Poor (P)	16,900	2.2	-	131,100	17.1	2.0
E + G + F + P	136,600	6.8	2.1	369,200	18.3	5.7
Nonirrigable (N)	98,400	2.5	1.5	475,300	12.2	7.3

Suitability Class	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
Excellent (E)	17,200	23.7	-	3,000	4.1	-
Good (G)	125,500	18.6	1.9	210,800	31.3	3.2
E + G	142,700	19.1	2.2	213,800	28.6	3.3
Fair (F)	97,400	19.4	1.5	103,200	20.6	1.6
E + G + F	240,100	19.2	3.7	317,000	25.4	4.9
Poor (P)	104,600	13.7	1.6	149,600	19.5	2.3
E + G + F + P	344,700	17.1	5.3	466,600	23.2	7.2
Nonirrigable (N)	531,100	13.6	8.2	998,800	25.5	15.4

Suitability Class	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Excellent (E)	49,700	68.6	1.0	-	-	-
Good (G)	140,300	20.8	2.2	-	-	-
E + G	190,000	25.4	2.9	-	-	-
Fair (F)	114,400	22.8	1.8	5,200	1.0	-
E + G + F	304,400	24.4	4.7	5,200	-	-
Poor (P)	293,400	38.3	4.5	39,600	5.2	1.0
E + G + F + P	597,800	29.7	9.2	44,800	2.2	1.0
Nonirrigable (N)	1,255,700	32.1	19.3	412,400	10.5	6.3

TABLE B23. IRRIGATION SUITABILITY (in acres) Cont.

Suitability Class	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-	-	-	-	-
Good (G)	-	-	-	-	-	-
E + G	-	-	-	-	-	-
Fair (F)	1,700	-	-	2,200	-	-
E + G + F	1,700	-	-	2,200	-	-
Poor (P)	12,400	1.6	-	8,500	1.1	-
E + G + F + P	14,100	1.0	-	10,700	1.0	-
Nonirrigable (N)	25,700	1.0	-	35,100	1.0	1.0

Suitability Class	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-	-	-	-	-
Good (G)	-	-	-	-	-	-
E + G	-	-	-	-	-	-
Fair (F)	9,600	1.9	-	9,600	1.9	-
E + G + F	9,600	1.0	-	9,600	1.0	-
Poor (P)	7,500	1.0	-	2,100	-	-
E + G + F + P	17,100	1.0	-	11,700	1.0	-
Nonirrigable (N)	21,900	1.0	-	57,300	1.5	1.0

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	72,500	1.1	5.2
Good (G)	673,800	10.4	15.7
E + G	746,300	11.5	13.2
Fair (F)	501,300	7.7	7.9
E + G + F	1,247,600	19.2	10.4
Poor (P)	765,700	11.8	16.4
E + G + F + P	2,013,300	31.0	12.1
Nonirrigable (N)	2,911,700	-	-
N + [N]	[4,486,700]	[69.0]	[10.0]

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
I	-	-		22,400	93.0	
IIe	-	-		-	-	
IIw	-	-		-	-	
IIe + IIw	-	-		-	-	
IIs	-	-		-	-	
IIc	20,200	10.4		56,800	29.4	
Total II	20,200	9.1		56,800	25.7	
I + IIe + IIw	-	-		22,400	76.4	
Total I + II	20,200	8.2		-	-	
IIIe	94,700	12.2		169,500	21.8	
IIIw	-	-		6,500	19.5	
IIIe + IIIw	94,700	11.7		176,000	21.7	
IIIs	-	-		-	-	
IIIc	-	-		2,200	1.0	
Total III	94,700	8.5		178,200	16.0	
I + IIe + IIw + IIIe + IIIw	94,700	11.3		198,400	23.6	
Total I+II+III	114,900	8.5		257,400	19.0	
IVe	62,700	25.2		103,900	41.8	
IVw	-	-		-	-	
IVe + IVw	62,700	24.9		103,900	41.2	
IVs	1,400	-		17,900	3.8	
IVc	-	-		1,600	-	
Total IV	64,100	3.4		123,400	6.5	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	157,400	14.4		302,300	27.7	
Total I+II+III+IV	179,000	5.5		380,800	11.7	
VIe	-	-		69,700	22.6	
VIw	-	-		-	-	
VIs	-	-		223,600	32.4	
VIc	-	-		4,000	1.1	
Total VI	-	-		297,300	21.8	
VIIe	-	-		21,900	7.3	
VIIw	-	-		-	-	
VIIs	56,000	5.9		144,500	15.3	
VIIc	-	-		-	-	
Total VII	56,000	4.3		166,400	12.9	

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
I	1,700	7.0		-	-	
IIe	5,200	100.0		-	-	
IIw	-	-		-	-	
IIe + IIw	5,200	100.0		-	-	
IIs	19,400	87.8		-	-	
IIc	17,000	8.8		4,000	2.1	
Total II	41,600	18.8		4,000	1.8	
I + IIe + IIw	6,900	23.6		-	-	
Total I + II	43,300	17.7		4,000	1.6	
IIIe	165,900	21.4		286,700	36.9	
IIIw	-	-		9,900	29.6	
IIIe + IIIw	165,900	20.5		296,600	36.6	
IIIs	1,000	3.9		7,800	30.5	
IIIc	15,000	5.4		65,100	23.5	
Total III	181,900	16.3		369,500	33.2	
I + IIe + IIw + IIIe + IIIw	172,800	20.6		296,600	35.4	
Total I+II+III	225,200	16.6		373,500	27.5	
IVe	73,500	29.6		2,100	1.0	
IVw	-	-		-	-	
IVe + IVw	73,500	29.2		2,100	1.0	
IVs	46,300	9.9		38,600	8.2	
IVc	2,800	-		552,000	46.5	
Total IV	122,600	6.4		592,700	31.1	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	246,300	22.6		298,700	27.4	
Total I+II+III+IV	347,800	10.6		966,200	29.6	
VIe	68,800	22.5		126,000	40.9	
VIw	-	-		-	-	
VIs	91,600	13.3		56,000	8.1	
VIc	33,000	9.0		71,700	19.6	
Total VI	193,400	14.1		253,700	18.6	
VIIe	138,400	46.3		22,700	7.6	
VIIw	-	-		-	-	
VIIs	191,200	20.2		222,800	23.5	
VIIc	5,000	10.4		-	-	
Total VII	334,600	25.9		245,500	19.0	

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		-	-	
IIw	-	-		-	-	
IIe + IIw	-	-		-	-	
IIs	2,700	12.2		-	-	
IIc	95,500	49.4		-	-	
Total II	98,200	44.5		-	-	
I + IIe + IIw	-	-		-	-	
Total I + II	98,200	40.1		-	-	
IIIe	59,500	7.7		-	-	
IIIw	11,800	35.3		5,200	15.6	
IIIe + IIIw	71,300	8.8		5,200	1.0	
IIIs	16,800	65.6		-	-	
IIIc	176,300	63.6		-	-	
Total III	264,400	23.7		5,200	-	
I + IIe + IIw + IIIe + IIIw	71,300	8.5		5,200	1.0	
Total I+II+III	362,600	26.7		5,200	-	
IVe	6,300	2.5		-	-	
IVw	3,600	100.0		-	-	
IVe + IVw	9,900	3.9		-	-	
IVs	352,500	75.2		-	-	
IVc	170,600	14.4		355,000	29.9	
Total IV	533,000	28.0		355,000	18.6	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	81,200	7.4		5,200	-	
Total I+II+III+IV	895,600	27.4		360,200	11.0	
VIe	37,500	12.2		600	-	
VIw	1,500	100.0		-	-	
VIs	288,200	41.7		2,500	-	
IVc	154,900	42.3		90,000	24.6	
Total VI	482,100	35.3		93,100	6.8	
VIIe	114,300	38.2		-	-	
VIIw	-	-		-	-	
VIIs	320,800	33.9		3,900	-	
VIIc	40,700	84.6		-	-	
Total VII	475,800	36.8		3,900	-	

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		-	-	
IIw	-	-		-	-	
IIe + IIw	-	-		-	-	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	-	-		-	-	
I + IIe + IIw	-	-		-	-	
Total I + II	-	-		-	-	
IIIe	-	-		-	-	
IIIw	-	-		-	-	
IIIe + IIIw	-	-		-	-	
IIIs	-	-		-	-	
IIIc	1,000	-		-	-	
Total III	1,000	-		-	-	
I + IIe + IIw + IIIe + IIIw	-	-		-	-	
Total I+II+III	1,000	-		-	-	
IVe	-	-		-	-	
IVw	-	-		-	-	
IVe + IVw	-	-		-	-	
IVs	3,200	1.0		5,800	1.2	
IVc	25,500	2.1		5,600	-	
Total IV	28,700	1.5		11,400	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		-	-	
Total I+II+III+IV	29,700	1.0		11,400	-	
VIe	-	-		5,100	-	
VIw	-	-		-	-	
VIs	4,100	-		12,200	1.8	
VIc	6,000	1.6		5,500	1.5	
Total VI	10,100	1.0		22,800	1.7	
VIIe	-	-		1,700	-	
VIIw	-	-		-	-	
VIIs	-	-		7,500	1.0	
VIIc	-	-		2,400	5.0	
Total VII	-	-		11,600	1.0	

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		-	-	
IIw	-	-		-	-	
IIe + IIw	-	-		-	-	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	-	-		-	-	
I + IIe + IIw	-	-		-	-	
Total I + II	-	-		-	-	
IIIe	-	-		-	-	
IIIw	-	-		-	-	
IIIe + IIIw	-	-		-	-	
IIIs	-	-		-	-	
IIIc	3,900	1.4		13,900	5.0	
Total III	3,900	-		13,900	1.2	
I + IIe + IIw + IIIe + IIIw	-	-		-	-	
Total I+II+III	3,900	-		13,900	1.0	
IVe	-	-		-	-	
IVw	-	-		-	-	
IVe + IVw	-	-		-	-	
IVs	2,900	1.0		-	-	
IVc	18,900	1.6		54,100	4.6	
Total IV	21,800	1.1		54,100	2.8	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		-	-	
Total I+II+III+IV	25,700	1.0		68,000	2.1	
VIe	-	-		400	-	
VIw	-	-		-	-	
VIs	12,500	1.8		-	-	
VIc	800	-		600	-	
Total VI	13,300	1.0		1,000	-	
VIIe	-	-		-	-	
VIIw	-	-		-	-	
VIIs	-	-		-	-	
VIIc	-	-		-	-	
Total VII	-	-		-	-	

TABLE B24. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	24,100	-	12.5
IIe	5,200	-	-
IIw	-	-	-
IIe + IIw	5,200	-	-
IIs	22,100	-	8.5
IIc	193,500	3.0	22.2
Total II	220,800	3.4	7.1
I + IIe + IIw	29,300	-	1.3
Total I + II	244,900	3.8	7.4
IIIe	776,300	11.9	27.2
IIIw	33,400	-	5.7
IIIe + IIIw	809,700	12.4	23.5
IIIs	25,600	1.7	-
IIIc	277,400	13.6	4.3
Total III	1,112,700	16.0	17.1
I + IIe + IIw + IIIe + IIIw	839,000	14.9	12.9
Total I+II+III	1,357,600	13.2	20.9
IVe	248,500	10.7	3.8
IVw	3,600	-	-
IVe + IVw	252,100	8.0	3.9
IVs	468,600	8.4	7.2
IVc	1,186,100	27.3	18.2
Total IV	1,906,800	14.5	29.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	1,091,100	12.4	16.8
Total I+II+III+IV	3,264,400	14.0	50.2
VIe	308,100	7.2	4.7
VIw	1,500	-	-
VIs	690,700	10.9	10.6
VIc	366,500	16.2	5.6
Total VI	1,366,800	10.3	21.0
VIIe	299,000	4.7	4.6
VIIw	-	-	-
VIIs	946,700	14.9	14.6
VIIc	48,100	68.1	1.0
Total VII	1,293,800	10.1	19.9

TABLE B25. AVERAGE ELEVATION (by hundreds of feet)

Elevation	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
0 - 6	-	-	-	-	-	-
6 - 9	14,700	100.0	-	-	-	-
Total 0 - 9	14,700	100.0	-	-	-	-
9 - 12	-	-	-	-	-	-
Total 0 - 12	14,700	100.0	-	-	-	-
12 - 15	91,300	93.4	-	6,400	6.6	-
Total 0 - 15	106,000	94.3	1.6	6,400	5.7	-
15 - 18	-	-	-	11,100	100.0	-
Total 0 - 18	106,000	85.8	1.2	17,500	14.2	-
18 - 21	32,500	14.2	-	155,400	67.9	-
21 - 24	1,800	-	-	213,300	58.1	-
Total 0 - 24	140,300	19.5	2.2	386,200	53.7	5.9
24 - 27	94,700	23.6	-	258,400	64.3	-
27 - 30	-	-	-	28,200	12.8	-
Total 0 - 30	235,000	17.5	3.6	672,800	50.2	10.4
30 - 33	-	-	-	29,500	6.2	-
33 - 36	-	-	-	98,600	14.9	-
Total 0 - 36	-	-	-	800,900	32.1	12.3
36 - 39				-	-	-
Total 0 - 39	-	-	-	800,900	31.2	12.3
39 - 42				10,200	1.5	-
Total 0 - 42	-	-	-	811,100	25.0	12.5
42 - 45				1,800	-	-
Total 0 - 45	-	-	-	812,900	22.2	12.5
45 - 48				29,700	4.2	-
Total 0 - 48	-	-	-	842,600	19.3	13.0
48 - 51				1,900	1.0	-
Total 0 - 51	-	-	-	844,500		
51 - 54						
Total 0 - 54	235,000			844,500		

TABLE B25. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
0 - 6	-	-	-	-	-	-
6 - 9						
Total 0 - 9	-	-	-	-	-	-
9 - 12						
Total 0 - 12	-	-	-	-	-	-
12 - 15						
Total 0 - 15	-	-	-	-	-	-
15 - 18						
Total 0 - 18	-	-	-	-	-	-
18 - 21	41,100	17.9	-			
21 - 24	151,800	41.4	-			
Total 0 - 24	192,900	26.8	3.0	-	-	-
24 - 27	49,000	12.2	-			
27 - 30	191,300	87.2	-			
Total 0 - 30	433,200	32.3	6.7	-	-	-
30 - 33	50,900	10.4	-	145,200	29.7	-
33 - 36	189,000	28.5	-	222,200	33.5	-
Total 0 - 36	673,100	27.0	10.4	376,400	15.1	5.8
36 - 39	-	-	-	-	-	-
Total 0 - 39	673,100	26.2	10.4	376,400	14.7	5.8
39 - 42	49,900	7.4	-	207,100	30.7	-
Total 0 - 42	723,000	22.3	11.1	574,500	17.7	8.8
42 - 45	49,700	11.6	-	20,900	4.9	-
Total 0 - 45	772,700	21.1	11.9	595,400	16.2	9.2
45 - 48	76,300	10.7	-	202,400	28.4	-
Total 0 - 48	849,000	19.4	13.1	797,800	18.2	12.3
48 - 51	2,400	1.0	-	7,300	2.6	-
Total 0 - 51	851,400	18.3	13.1	805,100	17.3	12.4
51 - 54	24,400	1.9	-	660,300	52.1	-
Total 0 - 54	875,800			1,465,400		

TABLE B25. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
0 - 6	-	-	-	-	-	-
6 - 9						
Total 0 - 9	-	-	-	-	-	-
9 - 12						
Total 0 - 12	-	-	-	-	-	-
12 - 15						
Total 0 - 15	-	-	-	-	-	-
15 - 18						
Total 0 - 18	-	-	-	-	-	-
18 - 21						
21 - 24						
Total 0 - 24	-	-	-	-	-	-
24 - 27						
27 - 30						
Total 0 - 30	-	-	-	-	-	-
30 - 33	263,800	53.9	-			
33 - 36	153,500	23.1	-			
Total 0 - 36	417,300	16.7	6.4	-	-	-
36 - 39	69,800	100.0	-			
Total 0 - 39	487,100	19.0	7.5	-	-	-
39 - 42	402,500	59.7	-			
Total 0 - 42	889,600	27.5	13.7	-	-	-
42 - 45	320,900	74.8	-			
Total 0 - 45	1,210,500	33.0	18.6	-	-	-
45 - 48	322,600	45.2	-	11,600	1.6	-
Total 0 - 48	1,533,100	34.8	23.6	11,600	-	-
48 - 51	236,000	84.7	-	-	-	-
Total 0 - 51	1,769,100	38.0	27.2	11,600	-	-
51 - 54	84,400	6.7	-	445,600	35.2	-
Total 0 - 54	1,853,500			457,200		

TABLE B25. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
0 - 6	-	-	-	-	-	-
6 - 9						
Total 0 - 9	-	-	-	-	-	-
9 - 12						
Total 0 - 12	-	-	-	-	-	-
12 - 15						
Total 0 - 15	-	-	-	-	-	-
15 - 18						
Total 0 - 18	-	-	-	-	-	-
18 - 21						
21 - 24						
Total 0 - 24	-	-	-	-	-	-
24 - 27						
27 - 30						
Total 0 - 30	-	-	-	-	-	-
30 - 33						
33 - 36						
Total 0 - 36	-	-	-	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42						
Total 0 - 42	-	-	-	-	-	-
42 - 45	1,400	-	-	21,800	5.1	-
Total 0 - 45	1,400	-	-	21,800	1.0	1.0
45 - 48	14,500	2.0	0	4,900	1.0	-
Total 0 - 48	15,900	-	-	26,700	1.0	-
48 - 51	10,300	3.7	-	9,400	3.4	-
Total 0 - 51	26,200	-	-	36,100	1.0	1.0
51 - 54	13,600	1.1	-	9,700	1.0	-
Total 0 - 54	39,800			45,800		

TABLE B25. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
0 - 6	-	-	-	-	-	-
6 - 9						
Total 0 - 9	-	-	-	-	-	-
9 - 12						
Total 0 - 12	-	-	-	-	-	-
12 - 15						
Total 0 - 15	-	-	-	-	-	-
15 - 18						
Total 0 - 18	-	-	-	-	-	-
18 - 21						
21 - 24						
Total 0 - 24	-	-	-	-	-	-
24 - 27						
27 - 30						
Total 0 - 30	-	-	-	-	-	-
30 - 33						
33 - 36						
Total 0 - 36	-	-	-	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42				4,300	1.0	-
Total 0 - 42	-	-	-	4,300	-	-
42 - 45	1,600	-	-	10,800	2.5	-
Total 0 - 45	1,600	-	-	15,100	-	-
45 - 48	21,200	3.0	-	30,400	4.3	-
Total 0 - 48	22,800	1.0	-	45,500	1.0	1.0
48 - 51	11,200	4.0	-	-	-	-
Total 0 - 51	34,000	1.0	1.0	45,500	1.0	1.0
51 - 54	5,000	-	-	23,500	1.8	-
Total 0 - 54	39,000			68,800		

TABLE B25. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 6	-	-	-
6 - 9	14,700	-	-
Total 0 - 9	14,700	-	-
9 - 12	-	-	-
Total 0 - 12	14,700	-	-
12 - 15	97,700	1.5	9.9
Total 0 - 15	112,400	1.7	1.6
15 - 18	11,100	-	1.0
Total 0 - 18	123,500	1.9	1.4
18 - 21	229,000	3.5	18.8
21 - 24	366,900	5.6	15.9
Total 0 - 24	719,400	11.1	5.8
24 - 27	402,100	6.2	22.3
27 - 30	219,500	3.4	14.1
Total 0 - 30	1,341,000	20.6	8.6
30 - 33	489,400	7.5	26.3
33 - 36	663,300	10.2	40.9
Total 0 - 36	2,493,700	38.4	13.0
36 - 39	69,800	1.1	-
Total 0 - 39	2,563,500	39.4	11.6
39 - 42	674,000	10.4	16.5
Total 0 - 42	3,237,500	49.8	11.9
42 - 45	428,900	6.6	8.3
Total 0 - 45	3,666,400	56.4	11.3
45 - 48	713,600	11.0	9.7
Total 0 - 48	4,380,000	67.4	11.0
48 - 51	278,500	4.3	-
Total 0 - 51	4,658,500	71.7	10.7
51 - 54	1,266,500	19.5	30.9
Total 0 - 54	5,925,000		

TABLE B26. SLOPE OF SOIL (acres by percent slope)

Slope %	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-	-	25,000	5.6	-
4 - 7	63,200	5.3	-	100,500	8.5	-
Total 0 - 7	63,200	3.9	1.0	125,500	7.7	1.9
8 - 12	89,500	4.8	-	336,000	18.1	-
Total 0 - 12	152,700	4.4	2.3	461,500	13.2	7.1
13 - 20	16,900	2.7	-	77,900	12.4	-
Total 0 - 20	169,600	4.1	2.6	539,400	13.1	8.3
21 - 30	4,000	80.0	-	-	-	-
Total 0 - 30	173,600	4.2	2.6	539,400	13.1	8.3
31 - 99	61,400	-	-	305,100	-	-

Slope %	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
0 - 3	27,600	6.2	-	131,500	29.6	-
4 - 7	164,900	14.0	-	549,200	46.5	-
Total 0 - 7	192,500	11.8	3.0	680,700	41.9	10.5
8 - 12	218,600	11.8	-	539,300	29.0	-
Total 0 - 12	411,100	11.8	6.3	1,220,000	35.0	18.8
13 - 20	47,800	7.6	-	51,200	8.1	-
Total 0 - 20	458,900	11.2	7.1	1,271,200	30.9	19.6
21 - 30	1,000	20.0	-	-	-	-
Total 0 - 30	459,900	11.2	7.1	1,271,200	30.8	19.6
31 - 99	415,900	-	-	194,200	-	-

Slope %	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
0 - 3	129,400	29.1	-	130,800	29.4	-
4 - 7	132,300	11.2	-	150,600	12.7	-
Total 0 - 7	261,700	16.1	4.0	281,300	17.3	4.3
8 - 12	534,800	28.8	-	58,000	3.1	-
Total 0 - 12	796,500	22.9	12.2	339,300	9.7	5.2
13 - 20	320,400	50.9	-	63,200	10.0	-
Total 0 - 20	1,116,900	27.2	17.2	402,500	9.8	6.2
21 - 30	-	-	-	-	-	-
Total 0 - 30	1,116,900	27.2	17.2	402,500	9.8	6.2
31 - 99	736,600	-	-	54,700	-	-

TABLE B26. SLOPE OF SOIL (acres by percent slope) Cont.

Slope %	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-	-	-	-	-
4 - 7	-	-	-	-	-	-
Total 0 - 7	-	-	-	-	-	-
8 - 12	12,800	1.0	-	11,900	1.0	-
Total 0 - 12	12,800	-	-	11,900	-	-
13 - 20	16,800	2.7	-	14,300	2.3	-
Total 0 - 20	29,600	1.0	-	26,200	1.0	-
21 - 30	-	-	-	-	-	-
Total 0 - 30	29,600	1.0	-	26,200	1.0	-
31 - 99	10,200	-	-	19,600	-	-

Slope %	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-	-	-	-	-
4 - 7	1,600	-	-	19,600	1.6	-
Total 0 - 7	1,600	-	-	19,600	1.2	-
8 - 12	17,400	1.0	-	38,500	2.1	-
Total 0 - 12	19,000	1.0	-	58,100	1.7	1.0
13 - 20	19,200	3.0	-	1,500	-	-
Total 0 - 20	38,200	1.0	1.0	59,600	1.4	1.0
21 - 30	-	-	-	-	-	-
Total 0 - 30	38,200	1.0	1.0	59,600	1.4	1.0
31 - 99	800	-	-	9,400	-	-

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	444,200	-	7.1
4 - 7	1,181,900	-	20.6
Total 0 - 7	1,626,100	25.0	13.7
8 - 12	1,856,800	-	16.4
Total 0 - 12	3,482,900	53.6	15.0
13 - 20	629,200	-	10.7
Total 0 - 20	4,112,100	63.3	14.2
21 - 30	5,000	-	-
Total 0 - 30	4,117,100	63.3	13.9
31 - 99	1,807,900	-	-

TABLE B27. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		22,400	31.3	
Moderate (MD)	81,900	23.2		64,300	18.2	
SL + MD	81,900	19.3		86,700	20.4	
Severe (SV)	62,700	7.4		139,100	16.5	
SL + MD + SV	144,600	11.4		225,800	17.8	
Very Severe (VS)	90,400	1.9		618,700	13.3	

Limitation	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHUTES COUNTY	% Basin Class	% Basin Soils
Slight (SL)	1,700	2.4		1,000	1.4	
Moderate (MD)	68,900	19.5		9,700	2.8	
SL + MD	70,600	16.6		10,700	2.5	
Severe (SV)	202,900	24.1		226,700	27.0	
SL + MD + SV	273,500	21.6		237,400	18.8	
Very Severe (VS)	602,300	12.9		1,228,000	26.4	

Limitation	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Slight (SL)	46,400	64.9		-	-	
Moderate (MD)	127,800	36.2		-	-	
SL + MD	174,200	41.1		-	-	
Severe (SV)	154,800	18.4		39,200	4.7	
SL + MD + SV	329,100	26.0		39,200	3.1	
Very Severe (VS)	1,524,500	32.7		418,000	9.0	

TABLE B27. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre) Cont.

Limitation	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	-	-		-	-	
SL + MD	-	-		-	-	
Severe (SV)	3,600	-		-	-	
SL + MD + SV	3,600	-		-	-	
Very Severe (VS)	36,200	1.0		45,800	1.0	

Limitation	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	-	-		-	-	
SL + MD	-	-		-	-	
Severe (SV)	3,200	-		8,800	1.0	
SL + MD + SV	3,200	-		8,800	1.0	
Very Severe (VS)	35,800	1.0		60,200	1.3	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	71,500	1.1	7.1
Moderate (MD)	352,600	5.4	12.1
SL + MD	424,100	6.5	10.8
Severe (SV)	841,000	12.9	14.5
SL + MD + SV	1,265,100	19.4	13.0
Very Severe (VS)	4,659,900	71.7	11.7
Nonclassified (NC)	575,000		
NC + VS	5,234,900	80.5	10.1

TABLE B28. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	SHERMAN COUNTY	% Basin Class	% Basin Soils	WASCO COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	-	-	-	-	-	-
165 - 180	-	-	-	-	-	-
150 - 165	106,000	94.2	1.6	6,400	5.8	-
Over 150	106,000	94.2	1.6	6,400	5.8	-
135 - 150	32,500	11.3	1.0	254,400	88.7	39.0
120 - 135	94,700	22.1	1.4	333,800	77.9	5.1
105 - 120	-	-	-	-	-	-
Over 105	233,200	28.2	3.6	594,600	71.8	9.1
90 - 105	-	-	-	55,100	8.9	1.0
Over 90	-	-	-	649,700	53.6	10.0
75 - 90	1,800	-	-	127,800	7.0	2.0
Over 75	235,000			777,500	25.7	12.0
60 - 75				40,300	6.9	1.0
Over 60	-	-	-	817,800	22.6	12.6
45 - 60				-	-	-
Over 45	-	-	-	817,800	20.9	12.6
30 - 45				200	-	-
Over 30	-	-	-	818,000	20.0	12.6
0 - 30				26,500	1.8	-

Days	JEFFERSON COUNTY	% Basin Class	% Basin Soils	DESCHURES COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105	241,900	39.1	3.5	9,500	1.5	-
Over 90	241,900	19.9	3.7	9,500	1.0	-
75 - 90	167,100	9.2	2.6	552,200	30.4	8.5
Over 75	409,000	13.5	6.3	561,700	18.5	8.6
60 - 75	330,900	56.6	5.1	4,500	1.0	-
Over 60	739,900	20.5	11.4	566,200	15.7	-
45 - 60	12,500	3.0	-	152,000	36.0	2.3
Over 45	752,400	19.2	11.6	718,200	18.4	11.0
30 - 45	23,400	13.6	-	-	-	-
Over 30	775,800	19.0	11.9	718,200	17.6	11.0
0 - 30	100,000	6.8	1.5	747,200	50.4	11.5

TABLE B28. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	CROOK COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105	311,200	50.3	4.8			
Over 90	311,200	25.6	4.8	-	-	-
75 - 90	866,800	47.7	13.3			
Over 75	1,178,000	38.9	18.1	-	-	-
60 - 75	191,400	32.7	2.9			
Over 60	1,369,400	37.9	8.7	-	-	-
45 - 60	213,600	50.6	3.3	5,200	1.2	-
Over 45	1,583,000	40.4	24.4	5,200	-	-
30 - 45	141,100	82.3	2.2	-	-	-
Over 30	1,724,100	42.2	26.5	5,200	-	-
0 - 30	129,400	8.7	2.0	452,000	30.5	7.0

Days	GRANT COUNTY	% Basin Class	% Basin Soils	WHEELER COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90	25,100	1.4	-	13,900	1.0	-
Over 75	25,100	1.0	-	13,900	-	-
60 - 75	4,300	1.0	-	-	-	-
Over 60	29,400	1.0	-	13,900	-	-
45 - 60	10,400	2.5	-	22,300	5.3	-
Over 45	39,800			36,200	1.0	1.0
30 - 45	-	-	-	6,800	4.0	-
Over 30	-	-	-	43,000	1.0	1.0
0 - 30				2,800	-	-

TABLE B28. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	HARNEY COUNTY	% Basin Class	% Basin Soils	LAKE COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105				900	-	-
Over 90	-	-	-	900	-	-
75 - 90	27,700	1.5	-	35,800	2.0	1.0
Over 75	27,700	1.0	-	36,700	1.2	1.0
60 - 75	4,900	1.0	-	8,800	1.5	-
Over 60	32,600	1.0	1.0	45,500	1.2	1.0
45 - 60	6,400	1.5	-	-	-	-
Over 45	39,000			-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165	112,500	1.7	5.0
Over 150	112,500	1.7	1.1
135 - 150	286,900	4.4	12.9
120 - 135	428,500	6.6	12.2
105 - 120	-	-	-
Over 105	827,800	12.7	4.8
90 - 105	618,600	9.5	10.9
Over 90	1,213,200	18.7	5.3
75 - 90	1,818,200	28.0	13.0
Over 75	3,029,600	46.6	8.2
60 - 75	585,100	9.0	23.8
Over 60	3,614,700	55.6	9.2
45 - 60	422,400	6.5	21.7
Over 45	3,912,800	60.2	9.5
30 - 45	171,500	2.6	5.2
Over 30	4,084,300	62.8	9.2
0 - 30	1,481,400	22.8	29.5

DRAINAGE BASIN #6 - JOHN DAY RIVER DRAINAGE BASIN

5,120,000 acres 3,570,300 acres classified (69.7%)

TABLE B29. MAJOR LAND USE (in acres)

Major Land Use	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	25,800	3.6		98,500	13.7	
Pasture (P)	-	-		2,700	100.0	
C + P	25,800	3.6		101,200	14.0	
Forests (F)	227,900	27.8		477,900	58.2	
Range (R)	581,200	28.7		719,800	35.6	
F + R	809,100	28.5		1,197,700	42.1	
Hay (H)	-	-		4,800	100.0	
C + P + H	25,800	3.6		106,000	14.6	
Water Shed	-	-		1,500	-	
P + R	581,200	28.6		722,500	35.7	

Major Land Use	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		185,400	25.8	
Pasture (P)	-	-		-	-	
C + P	-	-		185,400	25.7	
Forests (F)	14,000	1.7		6,800	1.0	
Range (R)	1,500	-		100,500	5.0	
F + R	15,500	1.0		107,300	3.8	
Hay (H)	-	-		-	-	
C + P + H	-	-		185,400	25.6	
Water Shed	-	-		-	-	
P + R	1,500	-		100,500	5.0	

Major Land Use	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	353,200	49.2		49,200	6.8	
Pasture (P)	-	-		-	-	
C + P	353,200	49.0		49,200	6.8	
Forests (F)	43,100	5.3		31,200	3.8	
Range (R)	284,100	14.0		27,400	1.4	
F + R	327,200	11.5		58,600	2.1	
Hay (H)	-	-		-	-	
C + P + H	353,200	48.6		49,200	6.7	
Water Shed	-	-		-	-	
P + R	284,100	14.0		27,400	1.4	

TABLE B29. MAJOR LAND USE (in acres) Cont.

Major Land Use	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	800	-		-	-	
Pasture (P)	-	-		-	-	
C + P	800	-		-	-	
Forests (F)	-	-		4,000	-	
Range (R)	124,800	6.2		134,600	6.6	
F + R	124,800	4.4		138,600	4.9	
Hay (H)	-	-		-	-	
C + P + H	800	-		-	-	
Water Shed	-	-		-	-	
P + R	124,800	6.2		134,600	6.6	

Major Land Use	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	5,500	-		718,400	14.0	11.2
Pasture (P)	-	-		2,700	-	-
C + P	5,500	-		721,100	14.1	7.6
Forests (F)	15,900	1.9		820,800	16.0	5.2
Range (R)	48,200	2.4		2,022,100	39.5	9.0
F + R	64,100	2.2		2,842,900	55.5	7.4
Hay (H)	-	-		4,800	-	57.2
C + P + H	5,500	-		725,900	14.2	7.7
Water Shed	-	-		1,500	-	-
P + R	48,200	2.4		2,024,800	39.5	8.0

TABLE B30. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-		1,500	9.4	
Good (G)	12,500	3.5		30,800	8.6	
E + G	12,500	3.4		32,300	8.7	
Fair (F)	27,400	7.4		111,900	30.3	
E + G + F	39,900	5.4		144,200	19.4	
Poor (P)	64,600	18.9		202,900	59.4	
E + G + F + P	104,500	9.6		347,100	32.0	
Nonirrigable (N)	730,400	29.4		958,100	38.5	

Suitability Class	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-		3,500	21.9	
Good (G)	-	-		125,100	35.0	
E + G	-	-		128,600	34.5	
Fair (F)	-	-		53,400	14.5	
E + G + F	-	-		182,000	24.5	
Poor (P)	-	-		3,400	1.0	
E + G + F + P	-	-		185,400	17.1	
Nonirrigable (N)	15,500	1.0		107,300	4.3	

Suitability Class	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Excellent (E)	11,000	68.8		-	-	
Good (G)	166,300	46.6		22,000	6.2	
E + G	177,300	47.5		22,000	5.9	
Fair (F)	147,000	39.9		17,000	4.6	
E + G + F	324,300	43.7		39,000	5.2	
Poor (P)	15,200	4.4		16,300	4.8	
E + G + F + P	339,500	31.3		55,300	5.1	
Nonirrigable (N)	340,900	13.7		52,500	2.1	

TABLE B30. IRRIGATION SUITABILITY (in acres) Cont.

Suitability Class	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-		-	-	
Good (G)	200	-		-	-	
E + G	200	-		-	-	
Fair (F)	1,800	-		-	-	
E + G + F	2,000	-		-	-	
Poor (P)	20,000	5.8		1,200	-	
E + G + F + P	22,000	2.0		1,200	-	
Nonirrigable (N)	103,600	4.2		137,400	5.5	

Suitability Class	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	-	-		16,000	-	-
Goof (G)	-	-		356,900	7.0	8.3
E + G	-	-		372,900	7.3	6.6
Fair (F)	10,200	2.8		368,700	7.2	5.8
E + G + F	10,200	1.4		741,600	14.5	6.2
Poor (P)	17,800	5.2		341,400	6.7	7.3
E + G + F + P	28,000	2.6		1,083,000	21.2	6.5
Nonirrigable (N)	41,600	1.7		2,487,300		
N + [N]				[4,037,000]	[78.8]	[9.0]

TABLE B31. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	700	-		-	-	
IIw	4,700	46.7		3,800	37.2	
IIe + IIw	5,400	10.8		3,800	7.6	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	5,400	3.7		3,800	2.6	
I + IIe + IIw	5,400	8.8		3,800	6.2	
Total I + II	5,400	3.4		3,800	2.4	
IIIe	17,200	6.2		35,600	13.0	
IIIw	1,900	27.5		2,100	30.4	
IIIe + IIIw	19,100	6.8		37,700	13.4	
IIIs	-	-		-	-	
IIIc	12,000	21.9		40,000	73.1	
Total III	31,100	8.6		77,700	21.4	
I + IIe + IIw + IIIe + IIIw	24,500	7.1		41,500	12.1	
Total I+II+III	36,500	7.0		81,500	15.7	
IVe	2,600	1.2		4,800	2.2	
IVw	400	4.5		8,500	95.5	
IVe + IVw	3,000	1.3		13,300	5.8	
IVs	12,500	12.7		60,500	61.4	
IVc	98,700	35.0		146,000	51.8	
Total IV	114,200	18.8		219,800	36.1	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	27,500	4.8		54,800	9.6	
Total I+II+III+IV	150,700	13.3		301,300	26.7	
VIe	22,600	14.2		126,200	79.3	
VIw	200	2.4		6,600	79.5	
VIs	234,300	31.0		250,700	33.2	
VIc	142,500	38.2		173,900	46.7	
Total VI	399,600	30.8		557,400	43.0	
VIIe	99,100	34.3		85,200	29.5	
VIIw	-	-		-	-	
VIIs	185,500	20.3		361,300	39.6	
VIIc	-	-		-	-	
Total VII	284,600	24.8		446,500	39.0	

TABLE B31. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		7,900	19.8	
IIw	-	-		-	-	
IIe + IIw	-	-		7,900	15.7	
IIs	-	-		-	-	
IIc	-	-		57,500	60.2	
Total II	-	-		65,400	44.9	
I + IIe + IIw	-	-		7,900	12.9	
Total I + II	-	-		65,400	41.7	
IIIe	-	-		50,600	18.4	
IIIw	-	-		-	-	
IIIe + IIIw	-	-		50,600	18.0	
IIIs	-	-		-	-	
IIIc	-	-		-	-	
Total III	-	-		50,600	13.9	
I + IIe + IIw + IIIe + IIIw	-	-		58,500	17.0	
Total I+II+III	-	-		116,000	22.3	
IVe	-	-		71,400	32.5	
IVw	-	-		-	-	
IVe + IVw	-	-		71,400	31.2	
IVs	-	-		-	-	
IVc	-	-		24,900	8.8	
Total IV	-	-		96,300	15.8	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		129,900	22.7	
Total I+II+III+IV	-	-		212,300	18.8	
VIe	-	-		-	-	
VIw	-	-		-	-	
VIs	-	-		36,900	4.9	
VIc	-	-		-	-	
Total VI	-	-		36,900	2.8	
VIIe	11,100	3.8		-	-	
VIIw	-	-		-	-	
VIIs	1,500	-		43,500	4.8	
VIIc	2,900	78.4		-	-	
Total VII	15,500	1.4		43,500	3.8	

TABLE B31. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
I	11,000	100.0		-	-	
IIe	31,400	80.2		-	-	
IIw	1,500	14.7		-	-	
IIe + IIw	32,900	65.5		-	-	
IIs	-	-		-	-	
IIc	36,300	38.0		1,700	1.8	
Total II	69,200	47.5		1,700	1.2	
I + IIe + IIw	43,900	71.7		-	-	
Total I + II	80,200	51.2		1,700	1.1	
IIIe	115,500	42.0		32,000	11.6	
IIIw	2,700	39.1		-	-	
IIIe + IIIw	118,200	41.9		32,000	11.4	
IIIs	26,700	98.5		-	-	
IIIc	1,700	3.1		1,000	1.8	
Total III	146,600	40.3		33,000	9.1	
I + IIe + IIw + IIIe + IIIw	162,100	47.2		32,000	9.3	
Total I+II+III	226,800	43.6		34,700	6.7	
IVe	130,300	59.2		10,800	4.9	
IVw	-	-		-	-	
IVe + IVw	130,300	56.9		10,800	4.7	
IVs	3,400	3.4		3,600	3.7	
IVc	-	-		6,600	2.3	
Total IV	133,700	22.0		21,000	3.4	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	292,400	51.1		42,800	7.5	
Total I+II+III+IV	360,500	31.9		55,700	4.9	
VIe	4,400	2.8		4,400	2.8	
VIw	-	-		-	-	
VIs	142,200	18.8		31,900	4.2	
VIc	33,600	9.0		9,400	2.5	
Total VI	180,200	13.9		45,700	3.5	
VIIe	900	-		5,200	1.8	
VIIw	-	-		-	-	
VIIs	138,800	15.2		1,200	-	
VIIc	-	-		-	-	
Total VII	139,700	12.2		6,400	-	

TABLE B31. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		-	-	
IIw	200	-		-	-	
IIe + IIw	200	-		-	-	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	200	-		-	-	
I + IIe + IIw	200	-		-	-	
Total I + II	200	-		-	-	
IIIe	23,000	8.4		400	-	
IIIw	200	2.9		-	-	
IIIe + IIIw	23,200	8.2		400	-	
IIIs	400	1.5		-	-	
IIIc	-	-		-	-	
Total III	23,600	6.5		400	-	
I + IIe + IIw + IIIe + IIIw	23,400	6.8		400	-	
Total I+II+III	23,800	4.6		400	-	
IVe	-	-		-	-	
IVw	-	-		-	-	
IVe + IVw	-	-		-	-	
IVs	4,800	4.9		-	-	
IVc	-	-		-	-	
Total IV	4,800	1.1		-	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	23,400	4.1		400	-	
Total I+II+III+IV	28,600	2.5		400	-	
VIe	-	-		-	-	
VIw	-	-		-	-	
VIs	47,200	6.2		8,100	1.1	
VIc	-	-		2,500	-	
Total VI	47,200	3.6		10,600	1.0	
VIIe	7,400	2.6		18,800	6.5	
VIIw	-	-		-	-	
VIIs	42,400	4.6		108,000	11.8	
VIIc	-	-		800	21.6	
Total VII	49,800	4.3		127,600	11.1	

TABLE B31. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-		11,000	5.7	-
IIe	-	-		40,000	3.9	1.0
IIw	-	-		10,200	1.1	-
IIe + IIw	-	-		50,200	2.5	1.0
IIs	-	-		-	-	-
IIc	-	-		95,500	11.0	1.9
Total II	-	-		145,700	4.7	2.8
I + IIe + IIw	-	-		61,200	2.8	1.2
Total I + II	-	-		156,700	4.7	3.1
IIIe	600	-		274,900	9.6	5.4
IIIw	-	-		6,900	1.2	-
IIIe + IIIw	600	-		281,800	8.2	5.5
IIIs	-	-		27,100	1.8	-
IIIc	-	-		54,700	2.7	1.0
Total III	600	-		363,600	5.2	7.1
I + IIe + IIw + IIIe + IIIw	600	-		343,000	6.1	6.7
Total I+II+III	600	-		520,300	5.1	10.2
IVe	-	-		219,900	9.4	4.3
IVw	-	-		8,900	1.1	-
IVe + IVw	-	-		228,800	7.2	4.5
IVs	13,700	13.9		98,500	1.8	1.9
IVc	5,500	2.0		281,700	6.5	5.5
Total IV	19,200	3.2		609,000	4.6	11.9
I+IIe+IIw+IIIe + IIIw+IVe+IVw	600	-		571,800	6.5	11.2
Total I+II+III+IV	19,800	1.8		1,129,300	4.8	22.0
VIe	1,600	1.0		159,200	3.7	3.1
VIw	1,500	18.1		8,300	2.1	-
VIs	4,300	-		755,600	11.9	14.8
VIc	10,600	2.9		372,500	16.5	7.3
Total VI	18,000	1.4		1,295,600	9.8	25.3
VIIe	1,200	-		228,900	4.6	4.5
VIIw	-	-		-	-	-
VIIs	30,600	3.4		9.2,800	14.3	17.8
VIIc	-	-		3,700	5.2	-
Total VII	31,800	2.8		1,145,400	9.0	22.4

TABLE B32. AVERAGE ELEVATION (by hundreds of feet)

Elevation	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
3 - 6	-	-	-	-	-	-
6 - 9	-	-	-	-	-	-
Total 0 - 9	-	-	-	-	-	-
9 - 12						
Total 0 - 12	-	-	-	-	-	-
12 - 15						
Total 0 - 15	-	-	-	-	-	-
15 - 18	1,000	1.0	-	-	-	-
Total 0 - 18	1,000	-	-	-	-	-
18 - 21	116,500	33.4		35,100	10.1	-
21 - 24	42,200	38.0	-	18,100	16.3	-
Total 0 - 24	159,700	17.6	3.1	53,200	5.9	1.0
24 - 27	8,600	2.8	-	3,800	1.2	-
27 - 30	7,100	5.6	-	17,800	14.1	-
Total 0 - 30	175,400	13.1	3.4	74,800	5.6	1.5
30 - 33	103,400	30.6	-	146,700	43.4	-
33 - 36	72,300	47.0	-	56,700	36.8	-
Total 0 - 36	351,100	19.2	6.8	278,200	15.2	5.4
36 - 39	165,500	24.0	-	482,500	70.0	-
Total 0 - 39	516,600	20.5	10.1	760,700	30.2	14.8
39 - 42	14,700	6.2	-	106,400	44.5	-
Total 0 - 42	531,300	19.3	10.4	867,100	31.5	16.9
42 - 45	70,600	47.7	-	50,100	33.8	-
Total 0 - 45	601,900	20.7	11.8	917,200	31.6	17.9
45 - 48	49,500	30.6	-	94,600	58.6	-
Total 0 - 48	651,400	21.2	12.7	1,011,800	33.0	19.7
48 - 51	88,600	42.3	-	100,800	48.2	-
Total 0 - 51	740,000	22.6	14.4	1,112,600	34.0	21.7
51 - 54	94,900	32.1	1.9	192,600	65.1	3.8
Total 0 - 54	834,900			1,305,200		

TABLE B32. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
3 - 6	-	-	-	-	-	-
6 - 9	-	-	-	28,500	17.8	
Total 0 - 9	-	-	-	28,500	16.8	1.0
9 - 12	-	-	-	-	-	-
Total 0 - 12	-	-	-	28,500	16.5	1.0
12 - 15	-	-	-	101,700	58.9	
Total 0 - 15	-	-	-	130,200	37.7	2.5
15 - 18	-	-	-	15,700	15.5	
Total 0 - 18	-	-	-	145,900	32.6	2.8
18 - 21	-	-	-	36,900	10.6	
21 - 24	-	-	-	8,200	7.4	
Total 0 - 24	-	-	-	191,000	21.1	3.7
24 - 27	-	-	-	101,700	33.6	
27 - 30	-	-	-	-	-	-
Total 0 - 30	-	-	-	292,700		
30 - 33						
33 - 36						
Total 0 - 36	-	-	-	-	-	-
36 - 39						
Total 0 - 39	-	-	-	-	-	-
39 - 42	1,500	1.0				
Total 0 - 42	1,500	-	-	-	-	-
42 - 45	14,000	9.4	-			
Total 0 - 45	15,500			-	-	-
45 - 48						
Total 0 - 48	-	-	-	-	-	-
48 - 51						
Total 0 - 51	-	-	-	-	-	-
51 - 54						
Total 0 - 54	-	-	-	-	-	-

TABLE B32. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
3 - 6	10,200	100.0	--	-	-	-
6 - 9	130,700	81.7		700	-	
Total 0 - 9	140,900	82.8	2.8	700	-	-
9 - 12	2,300	85.2		-	-	
Total 0 - 12	143,200	82.9	2.8	700	-	-
12 - 15	68,300	39.6		2,600	1.5	
Total 0 - 15	211,500	61.2	4.1	3,300	1.0	-
15 - 18	73,600	72.6		-	-	
Total 0 - 18	285,100	63.8	5.6	3,300	1.0	-
18 - 21	118,900	34.1		16,500	4.7	
21 - 24	30,600	27.6		1,500	1.4	
Total 0 - 24	434,600	48.0	8.5	21,300	2.4	-
24 - 27	157,200	51.9		9,600	3.2	
24 - 30	67,200	53.2		34,100	27.0	
Total 0 - 30	659,000	49.4	12.9	65,000	4.9	1.3
30 - 33	1,100	-		-	-	
33 - 36	500	-		-	-	
Total 0 - 36	660,600	36.2	12.9	65,000	3.6	1.3
36 - 39	12,400	1.8		9,000	1.3	
Total 0 - 39	673,000	26.7	13.1	74,000	2.9	1.4
39 - 42	-	-		1,800	1.0	
Total 0 - 42	673,000	24.4	13.1	75,800	2.8	1.5
42 - 45	-	-		800	1.0	
Total 0 - 45	673,000	23.2	13.1	76,600	2.6	1.5
45 - 48	7,100	4.4		7,800	4.8	
Total 0 - 48	680,100	22.2	13.3	84,400	2.8	13.3
48 - 51	300	-		15,200	7.3	
Total 0 - 51	680,400			99,600	3.0	1.9
51 - 54				8,200	2.8	
Total 0 - 54				107,800		

TABLE B32. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
3 - 6	-	-	-	-	-	-
6 - 9						
Total 0 - 9	-	-	-	-	-	-
9 - 12	400	14.8				
Total 0 - 12	400	-	-	-	-	-
12 - 15						
Total 0 - 15	400	-	-	-	-	-
15 - 18	11,100	10.9				
Total 0 - 18	11,500	2.6	-	-	-	-
18 - 21	17,400	5.0		6,900	2.0	
21 - 24	10,400	9.4		-	-	
Total 0 - 24	39,300	4.3	1.0	6,900	1.0	-
24 - 27	21,800	7.2		400	-	
27 - 30	-	-		-	-	
Total 0 - 30	61,100	4.6	1.2	7,300	1.0	
30 - 33	37,300	11.0		49,600	14.7	
33 - 36	8,800	5.7		15,600	10.1	
Total 0 - 36	107,200	5.9	2.1	72,500	2.9	1.4
36 - 39	-	-		-	-	
Total 0 - 39	107,200	4.2	2.1	72,500	2.9	1.4
39 - 42	18,400	7.7		59,600	24.9	
Total 0 - 42	125,600			132,100	4.8	2.6
42 - 45				6,500	4.4	
Total 0 - 45	-	-	-	138,600		
45 - 48						
Total 0 - 48	-	-	-	-	-	-
48 - 51						
Total 0 - 51	-	-	-	-	-	-
51 - 54						
Total 0 - 54	-	-	-	-	-	-

TABLE B32. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
3 - 6	-	-	-	10,200	-	-
6 - 9				159,900	3.1	11.6
Total 0 - 9	-	-	-	170,100	3.3	3.4
9 - 12				2,700	-	-
Total 0 - 12	-	-	-	172,800	3.4	3.0
12 - 15				172,600	3.4	17.5
Total 0 - 15	-	-	-	345,400	6.7	5.1
15 - 18				101,400	2.0	5.1
Total 0 - 18	-	-	-	446,800	8.7	5.1
18 - 21				348,200	6.8	28.6
21 - 24				111,000	2.2	4.8
Total 0 - 24	-	-	-	906,000	17.7	7.4
24 - 27				303,100	5.9	16.8
27 - 30				126,200	2.5	8.1
Total 0 - 30	-	-	-	1,335,300	26.1	8.5
30 - 33				338,100	6.6	18.2
33 - 36				153,900	3.0	9.5
Total 0 - 36	-	-	-	1,827,300	35.7	9.6
36 - 39	20,100	2.9		689,500	13.5	23.2
Total 0 - 39	20,100	1.0	-	2,516,800	49.2	11.4
39 - 42	36,500	15.3		238,900	4.7	4.9
Total 0 - 42	56,600	2.0	1.1	2,755,700	53.8	10.1
42 - 45	6,100	4.1		148,100	2.9	2.9
Total 0 - 45	62,700	2.2	1.2	2,903,800	56.7	9.0
45 - 48	2,500	1.5		161,500	3.2	2.2
Total 0 - 48	65,200	2.1	1.3	3,065,300	59.9	7.7
48 - 51	4,400	2.1		209,300	4.1	5.4
Total 0 - 51	69,600			3,274,600	64.0	7.5
51 - 54				295,700	5.8	7.2
Total 0 - 54				3,570,300		

TABLE B33. SLOPE OF SOIL (acres by percent slope)

Slope %	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
0 - 3	6,700	9.0		36,800	49.3	
4 - 7	15,300	4.0		63,200	16.3	
Total 0 - 7	22,000	4.8	-	100,000	21.7	2.0
8 - 12	53,800	8.9		205,200	34.1	
Total 0 - 12	75,800	7.1	1.5	305,200	28.7	6.0
13 - 20	132,300	22.4		393,200	66.4	
Total 0 - 20	208,100	12.6	4.1	698,400	42.2	13.6
21 - 30	-	-		-	-	
Total 0 - 30	208,100	12.6	4.1	698,400	42.2	13.6
31 - 99	626,800			606,800		

Slope %	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-		3,500	4.7	
4 - 7	-	-		114,500	29.6	
Total 0 - 7	-	-	-	118,000	25.6	2.3
8 - 12	-	-		90,200	15.0	
Total 0 - 12	-	-	-	208,200	19.6	4.1
13 - 20	1,000	-		3,400	1.0	
Total 0 - 20	1,000	-	-	211,600	12.8	4.1
21 - 30	-	-		700	-	
Total 0 - 30	1,000	-	-	212,300	12.8	4.1
31 - 99	14,500			80,400		

Slope %	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
0 - 3	18,200	24.4		1,900	2.5	
4 - 7	154,200	39.9		23,600	6.1	
Total 0 - 7	172,400	37.4	3.4	25,500	5.5	-
8 - 12	177,800	29.6		30,800	5.1	
Total 0 - 12	350,200	33.0	6.8	56,300	5.3	1.1
13 - 20	12,200	2.1		11,800	2.0	
Total 0 - 20	362,400	21.9	7.1	68,100	4.1	1.3
21 - 30	-	-		-	-	
Total 0 - 30	362,400	21.9	7.1	68,100	4.1	1.3
31 - 99	318,000			39,700		

TABLE B33. SLOPE OF SOIL (acres by percent slope) Cont.

Slope %	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
0 - 3	600	1.0		-	-	
4 - 7	7,800	2.0		-	-	
Total 0 - 7	8,400	1.8	-	-	-	-
8 - 12	25,500	4.2		1,600	-	
Total 0 - 12	33,900	3.2	1.0	1,600	-	-
13 - 20	4,800	1.0		-	-	
Total 0 - 20	38,700	2.3	1.0	1,600	-	-
21 - 30	-	-		-	-	
Total 0 - 30	38,700	2.3	1.0	1,600	-	-
31 - 99	86,900			137,000		

Slope %	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	7,000	9.4		74,700		1.2
4 - 7	8,000	2.0		386,600		6.7
Total 0 - 7	15,000	3.2	-	461,300	9.0	3.9
8 - 12	16,400	2.7		601,300		5.3
Total 0 - 12	31,400	3.0	1.0	1,062,600	20.8	4.6
13 - 20	33,000	5.6		591,700		10.0
Total 0 - 20	64,400	3.9	1.2	1,654,300	32.3	5.7
21 - 30	-	-		700		-
Total 0 - 30	64,400	3.9	1.2	1,655,000	32.3	5.6
31 - 99	5,200			1,915,300		

TABLE B34. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	7,000	2.4		27,400	9.4	
SL + MD	7,000	2.4		27,400	9.4	
Severe (SV)	52,200	13.8		104,600	27.7	
SL + MD + SV	59,200	8.9		132,000	19.6	
Very Severe (VS)	775,700	26.8		1,173,200	40.5	

Limitation	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	-	-		116,700	40.1	
SL + MD	-	-		116,700	40.1	
Severe (SV)	-	-		69,400	18.4	
SL + MD + SV	-	-		186,100	27.6	
Very Severe (VS)	15,500	1.0		106,600	3.7	

Limitation	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	137,500	47.2		2,600	1.0	
SL + MD	137,500	47.2		2,600	1.0	
Severe (SV)	120,200	31.9		9,600	2.5	
SL + MD + SV	257,700	38.2		12,200	1.8	
Very Severe (VS)	422,700	14.6		95,600	3.3	

TABLE B34. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre) Cont.

Limitation	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	-	-		-	-	
SL + MD	-	-		-	-	
Severe (SV)	21,000	5.6		-	-	
SL + MD + SV	21,000	3.1		-	-	
Very Severe (VS)	104,600	3.6		138,600	4.8	

Limitation	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-		-	-	-
Moderate (MD)	-	-		291,200	5.7	10.0
SL + MD	-	-		291,200	5.7	7.4
Severe (SV)	5,500	1.4		377,000	7.4	6.5
SL + MD + SV	5,500	1.0		673,700	13.1	6.9
Very Severe (VS)	64,100	2.2		2,896,600	56.6	7.3
Nonclassified (NC)				1,549,700		
NC + VS				4,446,300	86.8	8.6

TABLE B35. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	WHEELER COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150	-	-	-	48,800	17.8	1.0
120 - 135	133,300	23.0	2.6	39,000	6.7	1.0
105 - 120	143,200	37.9	2.8	234,400	62.1	4.6
Over 105	276,500	16.6	5.4	322,200	19.4	6.3
90 - 105	152,900	25.8	3.0	316,800	53.4	6.2
Over 90	429,400	21.8	8.4	639,000	32.4	12.5
75 - 90	203,700	37.4	4.0	284,000	52.1	5.5
Over 75	633,100	25.2	12.4	923,000	36.8	18.0
60 - 75	79,700	39.9	1.6	70,100	35.1	1.4
Over 60	712,800	35.2	13.9	993,100	49.0	19.4
45 - 60	107,900	20.3	2.1	304,900	57.4	6.0
Over 45	820,700	36.4	16.0	1,298,000	57.6	25.4
30 - 45	14,200	39.8	-	7,200	20.2	-
Over 30	834,900			1,305,200		

Days	CROOK COUNTY	% Basin Class	% Basin Soils	SHERMAN COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165				145,900	42.6	2.8
Over 150	-	-	-	145,900	33.8	2.8
135 - 150				36,900	13.5	1.0
120 - 135				101,700	17.6	2.0
105 - 120				-	-	-
Over 105	-	-	-	284,500	17.1	5.6
90 - 105						
Over 90	-	-	-	284,500		
75 - 90				8,200	1.5	-
Over 75	-	-	-	292,700		
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60	1,500	-	-			
Over 45	1,500	-	-	-	-	-
30 - 45	11,100	31.1	-			
Over 30	12,600	8.4	-	-	-	-
0 - 30	2,900	78.4	-			

TABLE B35. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180	88,600	100.0	1.7			
150 - 165	196,500	57.4	3.6			
Over 105	285,100	66.2	5.6	-	-	-
135 - 150	130,300	47.6	2.5	28,900	10.5	1.0
120 - 135	243,600	42.1	4.8	36,100	6.2	1.0
105 - 120	-	-	-	-	-	-
Over 105	659,000	39.7	12.9	65,000	3.9	1.3
90 - 105	3,200	1.0	-	7,800	1.3	-
Over 90	662,200	33.6	12.9	72,800	3.7	1.4
75 - 90	7,400	1.4	-	22,900	4.2	-
Over 75	669,600	26.7	13.1	95,700	3.8	1.9
60 - 75	10,800	5.4	-	1,200	1.0	-
Over 60	680,400			96,900	4.8	1.9
45 - 60				10,900	2.0	-
Over 45	-	-	-	107,800		
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	WASCO COUNTY	% Basin Class	% Basin Soils	JEFFERSON COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150	29,100	10.6	1.0			
120 - 135	24,500	4.2	-			
105 - 120	-	-	-			
Over 105	53,600	3.2	1.0	-	-	-
90 - 105	37,300	6.3	1.0	56,900	9.6	1.1
Over 90	90,900	4.6	1.8	56,900	2.9	1.1
75 - 90	7,500	1.4	-	2,500	-	-
Over 75	98,400	3.9	1.9	59,400	2.4	1.2
60 - 75	8,800	4.4	-	15,600	7.8	-
Over 60	107,200	5.3	2.1	75,000	3.7	1.5
45 - 60	18,400	3.5	-	59,600	11.2	1.2
Over 45	125,600			134,600	6.0	2.6
30 - 45				3,200	9.0	-
Over 30	-	-	-	137,800	91.6	2.7
0 - 30				800	21.6	-

TABLE B35. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180				88,600	1.7	6.0
150 - 165				342,400	6.6	15.1
Over 150	-	-	-	431,000	8.4	4.3
135 - 150				274,000	5.4	12.3
120 - 135				578,200	11.3	16.5
105 - 120				377,600	7.4	30.3
Over 105	-	-	-	1,660,800	32.4	9.7
90 - 105	18,600	3.1	-	593,500	11.6	10.5
Over 90	18,600	1.0	-	2,254,300	44.0	9.9
75 - 90	8,800	1.6	-	545,000	10.6	3.9
Over 75	27,400	1.1	1.0	2,799,300	54.7	7.6
60 - 75	13,600	6.8	-	199,800	3.9	8.1
Over 60	41,000	2.0	1.0	2,999,100	58.6	7.7
45 - 60	28,600	5.4	1.0	531,800	10.4	27.4
Over 45	69,600	2.0	1.4	3,530,900	69.0	8.6
30 - 45				35,700	1.0	1.1
Over 30	-	-	-	3,566,600	69.7	8.0
0 - 30				3,700	-	-

DRAINAGE BASIN #7 - UMATILLA RIVER DRAINAGE BASIN

2,915,700 acres 2,915,700 acres classified (100%)

TABLE B36. MAJOR LAND USE (in acres)

Major Land Use	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	73,000	5.0		579,500	39.9	
Pasture (P)	-	-		2,900	29.9	
C + P	73,000	5.0		582,400	39.9	
Forests (F)	3,100	1.0		49,900	14.6	
Range (R)	33,000	3.0		452,600	40.7	
F + R	36,100	2.5		502,500	34.5	
Hay (H)	-	-		-	-	
C + P + H	73,000	5.0		582,400	39.9	
Water Shed	-	-		-	-	
P + R	33,000	2.9		455,500	40.6	

Major Land Use	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	798,900	55.0		1,451,400	49.8	22.6
Pasture (P)	6,800	70.1		9,700	-	-
C + P	805,700	55.1		1,461,100	50.1	15.4
Forests (F)	289,500	84.4		342,500	11.7	2.2
Range (R)	626,500	56.3		1,112,100	38.1	5.0
F + R	916,000	63.0		1,454,600	49.9	3.8
Hay (H)	-	-		-	-	-
C + P + H	805,700	55.1		1,461,100	50.1	3.8
Water Shed	-	-		-	-	-
P + R	633,300	56.4		1,121,800	38.5	4.4

TABLE B37. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Excellent (E)	6,100	4.6		26,000	19.5	
Good (G)	27,400	5.0		248,800	45.6	
E + G	33,500	4.9		274,800	40.5	
Fair (F)	36,700	4.6		355,900	44.8	
E + G + F	70,200	4.8		630,700	42.8	
Poor (P)	11,700	3.5		84,100	25.5	
E + G + F + P	81,900	4.5		714,800	39.7	
Nonirrigable (N)	27,200	2.4		370,100	33.2	

Suitability Class	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	101,000	75.9		133,100	'4.6	9.6
Good (G)	268,800	49.3		545,000	18.7	12.7
E + G	369,800	54.5		678,100	23.2	12.0
Fair (F)	401,200	50.5		793,800	27.2	12.6
E + G + F	771,000	52.4		1,471,900	50.5	12.3
Poor (P)	233,800	21.0		329,600	11.3	7.0
E + G + F + P	1,004,800	55.8		1,801,500	61.8	10.8
Nonirrigable (N)	716,900	64.3		1,114,200	38.2	
N + [N]						[2.5]

TABLE B38. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
I	5,800	8.7		29,300	43.9	
IIe	20,400	6.2		154,400	46.8	
IIw	1,600	6.8		8,800	37.1	
IIe + IIw	22,000	6.0		163,200	46.1	
IIs	-	-		-	-	
IIc	5,700	7.0		10,000	12.2	
Total II	27,700	6.2		173,200	39.0	
I + IIe + IIw	27,800	6.6		192,500	45.8	
Total I + II	33,500	6.6		202,500	39.6	
IIIe	24,400	5.0		139,000	28.6	
IIIw	2,700	28.7		-	-	
IIIe + IIIw	27,100	5.5		139,000	28.1	
IIIs	3,500	7.0		-	-	
IIIc	-	-		3,100	73.8	
Total III	30,600	5.6		142,100	25.9	
I + IIe + IIw + IIIe + IIIw	54,900	6.0		331,500	36.2	
Total I+II+III	64,100	6.0		344,600	32.5	
IVe	2,600	1.0		216,500	53.0	
IVw	-	-		-	-	
IVe + IVw	2,600	1.0		216,500	53.0	
IVs	6,000	1.1		150,800	28.3	
IVc	-	-		19,500	83.7	
Total IV	8,600	1.0		386,800	40.1	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	57,500	4.3		548,000	41.4	
Total I+II+III+IV	72,700	3.6		731,400	36.2	
VIe	15,300	7.6		84,600	42.1	
VIw	-	-		-	-	
VIs	16,800	4.4		172,300	45.4	
VIc	-	-		23,000	18.3	
Total VI	32,100	4.8		279,900	42.3	
VIIe	-	-		16,600	14.6	
VIIw	-	-		-	-	
VIIs	4,300	3.7		57,000	48.7	
VIIc	-	-		-	-	
Total VII	4,300	1.8		73,600	31.8	

TABLE B38. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	31,600	47.7		66,700	2.3	34.7
IIe	155,200	47.0		330,000	11.3	32.0
IIw	13,300	56.1		23,700	1.0	2.5
IIe + IIw	168,500	47.6		353,700	12.1	17.8
IIs	8,700	100.0		8,700	-	3.4
IIc	66,200	80.8		81,900	2.8	9.4
Total II	243,400	54.8		444,300	15.2	14.3
I + IIe + IIw	200,100	47.6		520,400	14.4	19.3
Total I + II	275,000	53.8		511,000	17.5	15.4
IIIe	321,700	66.3		485,100	16.6	17.0
IIIw	6,700	71.3		9,400	-	1.6
IIIe + IIIw	328,400	66.4		494,500	17.0	14.3
IIIs	46,100	93.0		49,600	1.7	3.3
IIIc	1,100	26.2		4,200	-	-
Total III	375,600	68.5		548,300	18.8	7.9
I + IIe + IIw + IIIe + IIIw	528,500	57.8		914,900	31.4	16.2
Total I+II+III	650,600	71.5		1,059,300	36.3	10.3
IVe	189,000	46.0		408,100	14.0	17.5
IVw	-	-		-	-	-
IVe + IVw	189,000	46.0		408,100	14.0	12.9
IVs	375,200	70.6		532,000	18.2	9.5
IVc	3,800	16.6		23,300	1.0	-
Total IV	568,000	58.9		963,400	33.0	7.4
I+IIe+IIw+IIIe + IIIw+IVe+IVw	1,218,600	92.3		1,323,000	45.4	15.0
Total I+II+III+IV	1,218,600	60.2		2,022,600	69.4	8.6
VIe	101,000	50.3		200,900	6.9	4.7
VIw	-	-		-	-	-
VIs	190,500	50.2		379,600	13.0	6.0
VIc	58,300	71.7		81,300	2.8	3.6
Total VI	349,800	52.9		661,800	22.7	5.0
VIIe	97,500	85.4		114,100	3.9	1.8
VIIw	-	-		-	-	-
VIIs	55,800	47.6		117,100	4.0	1.8
VIIc	-	-		-	-	-
Total VII	153,300	66.4		231,200	7.9	1.8

TABLE B39. AVERAGE ELEVATION (by hundreds of feet)

Elevation	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-		-	-	
3 - 6	16,700	5.6		158,600	52.8	
6 - 9	27,900	11.2		157,900	63.7	
Total 0 - 9	44,600	8.1	1.5	316,500	57.7	10.9
9 - 12	1,600	1.8		19,500	22.5	
Total 0 - 12	46,200	7.3	1.6	336,000	52.9	11.6
12 - 15	17,800	4.8		27,800	7.4	
Total 0 - 15	64,000	6.3	2.2	363,800	36.1	12.5
15 - 18	35,900	8.2		202,300	46.1	
Total 0 - 18	99,900	6.9	3.4	566,100	39.1	19.4
18 - 21	2,800	1.3		124,800	57.7	
21 - 24	-	-		32,100	78.1	
Total 0 - 24	102,700	6.0	3.5	723,000	42.4	24.8
24 - 27	3,100	1.4		125,200	57.1	
27 - 30	3,300	1.0		128,600	39.5	
Total 0 - 30	109,100			976,800	43.4	33.5
30 - 33				-	-	
33 - 36				-	-	
Total 0 - 36				976,800	43.4	33.5
36 - 39				66,100	15.8	
Total 0 - 39				1,042,900	39.1	35.8
39 - 42				-	-	
Total 0 - 42				1,042,900	39.0	35.8
42 - 45				8,400	75.0	
Total 0 - 45				1,051,300	39.2	36.0
45 - 48				21,000	28.8	
Total 0 - 48				1,072,300	38.9	36.8
48 - 51				12,600	7.9	
Total 0 - 51				1,084,900		

TABLE B39. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	-	-		-	-	-
3 - 6	125,300	41.7		300,600	10.4	19.8
6 - 9	72,100	25.0		247,900	8.5	12.0
Total 0 - 9	187,400	34.2	6.5	548,500	18.9	11.1
9 - 12	65,700	75.7		86,800	3.0	9.9
Total 0 - 12	253,100	39.8	8.7	635,300	21.9	10.9
12 - 15	327,300	87.8		372,900	12.8	37.8
Total 0 - 15	580,400	57.6	20.0	1,008,200	34.8	14.8
15 - 18	201,000	45.8		439,200	15.1	22.3
Total 0 - 18	781,400	54.0	26.8	1,447,400	49.9	16.5
18 - 21	88,600	41.0		216,200	7.4	17.8
21 - 24	9,000	21.9		41,100	1.4	1.8
Total 0 - 24	879,000	51.6	30.1	1,704,700	58.5	13.8
24 - 27	90,900	41.5		219,200	7.5	12.2
27 - 30	193,700	59.5		325,600	11.2	21.0
Total 0 - 30	1,163,600	56.6	39.9	2,249,500	77.1	14.4
30 - 33	-	-		-	-	-
33 - 36	-	-		-	-	-
Total 0 - 36	1,163,600	56.6	39.9	2,249,500	77.1	11.7
36 - 39	351,500	84.2		417,600	14.3	14.0
Total 0 - 39	1,515,100	60.9	52.0	2,667,100	91.5	12.0
39 - 42	5,700	100.0		5,700	-	-
Total 0 - 42	1,520,800	61.0	52.2	2,672,800	91.6	9.8
42 - 45	2,800	25.0		11,200	-	-
Total 0 - 45	1,523,600	60.8	52.2	2,684,000	92.0	8.3
45 - 48	51,800	71.2		72,800	2.5	1.0
Total 0 - 48	1,575,400	61.1	54.0	2,756,800	94.5	6.9
48 - 51	146,300	92.1	5.0	158,900	5.4	4.1
Total 0 - 51	1,721,700			2,915,700		

TABLE B40. SLOPE OF SOIL (acres by percent slope)

Slope %	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
0 - 3	22,200	6.0		139,800	37.8	
4 - 7	19,600	2.9		341,600	50.1	
Total 0 - 7	41,800	4.0	1.4	481,400	45.7	16.6
8 - 12	42,900	5.7		245,200	32.6	
Total 0 - 12	84,700	4.7	2.9	726,600	40.2	25.0
13 - 20	9,600	4.6		49,300	23.6	
Total 0 - 20	94,300	4.7	3.2	775,900	38.5	26.8
21 - 30	-	-		300	5.6	
Total 0 - 30	94,300	4.7	3.2	776,200	38.5	26.8
31 - 99	14,800			308,700		

Slope %	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	208,200	57.2		370,200		5.9
4 - 7	321,100	77.0		682,300		11.9
Total 0 - 7	529,300	50.3	18.2	1,052,500	36.3	8.9
8 - 12	464,500	61.7		752,600		6.7
Total 0 - 12	993,800	55.0	34.3	1,805,100	62.2	7.8
13 - 20	149,600	71.8		208,500		3.5
Total 0 - 20	1,143,400	56.8	39.4	2,013,600	69.4	6.9
21 - 30	5,100	94.4		5,400		-
Total 0 - 30	1,148,500	56.8	39.4	2,019,000	69.4	6.8
31 - 99	573,200			896,700		

TABLE B41. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	54,100	6.1		293,800	33.2	
SL + MD	54,100	6.1		293,800	33.2	
Severe (SV)	26,000	4.8		329,500	61.3	
SL + MD + SV	80,100	5.6		623,300	43.8	
Very Severe (VS)	29,000	1.9		461,600	30.9	

Limitation	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-		-	-	-
Moderate (MD)	536,700	60.7		884,600	30.3	30.3
SL + MD	536,700	60.7		884,600	30.3	22.5
Severe (SV)	182,300	33.9		537,800	18.4	9.3
SL + MD + SV	719,000	50.6		1,422,400	48.7	14.6
Very Severe (VS)	1,002,700	67.2		1,493,300	51.2	3.8
Nonclassified (NC)				-	-	-
NC + VS				1,493,300	51.2	3.8

TABLE B42. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	GILLIAM COUNTY	% Basin Class	% Basin Soils	MORROW COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	16,500	14.9	1.0	36,800	33.3	1.3
165 - 180	18,400	8.6	1.0	112,600	52.5	3.9
150 - 165	63,300	5.5	2.2	413,400	35.7	14.3
Over 150	98,200	6.6	3.4	562,800	37.9	19.8
135 - 150	4,500	1.3	-	173,400	49.1	6.0
120 - 135	3,100	-	-	233,100	65.3	8.0
105 - 120	-	-	-	400	1.1	-
Over 105	105,800	4.7	3.6	969,700	43.5	33.4
90 - 105	3,300	2.0	-	30,700	18.5	1.0
Over 90	109,100			1,000,400	43.7	34.5
75 - 90				42,000	17.3	1.4
Over 75	-	-	-	1,042,400	41.2	35.9
60 - 75				42,500	15.4	1.5
Over 60	-	-	-	1,084,900		
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	UMATILLA COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195	57,300	51.8	2.0	110,600	3.8	1.8
165 - 180	83,400	38.9	2.9	214,400	7.4	14.6
150 - 165	682,500	58.9	23.5	1,159,200	40.0	51.1
Over 150	823,200	55.5	28.4	1,484,200	51.2	14.7
135 - 150	175,500	49.7	6.0	353,400	12.2	15.9
120 - 135	120,500	33.8	4.2	356,700	12.3	10.2
105 - 120	36,200	98.9	1.2	36,600	1.3	2.9
Over 105	1,155,400	51.8	39.8	2,230,900	76.9	13.1
90 - 105	132,200	79.5	4.5	166,200	5.7	2.9
Over 90	1,287,600	56.3	44.4	2,397,100	82.2	10.6
75 - 90	200,900	82.7	6.9	242,900	8.4	1.7
Over 75	1,488,500	58.8	51.3	2,640,000	90.5	7.2
60 - 75	233,200	84.6	8.0	275,700	9.5	11.2
Over 60	1,721,700			2,915,700		
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

DRAINAGE BASIN #8 - GRANDE RONDE RIVER DRAINAGE BASIN

3,180,000 acres

2,919,600 acres classified (91.8%)

TABLE B43. MAJOR LAND USE (in acres)

Major Land Use	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	200,100	67.8		95,100	32.2	
Pasture (P)	-	-		1,500	-	
C + P	200,100	67.4		96,600	32.6	
Forests (F)	762,800	41.4		1,077,700	58.6	
Range (R)	123,800	21.2		459,600	78.8	
F + R	886,600	36.6		1,537,300	63.4	
Hay (H)	-	-		-	-	
C + P + H	200,100	67.4		96,600	32.6	
Water Shed	46,400	23.3		152,600	76.7	
P + R	123,800	21.2		461,100	78.8	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	295,200	9.3	4.6
Pasture (P)	1,500	-	-
C + P	296,700	9.3	3.1
Forests (F)	1,840,500	57.9	11.7
Range (R)	583,400	18.3	2.6
F + R	2,423,900	76.2	6.4
Hay (H)	-	-	-
C + P + H	296,700	9.3	9.3
Water Shed	199,000	6.2	11.2
P + R	584,900	18.4	2.3

TABLE B44. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
Excellent (E)	27,300	80.5		6,600	19.5	
Good (G)	86,400	68.5		39,700	31.5	
E + G	113,700	71.1		46,300	28.9	
Fair (F)	72,800	23.4		238,200	76.6	
E + G + F	186,500	39.6		284,500	60.1	
Poor (P)	42,500	47.3		47,400	52.7	
E + G + F + P	229,000	40.8		331,900	59.2	
Nonirrigable (N)	904,100	35.6		1,454,600	64.4	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	33,900	1.0	2.4
Good (G)	126,100	4.0	2.9
E + G	160,000	5.0	2.8
Fair (F)	311,000	10.0	4.9
E + G + F	471,000	14.8	3.9
Poor (P)	89,900	2.8	1.9
E + G + F + P	560,900	17.6	3.4
Nonirrigable (N)	2,358,700		
N + [N]	[2,619,100]	[82.4]	[5.8]

TABLE B45. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	17,900	100.0		-	-	
IIw	15,500	100.0		-	-	
IIe + IIw	33,400	100.0		-	-	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	33,400	100.0		-	-	
I + IIe + IIw	33,400	100.0		-	-	
Total I + II	33,400	100.0		-	-	
IIIe	30,000	100.0		-	-	
IIIw	61,800	100.0		-	-	
IIIe + IIIw	91,800	100.0		-	-	
IIIs	20,000	41.1		28,700	58.9	
IIIc	1,400	6.2		21,100	93.8	
Total III	113,200	69.4		49,800	30.6	
I + IIe + IIw + IIIe + IIIw	125,200	100.0		-	-	
Total I+II+III	146,600	74.6		49,800	25.4	
IVe	30,500	54.4		25,600	45.6	
IVw	6,800	100.0		-	-	
IVe + IVw	37,300	59.3		25,600	40.7	
IVs	38,200	14.8		218,900	85.2	
IVc	-	-		55,100	100.0	
Total IV	75,500	20.1		299,600	79.9	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	162,500	86.4		25,600	13.6	
Total I+II+III+IV	222,100			349,400		
VIe	22,200	62.3		36,700	37.7	
VIw	12,400	89.2		1,500	10.8	
VIs	470,300	39.4		715,600	60.3	
VIc	94,400	46.5		108,500	53.5	
Total VI	599,300	41.0		862,300	59.0	
VIIe	261,300	41.9		361,900	58.1	
VIIw	-	-		-	-	
VIIs	50,400			212,900		
VIIc	-	-		-	-	
Total VII	311,700	35.2		574,800	64.8	

TABLE B45. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	17,900	1.0	1.7
IIw	15,500	-	1.6
IIe + IIw	33,400	1.1	1.7
IIs	-	-	-
IIc	-	-	-
Total II	33,400	1.1	1.1
I + IIe + IIw	33,400	1.1	1.5
Total I + II	33,400	1.1	1.0
IIIe	30,000	1.0	1.0
IIIw	61,800	1.9	10.5
IIIe + IIIw	91,800	2.9	2.7
IIIs	48,700	1.5	3.3
IIIc	22,500	1.0	1.1
Total III	163,000	5.1	2.3
I + IIe + IIw + IIIe + IIIw	125,200	3.9	2.2
Total I+II+III	196,400	6.2	1.9
IVe	56,100	1.8	2.4
IVw	6,800	-	1.0
IVe + IVw	62,900	2.0	2.0
IVs	257,100	8.1	4.6
IVc	55,100	1.7	1.3
Total IV	375,100	11.8	2.9
I+IIe+IIw+IIIe + IIIw+IVe+IVw	188,100	5.9	2.1
Total I+II+III+IV	571,500	18.0	2.4
VIe	58,900	1.8	1.4
VIw	13,900	-	3.6
VIs	1,185,900	37.3	18.7
VIc	202,900	6.4	9.0
Total VI	1,461,600	46.0	11.0
VIIe	623,200	19.6	9.9
VIIw	-	-	-
VIIs	263,300	8.3	4.1
VIIc	-	-	-
Total VII	886,500	27.9	7.0

TABLE B46. AVERAGE ELEVATION (by hundreds of feet)

Elevation	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
0 - 18	-	-	-	-	-	-
18 - 21	-	-	-	-	-	-
21 - 24	15,500	20.4		60,300	79.6	
Total 0 - 24	15,500	20.4	-	60,300	79.6	1.9
24 - 27	5,500	100.0		-	-	
27 - 30	165,600	86.3		26,200	13.7	
Total 0 - 30	186,600	68.3	5.9	86,500	31.7	2.7
30 - 33	22,400	16.8		110,500	83.2	
33 - 36	76,300	30.0		177,800	70.0	
Total 0 - 36	285,300	43.2	9.0	374,800	56.8	11.8
36 - 39	315,500	37.2		531,400	62.8	
Total 0 - 39	600,800	39.9	18.9	906,200	60.1	28.5
39 - 42	13,600	11.5		105,000	88.5	
Total 0 - 42	614,400	37.8	19.3	1,011,200	62.2	31.8
42 - 45	-	-		30,800	100.0	
Total 0 - 45	614,400	37.1	19.3	1,042,000	62.9	32.8
45 - 48	64,500	32.7		132,500	67.3	
Total 0 - 48	678,900	36.6	21.3	1,174,500	63.4	36.9
48 - 51	436,500	41.6	13.7	612,000	58.4	19.2
Total 0 - 51	1,115,400	38.4	35.1	1,786,500		
51 - 54	17,700	100.1	1.0			
Total 0 - 54	1,133,100					

TABLE B46. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 18	-	-	-
18 - 21	-	-	-
21 - 24	75,800	2.4	3.3
Total 0 - 24	75,800	2.4	1.0
24 - 27	5,500	-	-
27 - 30	191,800	6.0	12.4
Total 0 - 30	273,100	8.6	1.7
30 - 33	132,900	4.2	7.1
33 - 36	254,100	8.0	15.7
Total 0 - 36	660,100	20.8	3.4
36 - 39	846,900	26.6	28.5
Total 0 - 39	1,507,000	47.4	6.8
39 - 42	118,600	3.7	2.3
Total 0 - 42	1,625,600	51.1	6.0
42 - 45	30,800	1.0	1.0
Total 0 - 45	1,656,400	52.1	5.1
45 - 48	197,000	6.2	2.7
Total 0 - 48	1,853,400	58.3	4.7
48 - 51	1,048,500	33.0	28.0
Total 0 - 51	2,901,900	91.2	6.6
51 - 54	17,700	1.0	-
Total 0 - 54	2,919,600		

TABLE B47. SLOPE OF SOIL (acres by percent slope)

Slope %	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
0 - 3	130,500	67.8		62,000	32.2	
4 - 7	44,300	22.9		149,100	77.1	
Total 0 - 7	174,800	45.3	5.5	211,100	54.7	6.6
8 - 12	75,000	37.9		122,900	62.1	
Total 0 - 12	249,800	42.8	7.8	334,000	57.2	10.5
13 - 20	137,900	50.3		136,100	49.7	
Total 0 - 20	387,700	45.2	12.2	470,100	54.8	14.8
21 - 30	-	-		-	-	
Total 0 - 30	387,700	45.2	12.2	470,100	54.8	14.8
31 - 99	745,400			1,316,400		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	192,500		3.1
4 - 7	193,400		3.4
Total 0 - 7	385,900	12.1	3.2
8 - 12	197,900		1.8
Total 0 - 12	583,800	18.3	2.5
13 - 20	274,000		4.6
Total 0 - 20	857,800	27.0	3.0
21 - 30	-		-
Total 0 - 30	857,800	27.0	3.0
31 - 99	2,061,800		

TABLE B48. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	25,600	55.6		20,400	44.4	
SL + MD	25,600	55.6		20,400	44.4	
Severe (SV)	19,500	23.6		63,100	76.4	
SL + MD + SV	45,100	35.1		83,500	64.9	
Very Severe (VS)	1,088,000	39.0		1,703,000	61.0	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	46,000	1.4	1.6
SL + MD	46,000	1.4	1.2
Severe (SV)	82,600	2.6	1.4
SL + MD + SV	128,600	4.0	1.3
Very Severe (VS)	2,791,000	87.8	7.0
Nonclassified (NC)	260,400		
NC + VS	3,051,400	96.0	5.9

TABLE B49. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	UNION COUNTY	% Basin Class	% Basin Soils	WALLOWA COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150	183,500	100.0	5.8	-	-	-
120 - 135	43,900	30.4	1.4	100,500	69.6	3.2
105 - 120	5,700	17.9	0	26,200	82.1	1.0
Over 105	233,100	64.8	7.3	126,700	35.2	4.0
90 - 105	299,700	42.3	9.4	408,000	57.7	12.8
Over 90	532,800	49.9	16.8	534,700	50.1	16.8
75 - 90	513,400	36.1	16.1	908,100	63.9	28.6
Over 75	1,046,200	42.0	32.9	1,442,800	58.0	45.4
60 - 75	22,800	11.3	1.0	178,300	88.7	5.6
Over 60	1,069,000	39.7	33.6	1,621,100	60.3	51.0
45 - 60	17,700	58.0	1.0	12,800	42.0	-
Over 45	1,086,700	39.9	34.2	1,633,900	60.1	51.4
30 - 45	46,400	23.3	1.4	152,600	76.7	4.8
Over 30	1,133,100			1,786,500		
0 - 30						

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150	183,500	5.8	8.3
120 - 135	144,400	4.5	4.1
105 - 120	31,900	1.0	2.6
OVer 105	359,800	11.3	2.1
90 - 105	707,700	22.2	12.5
Over 90	1,067,500	33.6	4.7
75 - 90	1,421,500	44.7	10.1
Over 75	2,489,000	78.3	6.8
60 - 75	201,100	6.3	8.2
Over 60	2,690,100	84.6	6.9
45 - 60	30,500	1.0	1.6
Over 45	2,720,600	85.6	6.6
30 - 45	199,000	6.2	6.1
Over 30	2,919,600		
0 - 30			

DRAINAGE BASIN #9 - POWDER RIVER DRAINAGE BASIN

2,048,500 acres 1,814,100 acres classified (88.6%)

TABLE B50. MAJOR LAND USE (in acres)

Major Land Use	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	182,000	82.0		40,000	18.0	
Pasture (P)	10,800	100.0		-	-	
C + P	192,800	82.8		40,000	17.2	
Forests (F)	550,700	92.2		46,900	7.8	
Range (R)	944,300	96.3		36,100	3.7	
F + R	1,495,000	94.7		83,000	5.3	
Hay (H)	-	-		-	-	
C + P + H	192,800	82.8		40,000	17.2	
Water Shed	3,300	-		-	-	
P + R	955,100	96.4		36,100	3.6	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	222,000	10.8	3.4
Pasture (P)	10,800	1.0	-
C + P	232,800	11.4	2.5
Forests (F)	597,600	29.2	3.8
Range (R)	980,400	47.8	4.4
F + R	1,578,000	77.0	4.1
Hay (H)	-	-	-
C + P + H	232,800	11.4	11.4
Water Shed	3,300	-	-
P + R	991,200	48.4	3.9

TABLE B51. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
Excellent (E)	11,900	100.0		-	-	
Good (G)	168,200	88.2		22,600	11.8	
E + G	180,100	88.8		22,600	11.2	
Fair (F)	125,600	96.7		4,300	3.3	
E + G + F	305,700	91.9		26,900	8.1	
Poor (P)	80,900	71.0		33,000	29.0	
E + G + F + P	386,600	86.6		59,900	13.4	
Nonirrigable (N)	1,304,500			63,100		

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	11,900	1.0	1.0
Good (G)	190,800	9.3	4.4
E + G	202,700	9.9	3.6
Fair (F)	129,900	6.3	2.0
E + G + F	332,600	16.2	2.8
Poor (P)	113,900	5.6	2.4
E + G + F + P	446,500	21.8	2.7
Nonirrigable (N)	1,367,600		
N + [N]	[1,602,000]	[78.2]	[4.9]

TABLE B52. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	4,800	100.0		-	-	
IIw	24,900	72.0		9,700	28.0	
IIe + IIw	29,700	75.4		9,700	24.6	
IIs	16,100	85.2		2,800	14.8	
IIc	7,100	100.0		-	-	
Total II	52,900	80.9		12,500	19.1	
I + IIe + IIw	29,700	75.4		9,700	24.6	
Total I + II	52,900	80.9		12,500	19.1	
IIIe	65,300	87.3		9,500	12.7	
IIIw	39,600	95.0		2,100	5.0	
IIIe + IIIw	104,900	90.0		11,600	10.0	
IIIs	96,800	98.9		1,100	1.1	
IIIc	-	-		-	-	
Total III	201,700	94.1		12,700	5.9	
I + IIe + IIw + IIIe + IIIw	134,600	86.3		21,300	13.7	
Total I+II+III	254,600	91.0		25,200	9.0	
IVe	54,500	92.2		4,600	7.8	
IVw	12,900	100.0		-	-	
IVe + IVw	67,400	93.6		4,600	6.4	
IVs	94,800	95.0		5,000	5.0	
IVc	-	-		3,500	100.0	
Total IV	162,200	92.5		13,100	7.5	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	202,000	88.6		25,900	11.4	
Total I+II+III+IV	416,800	91.6		38,300	9.4	
VIe	162,300	93.6		11,100	6.4	
VIw	-	-		-	-	
VIs	334,700	93.9		21,600	6.1	
VIc	-	-		-	-	
Total VI	497,000	93.8		32,700	6.2	
VIIe	433,700	91.0		43,100	9.0	
VIIw	-	-		-	-	
VIIs	324,800	97.3		8,900	2.7	
VIIc	18,800	100.0		-	-	
Total VII	777,300			52,000		

TABLE B52. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	4,800	-	-
IIw	34,600	1.7	3.4
IIe + IIw	39,400	1.9	2.0
IIs	18,900	1.0	7.3
IIc	7,100	-	-
Total II	65,400	3.2	2.1
I + IIe + IIw	39,400	1.9	1.8
Total I + II	65,400	3.2	2.0
IIIe	74,800	3.6	2.6
IIIw	41,700	2.0	7.1
IIIe + IIIw	116,500	5.7	3.4
IIIs	97,900	4.8	6.6
IIIc	-	-	-
Total III	214,400	10.5	3.1
I + IIe + IIw + IIIe + IIIw	155,900	7.6	2.8
Total I+II+III	279,800	13.6	2.7
IVe	59,100	2.9	2.5
IVw	12,900	-	1.6
IVe + IVw	72,000	3.5	2.3
IVs	99,800	4.9	1.8
IVc	3,500	-	-
Total IV	175,300	8.6	1.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	227,900	11.1	2.6
Total I+II+III+IV	455,100	22.2	1.9
VIe	173,400	8.5	4.0
VIw	-	-	-
VIs	356,300	17.4	5.6
VIc	-	-	-
Total VI	529,700	25.8	4.0
VIIe	476,800	23.3	7.6
VIIw	-	-	-
VIIs	333,700	16.3	5.2
VIIc	18,800	1.0	26.6
Total VII	829,300	40.5	6.5

TABLE B53. AVERAGE ELEVATION (by hundreds of feet)

Elevation	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
Total 0 - 9	-	-	-	-	-	-
9 - 12	4,600	100.0		-	-	
Total 0 - 12	4,600	100.0	-	-	-	-
12 - 15	-	-		-	-	
Total 0 - 15	4,600	100.0	-	-	-	-
15 - 18	-	-		-	-	
Total 0 - 18	4,600	100.0	-	-	-	-
18 - 21	11,700	84.8		2,100	15.2	
21 - 24	4,900	34.8		9,200	65.2	
Total 0 - 24	21,200	65.2	1.0	11,300	34.8	1.0
24 - 27	13,800	100.0		-	-	
27 - 30	203,100	99.8		500	-	
Total 0 - 30	238,100	95.3	11.6	11,800	4.7	1.0
30 - 33	528,900	92.5		42,600	7.5	
33 - 36	84,400	84.6		15,300	15.4	
Total 0 - 36	851,400	92.4	41.6	69,700	7.6	3.4
36 - 39	449,300	90.3		48,300	9.7	
Total 0 - 39	1,300,700	91.7	63.5	118,000	8.3	5.8
39 - 42	182,600	99.3		1,200	1.0	
Total 0 - 42	1,483,300	92.6	72.4	119,200	7.4	5.8
42 - 45	22,200	98.7		300	1.3	
Total 0 - 45	1,505,500	92.6	73.5	119,500	7.4	5.8
45 - 48	18,800	100.0		-	-	
Total 0 - 48	1,524,300	92.7	74.4	119,500	7.3	5.8
48 - 51	39,700	100.0		-	-	
Total 0 - 51	1,564,000	92.9	76.4	119,500	7.1	5.8
51 - 54	127,100	97.3	6.2	3,500	2.7	-
Total 0 - 54	1,691,100			123,000		

TABLE B53. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Total 0 - 9	-	-	-
9 - 12	4,600	-	1.0
Total 0 - 12	4,600	-	-
12 - 15	-	-	-
Total 0 - 15	4,600	-	-
15 - 18	-	-	-
Total 0 - 18	4,600	-	-
18 - 21	13,800	1.0	1.1
21 - 24	14,100	1.0	1.0
Total 0 - 24	32,500	1.6	-
24 - 27	13,800	1.0	1.0
27 - 30	203,600	9.9	13.1
Total 0 - 30	249,900	12.2	1.6
30 - 33	571,500	27.9	30.7
33 - 36	99,700	4.9	6.1
Total 0 - 36	921,100	45.0	4.8
36 - 39	497,600	24.3	16.7
Total 0 - 39	1,418,700	69.3	6.4
39 - 42	183,800	9.0	3.6
Total 0 - 42	1,602,500	78.2	5.9
42 - 45	22,500	1.1	-
Total 0 - 45	1,625,000	79.3	5.0
45 - 48	18,800	1.0	-
Total 0 - 48	1,643,800	80.3	4.1
48 - 51	39,700	1.9	1.0
Total 0 - 51	1,683,500	82.2	3.9
51 - 54	130,600	6.4	3.2
Total 0 - 54	1,814,100		

TABLE B54. SLOPE OF SOIL (acres by percent slope)

Slope %	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
0 - 3	126,100	89.2		15,200	10.8	
4 - 7	148,200	90.9		14,800	9.1	
Total 0 - 7	274,300	90.1	13.4	30,000	9.9	1.5
8 - 12	119,600	91.6		10,900	8.4	
Total 0 - 12	393,900	90.6	19.2	40,900	9.4	2.0
13 - 20	162,500	85.2		28,200	14.8	
Total 0 - 20	556,400	89.0	27.2	69,100	11.0	3.4
21 - 30	-	-		-	-	
Total 0 - 30	556,400	89.0	27.2	69,100	11.0	3.4
31 - 99	1,134,700			53,900		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	141,300		2.2
4 - 7	163,000		2.8
Total 0 - 7	304,300	14.9	2.6
8 - 12	130,500		1.2
Total 0 - 12	434,800	21.2	1.9
13 - 20	190,700		3.2
Total 0 - 20	625,500	30.5	2.2
21 - 30	-	-	-
Total 0 - 30	625,500	30.5	2.1
31 - 99	1,188,600		

TABLE B55. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	14,900	100.0		-	-	
SL + MD	14,900	100.0		-	-	
Severe (SV)	43,600	71.8		17,100	28.2	
SL + MD + SV	58,500	77.4		17,100	22.6	
Very Severe (VS)	1,632,600	93.9		105,900	6.1	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-	-
Moderate (MD)	14,900	1.0	1.0
SL + MD	14,900	1.0	-
Severe (SV)	60,700	3.0	1.0
SL + MD + SV	75,600	3.7	1.0
Very Severe (VS)	1,738,500	84.9	4.4
Nonclassified (NC)	234,400		
NC + VS	1,972,900	96.3	3.8

TABLE B56. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	BAKER COUNTY	% Basin Class	% Basin Soils	UNION COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135	958,900	92.8	46.8	74,900	7.2	3.7
105 - 120	158,600	99.2	7.7	1,200	1.0	-
Over 105	1,117,500	93.6	54.6	76,100	6.4	3.7
90 - 105	532,600	92.5	26.0	43,100	7.5	2.1
Over 90	1,650,100	93.3	80.6	119,200	6.7	5.8
75 - 90	41,000	99.3	2.0	300	1.0	-
Over 75	1,691,100			119,500		
60 - 75						
Over 60	-			119,500		
45 - 60				3,500	100.0	
Over 45	-			123,000		
30 - 45						
Over 30	-			-		
0 - 30						

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135	1,033,800	50.5	29.5
105 - 120	159,800	7.8	12.8
Over 105	1,193,600	58.3	7.0
90 - 105	575,700	28.1	10.2
Over 90	1,769,300	86.4	7.8
75 - 90	41,300	2.0	-
Over 75	1,810,600		
60 - 75			
Over 60	1,810,600		
45 - 60	3,500	-	-
Over 45	1,814,100		
30 - 45			
Over 30	-		
0 - 30			

DRAINAGE BASIN #10 - MALHEUR RIVER DRAINAGE BASIN

3,100,000 acres 2,865,300 acres classified (92.4%)

TABLE B57. MAJOR LAND USE (in acres)

Major Land Use	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		315,300	100.0	
Pasture (P)	36,300	51.0		34,900	49.0	
C + P	36,300	9.4		350,200	90.6	
Forests (F)	2,100	10.9		17,200	89.1	
Range (R)	668,000	28.7		1,662,300	71.3	
F + R	670,100	28.5		1,679,500	71.5	
Hay (H)	-	-		-	-	
C + P + H	36,300	9.4		350,200	90.6	
Water SHed	33,200	25.7		96,000	74.3	
P + R	704,300	29.3		1,697,200	70.7	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	315,300	10.2	4.9
Pasture (P)	71,200	2.3	2.3
C + P	386,500	12.5	4.1
Forests (F)	19,300	1.0	-
Range (R)	2,330,300	75.2	10.4
F + R	2,349,600	75.8	6.2
Hay (H)	-	-	-
C + P + H	386,500	12.5	4.1
Water Shed	129,200	4.2	7.3
P + R	2,401,500	77.5	9.4

TABLE B58. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
Excellent (E)	28,700	27.6		75,200	72.4	
Good (G)	19,000	7.3		137,500	92.7	
E + G	47,700	18.3		212,700	81.7	
Fair (F)	55,800	21.0		209,900	79.0	
E + G + F	103,500	19.7		422,600	80.3	
Poor (P)	24,400	12.8		165,900	87.2	
E + G + F + P	127,900	17.8		588,500	82.2	
Nonirrigable (N)	611,700	28.5		1,537,200	71.5	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	103,900	3.4	7.5
Good (G)	156,500	5.0	3.6
E + G	260,400	8.4	4.6
Fair (F)	265,700	8.6	4.2
E + G + F	526,100	17.0	4.4
Poor (P)	190,300	6.1	4.1
E + G + F + P	716,400	23.1	4.3
Nonirrigable (N)	2,148,900		
N + [N]	[2,383,600]	[76.9]	[5.3]

TABLE B59. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		47,400	100.0	
IIw	-	-		-	-	
IIe + IIw	-	-		47,400	100.0	
IIs	-	-		46,400	100.0	
IIc	63,400	42.0		87,600	58.0	
Total II	63,400	25.9		181,400	74.1	
I + IIe + IIw	-	-		47,400	100.0	
Total I + II	63,400	25.9		181,400	74.1	
IIIe	-	-		46,700	100.0	
IIIw	-	-		21,500	100.0	
IIIe + IIIw	-	-		68,200	100.0	
IIIs	5,700	3.7		150,400	96.3	
IIIc	72,000	58.2		51,700	41.8	
Total III	77,700	22.3		270,300	77.7	
I + IIe + IIw + IIIe + IIIw	-	-		115,600	100.0	
Total I+II+III	141,100	23.8		451,700	76.2	
IVe	2,600	11.7		19,600	88.3	
IVw	-	-		-	-	
IVe + IVw	2,600	11.7		19,600	88.3	
IVs	158,900	33.8		310,600	66.2	
IVc	67,200	42.8		89,700	57.2	
Total IV	228,700	35.3		419,900	64.7	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	2,600	1.9		135,200	98.1	
Total I+II+III+IV	369,800	29.8		871,600	70.2	
VIe	3,800	15.4		20,800	84.6	
VIw	-	-		-	-	
VIs	186,000	33.6		367,200	66.4	
VIc	81,700	42.8		109,400	57.2	
Total VI	271,500	35.3		497,400	64.7	
VIIe	-	-		31,100	100.0	
VIIw	-	-		-	-	
VIIs	98,300	11.9		725,600	88.1	
VIIc	-	-		-	-	
Total VII	98,300	11.5		756,700	88.5	

TABLE B59. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	47,400	1.5	4.6
IIw	-	-	-
IIe + IIw	47,400	1.5	2.4
IIs	46,400	1.5	17.9
IIc	151,000	4.9	17.4
Total II	244,800	7.9	7.8
I + IIe + IIw	47,400	1.5	2.2
Total I + II	244,800	7.9	7.4
IIIe	46,700	1.5	1.6
IIIw	21,500	1.0	3.6
IIIe + IIIw	68,200	2.2	2.0
IIIs	156,100	5.0	10.5
IIIc	123,700	4.0	6.1
Total III	348,000	11.2	5.0
I + IIe + IIw + IIIe + IIIw	115,600	3.7	2.0
Total I+II+III	592,800	19.1	5.8
IVe	22,200	1.0	1.0
IVw	-	-	-
IVe + IVw	22,200	1.0	1.0
IVs	469,500	15.1	8.4
IVc	156,900	5.1	3.6
Total IV	648,600	20.9	4.9
I+IIe+IIw+IIIe + IIIw+IVe+IVw	137,800	4.4	1.6
Total I+II+III+IV	1,241,400	40.0	5.3
VIe	24,600	1.0	1.1
VIw	-	-	-
VIs	553,200	17.8	8.7
VIc	191,100	6.3	8.4
Total VI	768,900	24.8	5.8
VIIe	31,100	1.0	-
VIIw	-	-	-
VIIs	823,900	26.6	12.9
VIIc	-	-	-
Total VII	855,000	27.6	6.7

TABLE B60. AVERAGE ELEVATION (by hundreds of feet)

Elevation	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
Total 0 - 9	-	-	-	-	-	-
9 - 12				16,200	100.0	
Total 0 - 12	-	-	-	16,200	100.0	1.0
12 - 15				-	-	
Total 0 - 15	-	-	-	16,200	100.0	1.0
15 - 18				-	-	
Total 0 - 18	-	-	-	16,200	100.0	1.0
18 - 21				24,000	100.0	
21 - 24				89,800	100.0	
Total 0 - 24	-	-	-	130,000	100.0	4.2
24 - 27				106,700	100.0	
27 - 30				35,900	100.0	
Total 0 - 30	-	-	-	272,600	100.0	
30 - 33				328,300	100.0	
33 - 36	18,100	7.1		236,800	92.9	
Total 0 - 36	18,100	2.1	1.0	837,700	97.9	27.0
36 - 39	81,800	39.1		49,500	60.9	
Total 0 - 39	49,900	5.3	1.6	887,200	94.7	28.6
39 - 42	116,800	17.3		558,200	82.7	
Total 0 - 42	166,700	10.3	5.4	1,445,400	89.7	46.6
42 - 45	130,300	44.6		162,000	55.4	
Total 0 - 45	297,000	15.6	9.6	1,607,400	84.4	51.8
45 - 48	197,500	39.8		299,300	60.2	
Total 0 - 48	494,500	20.6	16.0	1,906,700	79.4	61.5
48 - 51	245,100	52.8	7.9	219,000	47.2	7.1
Total 0 - 51	739,600			2,125,700		

TABLE B60. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Total 0 - 9	-	-	-
9 - 12	16,200	1.0	1.8
Total 0 - 12	16,200	1.0	-
12 - 15	-	-	-
Total 0 - 15	16,200	1.0	-
15 - 18	-	-	-
Total 0 - 18	16,200	1.0	-
18 - 21	24,000	1.0	2.0
21 - 24	89,800	2.9	3.9
Total 0 - 24	130,000	4.2	1.0
24 - 27	106,700	3.4	5.9
27 - 30	35,900	1.2	2.3
Total 0 - 30	272,600	8.8	1.7
30 - 33	328,300	10.6	17.6
33 - 36	254,900	8.3	15.7
Total 0 - 36	855,800	27.6	4.5
36 - 39	81,300	2.6	2.7
Total 0 - 39	937,100	30.2	4.2
39 - 42	675,000	21.8	13.3
Total 0 - 42	1,612,100	52.0	5.9
42 - 45	292,300	9.4	5.6
Total 0 - 45	1,904,400	61.4	5.9
45 - 48	496,800	16.0	6.8
Total 0 - 48	2,401,200	77.4	6.0
48 - 51	464,100	15.0	12.1
Total 0 - 51	2,865,300		

TABLE B61. SLOPE OF SOIL (acres by percent slope)

Slope %	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
0 - 3	43,600	18.0		198,700	82.0	
4 - 7	37,400	11.0		302,900	89.0	
Total 0 - 7	81,000	13.9	2.6	501,600	86.1	16.2
8 - 12	206,900	35.2		380,300	64.8	
Total 0 - 12	287,900	24.6	9.3	881,900	75.4	28.4
13 - 20	162,700	33.0		330,100	67.0	
Total 0 - 20	450,600	27.1	14.5	1,212,000	72.9	39.1
21 - 30	-	-		-	-	
Total 0 - 30	450,600	27.1	14.5	1,212,000	72.9	39.1
31 - 99	289,000			913,700		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	242,300		3.9
4 - 7	340,300		5.9
Total 0 - 7	582,600	18.8	4.9
8 - 12	587,200		5.2
Total 0 - 12	1,169,800	37.7	5.0
13 - 20	492,800		8.4
Total 0 - 20	1,662,600	53.6	5.7
21 - 30	-	-	-
Total 0 - 30	1,662,600	53.6	5.6
31 - 99	1,202,700		

TABLE B62. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
Slight (SL)	29,600	33.3		59,300	66.7	
Moderate (MD)	124,900	36.8		214,100	63.2	
SL + MD	154,500	36.1		273,400	63.9	
Severe (SV)	24,100	31.3		52,900	68.7	
SL + MD + SV	178,600	35.4		326,300	64.6	
Very Severe (VS)	561,000	23.8		1,799,400	76.2	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	88,900	2.9	8.8
Moderate (MD)	339,000	10.9	11.6
SL + MD	427,900	13.8	10.9
Severe (SV)	77,000	2.5	1.3
SL + MD + SV	504,900	16.3	5.2
Very Severe (VS)	2,360,400	76.1	5.9
Nonclassified (NC)	234,700		
NC + VS	2,595,100	83.7	5.0

TABLE B63. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	HARNEY COUNTY	% Basin Class	% Basin Soils	MALHEUR COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165				197,300	100.0	6.4
Over 150	-	-	-	197,300	100.0	6.4
135 - 150				42,200	100.0	1.4
120 - 135				584,500	100.0	18.8
105 - 120				38,700	100.0	1.2
Over 105	-	-	-	862,700	100.0	27.8
90 - 105	176,100	40.3	5.7	260,900	59.7	8.4
Over 90	176,100	13.5	5.7	1,123,600	86.5	36.2
75 - 90	280,900	27.3	9.1	746,400	72.7	24.1
Over 75	457,000	19.6	14.7	1,870,000	80.4	60.3
60 - 75	131,800	55.8	4.2	104,200	44.2	3.4
Over 60	588,800	23.0	19.0	1,974,200	77.0	63.7
45 - 60	114,300	68.0	3.7	53,800	32.0	1.7
Over 45	703,100			2,028,000		
30 - 45	-	-	-	-	-	-
Over 30	703,100			2,028,000		
0 - 30	36,500	27.2	1.2	97,700	72.8	3.2

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165	197,300	6.4	8.7
Over 150	197,300	6.4	2.0
135 - 150	42,200	1.4	1.9
120 - 135	584,500	18.8	16.7
105 - 120	38,700	1.2	3.1
Over 105	862,700	27.8	5.0
90 - 105	437,000	14.1	7.7
Over 90	1,299,700	41.9	5.7
75 - 90	1,027,300	33.1	7.3
Over 75	2,327,000	75.0	6.3
60 - 75	236,000	7.6	9.6
Over 60	2,563,000	82.7	6.5
45 - 60	168,100	5.4	8.6
Over 45	2,731,100		
30 - 45	-	-	-
Over 30	2,731,100		
0 - 30	134,200	4.3	2.7

DRAINAGE BASIN #11 - OWYHEE RIVER DRAINAGE BASIN

3,775,000 acres — 3,734,300 acres classified (98.9%)

TABLE B64. MAJOR LAND USE (in acres)

Major Land Use	MALHEUR COUNTY	% Basin Soils	% State Class
Cultivated (C)	70,900	1.9	1.1
Pasture (P)	65,900	1.7	2.2
C + P	136,800	3.6	1.4
Forests (F)	-	-	-
Range (R)	3,340,300	88.5	14.9
F + R	3,340,300	88.5	8.8
Hay (H)	-	-	-
C + P + H	136,800	3.6	1.4
Water Shed	257,200	6.8	14.5
P + R	3,406,200	90.2	13.4

TABLE B65. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	MALHEUR COUNTY	% Basin Soils	% State Class
Excellent (E)	77,400	2.1	5.6
Good (G)	107,600	2.9	2.5
E + G	185,000	5.0	3.3
Fair (F)	473,100	12.7	7.5
E + G + F	658,100	17.7	5.5
Poor (P)	417,800	11.2	8.9
E + G + F + P	1,075,900	28.8	6.4
Nonirrigable (N)	2,658,400		
N + [N]	[2,699,100]	[71.2]	[6.0]

TABLE B66. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	MALHEUR COUNTY	% Basin Soils	% State Class
I	-	-	-
IIe	11,400	-	1.1
IIw	-	-	-
IIe + IIw	11,400	-	1.0
IIs	13,600	-	5.2
IIc	113,000	3.0	13.0
Total II	138,000	3.6	4.4
I + IIe + IIw	11,400	-	1.0
Total I + II	138,000	3.6	4.2
IIIe	-	-	-
IIIw	4,200	-	-
IIIe + IIIw	4,200	-	-
IIIs	210,500	5.6	14.2
IIIc	294,200	7.8	14.5
Total III	508,900	13.5	7.3
I + IIe + IIw + IIIe + IIIw	15,600	-	-
Total I+II+III	646,900	17.1	6.3
IVe	7,600	-	-
IVw	-	-	-
IVe + IVw	7,600	-	-
IVs	1,207,500	32.0	21.6
IVc	518,000	13.7	11.9
Total IV	1,733,100	45.9	13.2
I+IIe+IIw+IIIe + IIIw+IVe+IVw	23,200	-	-
Total I+II+III+IV	2,380,000	63.0	10.2
VIe	3,600	-	-
VIw	-	-	-
VIs	642,000	17.0	10.1
VIc	236,600	6.3	10.5
Total VI	882,200	23.4	6.7
VIIe	-	-	-
VIIw	-	-	-
VIIs	472,100	12.5	7.4
VIIc	-	-	-
Total VII	472,100	12.5	3.7

TABLE B67. AVERAGE ELEVATION (by hundreds of feet)

Elevation	MALHEUR COUNTY	% Basin Soils	% State Class
Total 0 - 18	-	-	-
18 - 21	4,200	-	-
21 - 24	56,200	1.5	2.4
Total 0 - 24	60,400	1.6	-
24 - 27	9,400	-	-
27 - 30	1,100	-	-
Total 0 - 30	70,900	1.9	-
30 - 33	-	-	-
33 - 36	22,100	1.0	1.4
Total 0 - 36	93,000	2.5	-
36 - 39	65,900	1.7	2.2
Total 0 - 39	158,900	4.2	1.0
39 - 42	1,278,300	33.9	25.1
Total 0 - 42	1,437,200	38.1	5.3
42 - 45	529,300	14.0	10.2
Total 0 - 45	1,966,500	52.1	6.1
45 - 48	1,494,300	39.6	20.4
Total 0 - 48	3,460,800	91.7	8.7
48 - 51	270,900	7.2	7.0
Total 0 - 51	3,731,700	98.9	8.6
51 - 54	2,600	-	-
Total 0 - 54	3,734,300		

TABLE B68. SLOPE OF SOIL (acres by percent slope)

Slope %	MALHEUR COUNTY	% Basin Soils	% State Class
0 - 3	233,100	6.2	3.7
4 - 7	413,000	10.9	7.2
Total 0 - 7	646,100	17.1	5.4
8 - 12	1,623,000	43.0	14.4
Total 0 - 12	2,269,100	60.1	9.8
13 - 20	646,700	17.1	10.9
Total 0 - 20	2,915,800	77.2	10.0
21 - 30	-	-	-
Total 0 - 30	2,915,800	77.2	9.8
31 - 99	818,500		

TABLE B69. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre

Limitation	MALHEUR COUNTY	% Basin Soils	% State Class
Slight (SL)	89,900	2.4	8.9
Moderate (MD)	106,700	2.8	3.6
SL + MD	196,600	5.2	5.0
Severe (SV)	95,300	2.5	1.6
SL + MD + SV	291,900	7.7	3.0
Very Severe (VS)	3,442,400	91.2	8.7
Nonclassified (NC)	40,700		
NC + VS	3,483,100	92.3	6.7

TABLE B70. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	MALHEUR COUNTY	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180	14,800	-	1.0
150 - 165	55,000	1.4	2.4
Over 150	69,800	1.8	1.0
135 - 150	1,100	-	-
120 - 135	-	-	-
105 - 120	-	-	-
Over 105	70,900	1.9	-
90 - 105	559,100	14.8	9.9
Over 90	630,000	16.7	2.8
75 - 90	2,592,900	68.7	18.5
Over 75	3,222,900	85.4	8.8
60 - 75	101,100	2.7	4.1
Over 60	3,324,000	88.0	8.5
45 - 60	37,900	1.0	2.0
Over 45	3,361,900		
30 - 45	-	-	-
Over 30	3,361,900		
0 - 30	372,400	9.9	7.4

DRAINAGE BASIN #12 - MALHEUR LAKE DRAINAGE BASIN

6,334,000 acres — 5,511,900 acres classified (87.0%)

TABLE B71. MAJOR LAND USE (in acres)

Major Land Use	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		-	-	
Pasture (P)	9,800	3.1		289,800	90.9	
C + P	9,800	3.1		289,800	90.9	
Forests (F)	-	-		2,000	62.5	
Range (R)	237,500	5.0		3,918,500	82.5	
F + R	237,500	5.0		3,920,500	82.6	
Hay (H)	-	-		-	-	
C + P + H	9,800	3.1		289,800	90.9	
Water Shed	23,700	5.4		408,300	92.7	
P + R	247,300	4.9		4,208,300	83.0	

Major Land Use	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		-	-	
Pasture (P)	2,600	1.0		16,600	5.2	
C + P	2,600	1.0		16,600	5.2	
Forests (F)	-	-		1,200	37.5	
Range (R)	556,900	11.7		36,400	1.0	
F + R	556,900	11.6		37,600	1.0	
Hay (H)	-	-		-	-	
C + P + H	2,600	1.0		16,600	5.2	
Water Shed	8,600	2.0		-	-	
P + R	559,500	11.0		54,200	1.1	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	-	-	-
Pasture (P)	318,800	5.0	10.5
C + P	318,800	5.0	3.4
Forests (F)	3,200	-	-
Range (R)	4,749,300	75.0	21.2
F + R	4,752,500	75.0	12.4
Hay (H)	-	-	-
C + P + H	318,800	5.0	3.4
Water Shed	440,600	7.0	24.9
P + R	5,068,100	80.0	19.9

TABLE B72. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Excellent (E)	6,500	5.9		102,200	93.1	
Good (G)	20,600	3.3		568,200	92.0	
E + G	27,100	9.5		670,400	92.2	
Fair (F)	69,000	9.6		589,700	82.0	
E + G + F	96,100	6.6		1,260,100	87.1	
Poor (P)	16,700	3.3		429,900	85.3	
E + G + F + P	112,800	5.8		1,690,000	86.7	
Nonirrigable (N)	158,200	4.4		2,928,600	82.2	

Suitability Class	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Excellent (E)	1,100	1.0		-	-	
Good (G)	10,100	1.6		18,800	3.0	
E + G	11,200	1.5		18,800	2.6	
Fair (F)	34,000	4.7		26,000	3.6	
E + G + F	45,200	3.1		44,800	3.1	
Poor (P)	51,100	10.1		6,200	1.2	
E + G + F + P	96,300	4.9		51,000	2.6	
Nonirrigable (N)	471,800	13.2		3,200	1.0	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	109,800	1.7	7.9
Good (G)	617,700	9.8	14.4
E + G	727,500	11.5	12.8
Fair (F)	718,700	11.3	11.4
E + G + F	1,446,200	22.8	12.1
Poor (P)	503,900	8.0	10.8
E + G + F + P	1,950,100	30.8	11.7
Nonirrigable (N)	3,561,800		
N + [N]	[4,383,900]	[69.2]	[13.4]

TABLE B73. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe						
IIw						
IIe + IIw	-	-		-	-	
IIs						
IIc	9,100	4.8		152,200	81.1	
Total II	9,100	4.8		152,200	81.1	
I + IIe + IIw	-	-		-	-	
Total I + II	9,100	4.8		152,200	81.1	
IIIe						
IIIw						
IIIe + IIIw	-	-		-	-	
IIIs	9,500	1.8		506,400	96.1	
IIIc	59,300	9.6		522,800	84.6	
Total III	68,800	6.0		1,029,200	89.9	
I + IIe + IIw + IIIe + IIIw	-	-		-	-	
Total I+II+III	77,900	5.8		1,181,400	88.6	
IVe						
IVw						
IVe + IVw	-	-		-	-	
IVs	43,900	2.6		1,332,700	78.8	
IVc	40,400	3.8		848,700	80.8	
Total IV	84,300	3.1		2,181,400	79.6	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		-	-	
Total I+II+III+IV	162,200	4.0		3,362,800	82.5	
VIe	-	-		-	-	
VIw	-	-		-	-	
VIs	55,500	9.1		522,300	86.1	
VIc	4,000	2.2		148,600	81.7	
Total VI	59,500	7.5		670,900	85.1	
VIIe	3,300	11.0		26,700	89.0	
VIIw	-	-		-	-	
VIIs	46,000	7.4		558,200	90.2	
VIIc	-	-		-	-	
Total VII	49,300	7.6		584,900	90.1	

TABLE B73. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe						
IIw						
IIe + IIw	-	-		-	-	
IIs	-	-		-	-	
IIc	1,100	1.0		25,300	13.5	
Total II	1,100	1.0		25,300	13.5	
I + IIe + IIw	-	-		-	-	
Total I + II	1,100	1.0		25,300	13.5	
IIIe						
IIIw						
IIIe + IIIw	-	-		-	-	
IIIs	11,100	2.1		-	-	
IIIc	16,400	2.6		19,700	3.2	
Total III	27,500	2.4		19,700	1.7	
I + IIe + IIw + IIIe + IIIw	-	-		-	-	
Total I+II+III	28,600	2.1		45,000	3.4	
IVe						
IVw						
IVe + IVw	-	-		-	-	
IVs	311,700	18.4		3,100	-	
IVc	156,100	14.9		4,900	-	
Total IV	467,800	17.1		8,000	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		-	-	
Total I+II+III+IV	496,400	12.2		53,000	1.3	
VIe	-	-		-	-	
VIw	-	-		-	-	
VIs	27,700	4.6		1,200	-	
VIc	29,300	16.1		-	-	
Total VI	57,000	7.2		1,200	-	
VIIe	-	-		-	-	
VIIw	-	-		-	-	
VIIs	14,700	2.4		-	-	
VIIc	-	-		-	-	
Total VII	14,700	2.3		-	-	

TABLE B73. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe			
IIw			
IIe + IIw	-	-	-
IIs			
IIc	187,700	3.0	21.6
Total II	187,700	3.0	6.0
I + IIe + IIw	-	-	-
Total I + II	187,700	3.0	5.7
IIIe			
IIIw			
IIIe + IIIw	-	-	-
IIIs	527,000	8.3	35.6
IIIc	618,200	9.8	30.4
Total III	1,145,200	18.1	16.4
I + IIe + IIw + IIIe + IIIw	-	-	-
Total I+II+III	1,332,900	21.0	13.0
IVe			
IVw			
IVe + IVw	-	-	-
IVs	1,691,400	26.7	30.2
IVc	1,050,100	16.6	24.2
Total IV	2,741,500	43.3	20.9
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-	-
Total I+II+III+IV	4,074,400	64.3	17.4
VIe	-	-	-
VIw	-	-	-
VIs	606,700	9.6	9.6
VIc	181,900	2.9	8.0
Total VI	788,600	12.4	6.0
VIIe	30,000	-	-
VIIw	-	-	-
VIIs	618,900	9.8	9.7
VIIc	-	-	-
Total VII	648,900	10.2	5.1

TABLE B74. AVERAGE ELEVATION (by hundreds of feet)

Elevation	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Total 0 - 39	-	-	-	-	-	-
39 - 42	41,900	2.4		1,445,700	84.6	
Total 0 - 42	41,900	2.4	1.0	1,445,700	84.6	22.8
42 - 45	51,600	6.2		727,100	87.4	
Total 0 - 45	93,500	3.7		2,172,800	85.5	
45 - 48	140,800	6.4		1,849,200	83.5	
Total 0 - 48	234,300	4.9	3.7	4,022,000	84.6	63.5
48 - 51	36,700	5.6	1.0	532,200	80.6	
Total 0 - 51	271,000			4,554,200	84.1	71.9
51 - 54				63,700	91.7	
Total 0 - 54				4,617,900		
54 - 57						
57 - 60						
Total 0 - 60	-	-	-	-	-	-

Elevation	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Total 0 - 39	-	-	-	-	-	-
39 - 42	201,800	11.8		19,700	1.2	
Total 0 - 42	201,800	11.8	3.2	19,700	1.2	-
42 - 45	52,800	6.3		-	-	
Total 0 - 45	254,600	10.0		19,700	1.0	
45 - 48	191,400	8.6		33,300	1.5	
Total 0 - 48	446,000	9.4	7.0	53,000	1.1	1.0
48 - 51	91,700	13.9		-	-	
Total 0 - 51	537,700	9.9	8.5	53,000	1.0	1.0
51 - 54	3,800	5.5		1,200	1.7	
Total 0 - 54	541,500	9.9	8.5	54,200		
54 - 57						
57 - 60						
Total 0 - 60						

TABLE B74. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Total 0 - 39	-	-	-
39 - 42	1,709,800	27.0	33.6
Total 0 - 42	1,709,800	27.0	6.3
42 - 45	831,500	13.1	
Total 0 - 45	2,541,300	40.1	7.8
45 - 48	2,214,700	35.0	30.2
Total 0 - 48	4,756,000	75.1	12.0
48 - 51	660,600	10.4	17.2
Total 0 - 51	5,416,600	85.5	12.4
51 - 54	68,700	1.1	1.7
Total 0 - 54	5,485,300	86.6	11.5
54 - 57			
57 - 60			
Total 0 - 60	-	-	-

TABLE B75. SLOPE OF SOIL (acres by percent slope)

Slope %	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
0 - 3	42,400	3.4		1,132,200	91.5	
4 - 7	53,500	12.4		330,000	76.2	
Total 0 - 7	95,900	5.7	1.5	1,462,200	87.6	23.1
8 - 12	46,100	1.9		1,880,400	79.5	
Total 0 - 12	142,000	3.5	2.2	3,342,600	82.8	52.8
13 - 20	70,300	12.9		440,800	80.7	
Total 0 - 20	212,300	4.6	3.4	3,783,400	82.6	59.7
21 - 30	-	-		-	-	
Total 0 - 30	212,300	4.6	3.4	3,783,400	82.6	59.7
31 - 99	58,700			835,200		

Slope %	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
0 - 3	39,600	3.2		22,800	1.8	
4 - 7	22,000	5.1		27,300	6.3	
Total 0 - 7	61,600	3.7	1.0	50,100	3.0	1.0
8 - 12	436,600	18.4		2,100	-	
Total 0 - 12	498,200	12.3	7.9	52,200	1.3	1.0
13 - 20	35,300	6.5		-	-	
Total 0 - 20	533,500	11.6	8.4	52,200	1.1	1.0
21 - 30	-	-		-	-	
Total 0 - 30	533,500	11.6	8.4	52,200	1.1	1.0
31 - 99	34,600			2,000		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	1,237,000		19.8
4 - 7	432,800		7.5
Total 0 - 7	1,669,800	26.4	14.1
8 - 12	2,365,200		20.9
Total 0 - 12	4,035,000	63.7	17.4
13 - 20	546,400		9.3
Total 0 - 20	4,581,400	72.3	15.8
21 - 30	-		-
Total 0 - 30	4,581,400	72.3	15.4
31 - 99	930,500		

TABLE B76. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Slight (SL)	9,100	5.8		146,800	93.5	
Moderate (MD)	16,800	6.8		220,000	89.5	
SL + MD	25,900	6.4		366,800	91.0	
Severe (SV)	19,000	4.6		353,800	85.1	
SL + MD + SV	44,900	5.5		720,600	88.0	
Very Severe (VS)	226,100	4.8		3,898,000	83.0	

Limitation	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Slight (SL)	1,100	1.0		-	-	
Moderate (MD)	3,100	1.3		6,000	2.4	
SL + MD	4,200	1.0		6,000	1.5	
Severe (SV)	15,600	3.8		27,300	6.6	
SL + MD + SV	19,800	2.4		33,300	4.1	
Very Severe (VS)	548,300	11.7		20,900	-	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	157,000	2.5	15.6
Moderate (MD)	245,900	3.9	8.4
SL + MD	402,900	6.4	10.2
Severe (SV)	415,700	6.6	7.2
SL + MD + SV	818,600	13.0	8.4
Very Severe (VS)	4,693,300	74.1	11.8
Nonclassified (NC)	822,100		
NC + VS	5,515,400	87.1	10.6

TABLE B77. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	MALHEUR COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105	19,800	2.1	-	871,100	93.2	13.8
Over 90	19,800	2.1	-	871,100	93.2	13.8
75 - 90	192,300	5.5	3.0	2,837,600	81.0	44.8
Over 75	212,100	4.8	3.3	3,708,700	83.6	58.6
60 - 75	35,500	8.4	1.0	343,000	81.4	5.4
Over 60	247,600			4,051,700	88.9	64.0
45 - 60				162,000	85.4	2.6
Over 45	247,600			4,213,700	88.8	66.5
30 - 45				2,200	6.9	-
Over 30	247,600			4,215,900	88.3	66.5
0 - 30	23,400	5.4	-	402,700	92.8	6.4

Days	LAKE COUNTY	% Basin Class	% Basin Soils	GRANT COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105	20,400	2.2	-	22,800	2.4	-
Over 90	20,400	2.2	-	22,800	2.4	-
75 - 90	442,500	12.6	-	28,500	1.0	-
Over 75	462,900	10.4	7.3	51,300	1.2	1.0
60 - 75	42,900	10.2	1.0			
Over 60	505,800	11.1	8.0	51,300		
45 - 60	27,700	14.6	-			
Over 45	533,500	11.2	8.4	51,300		
30 - 45	26,600	83.9	-	2,900	9.1	-
Over 30	560,100	11.7	8.8	54,200		
0 - 30	8,000	1.8	-			

TABLE B77. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 105	-	-	-
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	-
90 - 105	934,100	14.7	16.5
Over 90	934,100	14.7	4.1
75 - 90	3,500,900	55.3	24.9
Over 75	4,435,000	70.0	12.1
60 - 75	421,400	6.6	17.1
Over 60	4,557,500	72.0	11.6
45 - 60	189,700	3.0	9.8
Over 45	4,747,200	74.9	11.5
30 - 45	31,700	1.0	1.0
Over 30	4,776,000	75.4	10.8
0 - 30	434,100	6.8	8.6

DRAINAGE BASIN #13 - GOOSE AND SUMMER LAKES DRAINAGE BASIN

5,271,000 acres — 5,271,000 acres classified (100%)

TABLE B78. MAJOR LAND USE (in acres)

Major Land Use	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	132,500	100.0		-	-	
Pasture (P)	156,600	99.0		700	-	
C + P	289,100	98.6		700	-	
Forests (F)	546,300	43.3		-	-	
Range (R)	2,952,700	85.7		367,100	10.6	
F + R	3,499,000	74.3		367,100	7.8	
Hay (H)	-	-		-	-	
C + P + H	289,100	98.6		700	-	
Water Shed	254,500	94.4		13,900	5.2	
P + R	3,109,300	86.3		367,800	10.2	

Major Land Use	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	-	-		2,000	-	
Pasture (P)	-	-		1,500	1.0	
C + P	-	-		3,500	1.2	
Forests (F)	60,400	4.8		655,800	51.9	
Range (R)	125,700	3.6		-	-	
F + R	186,100	4.0		655,800	13.9	
Hay (H)	-	-		-	-	
C + P + H	-	-		3,500	1.2	
Water Shed	1,300	-		-	-	
P + R	125,700	3.5		1,500	-	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	134,500	2.6	2.1
Pasture (P)	158,800	3.0	5.2
C + P	293,300	5.6	3.1
Forests (F)	1,262,500	24.0	8.0
Range (R)	3,445,500	65.4	15.4
F + R	4,708,000	89.4	12.3
Hay (H)	-	-	-
C + P + H	293,300	5.6	3.1
Water Shed	269,700	5.1	15.2
P + R	3,604,300	68.4	14.2

TABLE B79. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Excellent (E)	13,900	100.0		700	-	
Good (G)	191,000	73.9		41,700	16.0	
E + G	204,900	75.0		42,400	15.5	
Fair (F)	560,900	94.7		30,300	5.1	
E + G + F	765,800	88.5		72,700	8.4	
Poor (P)	460,400	97.8		1,100	-	
E + G + F + P	1,226,200	91.8		73,800	5.5	
Nonirrigable (N)	2,816,400	71.6		307,900	7.8	

Suitability Class	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Excellent (E)	-	-		-	-	
Good (G)	22,300	8.6		3,500	1.4	
E + G	22,300	8.2		3,500	1.2	
Fair (F)	1,200	-		-	-	
E + G + F	24,500	2.8		3,500	-	
Poor (P)	9,100	1.9		-	-	
E + G + F + P	33,600	2.5		3,500	-	
Nonirrigable (N)	154,800	3.9		655,800	16.7	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	14,600	-	1.0
Good (G)	258,500	4.9	6.0
E + G	273,100	5.2	4.8
Fair (F)	592,400	11.2	9.4
E + G + F	865,500	16.4	7.2
Poor (P)	470,600	8.9	10.0
E + G + F + P	1,336,100	25.3	8.0
Nonirrigable (N)	3,934,900	74.7	-
N + [N]			[8.8]

TABLE B80. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	41,100	100.0		-	-	
IIw	43,900	100.0		-	-	
IIe + IIw	85,000	100.0		-	-	
IIs	-	-		-	-	
IIc	13,900	95.2		700	4.8	
Total II	98,900	99.0		700	1.0	
I + IIe + IIw	85,000	100.0		-	-	
Total I + II	98,900	99.0		700	1.0	
IIIe	19,800	49.8		-	-	
IIIw	19,200	90.6		-	-	
IIIe + IIIw	39,000	63.9		-	-	
IIIs	124,500	87.0		9,500	6.6	
IIIc	543,500	85.9		45,100	7.1	
Total III	707,000	84.5		54,600	6.5	
I + IIe + IIw + IIIe + IIIw	124,000	84.9		-	-	
Total I+II+III	805,900	86.1		55,300	5.9	
IVe	118,500	100.0		-	-	
IVw	39,800	96.4		-	-	
IVe + IVw	158,300	99.0		-	-	
IVs	533,800	75.7		170,500	24.2	
IVc	790,800	75.2		115,400	11.0	
Total IV	1,482,900	77.4		285,900	14.9	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	282,300	92.3		-	-	
Total I+II+III+IV	2,288,800	80.2		341,200	11.9	
VIe	361,100	90.0		-	-	
VIw	-	-		-	-	
VIs	630,500	97.2		18,000	2.8	
VIc	92,900	70.5		8,600	6.5	
Total VI	1,084,500	92.1		26,600	2.2	
VIIe	184,200	25.2		-	-	
VIIw	-	-		-	-	
VIIs	485,100	95.9		13,900	2.7	
VIIc	-	-		-	-	
Total VII	669,300	54.0		13,900	1.1	

TABLE B80. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	-	-		-	-	
IIw	-	-		-	-	
IIe + IIw	-	-		-	-	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	-	-		-	-	
I + IIe + IIw	-	-		-	-	
Total I + II	-	-		-	-	
IIIe	20,000	50.2		-	-	
IIIw	-	-		2,000	9.3	
IIIe + IIIw	20,000	32.8		2,000	3.3	
IIIs	9,100	6.4		-	-	
IIIc	43,800	6.9		-	-	
Total III	72,900	8.7		2,000	-	
I + IIe + IIw + IIIe + IIIw	20,000	13.7		2,000	1.4	
Total I+II+III	72,900	7.8		2,000	-	
IVe	-	-		-	-	
IVw	-	-		1,500	3.6	
IVe + IVw	-	-		1,500	1.0	
IVs	1,200	-		-	-	
IVc	62,700	6.0		82,800	7.9	
Total IV	63,900	3.3		84,300	4.4	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	20,000	6.5		3,500	1.2	
Total I+II+III+IV	136,800	4.8		86,300	3.0	
VIe	36,300	9.1		-	-	
VIw	-	-		-	-	
VIs	-	-		-	-	
VIc	6,800	5.2		23,400	17.8	
Total VI	43,100	3.6		23,400	2.0	
VIIe	800	-		549,600	74.8	
VIIw	-	-		-	-	
VIIs	6,700	1.3		-	-	
VIIc	-	-		-	-	
Total VII	7,500	-		549,600	44.3	

TABLE B80. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	41,000	1.0	4.0
IIw	43,900	1.0	4.6
IIe + IIw	85,000	1.6	4.3
IIs	-	-	-
IIc	14,600	-	1.7
Total II	99,600	1.9	3.2
I + IIe + IIw	85,000	1.6	3.9
Total I + II	99,600	1.9	3.0
IIIe	39,800	1.0	1.4
IIIw	21,200	-	3.6
IIIe + IIIw	61,000	1.2	1.8
IIIs	143,100	2.7	9.6
IIIc	632,400	12.0	31.1
Total III	836,500	15.9	12.0
I + IIe + IIw + IIIe + IIIw	146,000	2.8	2.6
Total I+II+III	936,100	17.8	9.1
IVe	118,500	2.2	5.1
IVw	41,300	1.0	5.0
IVe + IVw	159,800	3.0	5.0
IVs	705,500	13.4	12.6
IVc	1,051,700	20.0	24.2
Total IV	1,917,000	36.4	14.6
I+IIe+IIw+IIIe + IIIw+IVe+IVw	305,800	5.8	3.5
Total I+II+III+IV	2,853,100	54.1	12.2
VIe	397,400	7.5	9.2
VIw	-	-	-
VIs	648,500	12.3	10.2
VIc	131,700	2.5	5.8
Total VI	1,177,600	22.3	8.9
VIIe	734,600	13.9	11.6
VIIw	-	-	-
VIIs	505,700	9.6	7.9
VIIc	-	-	-
Total VII	1,240,300	23.5	9.7

TABLE B81. AVERAGE ELEVATION (by hundreds of feet)

Elevation	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
0 - 42	-	-	-	-	-	-
42 - 45	1,370,800	84.5		175,000	10.8	
Total 0 - 45	1,370,800	84.5	26.0	175,000	10.8	3.3
45 - 48	1,358,000	84.3		195,900	12.3	
Total 0 - 48	2,728,800	84.5	51.8	372,900	11.5	7.1
48 - 51	434,800	98.0		8,800	2.0	
Total 0 - 51	3,163,600	86.1		381,700	10.4	
51 - 54	398,400	69.1				
Total 0 - 54	3,562,000	83.8	67.6			
54 - 57	176,300	24.7	3.3			
57 - 60	144,200	100.0	2.7			
Total 0 - 60	3,882,500					

Elevation	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
0 - 42	-	-	-	-	-	-
42 - 45	76,000	4.7		-	-	
Total 0 - 45	76,000	4.7	1.4	-	-	-
45 - 48	51,000	3.2		3,500	-	
Total 0 - 48	127,000	3.9	2.4	3,500	-	-
48 - 51	-	-		-	-	
Total 0 - 51	127,000	3.4		3,500	-	-
51 - 54	60,400	10.5		117,700	20.4	
Total 0 - 54	187,400	4.4	3.6	121,200	2.8	2.3
54 - 57				538,100	75.3	10.2
57 - 60				-	-	
Total 0 - 60				659,300		

TABLE B81. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 42	-	-	-
42 - 45	1,621,800	30.7	31.2
Total 0 - 45	1,621,800	30.7	5.0
45 - 48	1,610,400	30.6	22.0
Total 0 - 48	3,232,200	61.3	8.1
48 - 51	443,600	8.4	11.6
Total 0 - 51	3,675,800	69.7	8.4
51 - 54	576,500	10.9	14.1
Total 0 - 54	4,252,300	80.7	8.9
54 - 57	714,700	13.6	52.0
57 - 60	144,200	2.7	100.0
Total 0 - 60	5,111,200		

TABLE B82. SLOPE OF SOIL (acres by percent slope)

Slope %	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
0 - 3	594,400	91.3		49,500	7.6	
4 - 7	439,400	88.3		21,700	4.4	
Total 0 - 7	1,033,800	90.0	20.7	71,200	6.2	1.4
8 - 12	1,882,500	79.4		267,700	11.3	
Total 0 - 12	2,916,500	82.8	58.3	338,900	9.6	6.8
13 - 20	439,100	95.6		20,300	4.4	
Total 0 - 20	3,355,400	84.3	67.1	359,200	9.0	7.2
21 - 30	-	-		-	-	
Toal 0 - 30	3,355,400	84.3	67.1	359,200	9.0	7.2
31 - 99	687,200			22,500		

Slope %	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
0 - 3	3,500	-		3,500	1.0	
4 - 7	36,500	7.3		-	-	
Total 0 - 7	40,000	3.5	1.0	3,500	-	-
8 - 12	138,500	5.8		82,800	3.5	
Total 0 - 12	178,500	5.1	3.6	86,300	2.4	1.7
13 - 20	-	-		-	-	
Total 0 - 20	178,500	4.5	3.6	86,300	2.2	1.7
21 - 30	-	-		-	-	
Total 0 - 30	178,500	4.5	3.6	86,300	2.2	1.7
31 - 99	8,900			573,000		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	650,900		10.4
4 - 7	497,600		8.6
Total 0 - 7	1,148,500	23.0	9.7
8 - 12	2,371,500		21.0
Total 0 - 12	3,520,000	70.4	15.2
13 - 20	459,400		7.8
Total 0 - 20	3,979,400	79.6	13.7
21 - 30	-	-	-
Total 0 - 30	3,979,400	79.6	13.4
31 - 99	1,291,600		

TABLE B83. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Slight (SL)	123,600	99.0		700	1.0	
Moderate (MD)	50,900	54.6		40,000	42.9	
SL + MD	174,500	80.2		40,700	18.7	
Severe (SV)	243,200	92.3		200	-	
SL + MD + SV	417,700	86.9		40,900	8.5	
Very Severe (VS)	3,624,900	75.7		340,800	7.1	

Limitation	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		-	-	
Moderate (MD)	2,300	2.5		-	-	
SL + MD	2,300	1.1		-	-	
Severe (SV)	20,000	7.6		-	-	
SL + MD + SV	22,300	4.6		-	-	
Very Severe (VS)	165,100	3.4		659,300	13.8	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	124,300	2.4	12.3
Moderate (MD)	93,200	1.8	3.2
SL + MD	217,500	4.2	5.5
Severe (SV)	263,400	5.0	4.5
SL + MD + SV	480,900	9.1	4.9
Very Severe (VS)	4,790,100	90.9	12.1
Nonclassified (NC)			
NC + VS	4,790,100	90.9	12.1

TABLE B84. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	LAKE COUNTY	% Basin Class	% Basin Soils	HARNEY COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105	556,800	98.0	10.5	11,400	2.0	-
Over 90	556,800	98.0	10.5	11,400	2.0	-
75 - 90	1,799,900	78.9	34.1	355,900	15.6	6.8
Over 75	2,356,700	86.5	44.7	367,300	13.5	7.0
60 - 75	402,100	100.0	7.6	500	-	-
Over 60	2,758,800	100.0	52.3	-	-	-
45 - 60	159,400	100.0	3.0	-	-	-
Over 45	2,918,200	100.0	55.4	-	-	-
30 - 45	594,400	52.3	11.3	-	-	-
Over 30	3,512,600	86.6	66.6	-	-	-
0 - 30	530,000	73.3	10.0	-	-	-

Days	DESCHUTES COUNTY	% Basin Class	% Basin Soils	KLAMATH COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195						
165 - 180						
150 - 165						
Over 150	-	-	-	-	-	-
135 - 150						
120 - 135						
105 - 120						
Over 105	-	-	-	-	-	-
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90	125,700	5.5	2.4	-	-	-
Over 75	125,700			-	-	-
60 - 75	-	-	-	-	-	-
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45				541,600	47.7	10.3
Over 30	-	-	-	541,600	13.4	10.3
0 - 30	61,700	8.5	1.2	117,700	16.3	2.2

TABLE B84. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120			
Over 105	-	-	-
90 - 105	568,200	10.8	10.0
Over 90	568,200	10.8	2.5
75 - 90	2,281,500	43.3	16.2
Over 75	2,724,000	51.7	7.4
60 - 75	402,600	7.6	16.4
Over 60	2,758,800	52.3	7.0
45 - 60	159,400	3.0	8.2
Over 45	2,918,200	55.4	7.1
30 - 45	1,136,000	21.6	34.7
Over 30	4,054,200	76.9	9.1
0 - 30	723,300	13.7	14.4

DRAINAGE BASIN #14 - KLAMATH RIVER DRAINAGE BASIN

3,476,800 acres

3,476,800 acres classified (100%)

TABLE B85. MAJOR LAND USE (in acres)

Major Land Use	KLAMATH COUNTY	% Basin Soils	% State Class
Cultivated (C)	169,100	4.9	2.6
Pasture (P)	267,000	7.7	8.8
C + P	436,100	12.6	4.6
Forests (F)	2,321,000	66.8	14.7
Range (R)	567,700	16.3	2.5
F + R	2,888,700	83.1	7.6
Hay (H)	-	-	-
C + P + H	436,100	12.6	4.6
Water Shed	152,000	4.4	8.6
P + R	834,700	24.0	3.3

TABLE B86. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	KLAMATH COUNTY	% Basin Soils	% State Class
Excellent (E)	42,400	1.2	3.1
Good (G)	139,700	4.0	3.3
E + G	182,100	5.2	3.2
Fair (F)	741,800	21.3	11.7
E + G + F	923,900	26.6	7.7
Poor (P)	52,000	1.5	1.1
E + G + F + P	975,900	28.1	5.8
Nonirrigable (N)	2,500,900	71.9	-
N + [N]			[5.6]

TABLE B87. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	KLAMATH COUNTY	% Basin Soils	% State Class
I	-	-	-
IIe	28,400	1.0	2.8
IIw	-	-	-
IIe + IIw	28,400	1.0	1.4
IIs	-	-	-
IIc	21,700	1.0	2.5
Total II	50,100	1.4	1.6
I + IIe + IIw	28,400	1.0	1.3
Total I + II	50,100	1.4	1.5
IIIe	46,400	1.3	1.6
IIIw	63,700	1.8	10.8
IIIe + IIIw	110,100	3.2	3.2
IIIs	61,000	1.8	4.1
IIIc	6,600	-	-
Total III	177,700	5.1	2.6
I + IIe + IIw + IIIe + IIIw	138,500	4.0	2.5
Total I+II+III	227,800	6.6	2.2
IVe	45,700	1.3	2.0
IVw	207,600	6.0	25.1
IVe + IVw	253,300	7.3	8.0
IVs	5,500	-	-
IVc	19,400	-	-
Total IV	278,200	8.0	2.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw	391,800	11.3	4.4
Total I+II+III+IV	506,000	14.6	2.2
VIe	933,800	26.8	21.7
VIw	260,800	7.5	67.1
VIs	-	-	-
VIc	497,400	14.3	22.0
Total VI	1,692,000	48.7	12.8
VIIe	700,700	20.2	11.1
VIIw	-	-	-
VIIs	578,100	16.6	9.1
VIIc	-	-	-
Total VII	1,278,800	36.8	10.0

TABLE B88. AVERAGE ELEVATION (by hundreds of feet)

Elevation	KLAMATH COUNTY	% Basin Soils	% State Class
0 - 39	-	-	-
39 - 42	96,100	2.8	1.9
Total 0 - 42	96,100	2.8	-
42 - 45	496,400	14.3	9.6
Total 0 - 45	592,500	17.0	1.8
45 - 48	345,200	9.9	4.7
Total 0 - 48	937,700	26.9	2.4
48 - 51	252,700	7.3	6.6
Total 0 - 51	1,190,400	34.2	2.7
51 - 54	1,646,800	47.4	40.2
Total 0 - 54	2,837,200	81.6	6.0
54 - 57	603,100	17.3	43.8
57 - 60			
Total 0 - 60	3,440,300		

TABLE B89. SLOPE OF SOIL (acres by percent slope)

Slope %	KLAMATH COUNTY	% Basin Soils	% State Class
0 - 3	674,600	22.5	10.8
4 - 7	501,100	16.7	8.7
Total 0 - 7	1,175,700	39.2	9.9
8 - 12	-	-	-
Total 0 - 12	1,175,700	39.2	5.1
13 - 20	27,900	1.0	-
Total 0 - 20	1,203,600	40.1	4.1
21 - 30	530,500	17.7	85.0
Total 0 - 30	1,734,100	57.8	5.8
31 - 99	1,742,700		

TABLE B90. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	KLAMATH COUNTY	% Basin Soils	% State Class
Slight (SL)	64,400	1.8	6.4
Moderate (MD)	151,900	4.4	5.2
SL + MD	216,300	6.2	5.5
Severe (SV)	148,400	4.3	2.6
SL + MD + SV	364,700	10.5	3.7
Very Severe (VS)	3,112,100	89.5	7.8
Nonclassified (NC)	-	-	-
NC + VS	3,112,100	89.5	7.8

TABLE B91. AVERAGE FROST FREE PERIOD (32°F, by days)

Days	KLAMATH COUNTY	% Basin Soils	% State Class
Over 210	-	-	-
195 - 210			
180 - 195			
165 - 180			
150 - 165			
Over 150	-	-	-
135 - 150			
120 - 135			
105 - 120	154,200	4.4	12.4
Over 105	154,200	4.4	1.0
90 - 105	400,000	11.5	7.1
Over 90	554,200	15.9	2.4
75 - 90	-	-	-
Over 75	554,200	15.9	1.5
60 - 75	13,400	-	-
Over 60	567,600	16.3	1.4
45 - 60	1,100	-	-
Over 45	568,700	16.4	1.4
30 - 45	1,140,000	32.8	34.8
Over 30	1,708,700	49.1	3.8
0 - 30	1,768,100	50.9	35.2

DRAINAGE BASIN #15 - ROGUE RIVER DRAINAGE BASIN

3,000,000 acres 2,589,000 acres classified (86.3%)

TABLE B92. MAJOR LAND USE (in acres)

Major Land Use	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	300	-		33,100	47.9	
Pasture (P)	1,500	-		72,300	21.2	
C + P	1,800	-		105,400	25.7	
Forests (F)	7,000	-		873,500	40.6	
Range (R)	-	-		-	-	
F + R	7,000	-		873,500		
Hay (H)	-	-		-	-	
C + P + H	1,500	-		105,400	25.7	
Water Shed	-	-		-	-	
P + R	1,500	-		72,300	19.9	

Major Land Use	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	35,700	51.7		-	-	
Pasture (P)	267,400	78.4		-	-	
C + P	303,100	73.9		-	-	
Forests (F)	1,208,700	56.2		51,100	2.4	
Range (R)	22,100	100.0		-	-	
F + R	1,230,800			51,100		
Hay (H)	-	-		-	-	
C + P + H	303,100			-	-	
Water Shed	3,000	46.9		-	-	
P + R	289,500	80.1		-	-	

Major Land Use	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	-	-		69,100	2.3	1.1
Pasture (P)	-	-		341,200	11.4	11.2
C + P	-	-		410,300	13.7	4.3
Forests (F)	9,900	-		2,150,200	71.7	13.6
Range (R)	-	-		22,100	1.0	-
F + R	9,900	-		2,172,300	72.4	5.7
Hay (H)	-	-		-	-	-
C + P + H	-	-		410,300	13.7	4.3
Water Shed	3,400	53.1		6,400	-	-
P + R	-	-		363,300	12.1	1.4

TABLE B93. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
Excellent (E)	300	1.0		20,900	51.6	
Good (G)	-	-		34,400	59.8	
E + G	300	-		55,300	56.4	
Fair (F)	1,400	1.0		38,000	15.2	
E + G + F	1,700	-		93,300	26.8	
Poor (P)	-	-		12,100	9.5	
E + G + F + P	1,700	-		105,400	22.1	
Nonirrigable (N)	7,100	-		873,500	41.3	

Suitability Class	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Excellent (E)	19,300	47.6		-	-	
Good (G)	23,100	40.2		-	-	
E + G	42,400	43.4		-	-	
Fair (F)	197,300	78.8		9,900	4.0	
E + G + F	239,700	68.8		9,900	2.8	
Poor (P)	111,100	86.9		2,500	2.0	
E + G + F + P	350,800	73.6		12,400	2.6	
Nonirrigable (N)	1,186,100	56.1		38,700	1.8	

Suitability Class	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	-	-		40,500	1.4	2.9
Good (G)	-	-		57,500	1.9	1.3
E + G	-	-		98,000	3.3	1.7
Fair (F)	3,800	1.5		250,400	8.3	4.0
E + G + F	3,800	1.1		348,400	11.6	2.9
Poor (P)	2,200	1.7		127,900	4.3	2.7
E + G + F + P	6,000	1.2		476,300	15.9	2.8
Nonirrigable (N)	7,300	-		2,112,700		
N + [N]				[2,523,700]	[84.1]	[5.6]

TABLE B94. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
I	-	-		7,300	45.4	
IIe	300	1.5		13,600	50.2	
IIw	300	7.0		-	-	
IIe + IIw	600			13,600	43.3	
IIs	-	-		5,400	35.1	
IIc	-	-		-	-	
Total II	600	1.3		19,000	40.7	
I + IIe + IIw	600	1.5		20,900	44.0	
Total I + II	600	1.1		26,300	41.9	
IIIe	-	-		6,800	8.7	
IIIw	-	-		1,000	76.0	
IIIe + IIIw	-	-		7,800	9.8	
IIIs	-	-		34,600	85.2	
IIIc	-	-		-	-	
Total III	-	-		42,400	35.2	
I + IIe + IIw + IIIe + IIIw	600	-		28,700	22.6	
Total I+II+III	600	-		68,700	37.5	
IVe	-	-		-	-	
IVw	1,100	2.2		2,200	4.4	
IVe + IVw	1,100	1.2		2,200	2.4	
IVs	-	-		30,700	56.5	
IVc	-	-		-	-	
Total IV	1,100	1.0		32,900	22.8	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	1,700	1.0		30,900	14.2	
Total I+II+III+IV	1,700	-		101,600	31.0	
VIe	-	-		142,500	24.0	
VIw	-	-		-	-	
VIs	-	-		3,800	100.0	
VIc	-	-		-	-	
Total VI	-	-		146,300	22.0	
VIIe	6,600	-		720,100	46.9	
VIIw	-	-		-	-	
VIIs	500	-		10,900	17.5	
VIIc	-	-		-	-	
Total VII	7,100	1.0		731,000	45.8	

TABLE B94. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
I	8,800	54.6		-	-	
IIe	13,100	48.3		-	-	
IIw	4,000	93.0		-	-	
IIe + IIw	17,100	56.7		-	-	
IIs	10,000	64.9		-	-	
IIc	-	-		-	-	
Total II	27,100	58.0		-	-	
I + IIe + IIw	25,900	54.5		-	-	
Total I + II	35,900	57.2		-	-	
IIIe	71,600	91.3		-	-	
IIIw	300	23.1		-	-	
IIIe + IIIw	71,900	90.2		-	-	
IIIs	6,000	14.8		-	-	
IIIc	-	-		-	-	
Total III	77,900	64.8		-	-	
I + IIe + IIw + IIIe + IIIw	97,800	76.9		-	-	
Total I+II+III	113,800	62.2		-	-	
IVe	40,000	100.0		-	-	
IVw	47,000	93.4		-	-	
IVe + IVw	87,000	96.3		-	-	
IVs	23,600	43.5		-	-	
IVc	-	-		-	-	
Total IV	110,600	76.5		-	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	184,800	85.0		-	-	
Total I+II+III+IV	224,400	68.5		-	-	
VIe	406,500	68.5		37,400	6.3	
VIw	55,900	83.3		9,900	14.8	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	462,400	69.6		47,300	7.1	
VIIe	802,600	52.3		3,800	-	
VIIw	-	-		-	-	
VIIs	47,500	76.2		-	-	
VIIc	-	-		-	-	
Total VII	850,100	53.2		3,800	-	

TABLE B94. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-		16,100	-	8.4
IIe	-	-		27,100	1.0	2.6
IIw	-	-		4,300	-	-
IIe + IIw	-	-		31,400	1.0	1.6
IIs	-	-		15,400	-	5.9
IIc	-	-		-	-	-
Total II	-	-		46,700	1.6	1.5
I + IIe + IIw	-	-		47,500	1.6	2.2
Total I + II	-	-		62,800	2.1	1.9
IIIe	-	-		78,400	2.6	2.7
IIIw	-	-		1,300	-	-
IIIe + IIIw	-	-		79,700	2.6	2.3
IIIs	-	-		40,600	1.4	2.7
IIIc	-	-		-	-	-
Total III	-	-		120,300	4.0	1.7
I + IIe + IIw + IIIe + IIIw	-	-		127,200	4.2	2.3
Total I+II+III	-	-		183,100	6.1	1.8
IVe	-	-		40,000	1.4	1.7
IVw	-	-		50,300	1.7	6.1
IVe + IVw	-	-		90,300	3.0	2.8
IVs	-	-		54,300	1.8	1.0
IVc	-	-		-	-	-
Total IV	-	-		144,600	4.8	1.1
I+IIe+IIw+IIIe + IIIw+IVe+IVw	-	-		217,500	7.2	2.5
Total I+II+III+IV	-	-		327,700	10.9	1.4
VIe	6,700	1.1		593,100	19.8	13.8
VIw	1,300	1.9		67,100	2.2	17.2
VIs	-	-		3,800	-	-
VIc	-	-		-	-	-
Total VI	8,000	1.2		664,000	22.1	5.0
VIIe	1,900	-		1,535,000	51.2	24.3
VIIw	-	-		-	-	-
VIIs	3,400	5.4		62,300	2.1	1.0
VIIc	-	-		-	-	-
Total VII	5,300	1.0		1,597,300	53.2	12.5

TABLE B95. AVERAGE ELEVATION (by hundreds of feet)

Elevation	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
0 - 3	300	100.0		-	-	
3 - 6	1,900	4.0		18,500	39.1	
6 - 9	-	-		-	-	
Total 0 - 9	2,200	2.3	-	18,500	19.4	1.0
9 - 12	-	-		-	-	
Total 0 - 12	2,200	2.1	-	18,500	17.4	1.0
12 - 15	6,200	7.4		29,300	35.2	
Total 0 - 15	8,400	4.4	-	47,800	25.2	1.6
15 - 18	-	-		68,500	71.7	
Total 0 - 18	8,400	2.9	-	116,300	40.8	3.9
18 - 21	-	-		-	-	
21 - 24	-	-		497,300	65.5	
Total 0 - 24	8,400	1.0	-	613,600	48.8	20.4
24 - 27	-	-		-	-	
27 - 30	400	-		-	-	
Total 0 - 30	8,800		-	613,600	43.5	20.4
30 - 33				-	-	-
33 - 36				-	-	-
Total 0 - 36	-	-	-	613,600	40.9	20.4
36 - 39				222,800	66.0	
Total 0 - 39	-	-	-	836,400	45.5	27.9
39 - 42				-	-	
Total 0 - 42	-	-	-	836,400	45.0	27.9
42 - 45				142,500	24.9	4.8
Total 0 - 45	-	-	-	978,900		
45 - 48						
Total 0 - 48	-	-	-	-	-	-
48 - 51						
Total 0 - 51	-	-	-	-	-	-
51 - 54						
Total 0 - 54	-	-	-	-	-	-
54 - 57						
57 - 60						
Total 0 - 60	-	-	-	-	-	-

TABLE B95. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
0 - 3	-	-	-	-	-	-
3 - 6	26,900	56.9				
6 - 9	47,600	100.0				
Total 0 - 9	74,500	78.2	2.5	-	-	-
9 - 12	11,200	-				
Total 0 - 12	85,700	80.5	2.8	-	-	-
12 - 15	47,700	57.3				
Total 0 - 15	133,400	70.4	4.4	-	-	-
15 - 18	27,000	28.3				
Total 0 - 18	160,400	57.3	5.3	-	-	-
18 - 21	213,000	100.0				
21 - 24	261,700	34.5				
Total 0 - 24	635,100	50.5	21.2	-	-	-
24 - 27	-	-	-			
27 - 30	118,800	77.6		33,900	22.4	
Total 0 - 30	753,900	53.5	25.1	33,900	2.4	1.1
30 - 33	-	-		-	-	
33 - 36	90,400	100.0		-	-	
Total 0 - 36	844,300	56.3	28.1	33,900	2.2	1.1
36 - 39	114,700	34.0		-	-	
Total 0 - 39	959,000	52.2	32.0	33,900	1.8	1.1
39 - 42	22,100	100.0		-	-	
Total 0 - 42	981,100	52.7		33,900	1.8	1.1
42 - 45	420,800	73.4		5,200	1.0	
Total 0 - 45	1,401,900	57.6	46.7	39,100	1.6	1.3
45 - 48	3,000	46.9		-	-	
Total 0 - 48	1,404,900	57.6	46.8	39,100	1.6	1.3
48 - 51	-	-		-	-	
Total 0 - 51	1,404,900	57.6	46.8	39,100	1.6	1.3
51 - 54	74,300	83.9		12,000	13.5	
Total 0 - 54	1,479,200	58.5	49.3	51,100		
54 - 57	56,200	96.7	1.9			
57 - 60	1,500	60.0				
Total 0 - 60	1,536,900		51.2			

TABLE B95. AVERAGE ELEVATION (by hundreds of feet) Cont.

Elevation	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	-	-	-	300	-	-
3 - 6				47,300	1.6	3.4
6 - 9				47,600	1.6	2.3
Total 0 - 9	-	-	-	95,200	3.2	1.9
9 - 12				11,200	-	1.3
Total 0 - 12	-	-	-	106,400	3.5	1.8
12 - 15				83,200	2.8	8.4
Total 0 - 15	-	-	-	189,600	6.3	2.8
15 - 18				95,500	3.2	4.8
Total 0 - 18	-	-	-	285,100	9.5	3.2
18 - 21				213,000	7.1	17.5
21 - 24				759,000	25.3	32.8
Total 0 - 24	-	-	-	1,257,100	41.9	10.2
24 - 27				-	-	-
27 - 30				153,100	5.1	9.9
Total 0 - 30	-	-	-	1,410,200	47.0	9.0
30 - 33				-	-	-
33 - 36				90,400	3.0	5.6
Total 0 - 36	-	-	-	1,500,600	50.0	7.8
36 - 39				337,500	11.2	11.3
Total 0 - 39	-	-	-	1,838,100	61.3	8.3
39 - 42				22,100	1.0	-
Total 0 - 42	-	-	-	1,860,200	32.7	6.8
42 - 45	4,700	1.0		573,200	19.1	11.0
Total 0 - 45	4,700	-	-	2,433,400	81.1	7.5
45 - 48	3,400	53.1		6,400	-	-
Total 0 - 48	8,100	-	-	2,439,800	81.3	6.1
48 - 51	-	-	-	-	-	-
Total 0 - 51	8,100	-	-	2,439,800	81.3	5.6
51 - 54	2,300	2.6		88,600	3.0	2.2
Total 0 - 54	10,400	-	-	2,528,400	84.3	5.3
54 - 57	1,900	3.3	-	58,100	1.9	
57 - 60	1,000	40.0		2,500	-	-
Total 0 - 60	13,300			2,589,000	86.3	5.2

TABLE B96. SLOPE OF SOIL (acres by percent slope)

Slope %	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
0 - 3	1,900	1.2		54,500	34.6	
4 - 7	-	-		20,700	16.4	
Total 0 - 7	1,900	1.0	-	75,200	26.5	2.5
8 - 12	300	-		35,000	31.4	
Total 0 - 12	2,200	1.0	-	110,200	27.9	3.7
13 - 20	-	-		6,100	5.8	
Total 0 - 20	2,200	-	-	116,300	23.3	3.9
21 - 30	-	-		-	-	
Total 0 - 30	2,200	-	-	116,300	23.3	3.9
31 - 99	6,600			862,600		

Slope %	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
0 - 3	101,000	64.2		-	-	
4 - 7	91,700	72.7		9,900	7.8	
Total 0 - 7	192,700	68.0	6.4	9,900	3.5	-
8 - 12	76,000	68.3		-	-	
Total 0 - 12	268,700	68.0	9.0	9,900	2.5	-
13 - 20	90,300	86.0		3,500	3.3	
Total 0 - 20	359,000	71.8	12.0	13,400	2.7	-
21 - 30	-	-		-	-	
Total 0 - 30	359,000	71.8	12.0	13,400	2.7	-
31 - 99	1,177,900			37,700		

Slope %	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	-	-		157,400		2.5
4 - 7	3,800	3.0		126,100		2.2
Total 0 - 7	3,800	1.3	-	283,500	9.4	2.4
8 - 12	-	-		111,300		1.0
Total 0 - 12	3,800	1.0	-	394,800	13.2	1.7
13 - 20	5,100	4.8		105,000		1.8
Total 0 - 20	8,900	1.8	-	499,800	16.7	1.7
21 - 30	-	-		-	-	-
Total 0 - 30	8,900	1.8	-	499,800	16.7	1.7
31 - 99	4,400			2,089,200		

TABLE B97. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
Slight (SL)	-	-		20,400	69.9	
Moderate (MD)	-	-		3,800	5.4	
SL + MD	-	-		24,200	24.2	
Severe (SV)	300	-		25,400	7.0	
SL + MD + SV	300	-		49,600	10.7	
Very Severe (VS)	8,500	-		929,300	43.7	

Limitation	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Slight (SL)	8,800	30.1		-	-	
Moderate (MD)	55,900	78.8		9,900	14.0	
SL + MD	64,700	64.6		9,900	9.9	
Severe (SV)	312,100	85.8		24,700	6.8	
SL + MD + SV	376,800	81.3		34,600	7.5	
Very Severe (VS)	1,160,100	54.6		16,500	1.0	

Limitation	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-		29,200	1.0	2.9
Moderate (MD)	1,300	1.8		70,900	2.4	2.4
SL + MD	1,300	1.3		100,100	3.3	2.5
Severe (SV)	1,000	-		363,500	12.1	6.3
SL + MD + SV	2,300	-		463,600	15.4	4.8
Very Severe (VS)	11,000	1.0		2,125,400	70.8	5.4
Nonclassified (NC)				411,000		
NC + VS				2,536,400	84.5	4.9

TABLE B98. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	CURRY COUNTY	% Basin Class	% Basin Soils	JOSEPHINE COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210	6,600	100.0	-	-	-	-
180 - 195	1,700	2.0	-	7,600	9.2	-
165 - 180	500	-	-	75,200	29.8	2.5
150 - 165	-	-	-	33,400	21.4	1.1
Over 150	8,800	1.8	-	116,300	23.3	3.9
135 - 150				497,300	65.5	16.6
120 - 135				-	-	-
105 - 120				222,800	66.0	7.4
Over 105	-	-	-	836,400		
90 - 105				-	-	-
Over 90	-	-	-	836,400		
75 - 90				142,500	31.8	4.6
Over 75	-	-	-	978,900		
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	JACKSON COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Over 210	-	-	-	-	-	-
195 - 210						
180 - 195	73,600	88.8	2.4			
165 - 180	176,800	70.0	5.9			
150 - 165	123,000	78.6	4.1			
Over 150	373,400	74.9	12.4	-	-	-
135 - 150	261,700	34.5	8.7			
120 - 135	-	-	-			
105 - 120	114,700	34.0	3.8			
Over 105	749,800			-	-	-
90 - 105	90,400	100.0	3.0			
Over 90	840,200			-	-	-
75 - 90	271,400	60.6	9.0	33,900	7.6	1.1
Over 75	1,111,600		37.0	33,900		
60 - 75	22,100	100.0	1.0			
Over 60	1,133,700		37.8	33,900		
45 - 60	-	-	-			
Over 45	1,133,700		37.8	33,900		
30 - 45	324,400	96.5	10.8	5,200	1.5	-
Over 30	1,458,100		48.6	39,100		
0 - 30	78,800	80.8	2.6	12,000	12.3	-

TABLE B98. AVERAGE FROST-FREE PERIOD (32°F, by days) Cont.

Days	KLAMATH COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	-	-	-	-	-	-
195 - 210				6,600	-	1.8
180 - 195				82,900	2.8	1.4
165 - 180				252,500	8.4	17.2
150 - 165				156,500	5.2	6.9
Over 150	-	-	-	498,500	16.6	4.9
135 - 150				759,000	25.3	34.2
120 - 135				-	-	-
105 - 120				337,500	11.2	27.0
Over 105	-	-	-	1,595,000	53.2	9.3
90 - 105				90,400	3.0	1.6
Over 90	-	-	-	1,685,400	56.2	7.4
75 - 90				447,800	14.9	3.2
Over 75	-	-	-	2,133,200	71.1	5.8
60 - 75				22,100	1.0	1.0
Over 60	-	-	-	2,155,300	71.8	5.5
45 - 60				-	-	-
Over 45	-	-	-	2,155,300	71.8	5.2
30 - 45	6,600	2.0	-	336,200	11.2	10.2
Over 30	6,600			2,491,500	83.0	5.6
0 - 30	6,700	6.9	-	97,500	3.2	1.9

DRAINAGE BASIN #16 - UMPQUA RIVER DRAINAGE BASIN

3,600,000 acres 1,173,400 acres classified (32.6%)

TABLE B99. MAJOR LAND USE (in acres)

Major Land Use	DOUGLAS COUNTY	% Basin Soils	% State Class
Cultivated (C)	178,500	5.0	2.8
Pasture (P)	266,100	7.4	8.8
C + P	444,600	12.4	4.7
Forests (F)	728,800	20.2	4.6
Range (F)	-	-	-
F + R	728,800	20.2	1.9
Hay (H)	-	-	-
C + P + H	444,600	12.4	4.7
Water Shed	-	-	-
P + R	266,100	7.4	1.0

TABLE B100. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	DOUGLAS COUNTY	% Basin Soils	% State Class
Excellent (E)	34,700	1.0	2.5
Good (G)	69,700	1.9	1.6
E + G	104,400	2.9	1.8
Fair (F)	58,400	1.6	1.0
E + G + F	162,800	4.5	1.4
Poor (P)	107,200	3.0	2.3
E + G + F + P	270,000	7.5	1.6
Nonirrigable (N)	903,400		
N + [N]	[3,330,000]	[92.5]	[7.4]

TABLE B101. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	DOUGLAS COUNTY	% Basin Soils	% State Class
I	-	-	-
IIe	10,900	-	1.0
IIw	41,700	1.2	4.4
IIe + IIw	52,600	1.5	2.6
IIs	2,200	-	-
IIc	-	-	-
Total II	54,800	1.5	1.8
I + IIe + IIw	52,600	1.5	2.4
Total I + II	54,800	1.5	1.6
IIIe	72,700	2.0	2.5
IIIw	29,000	1.0	4.9
IIIe + IIIw	101,700	2.8	2.9
IIIs	32,300	1.0	2.2
IIIc	-	-	-
Total III	134,000	3.7	1.9
I + IIe + IIw + IIIe + IIIw	154,300	4.3	2.7
Total I+II+III	188,800	5.2	1.8
IVe	112,500	3.1	4.8
IVw	46,600	1.3	5.6
IVe + IVw	159,100	4.4	5.0
IVs	4,200	-	-
IVc	-	-	-
Total IV	163,300	4.5	1.2
I+IIe+IIw+IIIe + IIIw+IVe+IVw	313,400	8.7	3.6
Total I+II+III+IV	352,100	9.8	1.5
VIe	108,400	3.0	2.5
VIw	-	-	-
VIs	3,700	-	-
VIc	-	-	-
Total VI	112,100	3.1	1.0
VIIe	709,200	19.7	11.2
VIIw	-	-	-
VIIs	-	-	-
VIIc	-	-	-
Total VII	709,200	19.7	5.6

TABLE B102. AVERAGE ELEVATION (by hundreds of feet)

Elevation	DOUGLAS COUNTY	% Basin Soils	% State Class
0 - 3	61,300	1.7	4.0
3 - 6	161,900	4.5	11.8
6 - 9	63,100	1.8	3.1
Total 0 - 9	286,300	8.0	5.8
9 - 12	418,700	11.6	47.8
Total 0 - 12	705,000	19.6	12.1
12 - 15	2,800	-	-
Total 0 - 15	707,800	19.7	10.1
15 - 18	121,800	3.4	6.2
Total 0 - 18	829,600	23.1	9.4
18 - 21	54,900	1.5	4.5
21 - 24	283,800	7.9	12.3
Total 0 - 24	1,168,300	32.4	9.5
24 - 27	-	-	-
27 - 30	2,000	-	-
Total 0 - 30	1,170,300	32.5	7.5
30 - 33	-	-	-
33 - 36	-	-	-
Total 0 - 36	1,170,300	32.5	6.1
36 - 39	3,100	-	-
Total 0 - 39	1,173,400		

TABLE B103. SLOPE OF SOIL (acres by percent slope)

Slope %	DOUGLAS COUNTY	% Basin Soils	% State Class
0 - 3	75,500	2.1	1.2
4 - 7	73,200	2.0	1.3
Total 0 - 7	148,700	4.1	1.2
8 - 12	57,000	1.6	1.0
Total 0 - 12	205,700	5.7	1.0
13 - 20	52,100	1.4	1.0
Total 0 - 20	257,800	7.1	1.0
21 - 30	-	-	-
Total 0 - 30	257,800	7.1	1.0
31 - 99	915,600		

TABLE B104. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	DOUGLAS COUNTY	% Basin Soils	% State Class
Slight (SL)	10,600	-	1.0
Moderate (MD)	7,900	-	-
SL + MD	18,500	1.0	-
Severe (SV)	224,200	6.2	3.9
SL + MD + SV	242,700	6.7	2.5
Very Severe (VS)	930,700	25.8	2.3
Nonclassified (NC)	2,426,600		
NC + VS	3,357,300	93.2	6.5

TABLE B105. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	DOUGLAS COUNTY	% Basin Soils	% State Class
Over 210	1,700	-	10.8
195 - 210	181,400	5.0	48.2
180 - 195	558,900	15.5	9.4
165 - 180	112,000	3.1	7.6
150 - 165	30,200	1.0	1.3
Over 150	884,200	24.6	8.8
135 - 150	283,800	7.9	12.8
120 - 135	2,300	-	-
105 - 120	3,100	-	-
Over 105	1,173,400		
90 - 105			
Over 90	-	-	-
75 - 90			
Over 75	-	-	-
60 - 75			
Over 60	-	-	-
45 - 60			
Over 45	-	-	-
30 - 45			
Over 30	-	-	-
0 - 30			

DRAINAGE BASIN #17 - SOUTH COAST DRAINAGE BASIN

1,910,400 acres 195,500 acres classified (10.2%)

TABLE B106. MAJOR LAND USE (in acres)

Major Land Use	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	27,600	41.6		34,900	52.6	
Pasture (P)	7,400	9.6		66,400	85.8	
C + P	35,000	24.4		101,300	70.5	
Forests (F)	13,000	25.1		33,100	63.9	
Range (R)	-	-		-	-	
F + R	13,000	25.1		33,100	63.9	
Hay (H)	-	-		-	-	
C + P + H	35,000	24.4		101,300	70.5	
Water Shed	-	-		-	-	
P + R	7,400	9.6		66,400	85.8	

Major Land Use	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	3,800	5.7		66,300	3.5	1.0
Pasture (P)	3,600	4.6		77,400	4.0	2.6
C + P	7,400	5.1		143,700	7.5	1.5
Forests (F)	5,700	11.0		51,800	2.7	-
Range (R)	-	-		-	-	-
F + R	5,700	11.0		51,800	2.7	-
Hay (H)	-	-		-	-	-
C + P + H	7,400	5.1		143,700	7.5	1.5
Water Shed	-	-		-	-	-
P + R	3,600	4.6		77,400	4.0	-

TABLE B107. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
Excellent (E)	10,500	46.3		11,900	52.4	
Good (G)	7,200	26.2		15,900	57.6	
E + G	17,700	1.0		27,800	1.4	
Fair (F)	18,000	22.9		55,300	70.3	
E + G + F	35,700	27.7		83,100	64.4	
Poor (P)	6,500	20.4		25,000	78.4	
E + G + F ÷ P	42,200	26.2		108,100	67.2	
Nonirrigable (N)	5,800	16.8		26,300	76.0	

Suitability Class	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	300	1.3		22,700	1.2	1.6
Good (G)	4,500	16.3		27,600	1.4	1.0
E + G	4,800	-		50,300	2.6	1.0
Fair (F)	5,400	6.8		78,700	4.1	1.2
E + G + F	10,200	7.9		129,000	6.8	1.1
Poor (P)	400	1.0		31,900	1.7	1.0
E + G + F + P	10,600	6.6		160,900	8.4	1.0
Nonirrigable (N)	2,500	7.2		34,600	1.8	-
N + [N]				[1,749,500]	[91.6]	[3.9]

TABLE B108. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	13,700	38.0		22,300	61.0	
IIw	4,800	33.1		9,100	62.8	
IIe + IIw	18,500	36.6		31,400	62.2	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	18,500	36.6		31,400	62.2	
I + IIe + IIw	18,500	36.6		31,400	62.2	
Total I + II	18,500	36.6		31,400	62.2	
IIIe	7,100	25.2		16,400	58.2	
IIIw	5,700	23.0		18,500	74.6	
IIIe + IIIw	12,800	24.2		34,900	65.8	
IIIs	-	-		-	-	
IIIc	-	-		-	-	
Total III	12,800	24.2		34,900	65.8	
I + IIe + IIw + IIIe + IIIw	31,300	30.2		66,300	64.0	
Total I+II+III	31,300	30.2		66,300	64.0	
IVe	1,400	31.8		2,300	52.3	
IVw	2,300	6.6		28,300	81.8	
IVe + IVw	3,700	9.5		30,600	78.5	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	3,700	9.5		30,600	78.5	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	35,000	24.6		96,900	68.0	
Total I+II+III+IV	35,000	24.6		96,900	68.0	
VIe	2,800	50.0		2,800	50.0	
VIw	3,500	23.3		11,200	74.7	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	6,300	30.6		14,000	68.0	
VIIe	6,000	19.5		22,500	73.3	
VIIw	-	-		1,000	100.0	
VIIs	700	100.0		-	-	
VIIc	-	-		-	-	
Total VII	6,700	20.7		23,500	72.5	

TABLE B108. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-		-	-	-
IIe	-	-		36,000	1.9	3.5
IIw	600	4.1		14,500	1.0	1.5
IIe + IIw	600	1.2		50,500	2.6	2.5
IIs	-	-		-	-	-
IIc	-	-		-	-	-
Total II	600	1.2		50,500	2.6	1.6
I + IIe + IIw	600	1.2		50,500	2.6	2.3
Total I + II	600	1.2		50,500	2.6	1.5
IIIe	4,700	16.7		28,200	1.5	1.0
IIIw	600	2.4		24,800	1.3	4.2
IIIe + IIIw	5,300	10.0		53,000	2.8	1.5
IIIs	-	-		-	-	-
IIIc	-	-		-	-	-
Total III	5,300	10.0		53,000	2.8	1.0
I + IIe + IIw + IIIe + IIIw	5,900	5.7		103,500	5.4	1.8
Total I+II+III	5,900	5.7		103,500	5.4	1.0
IVe	700	15.9		4,400	-	-
IVw	4,000	11.6		34,600	1.8	4.2
IVe + IVw	4,700	12.0		39,000	2.0	1.2
IVs	-	-		-	-	-
IVc	-	-		-	-	-
Total IV	4,700	12.0		39,000	2.0	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	10,600	7.4		142,500	7.4	1.6
Total I+II+III+IV	10,600	7.4		142,500	7.4	1.0
VIe	-	-		5,600	-	-
VIw	300	2.0		15,000	1.0	3.8
VIs	-	-		-	-	-
VIc	-	-		-	-	-
Total VI	300	1.4		20,600	1.1	-
VIIe	2,200	7.2		30,700	1.6	-
VIIw	-	-		1,000	-	10.7
VIIs	-	-		700	-	-
VIIc	-	-		-	-	-
Total VII	2,200	6.8		32,400	1.7	-

TABLE B109. AVERAGE ELEVATION (by hundreds of feet)

Elevation	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
0 - 3	34,800	28.9		83,100	69.0	
3 - 6	11,600	26.0		33,100	74.0	
6 - 9	-	-		-	-	
Total 0 - 9	46,400	27.6	2.4	116,200	69.1	6.1
9 - 12	-	-		-	-	
Total 0 - 12	46,400	27.6	2.4	116,200	69.1	6.1
12 - 15	200	40.0		300	60.0	
Total 0 - 15	46,600	27.6	2.4	116,500	69.1	6.1
15 - 18	-	-		-	-	
Total 0 - 18	46,600	27.6	2.4	116,500	69.1	6.1
18 - 21	1,400	5.2		17,900	66.5	1.0
Total 0 - 21	48,000			134,400		

Elevation	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	2,600	2.2		120,500	6.3	7.9
3 - 6	-	-		44,700	2.3	3.2
6 - 9	2,900	100.0		2,900	-	-
Total 0 - 9	5,500	3.3	-	168,100	8.8	3.4
9 - 12	-	-		-	-	-
Total 0 - 12	5,500	3.3	-	168,100	8.8	2.9
12 - 15	-	-		500	-	-
Total 0 - 12	5,500	3.3	-	168,600	8.8	2.5
15 - 18	-	-		-	-	-
Total 0 - 18	5,500	3.3	-	168,600	8.8	1.9
18 - 21	7,600	28.2		26,900	1.4	2.2
Total 0 - 21	13,100			195,500		

TABLE B110. SLOPE OF SOIL (acres by percent slope)

Slope %	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
0 - 3	23,000	23.5		69,200	70.8	
4 - 7	16,900	58.9		8,500	29.6	
Total 0 - 7	39,900	31.6	2.1	77,700	61.5	4.1
8 - 12	1,500	5.1		26,400	90.1	
Total 0 - 12	41,400	26.6	2.2	104,100	66.8	5.4
13 - 20	1,800	15.2		9,600	81.4	
Total 0 - 20	43,200	25.8	2.3	113,700	67.9	6.0
21 - 30	-	-		-	-	
Total 0 - 30	43,200	25.8	2.3	113,700	67.9	6.0
31 - 99	4,800			20,700		

Slope %	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	5,500	5.6		97,700		1.6
4 - 7	3,300	11.5		28,700		-
Total 0 - 7	8,800	7.0	-	126,400	6.6	1.1
8 - 12	1,400	4.8		29,300		-
Total 0 - 12	10,200	6.6	1.0	155,700	8.2	1.0
13 - 20	400	3.4		11,800		
Total 0 - 20	10,600	6.3	1.0	167,500	8.8	1.0
21 - 30	-	-		-	-	-
Total 0 - 30	10,600	6.3	1.0	167,500	8.8	1.0
31 - 99	2,500			28,000		

TABLE B111. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
Slight (SL)	12,400	51.2		11,800	48.8	
Moderate (MD)	1,200	34.3		2,300	65.7	
SL + MD	13,600	49.1		14,100	50.9	
Severe (SV)	11,100	27.2		29,700	72.8	
SL + MD + SV	24,700	36.0		43,800	64.0	
Very Severe (VS)	23,300	18.3		90,600	71.3	

Limitation	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	-	-		24,200	1.3	2.4
Moderate (MD)	-	-		3,500	-	-
SL + MD	-	-		27,700	1.4	1.0
Severe (SV)	-	-		40,800	2.1	1.0
SL + MD + SV	-	-		68,500	3.6	1.0
Very Severe (VS)	13,100	10.3		127,000	6.6	-
Nonclassified (NC)				1,714,900		
NC + VS				1,841,900	96.4	3.6

TABLE B112. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	CURRY COUNTY	% Basin Class	% Basin Soils	COOS COUNTY	% Basin Class	% Basin Soils
Over 210	200	8.7	-	1,800	78.3	-
195 - 210	200	40.0	-	300	60.0	-
180 - 195	29,300	21.3	1.5	97,500	71.0	5.1
165 - 180	16,900	50.0	1.0	16,900	50.0	1.0
150 - 165	-	-	-	-	-	-
Over 150	46,600	26.8	2.4	116,500	67.0	6.1
135 - 150	-	-	-	-	-	-
120 - 135	1,400	6.5	-	17,900	83.2	1.0
105 - 120	-	-	-	-	-	-
Over 105	48,000			134,400		
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

Days	DOUGLAS COUNTY	% Basin Class	% Basin Soils	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	300	13.0	-	2,300	-	-
195 - 210	-	-	-	500	-	-
180 - 195	10,600	7.7	1.0	137,400	7.2	2.3
165 - 180	-	-	-	33,800	1.8	2.3
150 - 165	-	-	-	-	-	-
Over 150	10,900	6.3	1.0	174,000	9.1	1.7
135 - 150	-	-	-	-	-	-
120 - 135	2,200	10.2	-	21,500	1.1	1.0
105 - 120	-	-	-	-	-	-
Over 105	13,100			195,500		
90 - 105						
Over 90	-	-	-	-	-	-
75 - 90						
Over 75	-	-	-	-	-	-
60 - 75						
Over 60	-	-	-	-	-	-
45 - 60						
Over 45	-	-	-	-	-	-
30 - 45						
Over 30	-	-	-	-	-	-
0 - 30						

DRAINAGE BASIN #18 - MID-COAST DRAINAGE BASIN

1,511,400 acres 129,000 acres classified (8.5%)

TABLE B113. MAJOR LAND USE (in acres)

Major Land Use	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	13,200	41.6		3,500	11.0	
Pasture (P)	30,000	58.8		300	1.0	
C + P	43,200	52.2		3,800	4.6	
Forests (F)	21,000	45.4		-	-	
Range (R)	-	-		-	-	
F + R	21,000	45.4		-	-	
Hay (H)	-	-		-	-	
C + P + H	43,200	52.2		3,800	4.6	
Water Shed	-	-		-	-	
P + R	30,000	58.8		300	1.0	

Major Land Use	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Cultivated (C)	14,300	45.1		700	2.2	
Pasture (P)	17,100	33.5		3,600	7.0	
C + P	31,400	38.0		4,300	5.2	
Forests (F)	11,600	25.1		13,700	29.5	
Range (R)	-	-		-	-	
F + R	11,600	25.1		13,700	29.5	
Hay (H)	-	-		-	-	
C + P + H	31,400	38.0		4,300	5.2	
Water Shed	-	-		-	-	
P + R	17,100	33.5		3,600	7.0	

Major Land Use	TOTAL BASIN CLASS	% Basin Soils	% State Class
Cultivated (C)	31,700	2.1	1.0
Pasture (P)	51,000	3.4	1.7
C + P	82,700	5.5	1.0
Forests (F)	46,300	3.1	-
Range (R)	-	-	-
F + R	46,300	3.1	-
Hay (H)	-	-	-
C + P + H	82,700	5.5	1.0
Water Shed	-	-	-
P + R	51,000	3.4	-

TABLE B114. IRRIGATION SUITABILITY (in acres)

([N] = nonclassified acres)

Suitability Class	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Excellent (E)	15,400	47.1		3,800	11.6	
Good (G)	17,500	80.3		-	-	
E + G	32,900	60.4		3,800	7.0	
Fair (F)	11,600	47.2		-	-	
E + G + F	44,500	56.2		3,800	4.8	
Poor (P)	8,000	37.2		-	-	
E + G + F + P	52,500	52.2		3,800	3.8	
Nonirrigable (N)	11,700	41.2		-	-	

Suitability Class	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Excellent (E)	12,800	39.1		700	2.1	
Good (G)	4,000	18.3		300	1.4	
E + G	16,800	30.8		1,000	1.8	
Fair (F)	5,300	21.5		7,700	31.3	
E + G + F	22,100	27.9		8,700	11.0	
Poor (P)	7,400	34.4		6,100	28.4	
E + G + F + P	29,500	29.3		14,800	14.7	
Nonirrigable (N)	13,500	47.5		3,200	11.3	

Suitability Class	TOTAL BASIN CLASS	% Basin Soils	% State Class
Excellent (E)	32,700	2.2	2.4
Good (G)	21,800	1.4	1.0
E + G	54,500	3.6	1.0
Fair (F)	24,600	1.6	-
E + G + F	79,100	5.2	1.0
Poor (P)	21,500	1.4	-
E + G + F + P	100,600	6.6	1.0
Nonirrigable (N)	28,400	1.9	-
N + [N]	[1,410,800]	[93.3]	[3.1]

TABLE B115. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	7,900	43.9		2,800	15.6	
IIw	6,600	31.4		1,000	4.8	
IIe + IIw	14,500	37.2		3,800	9.7	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	14,500	37.2		3,800	9.7	
I + IIe + IIw	14,500	37.2		3,800	9.7	
Total I + II	14,500	37.2		3,800	9.7	
IIIe	20,600	88.0		-	-	
IIIw	5,600	60.9		-	-	
IIIe + IIIw	26,200	80.4		-	-	
IIIs	-	-		-	-	
IIIc	-	-		-	-	
Total III	26,200	80.4		-	-	
I + IIe + IIw + IIIe + IIIw	40,700	56.8		3,800	5.3	
Total I+II+III	40,700	56.8		3,800	5.3	
IVe	1,200	100.0		-	-	
IVw	10,600	61.6		-	-	
IVe + IVw	11,800	64.1		-	-	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	11,800	64.1		-	-	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	52,500	58.3		3,800	4.2	
Total I+II+III+IV	52,500	58.3		3,800	4.2	
VIe	1,300	7.6		-	-	
VIw	900	100.0		-	-	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	2,200	12.3		-	-	
VIIe	9,100	45.3		-	-	
VIIw	400	40.0		-	-	
VIIs	-	-		-	-	
VIIc	-	-		-	-	
Total VII	9,500	45.0		-	-	

TABLE B115. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
I	-	-		-	-	
IIe	500	2.8		6,800	37.8	
IIw	12,700	60.5		700	3.3	
IIe + IIw	13,200	33.8		7,500	19.2	
IIs	-	-		-	-	
IIc	-	-		-	-	
Total II	13,200	33.8		7,500	19.2	
I + IIe + IIw	13,200	33.8		7,500	19.2	
Total I + II	13,200	33.8		7,500	19.2	
IIIe	300	1.3		2,500	10.7	
IIIw	3,300	35.9		300	3.3	
IIIe + IIIw	3,600	11.0		2,800	8.6	
IIIs	-	-		-	-	
IIIc	-	-		-	-	
Total III	3,600	11.0		2,800	8.6	
I + IIe + IIw + IIIe + IIIw	16,800	23.5		10,300	14.4	
Total I+II+III	16,800	23.5		10,300	14.4	
IVe	-	-		-	-	
IVw	5,500	32.0		1,100	6.4	
IVe + IVw	5,500	29.9		1,100	6.0	
IVs	-	-		-	-	
IVc	-	-		-	-	
Total IV	5,500	29.9		1,100	6.0	
I+IIe+IIw+IIIe + IIIw+IVe+IVw	22,300	24.8		11,400	12.7	
Total I+II+III+IV	22,300	24.8		11,400	12.7	
VIe	11,300	66.5		4,400	25.9	
VIw	-	-		-	-	
VIs	-	-		-	-	
VIc	-	-		-	-	
Total VI	11,300	63.1		4,400	24.6	
VIIe	8,800	43.8		2,200	10.9	
VIIw	600	60.0		-	-	
VIIs	-	-		-	-	
VIIc	-	-		-	-	
Total VII	9,400	44.5		2,200	10.5	

TABLE B115. LAND CAPABILITY (by classes and subclasses in acres) Cont.

Classes and Subclasses	TOTAL BASIN CLASS	% Basin Soils	% State Class
I	-	-	-
IIe	18,000	1.2	1.7
IIw	21,000	1.4	2.2
IIe + IIw	39,000	2.6	2.0
IIs	-	-	-
IIc	-	-	-
Total II	39,000	2.6	1.2
I + IIe + IIw	39,000	2.6	1.8
Total I + II	39,000	2.6	1.2
IIIe	23,400	1.5	1.0
IIIw	9,200	-	1.6
IIIe + IIIw	32,600	2.2	1.0
IIIs	-	-	-
IIIc	-	-	-
Total III	32,600	2.2	-
I + IIe + IIw + IIIe + IIIw	71,600	4.7	1.3
Total I+II+III	71,600	4.7	1.0
IVe	1,200	-	-
IVw	17,200	1.1	2.1
IVe + IVw	18,400	1.2	1.0
IVs	-	-	-
IVc	-	-	-
Total IV	18,400	1.2	-
I+IIe+IIw+IIIe + IIIw+IVe+IVw	90,000	6.0	1.0
Total I+II+III+IV	90,000	6.0	-
VIe	17,000	1.1	-
VIw	900	-	-
VIs	-	-	-
VIc	-	-	-
Total VI	17,900	1.2	-
VIIe	20,100	1.3	-
VIIw	1,000	-	10.7
VIIs	-	-	-
VIIc	-	-	-
Total VII	21,100	1.4	-

TABLE B116. AVERAGE ELEVATION (by hundreds of feet)

Elevation	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
0 - 3	31,400	47.6		3,500	5.3	
3 - 6	25,900	63.6		300	-	
6 - 9	-	-		-	-	
Total 0 - 9	57,300	53.0	3.8	3,800	3.5	-
9 - 12	-	-		-	-	
Total 0 - 12	57,300	54.9	3.8	-	-	-
12 - 15	-	-				
Total 0 - 15	57,300	54.9	3.8	-	-	-
15 - 18	300	10.0				
Total 0 - 18	57,600	53.6	3.8	-	-	-
18 - 21	6,600	37.1				
Total 0 - 21	64,200			3,800		

Elevation	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
0 - 3	25,500	38.6		5,600	8.5	
3 - 6	4,300	10.6		10,200	25.1	
6 - 9	1,500	100.0		-	-	
Total 0 - 9	31,300	28.9	2.1	15,800	14.6	1.0
9 - 12	-	-		-	-	
Total 0 - 12	31,300	30.0	2.1	15,800	15.1	1.0
12 - 15	-	-		-	-	
Total 0 - 15	31,300	30.0	2.1	15,800	15.1	1.0
15 - 18	2,700	90.0		-	-	
Total 0 - 18	34,000	31.6	2.2	15,800	14.7	1.0
18 - 21	9,000	50.6	1.0	2,200	12.4	
Total 0 - 21	43,000			18,000		

Elevation	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	66,000	4.4	4.4
3 - 6	40,700	2.7	3.0
6 - 9	1,500	-	-
Total 0 - 9	108,200	7.2	2.2
9 - 12	-	-	-
Total 0 - 12	108,200	7.2	1.9
12 - 15	-	-	-
Total 0 - 15	108,200	7.2	1.6
15 - 18	3,000	-	-
Total 0 - 18	111,200	7.4	1.3
18 - 21	17,800	1.2	1.5
Total 0 - 21	129,000		

TABLE B117. SLOPE OF SOIL (acres by percent slope)

Slope %	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
0 - 3	30,700	46.8		3,800	5.8	
4 - 7	11,900	74.4		-	-	
Total 0 - 7	42,600	52.2	2.8	3,800	4.6	-
8 - 12	10,500	54.4		-	-	
Total 0 - 12	53,100	52.6		3,800	3.8	-
13 - 20	1,400	35.9		-	-	
Total 0 - 20	54,500	52.0	3.6	3,800	3.6	-
21 - 30	-	-		-	-	
Total 0 - 30	54,500	52.0	3.6	3,800	3.6	-
31 - 99	9,700					

Slope %	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
0 - 3	26,600	40.5		4,500	6.8	
4 - 7	3,100	19.4		1,000	6.2	
Total 0 - 7	29,700	36.4	2.0	5,500	6.7	-
8 - 12	2,000	10.4		6,800	35.2	
Total 0 - 12	31,700	31.4		12,300	12.2	
13 - 20	-	-		2,500	64.1	
Total 0 - 20	31,700	30.2	2.1	14,800	14.1	1.0
21 - 30	-	-		-	-	
Total 0 - 30	31,700	30.2	2.1	14,800	14.1	1.0
31 - 99	11,300			3,200		

Slope %	TOTAL BASIN CLASS	% Basin Soils	% State Class
0 - 3	65,600	4.3	1.0
4 - 7	16,000	1.0	-
Total 0 - 7	81,600	5.4	1.0
8 - 12	19,300	1.3	-
Total 0 - 12	100,900	6.7	-
13 - 20	3,900	-	-
Total 0 - 20	104,800	6.9	-
21 - 30	-	-	-
Total 0 - 30	104,800	6.9	-
31 - 99	24,200		

TABLE B118. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Slight (SL)	6,300	70.8		2,500	28.1	
Moderate (MD)	500	-		-	-	
SL + MD	6,800	69.4		2,500	25.5	
Severe (SV)	24,000	70.6		300	1.0	
SL + MD + SV	30,800	70.3		2,800	6.4	
Very Severe	33,400	39.2		1,000	1.2	

Limitation	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Slight (SL)	100	-		-	-	
Moderate (MD)	400	44.4		-	-	
SL + MD	500	5.1		-	-	
Severe (SV)	100	-		9,600	28.2	
SL + MD + SV	600	1.4		9,600	21.9	
Very Severe	42,400	49.8		8,400	9.8	

Limitation	TOTAL BASIN CLASS	% Basin Soils	% State Class
Slight (SL)	8,900	1.0	1.0
Moderate (MD)	900	-	-
SL + MD	9,800	1.0	-
Severe (SV)	34,000	2.2	1.0
SL + MD + SV	43,800	2.9	-
Very Severe (VS)	85,200	5.6	-
Nonclassified (NC)	1,382,400		
NC + VS	1,467,600	97.1	2.8

TABLE B119. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	LINCOLN COUNTY	% Basin Class	% Basin Soils	BENTON COUNTY	% Basin Class	% Basin Soils
Over 210	3,700	86.0	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	47,300	49.7	3.1	1,300	1.4	-
165 - 180	6,600	55.5	-	2,500	21.0	-
150 - 165	-	-	-	-	-	-
Over 150	57,600	51.7	3.8	3,800	3.4	-
135 - 150	-	-	-	-	-	-
120 - 135	6,600	37.5	-	-	-	-
105 - 120	-	-	-	-	-	-
Over 105	64,200	-	-	-	-	-

Days	LANE COUNTY	% Basin Class	% Basin Soils	DOUGLAS COUNTY	% Basin Class	% Basin Soils
Over 210	600	14.0	-	-	-	-
195 - 210	-	-	-	-	-	-
180 - 195	30,800	32.4	2.0	15,800	16.6	1.0
165 - 180	2,800	23.5	-	-	-	-
150 - 165	-	-	-	-	-	-
Over 150	34,200	30.7	2.3	15,800	14.2	1.0
135 - 150	-	-	-	-	-	-
120 - 135	8,800	50.0	1.0	2,200	12.5	-
105 - 120	-	-	-	-	-	-
Over 105	43,000			18,000		

Days	TOTAL BASIN CLASS	% Basin Soils	% State Class
Over 210	4,300	-	-
195 - 210	-	-	-
180 - 195	95,200	6.3	1.6
165 - 180	11,900	1.0	1.0
150 - 165	-	-	-
Over 150	111,400	7.4	1.1
135 - 150	-	-	-
120 - 135	17,600	1.2	1.0
105 - 120	-	-	-
Over 105	129,000		

THE STATE OF OREGON

61,461,600 acres

49,409,003 acres classified (80.2%)

TABLE B120. MAJOR LAND USE (in acres)

Major Land Use	TOTAL IN STATE	% State Soil
Cultivated (C)	6,422,069	10.4
Pasture (P)	3,030,965	4.9
C + P	9,453,034	15.3
Forests (F)	15,780,031	25.6
Range (R)	22,395,500	36.4
F + R	38,175,531	62.0
Hay (H)	8,400	-
C + P + H	9,461,434	15.4
Water Shed	1,772,038	2.9
P + R	25,426,465	41.3
Nonclassified [N]	[12,189,717]	[19.8]
F + [N]	[27,964,747]	[45.4]
F + [N] + R	[50,360,247]	[81.8]

TABLE B121. IRRIGATION SUITABILITY (in acres)

Suitability Class	TOTAL IN STATE	% State Soil
Excellent (E)	1,381,205	2.2
Good (G)	4,281,518	7.0
E + G	5,662,723	9.2
Fair (F)	6,318,148	10.2
E + G + F	11,980,871	19.4
Poor (P)	4,682,497	7.6
E + G + F + P	16,663,368	27.0
Nonirrigable (N)	32,745,635	53.2
Nonclassified [N]	[44,935,352]	[72.9]

TABLE B122. LAND CAPABILITY (by classes and subclasses in acres)

Classes and Subclasses	TOTAL IN STATE	% State Soil
I	192,313	0.3
IIe	1,031,818	1.7
IIw	955,363	1.5
IIe + IIw	1,987,180	3.2
IIs	258,887	-
IIc	869,700	1.4
Total II	3,115,363	5.1
I + IIe + IIw	2,179,490	3.5
Total I + II	3,307,670	5.4
IIIe	2,848,642	4.6
IIIw	589,082	1.0
IIIe + IIIw	3,477,720	5.6
IIIs	1,481,525	2.4
IIIc	2,033,900	3.3
Total III	6,963,149	11.3
I + IIe + IIw + IIIe + IIIw	5,627,210	9.1
Total I+II+III	10,270,820	16.7
IVe	2,330,816	3.8
IVw	827,661	1.3
IVe + IVw	3,158,480	5.1
IVs	5,601,188	9.1
IVc	4,345,800	7.0
Total IV	13,105,465	21.3
I+IIe+IIw+IIIe + IIIw+IVe+IVw	8,785,690	37.9
Total I+II+III+IV	23,376,285	14.2
VIe	4,305,445	7.0
VIw	388,790	1.0
VIs	6,325,261	10.3
VIc	2,261,900	3.7
Total VI	13,234,096	21.5
VIIe	6,307,884	10.2
VIIw	9,363	-
VIIs	6,363,110	10.3
VIIc	70,600	-
Total VII	12,750,957	20.7
Total VI + VII + Nonclassified	38,265,315	62.1

TABLE B123. AVERAGE ELEVATION (by hundreds of feet)

Elevation	TOTAL IN STATE	% State Soil
0 - 3	1,517,002	2.5
3 - 6	1,376,416	2.2
6 - 9	2,060,646	3.3
Total 0 - 9	4,954,064	8.0
9 - 12	875,975	1.4
Total 0 - 12	5,830,039	9.4
12 - 15	985,894	1.6
Total 0 - 15	6,815,933	11.1
15 - 18	1,971,672	3.2
Total 0 - 18	8,787,605	14.3
18 - 21	1,216,497	2.0
21 - 24	2,313,044	3.8
Total 0 - 24	12,317,146	20.0
24 - 27	1,800,859	2.9
27 - 30	1,552,420	2.5
Total 0 - 30	15,670,425	25.4
30 - 33	1,860,200	3.0
33 - 36	1,621,400	2.6
Total 0 - 36	19,152,025	31.0
36 - 39	2,974,400	4.8
Total 0 - 39	22,126,425	35.8
39 - 42	5,089,275	8.3
Total 0 - 42	27,215,700	44.2
42 - 45	5,192,100	8.4
Total 0 - 45	32,407,800	52.6
45 - 48	7,331,500	11.9
Total 0 - 48	39,739,300	64.5
48 - 51	3,837,600	6.2
Total 0 - 51	43,576,900	70.7
51 - 54	4,093,700	6.6
Total 0 - 54	47,670,600	77.3
54 - 57	1,375,600	2.2
57 - 60	144,200	-
Total 0 - 60	49,190,400	
Over 60	218,600	

TABLE B124. SLOPE OF SOIL (acres by percent slope)

Slope %	TOTAL IN STATE	% State Soil
0 - 3	6,255,982	10.2
4 - 7	5,749,102	9.3
Total 0 - 7	11,870,084	19.5
8 - 12	11,298,528	18.3
Total 0 - 12	23,168,612	37.8
13 - 20	5,889,050	9.6
Total 0 - 20	29,057,662	47.4
21 - 30	624,038	1.0
Total 0 - 30	29,681,700	48.4
31 - 99	19,727,273	51.6

TABLE B125. SEPTIC TANK FILTER FIELD LIMITATIONS (by acre)

Limitation	TOTAL IN STATE	% State Soil
Slight (SL)	1,007,096	1.6
Moderate (MD)	2,922,233	4.7
SL + MD	3,929,329	6.3
Severe (SV)	5,801,796	9.4
SL + MD + SV	9,731,125	15.7
Very Severe (VS)	39,677,878	64.4
Nonclassified (NC)	12,189,717	19.8
NC + VS	51,867,595	84.2

TABLE B126. AVERAGE FROST-FREE PERIOD (32°F, by days)

Days	TOTAL IN STATE	% State Soil
Over 210	15,800	-
195 - 210	376,277	1.0
180 - 195	5,956,109	9.7
165 - 180	1,465,002	2.4
150 - 165	2,270,010	3.7
Over 150	10,083,198	16.4
135 - 150	2,220,100	3.6
120 - 135	3,504,010	5.7
105 - 120	1,247,800	2.0
Over 105	17,055,108	27.7
90 - 105	5,650,500	9.2
Over 90	22,705,608	36.9
75 - 90	14,032,200	22.8
Over 75	36,737,808	59.6
60 - 75	2,458,300	4.0
Over 60	39,196,108	63.6
45 - 60	1,943,520	3.2
Over 45	41,139,628	66.8
30 - 45	3,273,275	5.3
Over 30	44,412,903	72.1
0 - 30	5,014,600	8.1

APPENDIX C

MISCELLANEOUS TABLES

AND FIGURES

TABLE C1. COUNTY CARRYING CAPACITY FOR THE PRESENT QUALITY OF LIFE

County	Construction	Carbohydrates	Animal Protein
Baker	1,199	152,095	1,667
Benton	15,115	121,566	5,297
Clackamas	126,296	216,215	30,952
Clatsop	1,455	26,260	5,163
Columbia	4,591	49,771	7,027
Coos	3,817	25,052	4,716
Crook	8,758	54,929	40,257
Curry	4,604	16,503	390
Deschutes	7,153	154,803	2,943
Douglas	8,513	142,013	15,916
Gilliam	10,684	364,715	1,298
Grant	4,218	59,159	14,512
Harney	5,831	0	67,656
Hood River	13,906	31,142	807
Jackson	40,738	45,926	22,918
Jefferson	5,913	159,394	1,111
Josephine	29,135	57,745	6,134
Klamath	18,922	249,645	86,052
Lake	4,798	44,413	12,339
Lane	37,602	262,448	31,072
Lincoln	8,009	14,608	3,266
Linn	60,177	301,921	26,290
Malheur	16,175	387,504	33,347
Marion	41,221	267,371	16,588
Morrow	10,256	442,290	1,207
Multnomah	44,300	70,172	5,345
Polk	17,242	150,617	5,293
Sherman	12,957	285,705	670
Tillamook	5,861	20,893	5,040
Umatilla	38,920	661,459	2,779
Union	3,892	133,259	388
Wallowa	3,858	31,346	775
Wasco	30,173	258,274	2,826
Washington	28,947	144,852	6,079
Wheeler	804	25,391	3,403
Yamhill	39,661	144,092	5,109

TABLE C2. BASIN CARRYING CAPACITY FOR THE PRESENT QUALITY OF LIFE

Basin	Construction	Carbohydrates	Animal Protein
North Coast	8,833	79,886	15,907
Willamette River	410,648	1,667,600	131,947
Hood	21,417	145,756	1,401
Deschutes River	48,979	635,176	46,841
John Day River	22,057	591,267	21,242
Umatilla	51,312	1,125,060	1,618
Grande Ronde	7,667	140,824	1,082
Powder	1,282	175,877	1,747
Malheur River	10,843	306,275	19,297
Owyhee	5,838	81,229	22,600
Malheur Lake	6,222	0	60,674
Goose and Summer Lakes	5,521	44,911	12,230
Klamath River	17,264	249,147	85,387
Rogue River	70,017	104,267	29,159
Umpqua River	8,006	137,815	15,459
South Coast	8,497	43,767	5,300
Mid-Coast	11,302	44,690	4,829

TABLE C3. STATE OF OREGON CARRYING CAPACITY FOR THE PRESENT QUALITY OF LIFE

	Construction	Carbohydrates	Animal Protein
State of Oregon	715,704	5,573,550	476,721

TABLE C4. COUNTY CARRYING CAPACITY FOR A STANDARD QUALITY OF LIFE

County	Construction	Carbohydrates	Animal Protein
Baker	1,540	177,101	3,500
Benton	19,414	141,552	11,125
Clackamas	162,220	251,763	65,002
Clatsop	1,868	30,577	10,843
Columbia	5,897	57,954	14,756
Coos	4,903	29,171	9,904
Crook	11,249	63,960	84,542
Curry	5,913	19,217	820
Deschutes	9,188	180,254	6,180
Douglas	10,934	165,362	33,425
Gilliam	13,724	424,678	2,725
Grant	5,417	68,886	30,475
Harney	7,490	0	142,082
Hood River	17,862	36,262	1,883
Jackson	52,326	53,477	48,129
Jefferson	7,595	185,600	2,332
Josephine	37,422	67,238	12,881
Klamath	24,304	290,690	180,712
Lake	6,163	51,714	25,912
Lane	48,298	305,597	65,252
Lincoln	10,287	17,010	6,859
Linn	77,294	351,560	55,211
Malheur	20,776	451,214	70,031
Marion	52,946	311,329	34,836
Morrow	13,173	515,007	2,534
Multnomah	56,901	81,709	11,224
Polk	22,147	175,379	11,115
Sherman	1,664	332,677	1,406
Tillamook	7,528	24,328	10,584
Umatilla	49,991	770,210	5,837
Union	5,000	155,168	815
Wallowa	4,955	36,500	1,628
Wasco	38,755	300,736	5,936
Washington	37,181	168,667	12,767
Wheeler	1,032	29,566	7,145
Yamhill	50,943	167,782	10,729

TABLE C5. BASIN CARRYING CAPACITY FOR A STANDARD QUALITY OF LIFE

Basin	Construction	Carbohydrates	Animal Protein
North Coast	11,346	93,020	33,406
Willamette River	527,455	1,941,770	277,095
Hood	27,509	169,720	2,942
Deschutes River	62,911	739,606	98,368
John Day River	28,332	688,478	44,610
Umatilla	65,907	1,310,030	3,399
Grande Ronde	9,848	163,977	2,273
Powder	1,646	204,793	3,669
Malheur River	13,928	356,630	40,525
Owyhee	7,498	94,584	47,461
Malheur Lake	7,991	0	127,419
Goose and Summer Lakes	7,091	52,295	25,684
Klamath River	22,175	290,109	179,317
Rogue River	89,933	121,409	61,235
Umpqua River	10,283	160,473	32,466
South Coast	10,914	50,962	11,130
Mid-Coast	14,516	52,038	10,140

TABLE C6. STATE OF OREGON CARRYING CAPACITY FOR A STANDARD QUALITY OF LIFE

	Construction	Carbohydrates	Animal Protein
State of Oregon	912,282	6,489,900	1,001,140

TABLE C 7. LIMITING FACTORS INHERENT WITH THE SOIL

		Equivalent Value: Construction	Equivalent Value: Crops
1.	Nearly level (0 - 2% slope)	.99	.99
2.	Gently sloping (2 - 5% slope)	.85	.85
3.	Sloping (5 - 15% slope)	.30	.50
4.	Moderately steep (15 - 35% slope)	.05	.10
5.	Steep to very steep (more than 35% slope)	.01	.01
6.	Excessive slope	.01	.01
7.	Poor uniformity of slope	.10	.10
8.	Moderate water erosion hazard	.10	.30
9.	Severe water erosion hazard	.01	.05
10.	Fair stability	.50	.70
11.	Poor stability	.05	.30
12.	Slide hazard during wet weather	.01	.20
13.	Moderate to severe wind erosion hazard	.10	.05
14.	Very slow permeability (less than 0.06 inches/hr)	.01	.20
15.	Slow permeability (0.06 - 0.20 inches/hr)	.05	.30
16.	Moderately slow permeability (0.20-0.63 inches/hr)	.20	.50
17.	Moderate permeability (0.63-2.00 inches/hr)	.50	.99
18.	Moderately rapid permeability (2.00-6.30 inches/hr)	.90	.70
19.	Rapid permeability (6.30-20.00 inches/hr)	.40	.40
20.	Very poorly drained	.01	.10
21.	Poorly drained	.01	.30
22.	Somewhat poorly to poorly drained	.10	.40
23.	Moderately well drained	.99	.90
24.	Somewhat excessively to excessively drained	.30	.10
25.	Slow to very slow runoff	.10	.40
26.	Rapid runoff	.30	.30
27.	Moderate to high seepage rate	.05	.30
28.	Accumulates seepage water	.01	.30
29.	Wet material or wet surface layer	.01	.10
30.	Prolonged inundation	.01	.10
31.	Low fluctuating water table during winter and early spring	.99	.99
32.	High fluctuating water table during winter and early spring	.01	.50
33.	Subject to flooding	.01	.60
34.	Outlet for drainage difficult to obtain or unfeasible	.05	.10
35.	Groundwater pollution hazard	.01	.80

TABLE C 7. LIMITING FACTORS INHERENT WITH THE SOIL Cont.

		Equivalent Value: Construction	Crops
36.	Surface stream pollution	.01	.80
37.	A-4 or A-5 AASHO engineering classification	.30	.60
38.	A-6 or A-7 AASHO engineering classification	.10	.40
39.	Shallow water table (less than 20 inches deep)	.01	.50
40.	Moderately deep water table (20 to more than 40 inches deep)	.50	.70
41.	High or moderate siltation potential	.10	.40
42.	Very shallow depth (5-10 inches to bedrock or hardpan)	.01	.05
43.	Shallow depth (10-20 inches to bedrock or hardpan)	.01	.40
44.	Moderate depth (20-40 inches to bedrock or hardpan)	.10	.60
45.	Hard bedrock at 40-60 inches	.20	.70
46.	Firm fragipan at 20-30 inches	.20	.50
47.	Coarse or very coarse surface layer texture	.60	.20
48.	Moderately fine surface layer texture	.99	.99
49.	Fine surface layer texture	.50	.50
50.	Stoniness and/or rock outcrop	.20	.05
51.	Coarse fragments (less than 6 inches in diameter)	.20	.05
52.	Coarse fragments (larger than 6 inches in diameter)	.01	.01
53.	Stony in surface layer or subsoil	.50	.20
54.	Sandy surface layer or subsoil	.05	.10
55.	Silt loam surface layer or subsoil	.99	.99
56.	Silty clay loam or clay loam surface layer or subsoil	.90	.90
57.	Clay surface layer or subsoil	.01	.30
58.	40-60% pebbles, remainder clay loam at 20-40 inches	.20	.05
59.	May contain more than 15% clay and silt	.20	.80
60.	Gravel throughout the soil	.50	.20
61.	Ashy and cindery material	.20	.01
62.	Very dusty when disturbed or trampled	.99	.10
63.	Moderate organic matter (2-15%)	.10	.50
64.	High organic matter (over 15%)	.01	.50
65.	Dispersed soil material or surface layer	.50	.10
66.	Subsoil texture: fine	.10	.40
67.	Subsoil texture: moderately fine	.90	.90
68.	Subsoil texture: coarse	.50	.20
69.	Subsoil texture: very coarse	.20	.01
70.	High amount of fines	.10	.50

TABLE C 7. LIMITING FACTORS INHERENT WITH THE SOIL Cont.

		Equivalent Value: Construction	Crops
71.	Very gravelly substratum at 20-40 inches	.40	.10
72.	Low shear strength	.99	.99
73.	Fair conpaction characteristics	.99	.99
74.	Poor compaction characteristics	.50	.60
75.	Pervious compacted characteristics	.50	.50
76.	Semi-pervious compacted characteristics	.60	.80
77.	High to moderate plasticity	.10	.30
78.	Moderate shrink-swell potential	.70	.70
79.	High shrink-swell potential	.40	.60
80.	Medium to high compressibility	.50	.50
81.	Very dry, less than 10 inches precipitation	.90	.10
82.	Strong to very strong alkalinity	.99	.10
83.	Strongly acid, pH below 5.5	.99	.10
84.	Short frost-free period (28°F.); less than 90 days	.99	.30
85.	Moderate frost-free period (28°F.); 110-130 days	.99	.60
86.	Susceptible to forming large frozen clods	.99	.50
87.	Moderate or high frost heave hazard	.99	.50
88.	Temperature restriction	.99	.10
89.	Very high available water-holding capacity (AWHC) (more than 12 inches)	.99	.99
90.	High AWHC (9-12 inches)	.90	.90
91.	Moderate AWHC (6-9 inches)	.50	.70
92.	Low AWHC (3-6 inches)	.40	.40
93.	Very low AWHC (less than 3 inches)	.20	.20
94.	Effective root zone: very shallow (0-10 inches)	.01	.01
95.	Effective root zone: shallow (10-20 inches)	.10	.30
96.	Effective root zone: moderately deep (20-40 inches)	.50	.99
97.	Effective root zone: deep (40-60 inches)	.99	.99
98.	Low fertility	.99	.01
99.	Forest, watershed, waste land	.01	.01

TABLE C8. REFERENCE LOW WATER STREAMFLOW DURING THE 1960-68 PERIOD
In cubic feet per second (cfs)

Basin	May	June	July	August	Sept.	Annual
1. North Coast	1,553	671	329	175	165	4,925
2. Willamette River	22,789	11,333	6,925	6,881	7,792	26,808
4. Hood	876	668	383	276	271	806
5. Deschutes River	3,642	3,463	3,135	3,140	3,055	3,588
6. John Day River	6,354	3,074	554	91	76	1,830
7. Umatilla	542	173	110	96	100	439
8. Grande Ronde	7,688	6,963	1,388	802	877	3,149
9. Powder River	1,652	1,367	422	211	183	689
10. Malheur River	15	60	9	8	5	115
11. Owyhee River	113	101	91	82	92	48
12. Malheur Lake	113	54	7	3	5	70
13. Goose & Summer Lakes	379	296	121	112	113	184
14. Klamath River	142	130	94	107	130	148
15. Rogue River	4,018	2,578	1,174	1,011	916	2,696
16. Umpqua River	5,310	2,606	1,329	1,092	1,048	6,684
17. South Coast	791	600	274	231	231	3,760
18. Mid-Coast	1,083	577	286	222	219	3,262

(U.S.G.S., 1968)

TABLE C9. RECOMMENDED MINIMUM STREAMFLOW
In cubic feet per second (cfs)

Basin	May (OFC)	June (OFC)	July (OFC)	August (OFC)	Sept. (OFC)	Annual (SWRB)
1. North Coast	950	680	355	347	610	270
2. Willamette River	6,500	6,500	6,500	6,500	6,500	6,500
4. Hood	382	382	275	151	151	110
5. Deschutes River	5,500	5,500	4,850	4,200	4,200	3,000
6. John Day River	1,700	1,000	750	670	670	20
7. Umatilla	165	165	165	165	165	222
8. Grande Ronde	2,295	1,730	1,106	1,087	1,162	505
9. Powder River	391	350	230	230	230	468
10. Malheur River	50	50	50	50	50	20
11. Owyhee	35	35	35	30	30	12
12. Malheur Lake	15	15	12	10	10	5
13. Goose & Summer Lakes	125	85	55	55	55	184
14. Klamath River	500	500	500	500	500	200
15. Rogue River	1,200	1,200	1,200	1,200	1,200	1,200
16. Umpqua River	600	600	600	600	600	525
17. South Coast	1,000	660	255	255	255	144
18. Mid-Coast	452	381	286	230	230	230

(OFC = Oregon Fish Commission)

(SWRB = State Water Resources Board)

Fig. C1. OR - Soils - 1 Form

OR-SOILS-1
Rev. 8-4-69
(File Code SOILS 12)

U. S. Department of Agriculture
Soil Conservation Service

SOIL INTERPRETATIONS

1. Willamette silt loam, 0-3% slopes
2. Willamette mottled substratum variant, 0-3% slopes.
3. Willamette silt loam, 3-7% slopes.
4. Willamette silt loam, 7-12% slopes.

State: Oregon Date: Rev. 6/71 Soils:

The Willamette series consists of well drained silt loam over silty clay loam soils formed from silty alluvium. They occupy nearly level broad valley terraces. Where not cultivated, the vegetation consists of hazel bush, wild blackberries, Oregon white oak, Douglas-fir and native grasses. Elevations range from 150 to 450 feet. The mean annual precipitation is 40 to 50 inches; mean annual air temperature is 52 to 54°F.; and the frost-free season is 165 to 210 days. These soils are associated with Amity and Woodburn soils.

The surface layer is very dark brown, silt loam about 24 inches thick. The subsoil is dark brown, silty clay loam about 29 inches thick. The substratum is dark yellowish brown, light silty clay loam many feet thick. There is no limiting layer within five feet.

The substratum ranges in texture from silty clay loam to heavy loam. High chroma mottles may occur in the lower subsoil. Contrasting layers may be encountered below 40 inches. The slope may range to 20 percent on terrace fronts or drainageways.

Permeability is moderate. Runoff is slow and the erosion hazard is slight except on the steeper sloping terrace fronts. Total available waterholding capacity is 10 to 12 inches.

These soils are used for nearly all agricultural crops adapted to Willamette Valley climatic conditions. Other uses are wildlife, recreation and homesites. These soils occur in the Willamette Valley Resource Area.

ENGINEERING INTERPRETATIONS

Estimated Chemical and Physical Properties

Depth from surface of typical profile Inches	Classification: USDA Texture	Classification: Unified *	Classification: AASHO *	Over 3" *	% of Material Passing Sieve: #4	#10	#40	#200	Permeability Inches Per Hour	Available Water Capacity Inches per Inch of Soil	Soil Reaction (pH)	Shrink Swell Potential	Corrosivity Uncoated Steel
0-24	Silt loam	ML	A-4	0	100	95-100	95-100	95-100	.63-2.0	.19-.21	5.6-6.5	Low	Mod.
24-53	Silty clay loam	ML CL	A-7	0	100	95-100	95-100	95-100	.63-2.0	.19-.21	5.6-6.5	Moderate	Mod.
53-60	Light silty clay loam	ML or CL	A-6	0	100	100	95-100	95-100	.63-2.0	.19-.21	5.6-6.5	Low	Low

*Lab. data from Linn County.

Suitability as a source of topsoil is good. Suitability as a source of sand and gravel is not suitable. Suitability as a source of road fill is poor. Hydrologic group is B. At 0 to 24 inches liquid limit is 35 to 40 and plasticity index is 5 to 10. At 24 to 53 inches liquid limit is 40 to 50 and plasticity index is 15 to 25. At 53 to 60" liquid limit is 35 to 40 and plasticity index is 10 to 15.

INTERPRETATIONS OF ENGINEERING PROPERTIES

Use	Soil	Limitation	Major Factors Affecting Use
Local Roads and Streets	1,2,3,4	Moderate	Moderate shrink-swell potential; ML or CL unified soil class
Dikes & Levees Pond Embankment	1,2,3,4	Moderate	Moderate shrink-swell potential; poor to fair resistance to piping; moderate shear strength.
Pond Reservoir Area	1,2,3,4	Moderate	Over 60 inches to bedrock; moderate permeability; 0-12% slopes.
Agricultural Drainage	1,3	--	Not needed.
	4	Slight	Unit 2 has a seasonal water table below 30 inches.
Terraces & Diversions	1,2	--	Not needed; nearly level.
	3,4	Moderate	3-12% slopes; moderate shrink-swell potential.
Grassed Waterways	4	Severe	7 to 12% slopes on Unit 4
	3	Moderate	3 to 7% slopes on Unit 3
	1,2	Slight	
Winter Grading	1,3,4	Slight	
	2	Moderate	Water table between 30-40 inches; silt loam and finer.

Fig. C1. OR - Soils - 1 Form Cont.

Continuation Sheet
OR-SOILS-1
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COMMUNITY INTERPRETATIONS

Use	Soil	Limitation	Major Factors Affecting Use
Dwellings	1,2,3	Moderate	Unit 2 may have water table within 30 inches. Unified soil grouping ML or CL; moderate shrink-swell potential.
	4	Moderate	7 to 12% slopes
	2	Severe	Seasonal water table below 30 inches for unit 2.
Septic tank sewage disposal	1,3	Moderate	Moderate permeability;
	4	Moderate	7-12% slopes.
	2	Severe	Seasonal water table below 30 inches.
Lagoon sewage disposal	1,3	Moderate	Moderate permeability; 0-7% slopes.
	4	Severe	Moderate permeability; 7-12% slopes.

RECREATION INTERPRETATIONS

Use	Soil	Limitation	Major Factors Affecting Use
Playgrounds	1,2	Slight	
	3	Moderate	3-7% slopes.
	4	Severe	7-12% slopes.
Camp Areas	1,2,3	Slight	0-7% slopes.
	4	Moderate	7-12% slopes.
Picnic Areas	1,2,3	Slight	0-7% slopes.
	4	Moderate	7-12% slopes.
Paths & Trails	1,2,3,4	Slight	

AGRICULTURE INTERPRETATIONS

Major Crops	Soil	Suitability	Optimum Yields	Major Factors Affecting Use
Alfalfa (Irrigated)	1,2,3,4	Good	6-7 Tons/ac	Silt loam surface; seasonal water table below 30" in #2; 1,3,4 well drained; 0-12% slopes.
Blackberries (Irrigated)	1,2,3,4	Good	4-6 Tons/ac	Same as above.
Bush Beans (Irrigated)	1,2,3,4	Good	5-6 Tons/ac	Same as above.
Filberts (Non-irrigated)	1,2,3,4	Good	.8-1 Tons/ac	Same as above.
Strawberries (Irrigated)	1,2,3,4	Good	4-6 Tons/ac	Same as above.
Sweet Corn (Irrigated)	1,2,3,4	Good to Fair	8-9 Tons/ac	Same as above.
Winter Wheat (Non-irrigated)	1,2,3,4	Good	70-90 bu/ac	Silt loam surface; seasonal water table below 30 inches in #2; 0-12% slopes.
Land Capability	1. I; 2. IIw 3 & 4 IIe			

WOODLAND INTERPRETATIONS

Species	Soil	Site Index	Limitations: Seedling mortality	Erosion hazard	Windthrow hazard	Plant Competition	Equipment Limitations	Native Species

RANGE INTERPRETATIONS

Site Name	Soil	Key Species and %	Pot. Yields: Total Lb/Ac	Usable Ac/AUM	Normal Season: Growing	Grazing
		Not applicable...				

Fig. C2 LAND CAPABILITY CLASSIFICATION

The capability classification is a grouping that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risks of damage when they are used, and the way they respond to treatment.

In the system used in this study all the kinds of soil are grouped at two levels, the capability class and subclass. The USDA Soil Conservation Service further group the soil into capability units, which are convenient groupings for making many statements about management of soils. This study will not include the capability unit which is normally designated by a number after the subclass, ie: IIe-2, the final 2 is the management unit.

The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In Class I are the soils that have few limitations, the wides range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In Class VIII are the soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, e, w, s or c, to the class numeral, for example, IIe. The letter e shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; w means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

Soils are classified in capability classes and subclasses in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive reshaping that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The classes and subclasses in the capability system are described in the list below.

Class I. Soils that have few limitations that restrict their use. There are no subclasses I.

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation. Subclasses IIe, IIw, and IIc, as discussed above.

Class III. Soils that have severe limitations that reduce the choice of plants, or require special conservation practices, or both.

Subclasses IIIe, IIIs and IIIc, as discussed above

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclasses IVe, IVw, IVs and IVc, as discussed above.

Class V. Soils not likely to erode that have other limitations, impractical to remove without major reclaimation, that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclasses VIe, VIw, VIs and VIc, as discussed above.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to range, woodland or wildlife.

Subclasses VIIe, VIIw, VIIs and the VIIc, as discussed above.

Class VIII. Soils and landforms that, without major reclaimation, have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, water supply, mining, or esthetic purposes.

In actual practive, soil scientists seldom use Class V and use Class VIII for watershed areas. For this study, the less than 16,000 acres in the state of Class V soils have been included with Class IVw soils, and all of the Class VIII soils have been included into Class VIIs soils.

Certain generalizations may be made about classifying soils by their capabilities:

1. Land in capability classes I through IV is generally suited to agriculture and associated uses.
2. Land in capability classes V through VII is best suited for range, forestry and wildlife.
3. The subclasses _e_ and _w_ are considered controllable in most cases by proper management and corrective measures.

Except where stated, this classification method was obtained from a variety of publications by the U.S.D.A. This was necessary because all Capability Classes and subclasses were not used in any one publication in Oregon.

Fig. C3.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SURVEY LEGEND

TOPSOIL TEXTURES
- V Very heavy - heavy clay
- H Heavy - clay, silty clay loam, sandy clay loam and heavier clay loams.
- M Medium - lighter clay loams, silt loams, loams, and very fine sandy loam.
- L Light - fine sandy loam, sandy loam, loamy very fine sand.
- C Very light - loamy sand, sand, and coarse sand.
- X Undifferentiated.

TEXTURE MODIFIERS
(If needed)
- g Gravelly - limiting crop adaptation and moisture holding capacity.
- s Stony - enough stone to hinder cultivation.
- v Very stony - enough stone to prevent cultivation.

SOIL DEPTH
1. Very deep - over 60 inches
2. Deep - 36-60 inches
3. Moderately deep - 20-36 inches.
4. Shallow - 10-20 inches.
5. Very shallow - Less than 10 inches.

SOIL PERMEABILITY
1. Very slow - less than 0.05 in/hr
2. Slow - 0.05-0.2 in/hr
3. Moderately slow - 0.2-0.8 in/hr
4. Moderate - 0.8-2.5 in/hr
5. Moderately rapid - 2.5-5.0 in/hr
6. Rapid - 5.0-10.0 in/hr
7. Very rapid - More than 10 in/hr

PERMEABILITY of first significant zone if present.

PERMEABILITY of second significant zone if present.

TYPE OF UNDERLYING MATERIAL
- B - Basic crystalline rock
- E - Shale, fine-grained sedimentary rock
- F - Sandstone - coarse grained sedimentary rock
- T - Old alluvium, terrace or valley fill
- X - Recent alluvium
- Y - Claypan
- Z - Gravel

SUBDIVISION of limiting or underlying material.

$$\frac{3\ v\ H\ 3\ 1\ E\ 4}{15\ D - 2}$$ = LAND CAPABILITY UNIT

SLOPE
- A 0-3 percent
- B 4-7 percent
- C 8-12 percent
- D 13-20 percent
- E 21-30 percent
- F 30 plus percent

EROSION
1. No apparent or slight erosion. Less than 25% of original topsoil removed.
2. Moderate erosion - from 25-75% of original topsoil removed.
3. Severe erosion - from 75% of original topsoil to 25% of subsoil removed.
4. Very severe erosion - all of original topsoil and 25-75% of subsoil removed.

Fig. C4. Soil Capability Evaluation

YAMHIL COUNTY OREGON ASSESSOR'S OFFICE

MARKET VALUE/ GROSS PRODUCTIVITY , RELATED TO S.C.S. SYMBOL COMPONENTS

SOIL DEPTH	TOPSOIL TEXTURE	SOIL PERMEABILITY	UNDERLYING MATERIAL
1 - 60" & up = 25	Medium = 25	1 - Very slow = 10	T - Old alluvium = 25
2 - 36" - 60" = 25	Light = 25	2 - Slow = 14	X - Recent alluvium = 25
3 - 20" - 36" = 15	Heavy = 20	3 - Moderate slow = 18	Z - Gravel = 22
4 - 10" - 20" = 12	Coarse = 18	4 - Moderate = 25	E - Shale = 18
5 - under 10" = 10	Very heavy = 10	5 - Moderate rapid = 18	F - Sandstone = 16
	X-undifferentiated	6 - Rapid = 14	B - Rock = 16
		7 - Very rapid = 10	Y - Claypan = 10

1 M 4 X -

Thus: 1(25) + M(25) + 4(25) + X(25) = 100% Acre

Other factors affecting % acre :

1. Slope
2. Wetness
3. Flood
4. Stoniness
5. Erosion (extreme)
6. Acidity (extreme)