

**MARION COUNTY**

**COMPREHENSIVE LAND USE PLAN**

**BACKGROUND AND INVENTORY REPORT**

PREPARED BY  
MARION COUNTY PLANNING DIVISION

ADOPTED March 31, 1982  
Revised 10/98  
Revised 05/00  
Revised 11/04

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## **INTRODUCTION**

This report is prepared as an integral part of the Marion County Comprehensive Plan. Its function is to serve as a factual data source for the development of Marion County land use goals and policies. The Comprehensive Plan is divided into two main documents: 1) Background and Inventory Report and 2) Goals and Policies Plan.

This, the Background and Inventory Report, is intended to separate factual data from the conclusionary directives stated in the County Goals and Policies Report. This report is primarily a statement of existing conditions, trends, needs and projections that lead to statements of problems or conflicts, therefore, the need to establish and implement policy decisions to deal with the planning issues.

This report is not intended to convey County land use policy; it does, however, provide the necessary information to determine land use conflicts so that County goals and policies can be established and balanced to minimize these problems. By doing this, the inventory requirements of the LCDC Goals are also satisfied.

The inventory data contained in this report represents the most current and most detailed information available. In some areas the data is not as detailed or current as is desirable. Most of it is, however, sufficient to serve the Plan needs at the present until better data becomes available. The 1980 national census will provide an abundance of current data that will be available by approximately 1982. This and other data being developed will be evaluated and incorporated into the Marion County Comprehensive Plan as additions to this report. Revisions to the base data may in turn require revisions to the goals and policies of the County.

Even though this report is considered a part of the Marion County Comprehensive Plan, updating of the data in its contents will be accomplished on a more regular basis than the Policy Plan. Revisions are essential to inventory data maintenance, are ongoing and should be accomplished on a yearly basis. When inventory data is revised it will be necessary to compare pertinent policies and update if necessary.

## **GENERAL BACKGROUND**

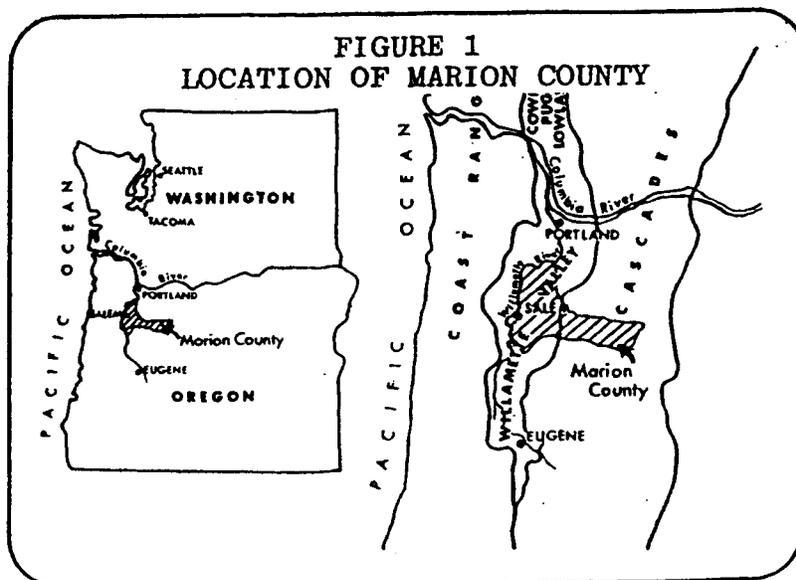
### **Geographic Description**

Marion County is located in northwest Oregon, in the central section of the Willamette River Basin. The Willamette Basin extends over 12,145 square miles between the crests of the Cascade and Coast Ranges and is drained by the Willamette and Sandy Rivers. The Willamette Basin is a major component of the Columbia River Basin. Generally rectangular in shape, the Willamette Basin is about 150 miles long and about 75 miles wide. The basin is bounded on the east by the Cascade Range, on the south by the Calapooya Mountains, on the west by the Coast Range, and on the north by the Columbia River, from Bonneville Dam to St. Helens, Oregon. Within the basin, elevations vary from less than 10 feet above mean sea level along the

Columbia to 450 feet on the valley floor at Eugene. Elevations in the Cascades are over 10,000 feet and in the Coast Range they are approximately 4,000 feet.

Willamette Valley trough lies within the western half of the basin. With an area of approximately 3,500 square miles, the Valley extends almost the length of the basin at an average width of 30 miles. The generally level to gently rolling topography is interrupted by several groups of hills and scattered buttes.

Marion County is located slightly north of the approximate geographic center of the Willamette Basin. It is bounded on the north and west by the Willamette River, on the south by the North Santiam River, and on the east by the Pudding River, Butte Creek, and the crest of the Cascade Range. Measured east to west, the County is approximately 72 miles at its widest point and 12 miles at its narrowest point. From north to south, the County ranges from 41 miles to 10 miles in length. The total area of the County is 746,240 acres. Salem, Oregon's capital city and the seat of Marion County, is located in the extreme western part of the County, adjacent to the Willamette River. Portland is approximately 47 miles north of Salem and Eugene is approximately 64 miles south of Salem.



### Settlement History

Kalapuyan Indian tribes were the major valley inhabitants prior to any settlement of white people. Each spoke their own dialect and names of tribes and bands such as Santiam, Yamhill, Lakmiute, Chemeketa and Chemawa are still commonly used.

The first settlements established in the Valley were fur trading centers. Around the latter part of 1812, the first such "trading house" was constructed on the present site of Salem by William Wallace and J.C. Halsey, two clerks associated with the Astor enterprise. By 1830, farms had

been established in the French Prairie area, now part of northern Marion County. The population of the Valley in 1841 has been estimated at only 140 persons. However, by that date the farms of the Valley were already exporting livestock, butter, cheese and hides. Exporting of surplus timber had begun nearly ten years earlier. After 1841, settlement increased rapidly – the population of the Valley reached 6,000 by 1845.

Organized government came to Oregon Country in 1843 with the establishment of a provisional government, thus ending a period of mutual occupancy by Great Britain and the United States which had begun in 1818. On July 5, 1843, the Provisional Government Legislative Committee created the governmental subdivision which is now Marion County.

### Climate

Marion County has a temperate maritime climate with moderately warm, dry summers and mild, wet winters. The varying topography produces some variations in the climate depending primarily on elevation.

The outstanding characteristics of the County's climate is the seasonal distribution of precipitation. About 60 percent of the annual precipitation occurs during the November through February winter storm season while only 10 percent occurs during the June through September dry season.

The average annual precipitation is as low as 40 inches in the western portions of the County but increases rapidly with elevation to 100 - 130 inches in parts of the Cascade Mountains in the eastern portions of the County. Below 2,000 feet elevation, most of the precipitation occurs as rain. Intensity of precipitation and the proportion of precipitation that is snow increases with elevation. The percentage of annual precipitation that occurs as snow increases from about 2 percent on the floor of the Valley region to 50 percent at 5,000 feet elevation and about 75 percent at 7,000 feet. Winter snow accumulations are quite large in much of the Cascades where they are an important source of summer streamflows. Summer precipitation in the County is limited to occasional light rainstorms and thunderstorms and frequently there are periods of 60 to 90 days when no rainfall occurs.

The prevailing winds are from the west and northwest during the summer and from the south and southwest during winter storm periods. Wind velocities are moderate, although strong winds sometimes accompany winter storms and short periods of strong easterly or northerly winds may occur at any time of the year. Periods of easterly winds bring cold, clear weather in winter and exceptionally dry, warm weather in summer.

Seasonal temperature variations are small in the Valley area of the County. Winter temperatures below 10 degrees (Fahrenheit) and summer temperatures above 100 degrees are rare. Maximum temperatures at Salem during the four summer months normally range from 74 to 82 degrees, although maximum daily temperatures as high as 110 degrees have been recorded. The normal minimum January temperature is 32 degrees. Some freezing of short duration occurs in the Valley every winter. Temperatures in the Cascades are generally cooler and the seasonal variations are greater than elsewhere in the County.

The frost-free season in most of the Valley area of the County is from April to October, a period of 180 to 200 days. At Salem, the average date of the last killing frost is April 3, and the first is November 1, making a long frost-free season (212 days). The frost-free season decreases with increasing elevations to less than 30 days at the higher elevations in the Cascades.

### Geology and Surficial Deposits

There are three major physiographic provinces within the Willamette Basin; the Coast Range, the Willamette Trough and the Cascade Range. These different physiographic areas have differing geologic structures. The Coast Range is an anticlinal uplift; the Willamette Trough is a sedimentary basin; and the Cascade Range is of volcanic origin. Both the Willamette Trough and the Cascade Range occur within Marion County.

Creation of the Willamette Valley Trough resulted from downfolding of the regional bedrock formations. At the same time, the Coast Range was being formed by an uplifting action. The resulting elongated basin (the Willamette syncline) has subsequently been filled with sediments derived from erosion of the Coast and Cascade Ranges. The syncline is not only a major element in the structural geology of Marion County, but it has also resulted in the creation of major topographical features. The bedrock of the syncline, composed of marine sediments and basalt, is exposed in the Waldo Hills and Salem Hills. The same bedrock units are also exposed in the Eola Hills of Polk County, adjacent to and west of Marion County. Between Eola Hills and the Waldo Hills, the bedrock formation bows downward, and from the Salem Hills, the resulting trough dips northeasterly out of the County.

The foregoing brief remarks concerning the structural geology of the County are intended only as a framework within which to view the following descriptive information on the major geologic formations within the County. A clearer picture of the structural geology should emerge from reading the text on the formations and by referring to the accompanying geology map. The map "Geology and Surficial Deposits" shows the geographic location within the County of the major geologic formation exposures. Also shown are two cross-sections, which indicate the stratigraphic relationships of the formations. Generally, the text describes the nature of the material in the formation and the types of soils that are developed from these materials, and also engineering and groundwater characteristics of each.

### Alluvium

This formation consists of gravels, sand, silt, clay and peat deposited in stream channels and on modern floodplains. Material sources are rock formations of the stream headwaters and all the formations through which the stream courses. Deposits within the stream channel itself are generally gravel and sand. However, within the channels of slower moving streams, the deposits are of a smaller particle size, ranging from silt to clay.

Only the Willamette and Santiam Rivers have developed significant floodplains and associated deposits. Floodplain deposits are mainly sand and silt, but may include clayey material in areas subject to back flooding and other areas of very slow moving or stagnant floodwaters.

Generally, the particle size of the sediments ranges from course to fine away from the stream channel and from fine to course from the ground surface downward.

Since this area is subject to flooding, it is usually not used for building sites. However, in addition to flood hazard limitations, much of the area has an additional characteristic, which limits the potential for buildings sites. The unconsolidated fine gravel and soils of the modern floodplain provide low foundation strength and area inadequate for moderate to heavy structures. However, a more suitable foundation material, semi-consolidated gravel, can usually be found beneath the surface materials at shallow depths.

Alluvial deposits of the Willamette River floodplain extend to a depth of about 50 to 75 feet. Moderate to large quantities of groundwater are available from this formation. Most wells tap highly permeable gravels at depths of less than 50 feet with average yields of about 500 GPM (gallons per minute). However, specific capacity ranges from about 4 GPM to as much as 700 GPM per foot of drawdown. Santiam River floodplain alluvial deposits only extend to depths of 25 to 40 feet and are composed mainly of course, highly permeable gravels, which yield large amounts of water. Well yields are frequently 500 GPM or greater.

### Willamette Silt

As can be seen from the geologic map, this formation covers an extensive area within the County. The formation extends to an average depth of about 70 feet. The formation is composed of individual stratified beds of silt, sandy silt, clayey silt and silty clay; thickness of the beds ranges from 6 inches to 3 or 4 feet. At the surface of the formation, the materials can be separated into three classifications by particle size: a clay phase, a clayey silt phase, and a silt phase.

The clay soil occurs in the French Prairie on flat, poorly drained, undissected terraces and may be from 3 to 4 feet thick to as much as 15 feet thick. Permeability in this soil is very restricted and the winter water table is nearly at the surface. During heavy rainfall, ponding may be expected. Restricted permeability is also a characteristic of the clayey silt soil, which generally occurs at the margins of the more clayey soil on flat or very gently sloping surfaces. The silt soils, located on the sloping edges of the terraces, are generally well drained. However, during the winter months, the water table will fluctuate and be very close to the ground surface during periods of heavy rainfall.

Soils within the Willamette Silt formation can generally provide adequate foundation support for light to moderate structural loads. When structural settlement cannot be tolerated, or for heavy structures, the structural load must be transferred to more suitable formations by means of pilings.

Groundwater from the Willamette Silt formation is generally adequate for domestic purposes. Most wells are completed in sand at the base of the formation. However, the primary source of groundwater is from formations, which underlie the Willamette Silts, the Troutdale Formation and the Linn Gravel.

### Linn Gravel

This formation occurs in the area west of Stayton, as shown on the geology map. As indicated by cross section B-B on the geology map, the formation also lies beneath the part of the Willamette Silt formation that occurs along the Santiam River in the southern part of the County. Generally, the Linn Gravel ranges in thickness from 30 to 40 feet. However, at Turner Gap it is over 100 feet thick. The “gravel” of this formation averages about 3 inches in diameter but often ranges up to 8 or 10 inches or more in diameter. Material composition is mostly basalt, but andesite, dacite, thuyolite, quartz and diorite also commonly occur. Layers of clay and silt occur in many areas of the gravel. Clay and silt within the interstices of the gravel acts as a cement. Where these cemented strata occur, groundwater flow and surface water drainage characteristics are greatly restricted.

This formation can be expected to produce moderate to large amounts of groundwater. Well records in the Ankeny Bottom area indicate yields of about 100 GPM at less than 50 feet. While the gravels are generally highly permeable, the clay and silt layers locally may reduce the capacity of the gravel to produce late quantities of water.

### Terrace Gravels

These gravels are the erosional remnants of gravel fans or terraces and are very limited in extent within Marion County, occurring only along the Santiam River. At the surface, the gravels are weathered to heavy impermeable clay. Patterns and outlines of the original pebbles and gravel from which the clay developed may still be distinguished. Subsurface extent of the formation is much greater than the surface exposure, and weathering has probably not been as great as at the surface. However, the characteristics may be much the same. Poor subsurface drainage is to be expected with the additional possibility of poor foundation characteristics.

### Troutdale Formation

Surface exposure of the Troutdale Formation occurs only at a few places along the Willamette River downstream from St. Paul. Because of the limited extent of surface expression, it has not been shown on the geology map. However, this formation has an extensive subsurface coverage. It underlies all of the surficial deposits of the northern part of the County, i.e. the Alluvium and the Willamette Silt formations. The stratigraphic relationship of these formations is depicted by the close sectional diagram A-A on the geology map.

Thickness of the formation varies considerably. In the northern part of the County, it has been measured and recorded on well logs as extending to depths greater than 650 feet with a thickness of about 550 feet. It is probably even thicker at the deepest part of the bedrock trough in which it lies. And as shown on cross section A-A, the formation becomes progressively thinner towards the east as it terminates against the Waldo Hills and Silverton Hills.

These sediments consist mainly of layers of clay, silt, sand and gravel alternating with locally cemented gravel and conglomerate. Because these sediments are mainly coarse grained and

have a high water-holding capacity, and because they cover such a large area, this formation is one of the major groundwater supply units in the Willamette Valley.

The whole area has excellent potential for development of moderate to large quantities of groundwater from wells. Variability in quantity is due mainly to the nature of the sedimentary layer being tapped with the higher quantities coming from beds with a high percentage of gravel. Through the study of well log records this formation has been divided into two major units according to the percentage of gravel occurring with the area. An area of 25% or less gravel content occurs in a triangular-shaped area bounded by St. Paul, Donald and St. Louis. The remainder of the area, from Salem northeasterly to Aurora, is composed of material, which is from 25% to 100% gravel.

Well depths in the St. Paul-Donald sub-area are usually in the range of 100 to 200 feet and are completed in sand or fine gravel. Yields are ordinarily greater than 100 GPM and many wells yield 500 GPM or more. A few wells have yields greater than 1,000 GPM. In the Salem-Aurora subarea, well logs indicate the coarse gravel or gravel and sand layers exist at depths ranging from 100 to 200 feet. Wells completed within these layers can be expected to yield moderate to large quantities of water. Common yields are 500 GPM or over, with some wells producing as much as 1,600 GPM.

#### Columbia River Basalt

This bedrock formation is exposed extensively in the Salem Hills south of Salem, in the Waldo Hills east of Salem, and in the Silverton Hills south of Silverton. As can be seen from both geologic cross sections, this formation is underlain by marine sedimentary rocks. General composition of the formation is of basaltic lavas as the name implies. However, there are also thin inter-beds of sedimentary rocks in addition to the lavas. Thickness of the Columbia River Basalt formation ranges from 200 to 600 feet.

Fresh basaltic lava is hard and blue black in color and has a characteristic jointed pattern. Weathering of exposed basalts results in red clay. The amount of weathering that has taken place in the basalts within the County varies considerably from place to place. In some areas, the red clay extends to depths of 30 feet and occasionally to 60 or 70 feet. Other areas appear to be only slightly weathered at the surface. Large, rounded residual boulders are likely to exist at the surface and in the subsurface where the weathering has been deep.

Groundwater tables within the basaltic lavas are largely perched above the valley water table, As an aquifer, the lavas may be expected to yield low to moderate amounts of water. High yields of several hundred gallons per minute (to as much as 1,000 GPM in a few instances) are generally obtained in rubbly interflow zones. However, yields are usually in the 10 to 30 GPM range. Development of this aquifer in the Salem Hills has been heavy, and because of low storage capacity, it is now subject to over-development.

## Marine Sediments

Exposure of this bedrock formation occurs only on the westerly to southerly facing escarpment of the Salem Hills, and in some locations in the Waldo and Silverton Hills east of Salem. Subsurface coverage is extensive. The marine sedimentary rocks are present throughout the entire Willamette Valley and, as shown by the geologic cross sections, they generally occur beneath the Columbia River Basalt. Total thickness of the sedimentary rocks may be more than 7,000 feet.

Composition of the sediments is largely sandstone, shale, and siltstone, which is made up of a considerable amount of volcanic ash. The rocks are well consolidated and hardened. At ground surface to several feet into the subsurface, the rocks are frequently weathered to heavy plastic clay, which is quite impermeable and subject to landslides.

Only small amounts of groundwater are available from the marine sediments. Groundwater occurrence is generally limited to the fractures and joints in the shale bedrock. Wells usually produce less than 5 GPM but occasionally will yield 20 GPM or more. In some areas, the water is saline or has high sulfur content and is unusable.

## Fern Ridge Tuff

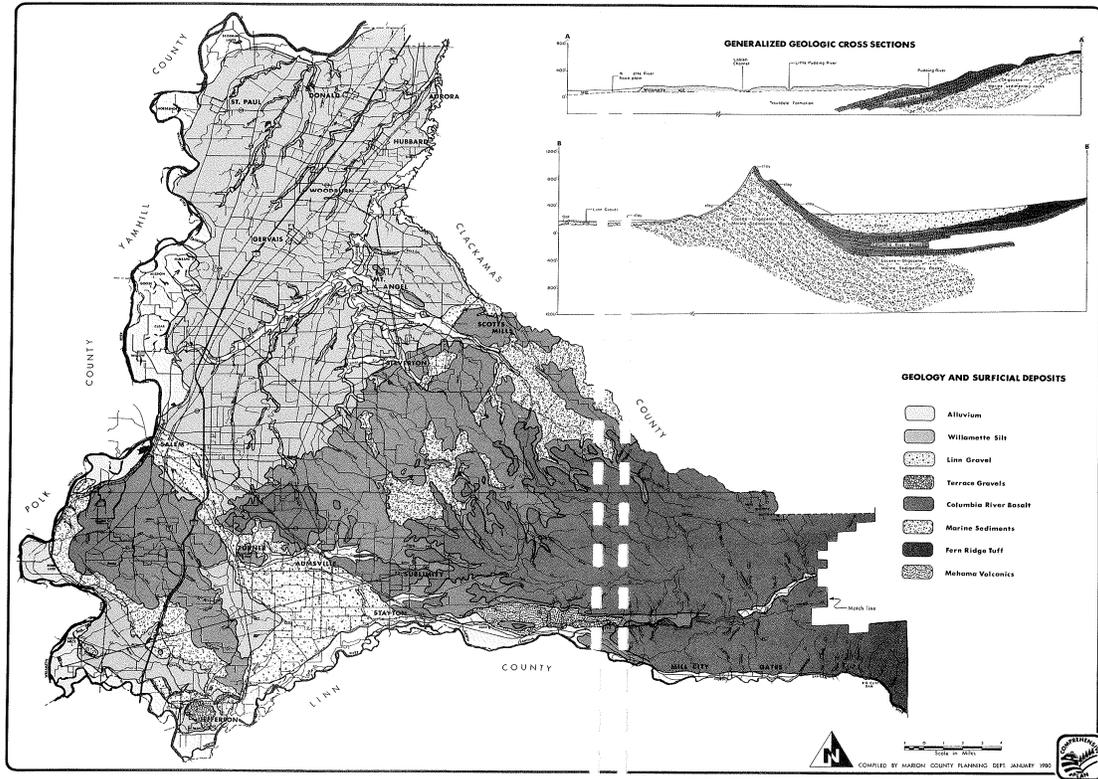
Fern Ridge Tuff is exposed in the hills north and to the east of Stayton. Composition is mainly of volcanic ash and pumice, which occur in the form of Breccia, sandstone, pebble beds and conglomerates. Surface weathering of this material results in a heavy impermeable clay, which is often several feet thick. Beneath the surface, the tuff is usually hardened. In some isolated areas of the formation, platy andesitic lavas occur within the upper segments. However, these lava overlays may be thin.

Groundwater availability is somewhat variable according to the Willamette Basin Hydrology study.<sup>1</sup> Within the Fern Ridge formation water yields of about 50 GPM at depths ranging from 100 to 300 feet may be obtained. Yields from the Columbia River formation where it underlays Fern Ridge range from 100 to 1,000 GPM also at 100 to 300 feet deep.

## Mehama Volcanics

These rocks are exposed at locations adjacent to the North Santiam River east of Mehama. Stratigraphically, they are located beneath the Columbia River Basalt in this area. Exposed thickness of the formation varies between 300 and 400 feet, but the total thickness is much more. Rock types within the formation vary from lava to volcanic ash. Careful exploration is needed to locate the most favorable sites for wells. Yields of 50 GPM may be found at depths ranging from 100 to 300 feet.

<sup>1</sup> Willamette Basin Comprehensive Study, Water and Related Land Resources, Appendix B Hydrology, 1969, Willamette Basin Task Force, Pacific Northwest River Basins Commission



## NATURAL RESOURCES INVENTORY

### Soils

The geological formations described in the previous sections have provided the major sources of parent material from which the soils of Marion County have developed. Length of time the material has been exposed to weathering and variations in climate, topography, and vegetation are other factors involved in the soil development process. The many different variables involved in the development process have resulted in many different types of soil, each with different properties. The differences in properties result in differences in use, suitability and management needs, problems and potentials. Knowledge of the properties is important in determining how a soil can be best used.

To permit general analysis of the potential uses and limitations of soils for urban and rural uses, the Soil Conservation Service has grouped individual soils into associations of soils. In Marion County, the 89 individual soils identified by the Soil Conservation Service have been grouped into 11 soil associations. A soil association may be described as a group of soils that are geographically associated in a repeating pattern on the landscape. An association consists of one or more major soils and at least one minor, often contrasting, soil and is named for the major soils. The soils in one association may occur in another but in a different pattern and proportion.

This soil association information is intended only to give a very generalized picture of the soils in the County and the relationship of soils to landform areas. The soil associations are grouped into four basic landform-general soils areas which are: (1) Alluvial Bottomlands, (2) Alluvial Terraces, (3) Low Foothills and (4) Cascade Mountain Foothills. The following is a discussion of these soil groups and their relative soil associations and is a summary of the descriptions contained in the Soil Survey for Marion County.

Soils in Marion County have been mapped, described and analyzed by the Soil Conservation Service in a soils report written jointly with the Oregon Agricultural Experiment Station. The report is written primarily as an agricultural management oriented analysis, however, it also contains valuable data on woodland suitability, development hazards and limitations and engineering properties. This report provides generalized and detailed soil mapping and analysis by soil association and individual soil type.

### Soil Associations

Soil associations are shown on the map "General Soils" and are useful for larger area analysis and planning for community development, public services, recreational facilities, wildlife areas, watershed management, etc. General soils data is used in the preparation of the Comprehensive Plan to determine land resource goals and apply use designations to the various areas of the County.

**Alluvial Bottomlands** - These soils are on bottomlands of the Willamette River and its tributaries and on former lakebeds. They have formed in alluvial and lacustrine materials and are nearly level. Drainage ranges from excessive to very poor but nearly one half of the acreage is well drained. Flooding is a hazard in many places and in some areas the water table is high during winter months. There are three soil associations in the group.

1. Cloquato-Newberg-Chehalis Association. This association consists of nearly level and gently undulating soils that formed in mixed alluvium on bottomlands of the Willamette River and its tributaries. The areas are traversed by numerous meandering sloughs and overflow channels. Elevations range from 100 to 650 feet. The annual precipitation is 40 to 45 inches, the annual air temperature is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 200 to 210 days. In areas that are not cultivated, the vegetation is mainly alder, ash, cottonwood, oak, maple and Douglas Fir; grasses; and wild blackberry, rose and other shrubs.

Cloquato, Newberg and Chehalis soils are dominant. The rest of the association consists of small areas of Camas soils, alluvial land and of McBee and Wapato soils. All of the soils are deep and are subject to frequent overflow.

Soils of this association are used mainly for small grains, pasture, hay, orchards and grass grown for seed, but vegetables and berries are grown when some areas are irrigated. A protective cover of plants is needed on the Cloquato, Newberg and Camas soils in winter and early in spring when most flooding occurs.

Wildlife is abundant on these soils. The sloughs are inhabited by ducks, geese and fish and enough browse and other plants are available to provide food and cover for quail, pheasant, rabbit and deer.

This association is well suited to use for development of recreational facilities. It is easily accessible, is near populated areas and has readily available water for recreational, domestic use and irrigation.

Where soils are protected from overflow their engineering properties make them moderately well suited to development as sites for roads, trails and buildings. The Camas soils are an excellent source of gravel.

2. Wapato-Bashaw-McBee Association. This association consists of nearly level soils in low, backwater areas of floodplains that are subject to frequent overflow. It is traversed by sloughs and overflow channels. The soils have formed in moderately fine textured and fine textured alluvium and they occur at elevations of 100 to 650 feet. The annual precipitation ranges from 40 to 45 inches, the annual air temperature is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 200 to 210 days. In areas that are not cultivated, the vegetation is mainly grasses, blackberries, sedges, rushes, willows, ash trees, oaks, maples and alders.

The association occupies about four percent of the survey area. Wapato, Bashaw and McBee soils are dominant. The rest of the association consists of minor areas of Chehalis, Cloquato and Labish soils.

This association is poorly suited to use for development of recreational facilities, even though it is near populated areas and is readily accessible. The soils have engineering properties that make them poorly suited to development as sites for roads, trails and buildings. Flooding is a hazard in most years.

3. Labish-Semiahmoo Association. This association consists of nearly level soils on the bottoms of former lakes, mainly on the Labish Bottom. Some of the soils have formed in mixed mineral and organic mineral and others have formed in organic material. Elevations range from about 130 to 175 feet. The annual precipitation is 40 to 45 inches, the annual air temperature is 52 to 54 Fahrenheit and the length of the frost-free season is 200 to 210 days.

Where these soils are drained they are well suited to crops and they have high value. Areas that are not drained and that are not protected are subject to flooding. In the past onion growers risked serious losses by planting their crop in areas subject to flooding. Dikes and a pumping unit are now used to overcome this hazard.

Soils of this association are intensively managed for crops. Therefore, little food or cover is available for wildlife. The high value of the soils makes it unlikely that greater encouragement will be given to wildlife in the future.

This association is poorly suited to use for development of recreational facilities. The soils also have engineering properties that make them poorly suited to development as sites for roads, trails and buildings.

**Alluvial Terraces** - These soils are on alluvial terraces. They occupy a fairly broad belt that lies between areas of alluvial soils on bottomlands and areas of soils on low foothills. Silty soils occupy a large acreage and clayey and gravelly soils occupy small tracts. Elevations range from 100 to 650 feet. The annual precipitation is 40 to 45 inches.

4. Woodburn-Amity-Willamette Association. This association consists of soils that occupy areas of Willamette silts above the bottomlands of the North Santiam, Santiam and Willamette Rivers. These soils are dominantly nearly level to rolling and they have formed in silty alluvium of mixed mineralogy. Elevations range from 150 to 350 feet. The annual precipitation is 40 - 45 inches, the annual air temperature is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 190 to 210 days. In areas that are not cultivated the vegetation is mainly grasses, shrubs, hardwoods and Douglas Fir.

Obtaining water for irrigation is probably the most limiting factor to the use of the soils for growing vegetables and specialty crops. Nevertheless, water can generally be obtained from wells without lowering the water table. In some areas ponds and dams have been constructed to provide places for storing irrigation water. As a result, enough water is available for irrigation in those places so that the damaging effects of dry weather in summer are overcome. In most places the soils are not well suited to use for constructing either the reservoir area or the embankment of a pond. Therefore, choosing the site for a pond requires care.

All of the soils, except the Willamette, have a perched water table in winter and early spring. For these wet soils, drainage is needed. Natural drainage ways throughout the association provide adequate outlets for artificial drainage and response to artificial drainage is good.

Abundant food and cover are available for game birds. The association is readily accessible and is close to populated areas but it is not well suited to use for development of recreational facilities. The soils have engineering properties that make them only moderately well suited to development as sites for ponds, dikes, roads and buildings.

5. Concord-Dayton-Amity Association. This association consists of soils in nearly level areas, in depressions and in shallow, imperfectly developed drainage ways. It is mainly on divides between the drainage areas of the Little Pudding, Pudding Rivers, Champoeg and Mission Creeks. The soils have formed in silty and clayey alluvium and they occur at elevations of 125 to 350 feet. The annual precipitation is 40 to 45 inches, the annual air temperature is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 190 to 210 days. In areas that are not cultivated the vegetation is mainly grasses, sedges, rushes, shrubs and hardwoods.

This association is dominated by Concord, Dayton and Amity soils. Holcomb soils make up an additional five percent and other minor soils make up the rest. The Amity soils occur at the highest elevations in the association and the Dayton soils, at the lowest.

The major soils of this association are used mainly for small grains, pasture, hay and grass grown for seed. The soils contain a perched water table and water ponds on the surface during wet periods in winter and spring. Drainage is needed if crops are to grow well. Both drainage and irrigation are needed for many crops and they would benefit all crops that are presently grown.

Obtaining enough water for irrigation and other purposes is difficult in summer, but supplemental water has been provided by constructing a few farm ponds. These soils are poorly suited to use for ponds or dams, however, and natural sites for dams are few. Therefore, if a pond is to be constructed, care must be used in choosing a site.

Abundant food and cover are available for game birds. The association is readily accessible and is near populated areas but it is not well suited to use for development of recreational facilities. The soils have engineering properties that make them poorly suited to use as sites for buildings and roads.

6. Clackamas-Sifton-Salem Association. This association consists of nearly level soils on low terraces in the Stayton Basin and along Mill Creek between Turner and Salem. It is traversed by a network of shallow drainageways. The soils have formed in gravelly alluvium and they occur at elevations of 100 to 650 feet. The annual precipitation is 40 to 45 inches, the annual temperature is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 200 to 210 days. In areas that are not cultivated the vegetation is mainly Douglas Fir, brackenfern, shrubs and grasses.

Clackamas, Sifton and Salem soils are dominant. Courtney soils make up nearly 19 percent and minor areas of Abiqua and Willamette soils make up the rest.

This association is moderately well suited to use for development of recreational facilities. Where adequate outlets are provided the Clackamas soils are easily drained. The Salem and Sifton soils are already suitable as sites for camping and for roads and, for the most part, construction of roads and trails is fairly easy. This association is in an irrigation district and water for recreation and domestic use is available.

**Low Foothills** - These soils are on low foothills, generally between alluvial terraces and the foot slopes of the Cascade Mountains. They are known as red hill soils. Most of these soils have clayey horizons below the surface layer. They are mainly underlain by basalt but the soils in rather large areas are underlain by sedimentary bedrock. Drainage is moderately good or good. Elevations range from 250 to 1,000 feet and the annual precipitation ranges from 40 to 60 inches.

Two associations are in this group. The soils of these associations are used mainly as woodland or are farmed. In the wooded areas, Douglas Fir is the dominant species but oak grows on some of the soils.

7. Steiwer-Chehulpum-Hazelair Association. This association is on low foothills that border the Salem Hills on the south and west. The soils have formed in sedimentary material. Thickness of the surface deposit varies but this material is thickest on the floor of the valley and it is thinner towards the red foothills. Elevations range from 250 to 650 feet, annual precipitation ranges from 40 to 60 inches and the annual air temperature is 52 to 54 degrees Fahrenheit. Length of the frost-free season is 190 to 210 days. In areas that are not cultivated the vegetation is mainly oak, rose, poison oak and grasses.

Steiwer, Chehulpum and Hazelair soils are dominant but the association also contains minor areas of Chehalem, Silverton and Nekia soils.

Quail, pheasant and other kinds of small game birds and game animals are plentiful. Wildlife can find abundant food and cover and they can generally obtain adequate water from streams and from irrigation ditches in adjacent associations. The numbers of small game animals and game birds could be increased by building low dams for impounding water and improving the habitat for waterfowl.

This association offers some possibilities for recreation. It contains scenic areas and favorable sites for dams and the soils are too rolling to be well suited to intensive use for cultivated crops. The soils are fairly suitable as sites for buildings and they also are fairly suitable as sites for roads and trails. Lack of adequate water for irrigation is the most limiting factor to use of these soils for some purposes.

8. Nekia-Jory Association. This association consists of soils on uplands of the Salem and Waldo Hills. The soils in the vicinity of the Salem Hills, south of Salem, are moderately steep and have been deeply dissected by streams. Those on the Waldo Hills to the east are mostly gently sloping and moderately sloping but they are steep where breaks occur in areas dissected by the major streams. One large area of the association in the Waldo Hills extends northward from the North Santiam River to Butte Creek. It extends eastward to the foot slopes of the Cascade Mountains and parallels the foot slopes of those mountains. Between Turner and Salem this association is dissected by areas of gravelly soils on terraces along Mill Creek.

Soils of this association have formed in colluvium from basalt and tuffs and they are among the oldest in the survey area. Elevations range from 300 to 1,000 feet. The annual precipitation is 52 to 54 degrees Fahrenheit and the length of the frost-free season is 190 to 210 days. In areas that are not cultivated the vegetation is mainly Douglas Fir but it includes scattered oaks and an understory of poison-oak, rose and brackenfern.

Nekia and Jory soils are dominant. Minor areas of stony rock land and of Salkum, Abiqua, Waldo, Stayton, Silverton, Santiam and Witzel soils make up the rest.

Soils of this association are used mainly as woodland and for small grains, orchards, pasture, hay and grass grown for seed. Some areas that are irrigated are used mostly for specialty crops and vegetables. Moisture is adequate for growing most field crops but supplemental irrigation is needed for best returns if vegetables and specialty crops are to

be grown commercially. Many areas are suitable for small ponds that could be used for storing irrigation water and a few sites are suitable for large dams. If cultivated, the steeper soils are subject to erosion but erosion is easily controlled.

Many features make this association suitable for development of recreational facilities. If large dams were constructed, water could be impounded for use for boating and fishing and also as habitat for waterfowl. The soils are suitable as sites for buildings and they are fairly suitable as sites for roads and trails. In most places groundwater is available for domestic use. Most of the areas have sites suitable for storing a limited supply of water for irrigation.

**Cascade Mountain Foot Slopes** - These soils are mostly steep or very steep. They are on foot slopes of the Cascade Mountains in the rugged eastern part of the survey area. Some of the soils are on ridges and others occupy long slopes that are dissected by numerous streams. The soils occur at elevations of 800 to 5,000 feet. Those at the lower elevations are clayey and those at the higher elevations are loamy. The annual precipitation ranges from 55 to 90 inches.

Three associations are in this group. They are mostly wooded but some of the areas at the lower elevations are farmed. Douglas Fir and hemlock are the principal species of trees growing at the higher elevations.

9. McCully Association. Part of this association consists of gently sloping to moderately steep soils on broad ridges. The rest consists of steep or very steep soils on breaks, where streams have deeply dissected the area. The soils have formed in till and colluvium and they occur at elevations of 800 to 2,000 feet. The annual precipitation is 55 to 75 inches, the annual air temperature is 48 to 51 degrees Fahrenheit and the length of the frost-free season is 165 to 190 days. In areas that are not cultivated the vegetation is mainly Douglas Fir, hemlock, vine maple, maple and brackenfern as well as salal, snowberry and other shrubs.

The McCully soils make up about 90 percent of the acreage, Hullt soils make up about five percent, Cumley soils about three percent and other minor soils about two percent.

Soils of this association are used mainly as woodland and for small grain, pasture, hay and grass grown for seed but a few areas are used for strawberries and orchards. About half of the association is wooded or has been cut over. Moisture is adequate for growing most field crops but supplemental water is needed for vegetables and berries. Few suitable sites are available for either large or small dams.

Wildlife is abundant. Quail, pheasant and grouse are numerous and deer are so plentiful that many cultivated fields are fenced to keep the deer out. During dry summers additional water is needed for wild game birds.

This association offers good possibilities for development of recreational facilities. It contains scenic areas, is not densely populated and is adjacent to timbered uplands that are not suitable for cultivation. Fishing and hunting are available and additional facilities

for boating and fishing could be provided. The soils are suitable as sites for buildings and for camping and are fairly suitable as sites for roads and trails. Water for domestic use is available from wells.

10. Kinney-Horeb Association. Some soils of this association are on broad, irregular ridges that are dissected by streams. Others occupy long slopes that end in abrupt, short breaks leading to the basin area adjacent to streams. The soils are gently sloping to very steep and they have formed in till and colluvium. Elevations range from 1,00 to 3,500 feet. The annual precipitation is 60 to 90 inches, the annual air temperature is 46 to 50 degrees Fahrenheit and the length of the frost-free season is 120 to 165 days. In areas that are not cultivated the vegetation is mainly Douglas Fir, hemlock, alder, salal, vine maple, brackenfern, swordfern and rhododendron. Kinney and Horeb soils are dominant.

Nearly all of this association is used for growing Douglas Fir. Most of the association is in large tracts held by private timber companies and logging companies but a few, small, scattered tracts are federally owned or are owned by the State or the County. A few farms, used mainly for the raising of livestock and for growing timber, are located along the North Santiam River.

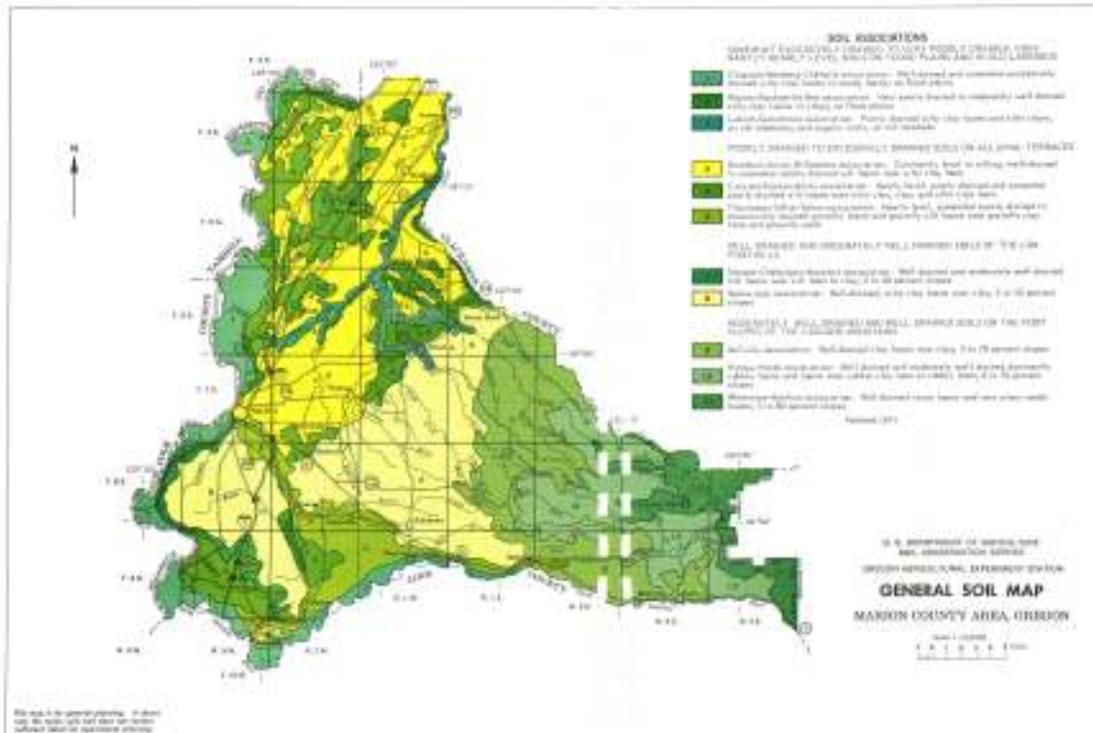
Soils of this association are poorly suited to farming. The Kinney soils are too cobbly for cultivation and the growing season is shorter than in association 8. In addition, the nights are cool enough that crops do not mature until after rains have started in fall. Controlling erosion has not been difficult under past land use.

This association offers little opportunity for recreation. It is near populated areas and is accessible but because of the risk of fire, most of the area is closed to the public in summer. Furthermore, although winters are rather mild, low clouds and haze obscure the beauty of scenic areas and the snow cover is generally inadequate for winter sports. Few sites are suitable for dams of any size.

11. Whetstone-Henline Association. This association occupies the middle slopes of the Cascade Mountains. It extends in a broad strip, probably to the foot slopes of Mt. Jefferson, which lies east of the survey area. The association is characterized by sharp, knife-like ridges having side slopes that plunge abruptly to basins or bottoms along streams. The soils have formed in colluvium and till. Elevations range from 3,000 to 5,000 feet. The annual precipitation ranges from 70 to 90 inches, the annual precipitation ranges from 70 to 90 inches, the annual air temperature is 41 to 45 degrees Fahrenheit and the length of the frost-free season is 90 to 100 days.

All of this association is in large timbered tracts that are privately owned, federally owned or State owned. The association is covered with snow in winter and spring and the cool climate and large amount of moisture make use and management of the soils difficult. None of the acreage is cultivated for the soils are too stony and steep for cultivation. Under proper management the soils are moderately well suited to Douglas Fir, silver fir and hemlock.

This association offers only limited opportunities for recreation. The area is closed to the public during the time when fires are most prevalent. In winter it is mostly inaccessible, although a few logging roads and fire roads have been constructed along the larger streams. The snow cover is adequate for winter sports, but the terrain is unsuitable in most places.



### Individual Soil Type Analysis

All of Marion County west of the National Forest lands is included in the soil report. In addition to the generalized soil analysis, the report is primarily oriented to the mapping and analysis of individual soil types. Each of the 89 soil types have separate and distinct characteristics that result in different use management considerations. Individual soil type data are used extensively and are important criteria in making decisions on area-wide planning as well as specific property land use change applications. The Soil Conservation Service report contains several analyses of each soils capability to be used for agriculture, forestry, development related activities, as well as a description of the engineering properties of each soil. The following is a discussion of the soil suitability for agricultural use. For details on this analysis see the report text.

### Soil Suitability for Agriculture

Soil suitability for agricultural use naturally varies from place to place and from soil type to soil type. Knowledge of the potentials and limitations of each soil for agricultural use (as well as for other uses) is quite important in resource planning. The total soil acreage available for agricultural use is being reduced in Marion County. Therefore, common sense indicates that

conservation of the “best” agricultural soils is an extremely important objective. Another equally important objective is the conservation of the “best” agricultural areas; that is, areas which not only contain soils of high productivity and natural agricultural suitability, but also are well suited in relation to necessary transportation facilities, processors, labor supply, water, etc., and are relatively free from non-farm uses which would interfere with efficient farming practices. The agricultural land preservation issue is discussed later in this report and in the Plan Policy Document.

As part of the County soil survey, each soil in the County has been analyzed and classified according to its suitability for agricultural use. The Soil Conservation Service classification system uses eight land capability classes. Soils categorized within each class exhibit the same general potential and limitations for sustained production of those common cultivated crops, which do not require specialized site conditioning or site treatment. The risk of soil damage or limitation in use becomes progressively greater from Class I to Class VIII. Within each class, sub-groups are established according to the major causes of limitation; these include: (e) for erosion hazard because of slope or textural quality, (w) for wetness because of drainage conditions or overflow, and (s) for root zone limitations because of soil qualities.

The soil types have been depicted on the map “Soil Suitability for Agriculture”, in three categories of soil class. The first two groups include soil Class I through Class IV which includes the most productive soils for agriculture. The third group of Class V through Class VIII is the marginal or less productive soil types and are generally considered non-farm lands. There are no soils in Marion County in land capability Class V. Some soils in the national forest area of the County are most likely Class VIII soils, but information is not currently available for that area. The following discussion from the Soil Conservation Service general soils report describes the land capability classification system used for Marion County.

Class I soils have few limitations that restrict their use and are excellent for cultivated crops. Class II soils have some limitations that reduce the choice of plants or require moderate conservation practices and are good for cultivated crops. Class III soils have severe limitations that reduce the choice of plants or require special conservation practices or both. They are fair for cultivated crops. Class IV soils have very severe limitations that restrict the choice of plants, require very careful management, or both. They are poor for cultivated crops. All four capability classes also can be used for pasture, woodland, and wildlife food and cover. Class VI soils have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture, woodland, or wildlife food and cover. Physical conditions are such that pasture and woodland improvements can be made if needed. Class VII soils have very severe limitations that make them unsuited for cultivation and that restrict their use largely to grazing, woodland or wildlife. Physical conditions are such that it is impractical to apply improvements. Soils and landforms in Class VII have limitations that prohibit their use for commercial plant production and restrict their use to recreation, wildlife, water supply and aesthetic purposes.

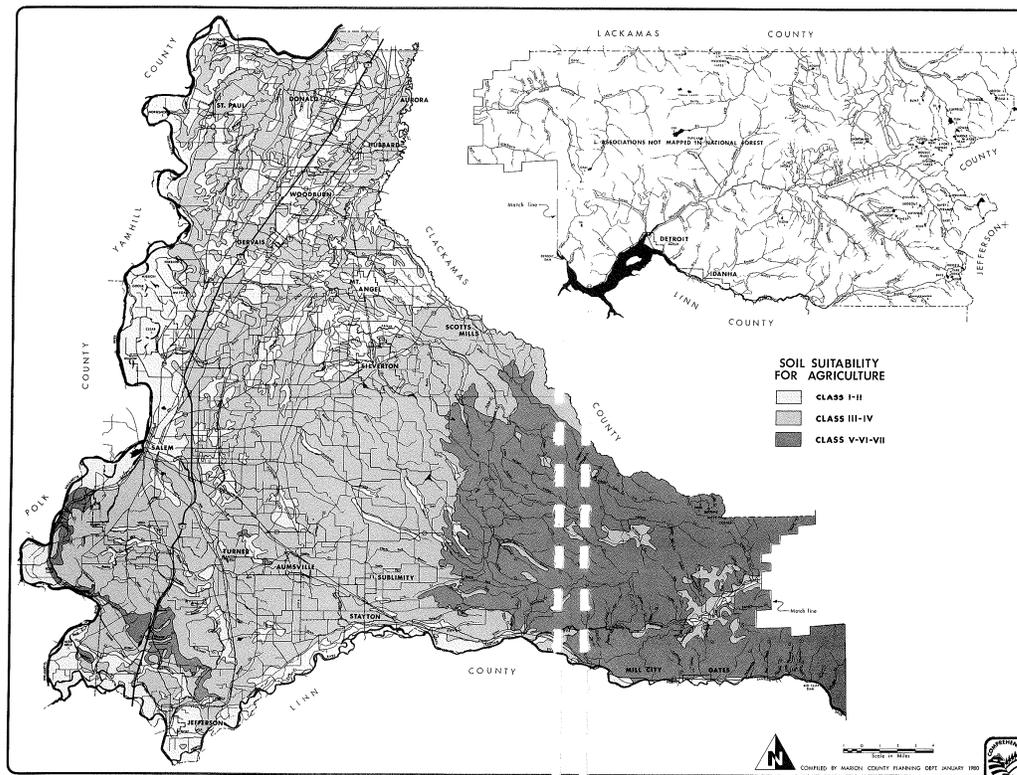
The SCS land capability classification system is applied to and categorizes individual soils, not soil associations. Consequently, in order to map land capability class information based on soil associations, it was necessary to convert and generalize the information on individual soils. The “Soil Suitability for Agriculture” map shows soil suitability for agriculture as they have been

grouped into the expanded soil associations, numbering 23. This map provides an overview of agricultural suitability for generalized planning purposes only. For a more detailed analysis of individual soil class for agriculture, the County Planning Department has developed subarea soil maps that are on file in that office.

The LCDC Agricultural Lands Goal No. 3 relies very heavily on the agricultural soil classification as the basis of the County's agricultural lands preservation program.

Though the Marion County Soil Survey has mapped individual soil types at a property specific scale, it may occasionally be necessary to have a more specific analysis done for an individual parcel when a specific development proposal is made. Soil types can be intermingled to the point that the Soil Conservation Service survey may not have shown them individually and aggregated them under one soil type. The mapping survey was not accomplished on the basis of on-site survey, therefore, a more specific survey may reveal a more refined and detailed soil pattern.

When an individual wishes to obtain a detailed soil study it will be necessary to consult with a reputable, qualified soil scientist to perform the study. Marion County will rely on the Soil Conservation Service representatives to help determine the adequacy of any detailed study.



## **WATER MANAGEMENT PLAN**

A separate “Water Management Plan” has been adopted as part of the County Comprehensive Plan, by reference. Goals and policies included in the Water Resources Planning section of the Comprehensive Plan are part of the overall guidance for county land use decisions developed from the information presented in the Water Management Plan.

Additionally, the County Board of Commissioners adopted a “Groundwater Resources” section to the Comprehensive Plan in 1997. That adoption also included background documentation and a zoning ordinance chapter, the “Sensitive Groundwater Overlay Zone”.

For more information, see the “Marion County Water Management Plan”.

## **WATER RESOURCES**

### **Surface Water**

The average annual precipitation in the Willamette Basin is 63 inches. This results in a volume of more than 40 million acre feet of water falling on the basin each year. In Marion County, the annual rainfall ranges from 40 inches in the Salem area to over 130 inches per year in some parts of the Willamette National Forest.

The eastern border of the County reaches the crest of the Cascade Mountains. This area of the County receives the greatest amount of rainfall and runoff here forms the headwaters of a complex stream and river system. These streams make their way into one of three major sub-basins of the Willamette Drainage Basin. These three basins are:

1. The Clackamas River Basin, which includes only a small area in the northeastern portion of the County;
2. The Santiam River, which forms the southern border of the County;
3. The Pudding River Basin, which runs parallel to the Willamette and joins it just north of Aurora.

A map of the Middle Willamette Drainage Basin that includes the three basins was prepared by the State Water Resources Department in 1977. This map is available for review in the Planning Department office and it illustrates all of the significant surface water features in the County.

The yields of Cascade streams reflect the impact of winter precipitation, occurring largely as snowfall. The average flow increases through the fall months, peaks initially in December, maintains a high flow through May and then subsides gradually.

Flooding is of obvious concern during the winter months. The danger of flooding along the Santiam and Willamette Rivers has been significantly reduced due to upstream control of flow conditions. Peak runoff can be stored in Detroit Lake and other reservoirs along tributaries of the Willamette and the water can later be released when the threat of flooding has subsided.

Drainage is a problem in flat-lying areas of the Willamette Valley portion of the Pudding Sub-basin, where the many areas identified in the Soils Survey for Marion County need artificial drainage. Large-scale irrigation is likely to aggravate this problem.

The marked decline in stream flow during the summer months is of critical concern to water quality management planning. Low stream flows are associated with high water temperatures, relatively high concentrations of nutrients, low dissolved oxygen and algae growth. These conditions are harmful to fish and would reduce their populations significantly if allowed to continue. Upstream reservoirs augment diminished flows to maintain a minimum supply of water for fish and wildlife recreation, irrigation, municipal uses and the assimilation of waste effluents released from sewage treatment plants.

In cooperation with the Department of Environmental Quality, the Mid-Willamette Valley Council of Governments has undertaken a study of water quality management and water pollution control (see pp. 112 in the Marion County Comprehensive Plan). Data has been incorporated into a technical study to help define the role that population growth, economic development, and related land uses play in analyzing local and regional water quality problems. The data will also be used to help on going and anticipated facility planning efforts into an area wide planning philosophy to achieve cost effective solutions to local and regional water quality problems.

Intensive forest management practices and soil conservation techniques are essential to maintain high water quality downstream. Clear-cut lands must be quickly restored to prevent erosion, flooding and excessive reservoir siltation. As streams flow through forested areas, and on downstream, the water should remain cool, clear, free of sediment and debris and low in biological contamination to meet municipal, recreation and anadromous fishery demands. Agricultural lands, especially in the foothills areas of the County, should also be managed in a way that will maintain adequate surface water and groundwater quality.

### Groundwater

Several groundwater studies have been completed for portions of Marion County by the US Geological Survey and the State of Oregon. An additional report prepared by the Pacific Northwest River Basins Commission serves as a summary of the information available for the County. This report indicates that the quantity and quality of the groundwater resource in the County is generally satisfactory to excellent. Some potential problem areas are discussed in this report but specific information relating to their extent and possible solutions are not identified. The following paragraphs describe the current groundwater conditions for each of the three sub-basins in the County.

In French Prairie, groundwater in storage within 200 feet of the surface is estimated to be about three million acre feet. In the same area, it is estimated that annual replenishment to the aquifer is about 160,000 acre feet; eight times the present rate of pumping. For most of the Pudding Sub-basin, no evidence of over development, such as declining water levels, has been noted. For the valley area, withdrawals are much less than estimates of recharge; therefore, pumpage in the Sub-basin could be increased several times.

Groundwater is abundant in the Willamette Valley portion of the Pudding Sub-basin with small to moderate quantities in the foothills and small quantities in the mountains. Groundwater is used for irrigation of nearly 34,000 acres; for the municipal supply of 14 communities with a combined population of more than 17, 000; and for the domestic supply of most of the rural and suburban homes in the sub-basin.

The Pudding Sub-basin has some of the best groundwater reservoirs in the Willamette Basin, but it also has a number of groundwater problems. In some parts of the foothills and mountains, groundwater at shallow depths is not adequate for domestic and stock supplies. Mutual interference between wells is a problem in several areas of concentrated pumping near Woodburn. In the foothills north of Stayton and Turner, where a number of irrigation wells pump large quantities of water from the basalt aquifer, water levels have been declining for several years, which indicate that the aquifer is locally overdeveloped.

There is generous supply of groundwater in the Santiam Sub-basin. More than 1,000 wells supply water to irrigate about 27,000 acres. In a small area in the loop of the river southeast of Jefferson, yields of irrigation wells are reported to decline during pumping season. Part of the decreased yield can be traced to deterioration of the wells and does not seem to be due to over development.

Groundwater is abundant in that portion of the Clackamas Sub-basin, which is included in Marion County. The entire area, however, is within the National Forest and it is doubtful that the water will ever be used extensively.

### Municipal Water Systems

The Pudding and Santiam River basins represent the two basic sources of water for all of the municipalities in Marion County. Wells are the primary method for obtaining water in the Pudding River Basin. Of the 11 cities in the basin, only two rely on surface water. Scotts Mills draws on Butte Creek for supplemental supply in the summer months and Silverton takes water from Abiqua and Silver Creeks. Surface water is the main source of supply for those municipalities in the Santiam River basin. The cities of Detroit and Idanha obtain water from tributaries of the North Santiam River. The City of Jefferson is the only city in the basin relying totally on a well. All other cities, including Salem, divert water from the North Santiam River. Available information from the cities, State Department of Water Resources, State Department of Environmental Quality, and State Health Division, does not indicate any water quality problems that are related to land use and development in the County. The State Health Division has indicated that Scotts Mills, Idanha, Detroit and Gates, have experienced some water quality problems but they appear to be related to improper treatment, not poor water supply. Water service is a primary public facility for each city and the status and planning for each is included in the respective Comprehensive Plan. There are no apparent land use conflicts associated with any city well systems. Potential land use conflicts with surface water systems for each waterway are discussed below:

### Butte Creek

This watershed encompasses portions of Marion and Clackamas Counties. Scotts Mills is the only city in Marion County that utilizes water from the Creek. A spring and two wells represent the primary source of supply and Butte Creek is only used on a temporary basis to meet summer peak demands. The entire watershed is zoned for resource use (FT, Farm/Timber, and TC, Timber Conservation, in Marion County and EFU-20, Exclusive Farm Use and TT-20, Transitional Timber, in Clackamas County).

### Abiqua and Silver Creeks

These two adjacent watersheds provide water for the City of Silverton. Water is diverted from Silver Creek Reservoir and Abiqua Creek southeast of the intersection of Timber Trail and South Abiqua Road. Both watersheds are predominantly zoned for resource use (FT, TC, and EFU). Approximately 790 acres of land is zoned AR (Acreage Residential) which allows for the creation of rural homesites that are generally 1.5 to 3.0 acres in size. An additional 210 acres is zoned AR-5 (Acreage Residential-5 acre minimum). The areas zoned AR recognize existing development and although additional homesites can be expected, the potential for significant numbers of new residences is limited.

### North Santiam River and Little North Fork

The North Santiam watershed is divided almost equally between Marion and Linn Counties. The portion of the basin in Linn County is primarily designated and zoned for agricultural and forestry use. In addition, over half of the watershed is under the control of the Willamette National Forest and the Bureau of Land Management.

Salem, Stayton, Lyons (Mehama), Mill City, and Gates, all utilize water from the North Santiam River for domestic use. None of these municipalities divert water directly from the Little North Fork but it is a tributary of major importance for Salem and Stayton. The majority of these watersheds are zoned for resource use (SA, EFU, FT, TC) but there are six exception areas, which contain a combination of properties that are zoned AR, P (Public), CR (Commercial Retail), and IH (Heavy Industrial). The P, CR, and IH zones apply to existing commercial and residential uses and two timber related industries. The 750 acres designated AR also includes some properties that are committed but not fully developed. However, the amount of land available for additional homesites is minimal.

Detroit and Idanha are also within the basin but the water resources are tributaries of the North Santiam River. Mackey Creek and Breitenbush River are tapped by Detroit and virtually all of the land included in the two drainage basins are managed by the US Forest Service. Idanha is supplied by Rainbow Creek, a spring, and Taylor Creek, which are located in Linn County. These tributaries are within the Linn County Forest Conservation and Management zone and most of the land involved is within the National Forest.

There are no formal agreements between different jurisdictions in the County related to surface water quality and quantity. However, the County and the US Forest Service have taken steps to

reduce the likelihood of detrimental water quality and quantity impacts. As mentioned above, the existing zoning provides water resource protection. Also, the cities of Silverton and Salem, which utilize the Abiqua Creek, Silver Creek, and the North Santiam Watersheds, have reviewed the County zoning designations and have voiced no objection to the permitted uses and land division policies in those watersheds. These cities will be notified of any proposed conditional use that may have an impact upon the water resource. The cities in the North Santiam Watershed are informed of US Forest Service land management plans including timber cutting that are proposed on National Forest lands that could have an impact upon a municipal water resource.

## **NATURAL AREAS**

### **Cross Country Trails**

In addition to the trails developed with parks and recreation areas, proposed trails between major points of interest are an important means of recreation. The cross-country trails within or passing through Marion County and their current status are discussed below.

1. Oregon Loop Trail - This bicycle route that originates in the Portland area travels to the coast, passes through Salem and heads back to Portland, was established as part of the Bicentennial Program in 1976. The route does contain some limited sections of separate bicycle paths, but most of the route, including the segment in Marion County, utilizes existing roadways. The route proceeds on Cherry Avenue through Keizer, to North River Road (State Highway 219), to French Prairie Road (MR 8), to Champoeg Road (MR 12, CR 414), and to Arndt Road (MR 11, MR 60, CR 428) on its way to Clackamas County. This route is shown on the Parks and Recreation Map.

Cherry Avenue and North River Road are designated as first priority bicycle routes in the Salem Urban Area Bicycle Plan. Also, a bidirectional route exists along Cherry Avenue. Acreage residential development is permitted in the Butteville area and the remainder of the route travels through land that is zoned EFU. The permitted uses in the AR and EFU zones do not pose any compatibility conflicts with the bicycle route. The conditional uses allowed in both zones should not create any problems but during the review of a conditional use permit, impact upon the bicycle route should be considered.

2. Indian Ridge Trail - The Indian Ridge Trail has been identified by the State Parks and Recreation Division as a potential trail linking Silver Falls State Park with the Pacific Crest Trail in the Olallie Lake Scenic area. The lower segment of the trail between the State Park and Willamette National Forest would primarily be on private land. Once in the National Forest, the trail is proposed to roughly follow the ridgeline separating Willamette and Mount Hood National Forests. In the National Forest pockets of private holdings will be encountered.

At this time, no work is being done on the trail and future work programs are not anticipated. The potential for a trail is recognized, but is not being pursued by the State

Parks and Recreation Division. A schematic location of this potential trail is shown on the Parks and Recreation Map (located in the Comprehensive Plan Report).

## **PUBLIC LANDS WITH SCENIC AND NATURAL AREAS**

Several of the public park areas listed in Table 26 also include natural or scenic areas. Statewide Planning Goal 5 requires that designated natural or scenic areas be protected. The natural and scenic areas on public lands are discussed below. The agencies responsible for managing these lands are aware of the identified natural and scenic qualities of these lands and have developed management plans that provide for their protection. The County's role is confined to coordination with the agencies involved and review of their plans and programs to ensure that these resources are protected. The scenic and natural areas located on private lands, where the County has a greater role in their protection, are discussed in the Environmental Quality and Natural Resources section of the Comprehensive Plan report.

1. Joryville Park - This park is approximately 27 acres in size and is located two miles south of Salem off of Jory Hill Road. The County owned and maintained park consists of a wooded area and a rare bird habitat with a stream meandering through it. Facilities include hiking and equestrian trails, a shelter building and picnic sites. The park is important as a nature study area and the County will continue to manage it primarily for this purpose.
2. Champoeg State Park Natural Area - This 567 acre park is situated along the Willamette River just west of Butteville. Valuable wildlife habitat exists near the river but the park is also important for its scenic, recreational and educational characteristics. The park is managed by the Oregon State Parks and Recreation Division based on the adopted State Master Plan for the park.
3. Silver Creek Falls State Park - Silver Creek Falls State Park is a place of giant trees and numerous waterfalls at the foot of the Western Cascades, southeast of Silverton. The greatest attraction is the 15 to 16 waterfalls where Silver Creek has cut through the overlaying Fern Ridge Tuff to more resistant Columbia River Basalt underneath. The water cascades over lips of resistant basalt, dropping a maximum of 184 feet, often forming amphitheatres behind the falls in the less resistant rock. The falls also act as a geographic isolating mechanism for fish. Most notably a race of cutthroat trout (*Salmo clarki clarki*) has been studied and was found to have a life history differing from that of the coastal race. These falls have been recommended for recognition as a geologic National Natural Landmark.

In addition to the aquatic features, the park holds several remnant stands of low elevation old growth Douglas Fir-western Hemlock forest that remain undisturbed. Giant firs up to seven feet in diameter and perhaps 400 years old characterize these stands. Three such stands are identified and others may exist in other portions of the Park and on adjacent land.

4. Willamette Mission State Park - This recently created park consists of 1,700 acres and is located eight miles north of Salem on Wheatland Road. Two great blue heron rookeries

occur in riparian forests within the park. The Wheatland Bar heronry consists of 54 active nests located in the tops of 100-foot tall black cottonwood trees a few hundred feet inland from the river. This large, productive heronry lies relatively isolated in a 50-acre path of riparian forest on Wheatland Bar, separated from the adjacent mainland to the north by a long curving slough. Associated with the cottonwood trees is Oregon ash and willows, with an understory of Pacific blackberry and the stinging nettle. The site is surrounded by water during the winter and spring and inundated during periods of high water.

The Grand Island heronry is located in riparian forest on Matheny Bar, which is the northern most tip of the park. The rookery consists of 15 nests in the tops of tall black cottonwood trees a few hundred feet inland from the river. A typical riparian forest community, the cottonwoods occur with Oregon ash, willows and an understory dominated by reed canarygrass and Pacific blackberry. Nearby sloughs and wetland areas along the river provide important feeding areas for the herons.

5. Mt. Jefferson Wilderness Area - The only designated wilderness area in Marion County is the northern portion of the Mt. Jefferson Wilderness. The Mt. Jefferson Wilderness has a total of 100,280 acres, 15,035 of which lie in Marion County. All of these lands are in the National Forest System and are located adjacent to the eastern border of the County.
6. Olallie Lake Scenic Area - This area is situated north of the Mt. Jefferson Wilderness area along the crest of the Cascades. This area has outstanding scenic qualities and is being considered for wilderness designation by the US Forest Service.

### **NATURAL AREAS OMITTED FROM INVENTORY**

Four natural areas identified by the Nature Conservancy were deleted from the County's inventory list because they were determined to be 1.A. sites, meaning that they are not considered to be of special importance. This determination was made for the French Prairie Osprey nests, the confluence of Silver Creek and the Pudding River, the Pudding River marshland, and Moss Lake, after considering testimony received at a public hearing held before the Board of Commissioners on April 7, 1981.

1. French Prairie Osprey Nests - This area encompasses McKay Reservoir, which was developed on Champoeg Creek for the purpose of providing irrigation water to nearby farms. After the reservoir filled, the trees along the stream bank died creating nesting areas for the ospreys. The acknowledgment of this site as a natural area was considered inappropriate because the habitat is man-made, the nesting sites will eventually disappear as the trees fall into the reservoir, the surrounding farming activity is apparently compatible, access to the site can be gained only by trespassing on private land, and expert testimony was given indicating that osprey is neither an endangered or threatened species.
2. Silver Creek and Pudding River - This area was identified by the Nature Conservancy because of its reported value as a wildlife habitat. Two owners of land on each side of Silver Creek testified that the area was used to graze livestock and that very little wildlife

was present. The pollution level in the creek apparently gets quite high during low runoff periods, greatly diminishing its habitat value. This area is omitted from the inventory because farm uses have significantly encroached upon the identified habitat, water pollution has reduced its habitat value, and no evidence is available to indicate that this area is any more significant than the other riparian habitats in the County.

3. Pudding River Marshland - This area is within several different farm parcels in the EFU (EXCLUSIVE FARM USE) zone west of Mt. Angel. The majority of this habitat area has been cleared, drained, and devoted to agricultural use. Much of this bottomland area has been in farm use for some time and as noted in the Silver Creek and Pudding River case, no evidence is available to suggest why this area should receive special consideration as a natural area.
4. Moss Lake - In its natural state, Moss Lake was approximately one acre in size. A dam was constructed which enlarged the lake to six acres. The original intention was to expand this peat forming lake in order to produce peat moss. This plan did not materialize and presently no particular use is made of the lake. Moss Lake was removed from the inventory because of its man-made status and the fact that a natural area designation would be likely to cause an increase in trespassing problems currently experienced by the property owners.

### Scenic Waterways

In order to preserve and protect selected rivers or sections of rivers, the State of Oregon enacted the Scenic Waterways legislation in 1970. This law was designated to insure that the free-flowing character of designated rivers is preserved in its natural setting.

When a river is designated as a Scenic Waterway, in addition to the County, land use regulations, the Oregon Transportation Commission considers changes in land use, development, timber harvest for their impact on the natural values of that waterway. Scenic Waterways have not been designated in Marion County. The segment of the North Santiam River between Big Cliff Dam and Mehama has been recognized by the State Parks and Recreation Division as a potential scenic waterway, but formal designation is not being actively pursued at this time.

In August, 1980, the Heritage Conservation and Recreation Service (which is not part of the National Park Service) released an inventory of natural and free flowing rivers in the northwestern United States which identified the entire length of Breitenbush River, the North Santiam River between Big Cliff Dam and Mehama and the 26 miles of the Willamette River downstream from Salem. These river segments are recognized as potentially suitable for inclusion in the Wild and Scenic Rivers System. A second phase of the inventory will be directed toward further refinement of the list. Following this phase the remaining river segments will be evaluated for wild and scenic designation and protection. The identified river segments are shown on the Parks and Recreation Map.

## Fish and Wildlife Habitats

The Oregon State Department of Fish and Wildlife prepared a report titled “Fish and Wildlife Habitat Protection Plan for Marion County”, (Heintz, Wetherbee; Nov. 1977) to assist in developing inventory and land use related policy statements on fish and wildlife habitat. This report will be summarized here and is available for review at the Marion County Planning Department. The map entitled “Wildlife Habitat” identifying sensitive fish habitat waterways, big game habitat areas and natural areas is located at the back of the Comprehensive Plan Report.

The report includes information about fish and wildlife habitats, species location and abundance and economic data to support specific land use recommendations. The identification and preservation of fish and wildlife habitats is essential to maintain high population levels and provide a variety of harvest opportunities for recreational and commercial users.

Marion County enjoys a great diversity of fish and wildlife species, which live in a variety of different habitats. Those habitats that are defined as sensitive can be adversely affected by land use activities and changes. The following subsections discuss the Department of Fish and Wildlife’s main concerns, which are to assure minimal impacts to the environment and protect fish and wildlife habitats while still permitting most other land uses. Fish and wildlife habitat goals and policies are listed in the Environmental Quality section of the Comprehensive Plan.

### Fish Habitats

Lakes and reservoirs are defined as natural and man-made bodies of water regardless of size, that have present or potential value for fish production and/or angling. All lakes and reservoirs are considered sensitive areas.

The concerns for lakes and reservoirs include protecting water quality, preserving fish and wildlife habitat, retaining land adjacent to water areas in as near natural condition as possible while allowing compatible land uses, maintaining public fishing areas and access and preserving aesthetic values.

Rivers and streams are defined as natural flowing water including sloughs, but excluding estuaries and man-made canals. All rivers and streams with either perennial or intermittent flows are considered sensitive areas.

Concerns for rivers and streams include retaining (1) riparian vegetation and channel integrity, (2) meanders and stable non-eroding banks to protect water quality and preserve habitats, and (3) provide for a variety of recreational and aesthetic values.

Headwaters are those areas defined as sensitive areas in stream drainage patterns that fish generally do not inhabit, but where man’s activities can cause a direct impact on downstream water quality and fish production. Steep topography and highly erosive soils typify headwater areas.

The Department of Fish and Wildlife stresses that for headwater areas it is desirable to reduce erosion and turbidities by providing stable conditions in areas of steep topography where the high erosive potential exists. Specific guidelines pertaining to these streams are outlined in Forest Practices Act rules.

Inventory-There is no specific estimate of the total numbers of the various fish species in Marion County. The following tables taken from the Marion County Fish and Wildlife report provide an idea of the relative abundance of the significant fish species in Marion County’s streams and lakes.

**TABLE NO. 1**  
 Fish Species, Location and Abundance  
 Marion County

Game Fish:

<u>Species</u>	<u>Location</u>	<u>Abundance</u>
Chinook Salmon	Wil, Santiam, LN Fk	Common
Coho	Few streams	Common
Sockeye	Wil R, Santiam main stem	Few
Kokanee	Detroit, Elk Lake	Few
W St	Wil R, Pudding, Santiam	Common
Su St	Wil R, Pudding, Santiam	Common
Cuthroat	Most streams, some lakes	Abundant
Rainbow	Most streams and lakes	Common
Brook Trout	Mostly high lakes, few streams	Common
Brown Trout	Rare-Round Lake, Leone Lake	Rare
Mt. Whitefish	Major streams	Common
Largemouth Bass	Wil R, sloughs, lower lakes	Abundant
Smallmouth Bass	Wil R, lower Santiam River	Few
Bluegill	Wil R, sloughs, lower lakes	Abundant
White Crappie	Wil R, sloughs, lower lakes	Abundant
Black Crappie	Wil R, sloughs, lower lakes	Common
Brown Bullhead	Wil R, sloughs, lower lakes	Abundant
Yellow Bullhead	Wil R, sloughs, lower lakes	Common
Yellow Perch	Wil R, sloughs, lower lakes	Common
Pumpkin Seed	Wil R, sloughs, lower lakes	Common
Warmouth	Wil R, sloughs, lower lakes	Common
Channel Catfish	Wil R, Pudding River	Few
Green Sunfish	Wil R, sloughs, some lakes	Few
White Sturgeon	Wil R	Few

Other Species

Carp	Wil R, sloughs, Pudding River	Abundant
Chiselmouth	Wil R, Santiam River, Pudding River	Abundant
Cottids	Most streams, some lakes	Abundant
Dace	Most streams	Abundant
Goldfish	Wil R, soughs, some lakes	Common
Pacific Lamprey	Most major streams	Abundant
Western Brook Lamprey	Most streams	Abundant
Peamouth	Most major streams	Common
Northern Squawfish	Most streams, some lakes	Abundant
Redside Shiner	Most streams, some lakes	Abundant
Sand Roller	Most major streams	Common
Large Scale Sucker	Most streams, sloughs and some lakes	Abundant
Mountain Sucker	Some streams	Few
Three-spine Stickleback	Wil R and some sloughs	Common
Gambusia (Mosquito Fish)	Some lakes	Common

Another way of showing relative abundance of fish is to determine angler catch. The following table indicates the numbers of sport fishery harvested.

<b>TABLE NO. 2</b>			
<b>Estimated Angler Catch, Effort and Economic Expenditure for Sport Fishery Harvest, Marion County, 1975</b>			
<u>Fishery</u>	<u>Harvest/1</u>	<u>Angler Days Gross</u>	<u>Angler Expenditure</u>
Spring Chinook	250	1,060	\$ 29,680/2
Fall Chinook	300	1,200	33,600/2
Coho	10	45	1,260/2
Summer Steelhead	330	1,485	41,580/2
Winter Steelhead	450	2,250	63,000/2
Resident Trout	262,780	129,860	1,064,852/3
Warm-water Species	12,504	7,917	64,919/3
Totals	278,634	143,817	\$1,298,891

Source: Fish and Wildlife Habitat Protection Plan for Marion County, by Oregon Department of Fish and Wildlife

Wildlife Habitats

Big Game basic habitat requirements include food, water, cover and freedom from harassment. These requirements are found in the forested areas of the County where logging practices or fires have created mixed stands of mature forests, brushlands, and have clear cuttings. The most important of these habitat areas are those located below 2,500 feet elevation as outlined on the Wildlife Habitat map. These are where deer and elk and other animals concentrate for feeding during the critical winter months.

To best preserve big game habitats while allowing normal agricultural and forest use, the Department of Fish and Wildlife make the following suggestions: (1) Development should not exceed densities of 1:40 acres; (2) New roads should be located to avoid sensitive areas wherever

possible, and roads that are no longer necessary for fire protection or logging should be blocked off permanently; (3) Off road vehicle use should be controlled during the winter and early spring.

Upland Game: Pheasants, and to a lesser extent valley quail, are truly products of and dependent on agriculture for their existence. Ideal habitat includes a varied patchwork of seed-producing crops interspersed with brushy fencerows, ditches, streams, and wood lots. This land use pattern provides their basic needs of food, water and cover.

The Department of Fish and Wildlife encourages the following actions to preserve the habitats of upland game. (1) Protect existing forest and agricultural habitats; (2) Limit residential densities to approximately 1:20 acres; (3) Encourage retention of vegetation along the stream banks, fencerows and wood lots.

**TABLE NO. 3**

**Estimated Big Game Populations in Marion County, 1975**

<u>Species</u>	<u>Estimated Populations Summer</u>
Roosevelt Elk	400
Black-tailed Deer	12,200
Black Bear	300
Cougar	35

**TABLE NO. 4**

**Estimated Upland Game Populations in Marion County, 1975**

<u>Species</u>	<u>Estimated Populations Summer</u>
Ring-necked Pheasant	40,560
Valley Quail	30,225
Mt. Quail	4,048
Bobwhite Quail	330
Ruffed Grouse	3,948
Blue Grouse	12,020
Doves	17,187
Band-tailed Pigeons	6,500
Silver Gray Squirrel	3,000

Waterfowl nesting, feeding and resting areas are definite habitat needs. Nesting is the most critical activity in late spring and early summer. Marshy areas, lakes, and slow moving streams with brushy banks provide important habitat for mallards, wood ducks, some teal, and Canada geese. During the late fall and early winter, large populations of birds that nest in the north migrate to the Willamette Valley. Areas that have large bodies of standing water with food nearby provide ideal resting and feeding areas needed for maintaining waterfowl populations.

The most sensitive areas for waterfowl are sloughs, oxbow lakes and floodplain areas along the Willamette, Santiam and Pudding drainages. There are also numerous areas of sensitive habitat

around ponds, small drainages, and swampy areas throughout the County that provide winter and nesting habitat.

These habitats are gradually shrinking in Marion County as sloughs, swampy areas and floodplains are continually being converted to other uses by diking, draining, tiling and filling. Clearing of riparian vegetation has meant the loss of nesting habitat for various species of waterfowl.

Recommendations proposed by the Department of Fish and Wildlife to preserve waterfowl habitats are: (1) Retain riparian vegetation along waterways; (2) Development or land use that requires drainage or channelization, filling or excessive removal of riparian vegetation in sensitive waterfowl areas should be identified as conditional uses; and (3) Setbacks or buffer zones should be incorporated into the plans of residential, commercial, or industrial developments adjacent to sensitive waterfowl habitats.

<u>Species</u>	<u>Estimated Populations</u>	
	Summer	Winter
Waterfowl:		
Geese	150	3,100
Ducks	6,715	48,095
Coots	150	2,500
Snipe	Migrant	Population
Swan	0	600
Total	7,015	54,295

Furbearing animals include both aquatic forms such as beaver, muskrat, and mink, and terrestrial forms such skunk, fox, and bobcat. They have a wide variety of habitat needs including, brushy streams, wetlands and forested areas.

Conflicts between furbearers and other land uses are minimal in the County. The recommendations for big game, upland game, and waterfowl will also benefit both aquatic and terrestrial furbearers.

<u>Species</u>	<u>Estimated Populations</u>
	Summer
Furbearers:	
Muskrat	1,700
Beaver	2,350
River Otter	140
Mink	800
Marten	100

Non-game Wildlife: Marion County contains important populations of hawks, owls, songbirds, small mammals, and numerous other non-game wildlife species.

Because of the large diversity of non-game wildlife species, their habitat requirements vary considerably depending on the individual species concerned. Habitat requirements outlined for the other wildlife groups listed previously are applicable to non-game wildlife.

<b>TABLE NO. 7</b>	
<b>Estimated Nongame Wildlife Populations Regularly Hunted in Marion County, 1975</b>	
<u>Species</u>	<u>Estimated Populations Summer</u>
Bobcat	500
Coyote	2800
Red Fox	2800
Gray Fox	620
Raccoon	3600
Brush Rabbit	8000
Eastern Cottontail	20,000
Snowshoe Hare	6000
Nutria	8000
Graydigger	30,000

### Mineral and Aggregate Sources

The combined values of sand, gravel, and stone rank as No. 1 in Oregon's mineral industry. Regions like the Willamette Valley, which are undergoing rapid industrial and urban expansion, and the accompanying population growth, require more sand and gravel per capita than do other areas. The Valley presently produces and consumes about two-thirds of the State's total in sand and gravel.

Aside from major dam construction, requirements for sand and gravel and crushed rock are directly related to population demands. Sand and gravel are vital raw materials for construction of highways, bridges, buildings, and airports. Large quantities of sand and gravel are also used for fill.

Sand and gravel occur in several types of deposits, primarily stream channels, flood plains, alluvial fans, and deltaic deposits.

The bar and channel gravels are constantly being replenished by the Willamette River. Some gravels originate in the upper reaches of the Willamette and many are brought in by the Santiam River. The quantity of gravel brought into the valley from the Cascade Range is now being limited by the high dams built on the North and South Santiam Rivers. The dams do not allow new gravel to move past their ponded areas, and the leveling effect of most of the floods by dams slows the migration of gravels downstream. Flood control dams and placement of riprap along the banks to prevent erosion result in minimizing bank gravels as a source of stream load.

Large deposits of sand and gravel occur in the mile-wide floodplain of the Willamette River. This material represents the gravel deposited during development of the Valley before the river

migrated to its present location. As the river meandered back and forth across the Valley, it deposited gravel and sand. During flood stages these areas were covered with varying amounts of silt. In the present floodplain, which is about a mile or so in width, the gravels have generally less than 10 feet of silt overburden. These gravels merge with gravels similarly deposited by the larger tributaries flowing from the Cascade Mountains.

Alluvial or glacial outwash fans in the Santiam River drainage between Mehama and Turner have provided a few hundred square miles in area of sand and gravel. The gravel resource forms a fairly narrow channel through Salem and the Turner Gap areas; but toward Stayton, where the channel of distribution widens there is 50 feet or more of gravels in this area with little or no overburden. Although these gravels are quite thick, the deposits are usually not as clean as floodplain gravels. This is due partly to weathering which has produced some clay in the deposits. At the present time, this area is too far from the markets for economical hauling, but there are good possibilities for the future.

Gravel deposits are quite numerous throughout Oregon and Marion County. Generally, transportation costs make only those gravels that are located less than 20 miles from the point of use economical. Those more distant deposits will become more valuable when urban expansion approaches to within the economic limits of the haul or when they are required for special local uses, such as for highways, bridges, or dams.

Gravel extraction operations are frequently halted by urban encroachment before the deposits are completely utilized; therefore, parts of these resources are wasted. Measurements of total quantities do not reflect the available gravel resources unless, for some reason, the land is not suitable for housing, farming, or industrial sites. Unfortunately, most gravel deposits lie in the flat ground adjacent to streams, highways, and rail transportation and therefore are also prime areas for farming as well as residential and industrial development.

Studies by the Department of Geology and Mineral Industries indicate that it is likely that most, if not all, of the available gravel, will be needed for future development within the source areas. From past experience in Oregon and other places, gravel shortages become critical long before the entire resource can be used. The incomplete utilization of the resource is attributable to several factors previously mentioned. Since gravel is a vital resource in the development of any area, and it appears that all of the favorable located gravel deposits will be required therefore, adequate protection by state and local governmental agencies will be needed to assure its availability for present and future use. The first step is to identify the minable resource and secondly establish policies for the resolution of conflicts between land uses. There is presently no detailed inventory of gravel or mineral resources in Marion County. However, the State Department of Geology and Mineral Industries is presently undertaking a study of the Marion-Polk County area to provide the basis of mineral and aggregate resource allocation policies.

In addition to sand and gravel, Marion County has significant deposits of precious stones and metals as well as bauxite. There are several active and inactive mines located in the upper end of the valley of the Little North Fork of the North Santiam River in eastern Marion County. These mines have yielded gold, opals, rubies and other similar materials.

Bauxite is the ore from which aluminum is produced. The Reynolds Metals Company owns large parcels of land primarily in the South Salem Hills where this resource is concentrated. Reynolds Metals Company has accomplished exploratory studies of this area and have determined that mining is not at this time economically feasible. The County is concerned with the continuing residential development of surrounding lands and the resultant conflicts that may occur should they attempt to mine this resource.

In order to operate a mineral resource site, a site registration must be filed with the Bureau of Mine Reclamation. Permits from the Division of State Lands must be obtained for riverbed extractions.

Further approval of the operation must be obtained from the Marion County Planning Commission. Information regarding reclamation plans, screening, access roads, and hours of operation must be provided to the commission for consideration in approving the application. The operation will also be required to maintain air, water, and noise pollution standards.

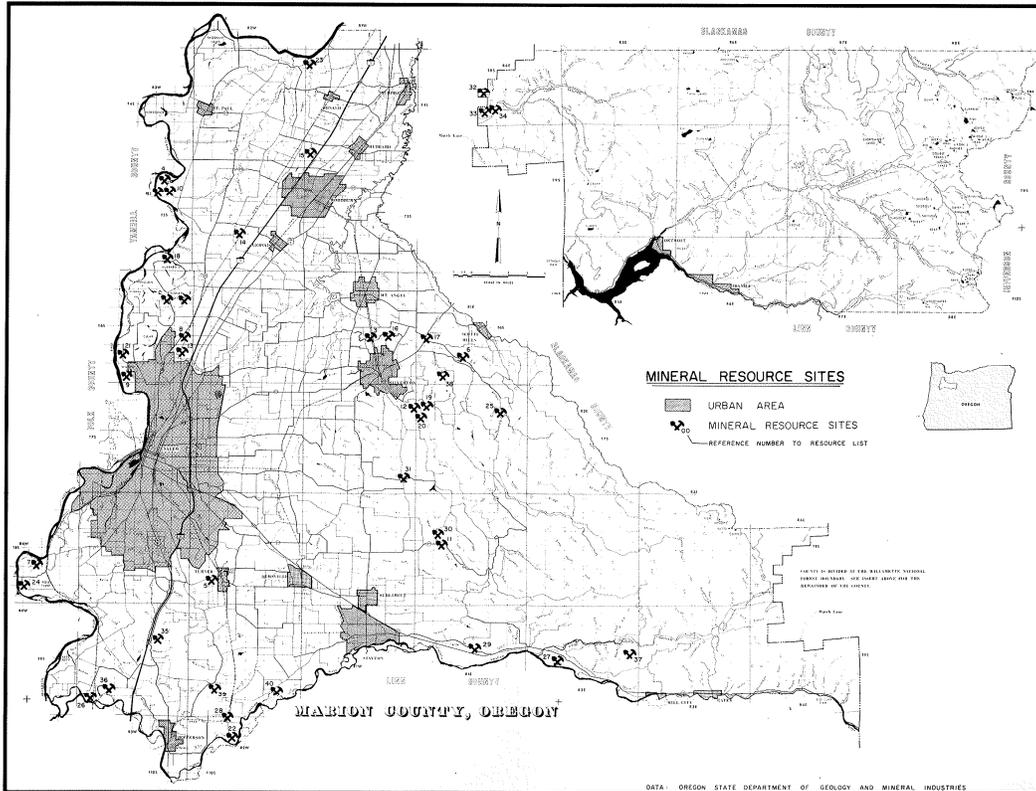
**MARION COUNTY**  
**EXISTING MINERAL AND AGGREGATE SITES - 1981**

<u>Map #</u>	<u>Name</u>	<u>Location</u>	<u>Material</u>	<u>Status</u>
1	M.P. Materials	SEC. 12, T6S, R3W	SAND & GRAVEL	SMP
2	Gordon H. Ball	SEC. 11, T6S, R3W	SAND & GRAVEL	CLOSED
3	AJ Humpert Abiqua Rock Products	SEC. 22, T6S, R1W	PIT RUN	LE
4	Gerald Baker	SEC 2,11, T5S, R3W	SAND & GRAVEL	LE
5	Turner Sand & Gravel	SEC 29, T8S,, R2W	ROCK	LE
6	W.F Fessler	SEC 28, T6S, R1EWM	ROCK	CLOSED
7	H.S.K., INC.	SEC 22, T8S, R4W	SAND & GRAVEL	LE
8	Stadeli Pump	SEC 21, T6S, R3W	RIVER ROCK	LE
9	Keizer Sand & Gravel	SEC 33, T6S, R3W	TOPSOIL & GRAVEL	LE
10	OSHD	SEC 11, T5S, R3W	GRAVEL	LE
11	OSHD	SEC 17, T8S, R1EWM	QUARRY ROCK	TE
12	Silvercrest Excavating	SEC 12, T7S, R1W	PIT RUN ROCK	SMP
13	OSHD	SEC 25, T6S, R3W	SOIL	CLOSED
14	OSHD	SEC 21, 28 T5S, R2W	SOIL	CLOSED

15	Ray Keizer Const.	SEC 23, T6S, R1W	SOIL	SMP
16	Bob Qualey Const.	SEC 19, T6S, R1E	SOIL, SAND & GRAVEL	SMP
17	Norman Stadel	SEC 35, T5S, R3W	ROCK	LE
18	Viesko Ready Mix	SEC 35, T5S, R3W	SAND & GRAVEL	LE
19	Vern Spaur, Silvercrest Excavating	SEC 7, T7S, R1E		TE
20	Bob Qualey Const	SEC 7, T7S, R1E	CRUSHED ROCK	SMP
21	Walling Sand & Gravel	SEC 28, T6S, R3W	SAND & GRAVEL	LE
22	Weyerhaeuser Co	SEC 9, T10S, R2W	RIVER ROCK	VOID
23	Henry Concrete & Gravel Co	SEC 6, T4S, R1W	BASALT	LE
24	Valley Concrete & Gravel Co	SEC 33, T8, R4W	STONE & SAND	LE
25	Silvercrest Excavating	SEC 11, T7S, R1E	PIT RUN ROCK	
26	Iris Homes, Inc	SEC 31, T9S, R3W	GRAVEL	TE
27	Capitol Crushing Co	SEC 20, T9S, R2E	GRAVEL	CLOSED
28	Willamette Quarries	SEC 32, 33, 4, 5 T9/10S, R2	WRIPRAP ROCK	LE
29	Charles Fair & Roger Dunn	SEC 15, T9S, R1E	QUARRY ROCK	VOID
30	Bob Qualey Const	SEC 17, T8S, R1E	BASALT	LE
31	Bob Qualey Const	SEC 25, 36, T7S, R1W	BASALT	LE
32	Crown Zellerbach	SEC 17, T8S, R4E	ANDESITE & BASALT	TE
33	Crown Zellerbach	SEC 20, T8S, R4W	ANDESITE & BASALT	TE
34	Crown Zellerbach	SEC 21, T8S, R4W	ANDESITE & BASALT	TE
35	OSHD	SEC 11, T9S, R3W	BASALT	TE
36	OSHD	SEC 29, T9S, R3E	BASALT	TE
37	Andrew Justice	SEC 13, T9S, R2E		
38	Mary McNatt	SEC 32, T6S, R1E	BASALT	SMP
39	Floyd Davidson	SEC 26, T9S, R2W	DRIED BASALT	LE
40	Louis Scofield	SEC 11, T5S, R3W	GRAVEL	TE
41	Dean Barlow	SEC 11, T5S, R3W	GRAVEL/SAND	TE

STATUS KEY  
TE-Total Exemption

Data from Oregon State Department of Geology and Mineral Industries - March, 1981



## EXISTING LAND USE

One of the most important considerations in land use planning is the manner in which the land is currently being used. Most existing development will remain in the future and will have a strong influence on the future pattern of development and land use in the County. The existing land use pattern has been created by settlement and the process of economic development. From the beginning of settlement in the County, economic activities have centered on natural resource utilization (farming and forestry). Trading centers were established to provide goods and services to those engaged in these basic economic activities. Transportation routes and facilities were developed to move goods and people, and to facilitate economic development. Eventually, manufacturing activities began in the trading centers to expand the range of economic activities. But even today, the economy of the County is strongly oriented to, and dependent upon, natural resource utilization. This fact is clearly reflected in the manner in which the land resources of the County are used and as described in the Economy section of the plan. The following table indicates by acreages and general use categories how the land resources of the County were being utilized in 1964.

**TABLE NO. 8**  
**EXISTING LAND USE IN MARION COUNTY**

LAND USE	ACRES	PERCENT
Urban	30,819	4.13
Agriculture	354,165	47.46
Forests	318,719	42.71
Parks	9,328	1.25
Conservation	9,850	1.32
Grazing	16,790	2.25
Non-Productive Land	6,569	0.88
Total Land in County	746,240	100.00%

Source: "Resources for Development", March 1964, Oregon Department of Planning and Development

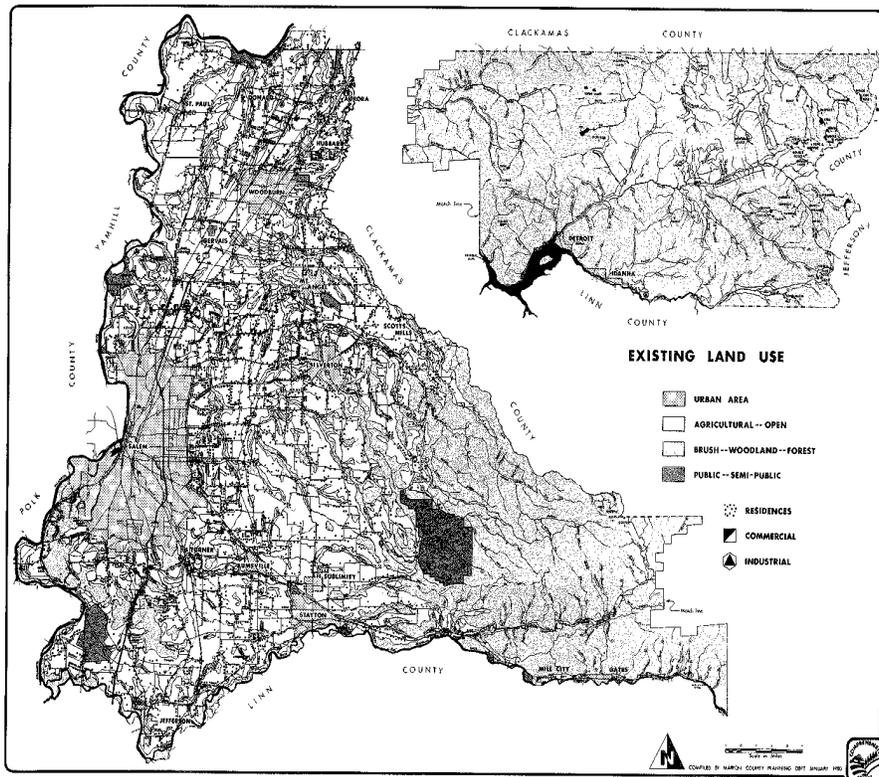
The categories of land use for natural resource utilization (agriculture, forestry and grazing) occupied approximately 92% of the land area of the County. Urban (developed) land uses occupied only 4% of the land area. However, the percentage of urban land use is probably not as significant as the pattern of use. An extremely dispersed pattern of urban or non-resource related uses may make large scale agricultural or forestry operations impossible. Since 1964, some changes in the amount of land area in each category have probably taken place, but the foregoing figures are sufficiently accurate to indicate the general pattern of land utilization. Land use changes are brought about by shifts in the population and economy. With the land area of the County remaining constant, increases in the land area of some uses will obviously bring about decreases in the land area of other uses.

Throughout the history of Marion County, population and economic growth have required the development of previously "undeveloped" resource lands or the conversion of open land uses. Future growth necessarily will require continued urban land area expansion as well as small amounts of rural area development. Much of this expansion will, as it has in the past, require the conversion of lands categorized as agricultural or forestry.

The Marion County Planning Department has continued to develop existing land use information. Land use not within urban growth areas was mapped in a 1978 Aerial photo survey and is available on maps at a scale of 1" to 800'. From these detailed maps, the land uses have been generalized as shown on the existing land use map. Land use data for urban areas may be found in each community's comprehensive plan. These plans cover the land within each identified urban growth boundary.

**TABLE NO. 9  
ACREAGE IN URBAN GROWTH BOUNDARIES  
IN MARION COUNTY**

CITY	DEVELOPED AREA 1975	TOTAL ACRES IN UGB-1978
Aumsville	257	631
Aurora	203	392
Detroit	98	314
Gates	118	407
Gervais	179	270
Hubbard	360	500
Idanha	189	739
Jefferson	298	627
Scotts Mills	103	238
Silverton	581	2,686
Stayton	794	2,935
St. Paul	129	285
Sublimity	184	477
Turner	464	1,150
Woodburn	1,509	3,658
Mill City	146	146
Mt. Angel	523	817
Donald	180	180
Salem	24,186	45,500
<b>Total</b>	<b>30,501</b>	<b>61,714</b>



As can be seen from the existing land use map, the urbanization pattern of the County is dominated by the City of Salem and surrounding peripheral development. The amount of urban land in the Salem area is far greater than the sum of urban land in the remainder of the County. Table 9 lists the acreage of land included within the urban growth boundary for each city with a comparison of existing land use as of 1975. These are areas within which each city has developed comprehensive land use plans that the County is also incorporating into this rural County plan.

Salem and most of the other smaller communities are located in the western half of the County. The major extent of urban development of the 19 cities in Marion County has taken place on the level alluvial lands. Notable exceptions to this generalization are the expansion of both Salem and Silverton into the hill lands south of these urban areas.

Probably the most significant factor concerning the urbanization pattern is the manner in which expansion has taken place. Peripheral expansion of many of the urban areas is characterized by “strip” development along the roadways extending outward from the city center, and residential subdivisions occurring in a very scattered pattern leaving much vacant land in the process. This factor may not be readily apparent from the existing land use map because of the small scale of the map and the generalization of the land use pattern. Examination of existing land use data from the 19 urban area plans and surveys will illustrate the point concerning scattered development and vacant land. These plans indicate that there is a significant amount of land area within the incorporated limits of the city that is vacant or unused and is potentially developable. And yet, the development pattern and pressures of many of the cities extends beyond the incorporated limits of those cities.

This scattered, unplanned pattern of urban development has resulted in problems with the lack of compact, efficient urban design and resultant increased need to convert rural resource land to urban use. The balancing of the urban and rural resource goals is a primary issue in the land use planning process and is affected greatly by the existing land use pattern.

### Agricultural Land

Agricultural lands are the dominant land use in Marion County. Approximately 40 percent of the entire land area of the County is presently devoted to crop production. As shown on the existing land use map, agriculture is located in the western one half of the County which is comprised of the valley floor and rolling foothills.

Not only is agriculture the dominant land use from a physical perspective, it is also a very important element of the Marion County and Mid-Willamette Valley economies.

Food processing and related products dominate the manufacturing economy of Marion County as shown in the industrial payroll and employment data contained in the economy study of Marion County. There are also additional impacts on other areas of the economy such as retail and wholesale trade and transportation services.

Not only are agricultural lands a valuable economic industry to Marion County they also provide important social and environmental benefits to both the general public and to those individuals engaged in farming. Agricultural lands, as a secondary role, provide open space that is a visual relief to the more intense urban setting. The large expanses of open land and rural atmosphere are a positive result of the preservation of farmland.

Those involved in farm activities also derive a considerable positive benefit from an alternative life style. Most farmers and their families find the rural vocational activities to be cherished ways of life with important social benefits that they wish to be able to pass on to future generations.

A comparison of the land use map and the general soils map shows that the agricultural lands are located primarily on the alluvial valley floor soils and the low foothill soils. A further analysis using the Soil Capability for Agriculture Map indicates that these soils are also the most productive with the fewest limitations to agricultural production.

By far the greatest majority of the western portion of Marion County contains Class I through IV agricultural soils with small areas of Class VI through VIII (there are no Class V soils in Marion County). The soil classification system for agriculture is explained in the soils section of this report.

The State LCDC Agricultural Lands Goal requires that all Class I through IV and those other lands, which are suitable for farming be preserved for agriculture by zoning them for farm use. This puts a great deal of emphasis on soil productivity, as it is determined in the Soil Conservation Service soil classification system. The Soil Suitability Map is only a general inventory of Class I through IV soils that shows their relative location in Marion County. The more specific agricultural soil classifications are contained in the Marion County Soil Report, which are listed in the appendix of that report.

In addition to productive soils, there are other factors that result in good agricultural characteristics for these lands in Marion County. Mild climate, abundant rainfall and groundwater sources, proximity to markets, transportation systems and processing centers are all positive factors that result in high productivity of the agricultural lands in Marion County. These factors have resulted in Marion County leading the State in crop revenue as well as having the greatest crop variety. The following table lists the general types of crops and their estimated cash receipts for 1979.

<b>TABLE NO. 10</b>	
<b>Estimated Cash Receipts From Farm Markets - Marion County, 1979</b>	
Small Fruits, Tree Fruits, Nuts	\$13,990,000
Specialty Horticultural Crops (Nursery, Bulb, Greenhouse, Turf Sod Mushrooms, etc.)	25,085,000
Vegetables	32,609,000
Grass and Legume Seeds	18,306,000
Grain and Forage Crops	18,328,000
Specialty Field and Forestry Crops (Beet Seed, Potatoes, Hops Mint, Dill, Forestry)	17,875,000
Livestock, Dairy, Poultry	<u>36,152,000</u>
	<b>\$136,339,000</b>

Source: Marion County Extension Office

To give an understanding of the variety of crops and their relative value, the specific breakdown of the information on crop production is listed in Appendix A of this report.

In addition to the fertility and management capabilities of farmland, the availability of the land base is the other most significant factor in long-term agricultural production. The amount of farmland and the limiting factors such as parcel sizes, incompatible surrounding land uses and other influences that limit the ability to farm these lands has a great deal of effect on the productive capabilities of these farm lands. Historical data indicates a continual decline in the amount of land in farms in Marion County. Table 11 gives an historical perspective of the amount of farmland in production. The total acreage in farms has continued to decrease with some of this land being converted to urban expansion. However, the decrease in farmland from 1964 to 1974 is 38,349 acres, whereas the total urbanized area in the County in 1975 accounts for only approximately 30,500 acres. Expansion of other uses such as rural homesite development may account for some of the loss. Another explanation of the status of some of this lost farmland is that it is an unused or conservation status or has been converted to other resource use such as forestry. It can be assumed that at least some of this land is being held in speculation for future development.

Even though the data indicates that the total farm acreage is declining, the cropland harvested is substantially increasing; however, this fluctuation is in response to yearly agricultural market conditions.

	<u>1959</u>	<u>1964</u>	<u>1969</u>	<u>1974</u>
Cropland Harvested	158,881	144,719	159,575	184,436
Hay, Silage and Grazed Cropland	56,648	57,164	na	na
Cropland not Harvested or Pastured	30,304	31,585	na	na
Non-Cultivated Pasture	17,685	26,874	na	na
Farm Woodlots, Wasteland, Roads Buildings, etc.	87,884	73,282	na	na
Total acres in farms	351,402	333,624	302,065	295,285

Source: U.S. Census of Agriculture

While the total farm acreage is declining Table 12 shows that the number of farms is also declining while the average size of farms is increasing. This indicates a trend to a consolidation of farmland into larger, more competitive farm units with an increase in corporate ownership.

Agriculture in Marion County is highly diversified. Uses range from intensively cultivated ornamental crops, to vegetables to livestock grazing. Mapping the specific agricultural use pattern would be difficult because of the large number of use categories, and not too meaningful for general planning purpose because of the relatively high yearly rate of change. However, a general description of the major agricultural uses and the crops grown by geographic areas of the County should be useful in understanding the general pattern of agriculture in relation to the previously described soil resources. The following statements provide a general description of major uses and crop groups within seven geographic areas of the County. Not all uses or crops

are listed for any area. The geographic areas correspond roughly to previously described landform areas.

**TABLE NO. 12**  
**NUMBER OF FARMS BY SIZE, MARION COUNTY**

<u>Size in Acres</u>	<u>1959</u>	<u>1964</u>	<u>1969</u>	<u>1974</u>
Less than 10	552	436	370	328
10 to 49	1,511	1,419	1,118	1,037
50 to 99	691	596	464	403
100 to 219	633	526	461	367
220 to 499	316	329	291	237
500 to 999	72	63	79	94
1,000 or more	<u>13</u>	<u>19</u>	<u>17</u>	<u>30</u>
Number of Farms	3,788	3,388	2,800	2,496
Average Size in Acres	92.8	98.5	107.9	118

Source: U.S. Census of Agriculture

**TABLE NO. 13**  
**AGRICULTURAL USES BY GEOGRAPHIC AREA IN MARION COUNTY**

<u>Area</u>	<u>Agricultural Uses and Crops</u>
1) Mission Bottom (Willamette River floodplain north of Salem)	Hops, vegetables, tree fruits and nuts, berries
2) Lake Labish (along the Labish Ditch northeastward from Salem)	Onions
3) North and Central Marion (generally the alluvial plain of the northern and central part of the County)	Hops, vegetables, tree fruits and nuts, berries, grass and legume seed, hay, grain, nursery stock, sugar beet seed, livestock and dairying
4) South Salem Hills	Grass seed, grain, livestock, tree fruits, nuts and grapes
5) Waldo Hills-Silverton Hills (low foothills east of Salem)	Grass seed, grain, farm forestry, livestock tree fruits
6) Turner-Stayton Flats (level alluvial areas)	Vegetables, berries
7) Ankeny-Jefferson (alluvial areas generally from Jefferson to the west along the Santiam River)	Peppermint, grass seed, vegetables, dairying, nursery stock

Source: Marion County Extension Service

## Agricultural Survey

In order to establish a basis for parcel size guidelines in farm zones, a sample survey was performed which considered the relationship between soil quality as expressed by Soil Conservation Service classifications and commercial farm unit size. Two samples were taken in each of the seven agricultural areas identified in Table 13 above. Except for the South Salem Hills, which is zoned SA (SPECIAL AGRICULTURE), the samples consisted of land zoned EFU and non-farm related uses such as rural residences were not considered. The sections selected for each agricultural area are listed below:

	<u>Section</u>	<u>Township</u>	<u>Range</u>
1. Mission Bottom	36	5	3W
	12	6	3W
2. Lake Labish	29	6	2W
	22	6	2W
3. North and Central Marion	26	4	2W
	18	6	1W
4. South Salem Hills	30	8	3W
	35	8	3W
5. Waldo Hill Silverton Hills	21	6	1E
	28	7	1W
6. Turner Stayton Flats	9	9	2W
	7	9	1W
7. Ankeny Jefferson	25	9	3W
	18	9	3W

Along with the parcels located completely within a section, parcels that were contained in the sample section and an adjacent section were also included. As a result, sample areas varied between one and two square miles in size.

To determine the size of farm units in sample areas, adjacent parcels were combined when they were under the same ownership or when it was apparent that they were managed as one unit. The acreage of the individual and the combined parcels was calculated and compared with the predominant soil classification for each farm unit.

Experience has shown that parcels of less than 10 acres typically do not represent commercial agricultural units, therefore, they were deleted. Also, after reviewing the farm unit size and soil information, it was apparent that the Lake Labish and South Salem Hills areas constitute a small percentage of the County's agricultural land and because of unique circumstances are characterized by exceptionally small farms. Therefore, for the purpose of determining a minimum farm parcel size guideline, these two areas were analyzed separately.

For the remaining sample areas, a pattern emerged indicating that farm unit size increases as soil quality diminishes. The acreage figures below indicate the approximate farm unit size that was met or exceeded by 75 percent of the parcels surveyed.

<u>Predominant Soil Classification</u>	<u>Acreage</u>
I	40
II	60
III	30
IV	80
VI	100

Except for the parcels that consisted of Class III soils, the average farm unit size increased approximately 20 acres for each incremental decline in soil quality. The reason for the departure from this trend for Class III soil was not apparent and additional study would be necessary to determine whether this is reflecting a unique situation in the areas sampled or a County-wide trend.

The same analysis of the South Salem Hills and the Lake Labish areas yielded significantly different results. In the South Salem Hills most of the farms consisted of predominantly Class III soils. The number of farms with predominantly Class II or IV soils was so small that separate evaluation would not have been meaningful. The average size of all farms is about 30 acres. The median farm size is about 20 acres. Seventy-five percent of the farms are 15 acres or more in size.

The determination of a parcel size guideline is complicated by the extreme range of parcel sizes. The samples showed that one-third of the parcels are more than 40 acres but represent 60 percent of the land area. The smallest third of the farms were 10-12 acres in size and involve 10 percent of the area surveyed. Because there are several types of commercial agriculture in the South Salem Hills that succeed on 20-acre parcels and 20 acres is the median farm size, the guideline in Special Agriculture zones is 20 acres.

The Lake Labish area is almost entirely made up of Class I and III soils. The total area is capable of intensive agricultural use on relatively small parcels. The survey showed that 75 percent of the farm parcels were 15 acres or larger for both soil classifications.

The survey confirmed that whether analyzed on an area basis, by farm type or soil type, commercial farms in Marion County are highly variable in size. This underscores the need to evaluate a proposed land division in relationship to the commercial farms in the immediate vicinity. A minimum parcel size approach for determining farm parcel size requirements would not adequately deal with the wide range of agricultural operations in the County. However, use of the established guideline establishes a valuable reference point when evaluating the justification for a primary dwelling and increases the burden of proof on the applicant when a parcel smaller than the guideline is requested. The survey alone showed that expanding the evaluation area from one-half to one mile for a proposal does not significantly alter the determination of area farm sizes as long as all land managed as part of a farm is considered.

### Forest Land

As previously reported, forested land area in 1964 amounted to 318,719 acres or approximately 43 percent of the County total area. The US Forest Service in 1973, reported 397,00 acres of forestland in Marion County. The differences between these figures are probably due to different measurement techniques and definitions. The Existing Land Use Map shows the

general pattern of forest cover. The forest land of Marion County, covering the eastern half of the County, may be divided into four distinct zones on the basis of ecology, climate, and pattern of land ownership: the Willamette Valley zone, the principal forest zone, the upper slope forest zone, and the subalpine forest zone.

The Willamette Valley zone generally lies below 1,000 feet elevation and has the driest and warmest climate of any part of the County. This zone was only partially forested at the time of settlement, and much of it has since been cleared for agricultural, urban and other uses. Most of the remaining forestland is generally owned by farmers and ranchers in blocks of less than 500 acres and is intermingled with agricultural land. There are both deciduous and coniferous stands. The deciduous stands – cottonwoods, Oregon ash, big leaf maple, and willows – occur on bottomlands subject to flooding, and on dry sites. Douglas fir is the most common coniferous species, and it occurs on a variety of sites.

The principal forest zone begins at about 500 - 1,000 feet elevation in the Cascades and extends up to 3,000 - 4,000 feet. It contains the major share of the timber-producing land of the County. More than 90 percent of this land is forested and most is public ownership. More than 90 percent of this land is owned by timber companies. Coniferous species such as Douglas fir, western hemlock, western red cedar, and true firs are predominant.

The upper slope forest zone begins at about 3,000 to 4,000 feet elevation and extends upward to 5,000 - 6,000 feet. About 80 percent of the land is forested; 20 percent consists mainly of non-forested areas of volcanic origin, meadows, and lakes. True fir and mountain hemlock stands are predominant. Most of the land is in national forests.

The subalpine forest zone begins at 5,500 to 6,000 feet elevation in the Cascades and extends to the upper limit of tree growth. The principal species - subalpine fir, mountain hemlock and whitebark pine - occur in scattered stands intermingled with meadows and barren areas.

Forest lands are defined by the United States Forest Service as those lands which are at least 10 percent stocked by trees of any size, or lands from which trees have been removed to less than 10 percent stocking and available for restocking.

Forest lands are also defined by LCDC as (1) lands composed of existing and potential forest lands which are suitable for commercial forest uses; (2) other forested lands needed for watershed protection, wildlife and fisheries habitat and recreations; (3) lands where extreme conditions of climate, soil and topography require the maintenance of vegetative cover irrespective of use; (4) other forested lands in urban and agricultural area which provide urban buffers, wind breaks, wildlife and fisheries habitat, livestock habitat, scenic corridors, and recreational use.

Forestlands are either classified as commercial or non-commercial timberland. Commercial timberland is capable of producing harvestable timber or other wood crops. The Oregon Department of Forestry defines commercial forestlands as lands capable of producing 20 cubic feet of timber per acre per year.

Non-commercial lands are incapable of producing industrial wood crops because of adverse site conditions or they are formerly forested lands that have been converted to another use. Many of

these sites may have timber growing on them, however, they are stabilizing the slope from serious erosion. If the vegetative cover is removed, the existing site conditions and downstream environment may be adversely affected.

The implication of the State Forest Lands Goal is that even though a particular land area is incapable of producing commercially harvestable timber, it may be important to protect other values such as land and water quality for wildlife habitat, watershed, recreation or other forest related issues. Therefore, the Goal does not directly relate to identifying and protecting only commercial forestland. It is, however, important to be able to determine by classification system, what the timber values are when determining appropriate land use plans and actions.

Forestlands are classified according to their capability to grow timber or wood fiber. Forest site classes are based on potential yields in cubic feet per acre of mean annual growth of commercial desirable trees. Site classes range from 1 to 7 with the highest growth increment occurring on Class 1 land. Douglas fir is the most abundant of the harvested trees and is therefore used as the index species for the classification system. Lands with site Class 1 through 6 are considered commercial timberland while Class 7 lands are non-commercial. Table No. 14 shows the site classes as they relate to the growth potential. The site class designations in Marion County are shown on the Timber Productivity Map. This data was obtained from the US Forest Service, State Forestry, State Revenue Department, Bureau of Land Management and soils data interpretation. This map graphically indicates the potential for timber growth on the forestlands in Marion County. It is evident from the map that the most productive forestland is located in the lower elevations outside of the National Forests. Most of this land is privately owned by timber companies interspersed with large block of public lands.

Potential Growth cubic feet per acre per year	0-20	20-49	50-84	85-119	120-164	165-224	225 & higher
cubic foot site class	7	6	5	4	3	2	1

Other important forestland factors influencing the identification of forestlands are the areas indicated for wildlife habitat and recreation activities. These areas are less specific in terms of classification but are important considerations in identifying lands appropriate for forestland designation.

The majority of the forestlands in Marion County are owned and managed by the US Forest Service as part of the Mt. Hood and Willamette National Forests. The location of these two forest areas is also shown on the timber productivity map. Land use plans for these forests have been developed to support multiple uses with continued timber production. These plans also provide for the protection of several areas of scenic and recreational value. Since federal lands are not subject to County land use controls, the National Forest plans will guide the Forest Service in managing these lands. The State Forestry Department and the Bureau of Land Management are the public agencies owning or managing the other public forestlands.

The second largest category of commercial forestland ownership is farmers and small woodlot owners. These are scattered throughout the foothills mostly at lower elevations. Many of these parcels are in Christmas tree production or farm woodlots.

The remaining commercial forestlands are owned by private companies comprising the forest industry and other public agencies.

Table No. 15 lists the ownership of commercial forestlands and their net volume of growing stock.

<b>TABLE NO. 15</b>		
<b>COMMERCIAL FOREST OWNERSHIP AND TIMBER VOLUME</b>		
<b>IN MARION COUNTY, JANUARY 1973</b>		
<u>Ownership</u>	<u>Acres</u>	<u>Volume (Million Board Feet)</u>
National Forest	140,000	6,612
Other Public	50,000	1,224
Forest Industry	38,000	---
Farmers, Miscellaneous, Private	<u>113,000</u>	<u>1,121</u>
<b>TOTAL</b>	341,000	8,957
Source: Timber Resources Statistics for Oregon, January 1, 1973, Pacific Northwest Forest and Range Experiment Station		

Forestry and the County's forest resources are a key element in the economy of Marion County. As shown in the economic section of this report, employment and payrolls associated with the forest industry is second only to agriculture in Marion County as is the value of lumber and wood products manufactured.

The County also benefits from timber receipt reserves from state and federal lands. The County receives several million dollars from timber revenue each year. This revenue is used for County road programs, and to support school districts and the County General Fund.

Forestlands serve a multitude of functions. The unique scenic and environmental qualities of forest lands make them attractive for recreational activities such as camping, hiking, fishing, hunting, water sports, etc. These activities, in addition to providing an important social benefit, also contribute significantly to the economy of Marion County.

Most of the water resources of the County originate in the many watershed areas high in the tree covered Cascade mountains. The trees and associated vegetation provide runoff control and therefore conserve the water and land resource. The conservation and protection of the watershed is a key to maintaining the high quality and quantity of water supply.

The public agencies have managed their large share of forest lands in Marion County based on their interest and knowledge in long term multiple use concepts.

Management of the public and private industry owned forestlands in Marion County is accomplished through their extensive knowledge and capabilities to deal with long-term forest management issues. Public agencies, as well as private timber companies, have the capabilities

to manage their areas of responsibility and interest and therefore attempt to maximize forestland values.

There are, however, difficulties in the management of private non-industrial forest lands. These lands are predominantly small timber tract owners or farm woodlot operators who have limited knowledge or capabilities for intensive management. This category, as shown on Table No. 15, comprises nearly one third of the commercial forestland acreage in Marion County. According to the State Forestry Department these management problems fall into three major categories, as follows:

1. Many private landowners are not aware of all the factors that can contribute to increasing the substantial economic benefits that forest management can yield.
2. Since forest management requires a long-term commitment, continuity and often a long term investment, individual landowners may be hampered by limited cash flow available to them.
3. Many of these landowners do not possess the technical forest management capabilities that will help them meet their particular needs and objectives.

Assistance in dealing with these education, financial and technical problems is available from many public and private sources. The State has published a catalog of programs that provide this assistance and is available at the State Forestry Department.<sup>1</sup>

Additional incentives for timber production include deferred property and timber taxes and tax credits for placing underutilized land into timber production. These program incentives plus the availability of a productive land base, provide the structure for a significant contribution of forest products from the many small private forestland tracts in Marion County. These tracts occur primarily in the foothills of the Cascade mountains and generally in a strip between the predominantly agricultural lands to the west and the larger timber tracts to the east. This area is generally contained within Range 1 East of the Willamette Meridian.

Land use planning of forestlands is involved primarily with the consequences of forestland uses. The actual operations, such as timber harvest or management, is beyond the plans scope and is dealt with directly by the State. In 1972, the State Legislature adopted the Oregon Forest Practices Act contained in ORS 527.610 to 527.730. By recognizing that the forest makes a vital contribution to Oregon by providing jobs, products, tax base and other social and economic benefits, the Act is intended as a means to assure continuous growth and harvest of timber and to protect Oregon's forest soil, air and water resource.

The State Board of Forestry is responsible for implementing this law and has, therefore, adopted the Oregon Forest Practices Rules. These rules apply to all commercial forest operations providing guidelines for the application of chemicals, disposal of slash, reforestation, road construction and harvesting. All state and private forestlands in Marion County are subject to compliance with the adopted rules.

<sup>1</sup> Oregon State Department of Forestry, Woodlands Assistance in Oregon, July, 1977.

This background data is important by complying with LCDC Forest Lands Goal No. 4. It forms the basis for developing an overall forestland use management element of the Marion County Comprehensive Plan and implementing measures.

Land Ownership

The most basic categories of land ownership are (1) private and (2) governmental. In 1978, 62 percent of the land area of Marion County was in private ownership. The remaining 38 percent of the land area was divided among the federal, state and local levels of government. As shown in Table No. 16, of the 289, 584 acres of land in government ownership, 82 percent was owned by the federal government, 13 percent by the State and only 5 percent was owned by various local governments.

<b>TABLE NO. 16 PUBLIC LAND OWNERSHIP, MARION COUNTY, 1978</b>		
<u>Government</u>	<u>Acres</u>	<u>Percent</u>
Federal	237,394	81.9
State	37,206	12.9
Local	14,984	5.2
Total	289,584	100.0%

Of the 237,394 acres under federal ownership, 87 percent was National Forest land administered by the US Forest Service and located entirely in the eastern portion of the County. Bureau of Reclamation administered land accounted for 9 percent of the federal lands. And US Army Corps of Engineers land at Detroit Dam accounted less than 2 percent. Federal land ownership by agency is shown by Table No. 17.

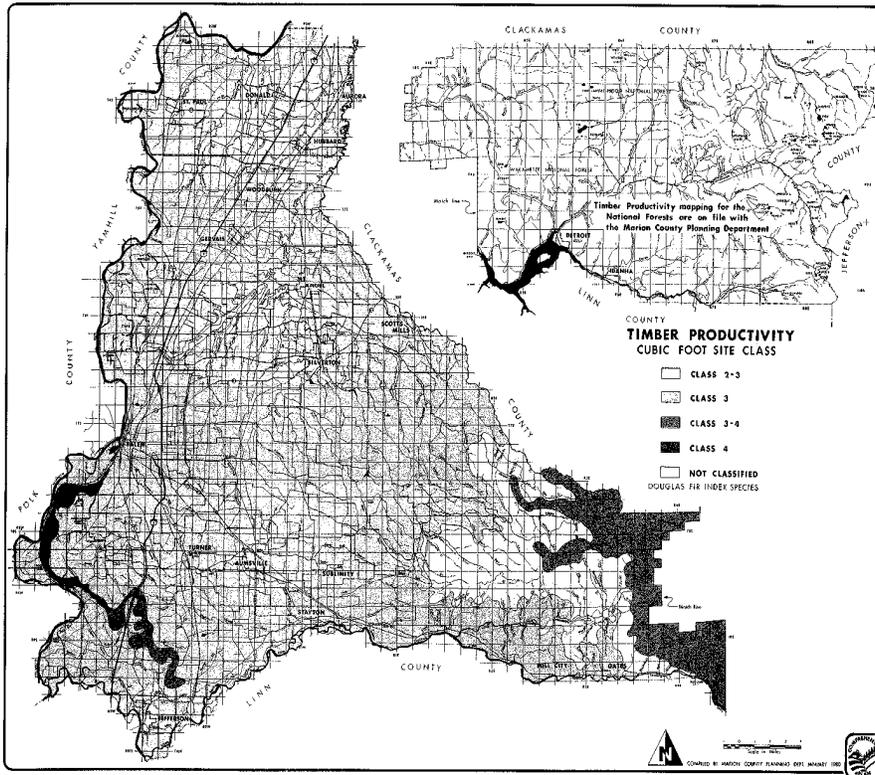
<b>TABLE NO. 17 FEDERAL LAND OWNERSHIP BY AGENCY, MARION COUNTY, 1978</b>		
<u>Agency</u>	<u>Acres</u>	<u>Percent</u>
Bureau of Land Management	20,952	8.8
US Forest Service	206,014	86.8
US Army Corps of Engineers	3,367	1.5
Bonneville Power Administration	82	--
Bureau of Indian Affairs	4,170	1.8
Post Office Department	10.5	--
Public Health Service	2	--
US Fish and Wildlife	2,796	1.2
Total	237,393.5	100%

State land ownership in 1964 was 37,206 acres, or 5 percent of the County's total land area. Nearly 50 percent of the land was administered by the State Board of Forestry. The other two state agencies controlling sizeable amounts of land were the Highway Commission with 37 percent and the State Institutions with 12 percent. Actual land area controlled by various state agencies is shown in table No. 18.

**TABLE NO. 18**  
**STATE LAND OWNERSHIP BY AGENCY, MARION COUNTY, 1972**

<u>Agency</u>	<u>Acres</u>	<u>Percent</u>
Division of State Lands	722	2.2
State Forestry Department	18,345	56.1
Highway Department	8,916	27.3
Fish and Wildlife	316	1
Higher Education	77	--
State Institutions	3,987	12.6
Military Departments	3	--
Board of Aeronautics	143	0.4
Fair Commission	182	0.5
State Fire Marshall	10	--
Public Employment Retirement System	4	--
Employment Division	1	-
<b>Total</b>	<b>37,206</b>	<b>99.9%</b>

Source: Oregon State Department of General Services



## **POPULATION HISTORY AND PROJECTIONS**

The first U.S. Census of Population, in 1850, reported Marion County's population as 2,749. At that time, other Oregon counties reporting population were: Benton, 814, Clackamas, 1,859; Clatsop, 462; Linn, 994, Polk, 1,051; Washington, 2,652; and Yamhill, 1,512.

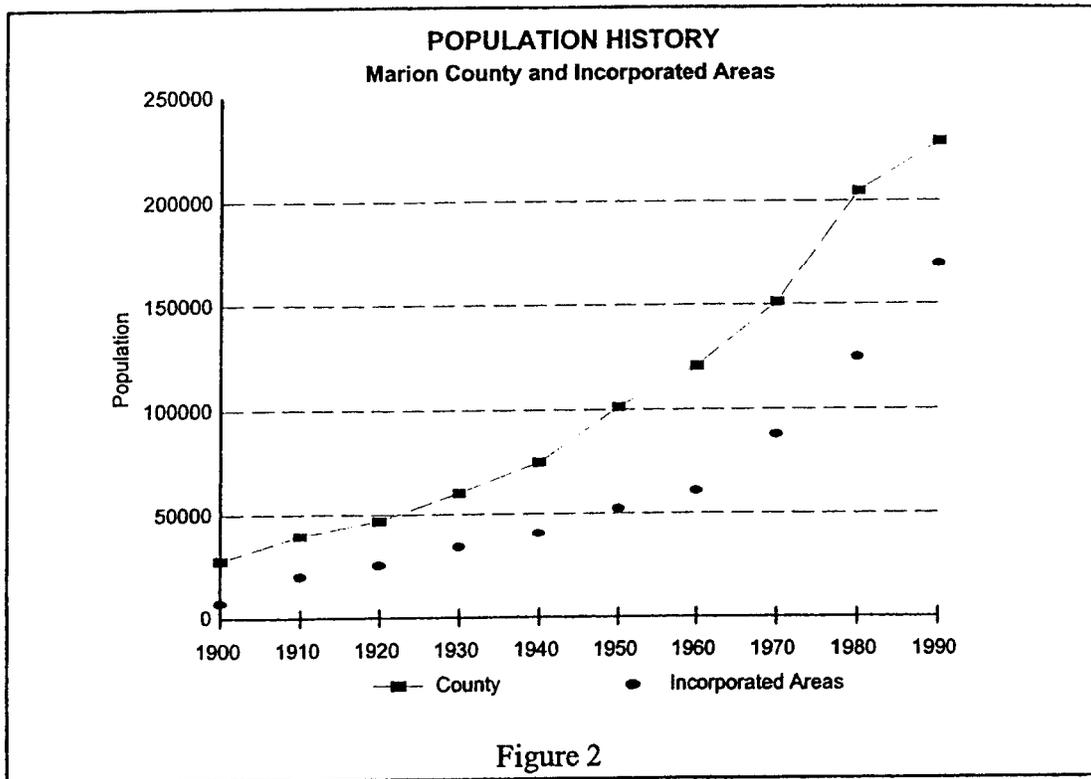
Historical population from 1900 for the State of Oregon, Marion County and the incorporated areas within the county is shown by Table No. 19. Figure 2 graphically shows the population growth trend of the county and the incorporated areas in the county and also the relationship between the two. In 1900, population within incorporated areas accounted for just 26.8 percent of total county population. By 1910, a major change had taken place in the amount of population residing within incorporated areas, with the figure at 50.6 percent. The incorporated population comprised 50 to 60 percent of the county's population into the 1970's, but by 1980 the incorporated area supported over 70 percent of the residents. The fluctuation in the percentages is a function of the manner in which incorporations and annexations have taken place.

**TABLE NO. 19 (Updated to include 2000 Census Information)  
POPULATION HISTORY 1900 – 2000  
Oregon, Marion County, and Incorporated Areas Within Marion County**

	1900	1920	1940	1950	1960	1970	1980	1990	2000
Oregon	413,536	783,389	1,089,684	1,521,341	1,768,687	2,633,105	2,842,321	2,842,321	3,421,399
Marion County	27,713	47,187	75,246	101,401	120,999	151,309	171,700	230,028	284,838
Aumsville	--	171	174	281	300	590	1,432	1,650	3,003
Aurora	122	229	228	242	274	306	523	567	655
Detroit	-	-	-	-	206	328	367	331	262
Donald	-	126	164	187	201	231	267	316	612
Gates	-	-	-	-	189	250	455	499	471
Gervais	224	268	332	457	438	746	799	992	2,009
Hubbard	213	320	387	493	526	975	1,640	1,881	2,483
Idanha	-	-	-	442	295	280	319	289	232
Jefferson	273	417	479	636	716	936	1,702	1,805	2,487
Keizer	-	-	-	-	-	-	-	21,884	32,203
Mill City	-	-	-	-	1,289	1,451	1,565	1,555	1,537
Mt Angel	537	936	1,032	1,315	1,428	1,973	2,876	2,778	3,121
St Paul	-	160	183	226	254	346	312	322	354
Salem	4,258	17,679	30,908	40,087	45,245	62,960	89,233	107,786	136,924
Scotts Mills	-	208	227	217	155	208	249	283	312
Silverton	656	2,251	2,925	3,146	3,081	4,301	5,168	5,635	7,414
Stayton	324	649	1,085	1,507	2,108	3,170	4,396	5,011	6,816
Sublimity	-	172	280	367	490	634	1,077	1,491	2,148
Turner	-	289	414	610	770	846	1,116	1,218	1,199
Woodburn	828	1,656	1,982	2,395	3,120	7,495	11,196	13,404	20,100

Source: U.S. Census Bureau

Concentrations of population adjacent to incorporated areas may exist for a number of years before the area is either incorporated or annexed. By 2000, with the incorporation of Keizer, incorporated areas accounted for nearly 79 percent of Marion County's population. This demonstrates that the percentages of incorporated population do not always reflect the true amount of urban population. The trend of total urban population growth would most likely be a constantly increasing percentage and would always be a higher percentage than incorporated population.



### State Population Projections

The history of population growth in the State of Oregon reveals a steady increase in total population every decade from 1900 to 2000. Historic and projected state population is displayed in Table No. 20. The projections were made by the Oregon Office of Economic Analysis in 2004.

The significance of the state population is its magnitude and distribution. The present growth rate (1990-1995) of approximately two percent per year is nearly double the national average<sup>1</sup>. In addition, approximately 70 percent of the state population is located in the Willamette Valley where most of the increase in population is occurring. Seventy percent of the state population increase between 1990 and 1995 occurred in the Willamette Valley with about 65 percent of this total increase being due to in-migration. The valley is expected to continue to receive the major share of the state's population increases, putting a great deal of pressure on Marion County and its cities to provide for these new residents.

<sup>1</sup> U.S. Bureau of Census

<b>TABLE NO. 20</b>		
<b>OREGON HISTORIC &amp; PROJECTED POPULATION</b>		
Year	Population	Average Annual Growth Rate (%)
1940	1,089,684	--
1950	1,521,341	3.39
1960	1,768,687	1.52
1970	2,091,533	1.69
1980	2,633,156	2.33
1990	2,842,321	0.77
1995	3,132,000	1.96
2000	3,421,399	1.79
2010	3,843,900	1.03
2020	4,359,258	1.26
2030	4,891,225	1.15
2040	5,425,408	1.04

Sources: 1940-2000, U.S. Census; 1995, Portland State University; 2000-40 Oregon Office of Economic Analysis

### County Population

The trend of continuous increase of total state population has been accompanied by continuous increases in total Marion County population; usually at a higher rate than achieved by total state growth.

Table No. 21 indicates that, like the state, Marion County is experiencing a large percentage of its population increase from in-migration. Marion County has experienced a steady population growth average per decade this century of approximately 25 percent up through 1990. The 1997 estimate of 267,700 people in Marion County indicates growth in the 1990s may closely resemble, the long-term average.

The Oregon Office of Economic Analysis (OEA) prepared state-and county-level population projections in 1997 at five-year increments through the year 2040. Marion County participated in a series of discussions with representatives of the cities to determine how the OEA estimate for Marion County should be distributed. The population projections for Marion County and all its incorporated cities are shown in Table No. 22. The methodology used to develop the preliminary projections was a combination of considering growth policies of the various jurisdictions, including the county.

<b>TABLE NO. 21</b>						
<b>COMPONENTS OF MARION COUNTY AND STATE POPULATION CHANGE</b>						
<b>1990-1997</b>						
	Births	Deaths	Natural Increase	Net Migration	Total Increase	Percent Increase
Marion County	29,476	16,266	13,210	26,007	39,217	17.2
Oregon	308,272	194,974	113,298	261,381	374,679	13.2

Source: PSU Center for Population Research and Census

**TABLE NO 22**  
**POPULATION-ACTUAL & PROJECTED**  
 Marion County and Incorporated Areas Within Marion County

<b>Jurisdiction</b>	<b>1990<sup>1</sup></b>	<b>1997<sup>1</sup></b>	<b>2000</b>	<b>2020<sup>2</sup></b>
Marion County	230,028	267,700	284,838	359,581
Aumsville	1,650	2,820	3,003	5,010
Aurora	567	675	655	930
Detroit	331	380	262	535
Donald	316	630	612	1,050
Gates <sup>3</sup>	458	489	429	800
Gervais	992	1,220	2,009	2,168
Hubbard	1,881	2,205	2,483	3,105
Idanha <sup>3</sup>	308	310	312	420
Jefferson	1,805	2,300	2,487	2,895
Mill City <sup>3</sup>	308	310	312	420
Mt Angel	2,778	3,020	3,121	4,365
St Paul	322	350	354	475
Salem/Keizer	129,677	152,530	169,127	255,338
Scotts Mills	283	315	312	420
Silverton	5,635	6,675	7,414	9,965
Stayton	5,011	6,290	6,816	9,250
Sublimity	1,491	2,145	2,148	3,590
Turner	1,218	1,330	11,199	2,363
Woodburn	13,404	16,150	20,100	34,919

<sup>1</sup> City only

<sup>2</sup> Urban area – city and unincorporated

<sup>3</sup> Marion County portion only

Sources: 1990 and 2000, U.S. Census Bureau; 1997, Portland State University Center for Population Research and Census; 2020 Marion County, Oregon Office of Economic Analysis; 2020 cities, Marion County Ordinance No. 1091

These projections must be viewed as guesses about the future population in Marion County. These numbers may or may not be achieved at specified points in time. It is important, however, that as accurate as possible projections be made for each jurisdiction's planning area to form a database for long- and short-range plans and implementing programs. These projections provide target dates for planners and decision makers to develop and implement the necessary programs to balance the various goals of the community. By programming community services and facilities according to levels of need at appropriate points in time, cost effective use of public and private funds can be improved.

The establishment and maintenance of 20-year projections for Marion County and the cities as shown in Table No. 22 are issued by the County to coordinate comprehensive plans and need to be reviewed and updated periodically. As actual growth rates change or new population studies are conducted and adopted, it is expected that these projections will be updated and new projections developed in coordination with the cities.

The Office of Economic Analysis (OEA) prepared updated long-term state and county population forecasts in 2004 at five-year increments through 2040 that incorporated the 2000 Census data. The 2004 OEA forecasts will be as a tool reviewing current adopted projections and for developing new coordinated projections with the cities and for the county.

The City of Woodburn, as part of their Periodic Review work program to update their comprehensive plan, prepared a population and employment projection study in 2002 for the planning period of 2000-2020. The study is the basis for revision to the 2020 projection for the City of Woodburn contained in Table No. 22 and similar revision to the county population total.

### Urban Population

Projection of urban area population area made based upon the urban growth programs of each city in Marion County and the overall land use goals and policies of the state and county. Each community's growth potential was analyzed using past growth trends and expected growth pressures in the future. Each community was consulted in developing these projections to coordinate city-county growth plans. These projections will help give perspective to the development pattern of Marion County by indicating the relationships among population centers. They will also provide guidance in updating of urban growth boundaries for each city.

## **PARKS AND RECREATION**

### Introduction

Marion County, located in the heart of the Willamette Valley, shares in the many desirable recreation features that the valley possesses. Highly variable terrain ranges from the fertile, stream-fed valley floor to the forested ridges and mountains of the Cascades. The County's climate is, for the most part, mild with winter conditions in the mountains hardy enough to challenge cross country skiers and other winter sports enthusiasts. Over thirty Federal, State and County campgrounds dot the rivers and valleys in mountainous areas.

Forming the western boundary of the County is the Willamette River. Numerous other rivers and streams course through the County. The increasingly strong water quality standards being applied by federal, state and local agencies have had a significant effect in restoring the suitability of the County's waterways for swimming and sport fishing.

Each of the cities in Marion County is developing an inventory of its recreational facilities and is putting together a plan to provide for the recreational needs and demands of the community.

The Regional Parks and Recreation Agency has developed a parks plan and is responsible for operating a recreation program in the Salem area. They have also developed a regional parks system plan and are responsible for building and maintaining parks within Salem, Marion County and Polk County.

In March 1976, the Oregon Transportation Commission approved the State Parks System Six Year Plan. The plan serves to identify specific objectives for the next six years and will guide the future growth of the state parks system. The plan is significant in that it outlines park improvements proposed by the State in terms of both land acquisition and development. Through system planning, the State Parks and Recreation Branch of the Department of Transportation desires to create a greater awareness of State park programs and activities while promoting more coordinated planning among all agencies concerned with public outdoor recreation.

Marion County and the State Parks and Recreation Branch have the responsibility of administering the Willamette River Greenway program established by the State Legislature.

Increased awareness, by the people of Marion County of the recreational opportunities in the County and the increasing numbers of persons to be served, naturally leads to pressures for the provision of additional facilities.

In order to determine what is needed in Marion County the Parks and Recreation Agency completed an inventory of existing recreation areas and compared these with the current and future recreation needs and desires of the citizens.

Table 26 is an inventory of existing park and recreation facilities. These existing sites are also identified on the Parks and Recreation map located in the Comprehensive Plan report. This provides a basis for developing the goals, policies and standards listed in the report to provide a framework for developing the ideal park system.

**TABLE NO. 26**  
**\* Existing Parks and Recreation Areas \***

State of Oregon

Name	Type	Acres
Champoeg State Park	Regional Park/Natural Area	567
Willamette Mission State Park	“	1700
Silver Creek Falls State Park	“	8300
Detroit Lake State Park	Regional Park	567
North Santiam State Park	General Park	120
St Louis Warm Water Fishery	Fishing Area	260
Shellburg Falls	Campground	8
Santiam River Rest Area	Picnic Area	120

Marion County

Bear Creek County Park	General Park	15
Bonesteel County Park	“	30
Spongs Landing County Park	“	62
Joryville County Park	“	27
Minto County Park	“	111
Niagra County Park	“	60
North Fork County Park	“	12
Packsaddle County Park	“	6
Salmon Falls County Park	“	22
Roger’s Wayside	Picnic Area	2
Evergreen Wayside	“	6
San Salvador	Fishing Area/Boat Ramp	1

Bureau of Land Management

Canyon Creek	General Park	80
Elkhorn Valley	“	58
Fisherman’s Bend	“	120

Additional Recreational Areas

Aurora Trout Farm	Fishing Area (private)	14
Beaver Creek	Picnic Area	-
Briar Knob	“	-
Detroit Lake Fishing Resort	Fishing Area/Boat Ramp (private)	3
Horseshoe Lake	“	180

<u>Name</u>	<u>Type</u>	<u>Acres</u>
Lombar Bridge	Picnic Area	-
O'Henry	"	-
Pudding River	"	-
Sullivan Falls	"	-
Sunny Bay	"	-
Big Cliff	Fishing Area/Boat Ramp	-

US Forest Service Campground

Breitenbush	35
Breitenbush Lake	7
Cleator Bend	2
Dunlop Lake	2
Elk Lake	16
Humbug	25
Lower Lake	8
Olallie Meadow	4
Piety Island	12
Pearl Creek	3
Round Lake	6
Shady Cove	9
Upper Arm	5
Whispering Falls	11
Whitewater	16

Private and Quasi-Public Campground Areas

Elkhorn Woods	-
Old's Mobile Park	7
Slayden's Resort	7
Camp Crestwood	-
Canyonview Campground	-
Skukum Tum Tum Youth Camp	-
Taylor Park Campground	-

Golf Courses

<u>Name</u>	<u>Holes</u>	<u>Location</u>
Auburn Golf Club	9	Auburn Road (East Salem)
Elkhorn Woods	9 (18)	Elkhorn Valley
Evergreen Golf Club	9	Mt. Angel
Santiam Golf Club	18	Stayton
West Woodburn Golf Club	9	West Woodburn

## **HISTORICAL SITES**

There are numerous buildings and sites in Marion County having special historic, cultural and architectural significance as part of the heritage of the County. As well as being inhabited by native populations thousands of years ago, it is an area of some of the earliest pioneer settlements in the Willamette Valley.

Marion County recognizes that the historical and cultural resources of the County should be preserved. Non-renewable, they hold importance for County citizens for varied reasons. Cultural reminders show the continuity and influence of the past, emphasize changes, teach about previous and possible events and fascinate the imagination. Early architecture and implements made in a less technological era are admired as well.

An inventory of historical sites, areas, structures and objects has been compiled with the aid of the Marion County Historical Society and State Parks Historian. Thirty-seven sites have been identified as appropriate for the cultural preservation designation.

Factors that were considered were its antiquity, association with historic and famous events, unique mode of construction or architectural design, relationship to the cultural history of the community and County, recognition in an official historic register and identification with persons who have significantly contributed to the history of the County. The sites are identified on Table 27 and the Parks and Recreation map located in the Comprehensive Plan report.

Presently various efforts are being made to preserve and protect these limited County resources. Private individuals, historical associations and governmental agencies are involved using a variety of methods to achieve preservation.

Preservation has primarily depended on private ownership and interest. It is often possible only if it is economically feasible to maintain the site for a contemporary use, such as a home, church, store, museum or restaurant.

Ninety-five Century farms have been designated in the County. These are lands that have been farmed by the same family continuously for 100 years or more. Marion County has the largest number of these in the state.

Eleven sites in rural Marion County are listed on the National Register of historic places and more may continually be added. Those on the register may be eligible for matching grants and tax benefits.

Local historical association activities are largely educational in nature. Government support of historical preservation has been indicated since the early 1900's and especially in recent years. Both state and federal governments are actively encouraging the identification and preservation of historical resources.

Beginning in 1906, the Federal Antiquities Act protected historic ruins or antiquities on federal lands. The National Historic Preservation Act of 1966 established a program of matching grants-in-aid for preservation efforts to state and local groups. It also created an advisory council

which comments on possible adverse effects of federal projects on sites or eligible for National Register of Historic Places.

The 1969 National Environmental Policy Act states “it is the continuing responsibility of the Federal Government to preserve important historic, cultural and natural aspects of our national heritage”. Any federally funded project must be evaluated for its environmental impact, including the effect on historical areas.

The Archaeological and Historical Preservation Act (1974) also provides for cultural resources protection in federal projects, emphasizing recovery of prehistoric and historic data.

Oregon Revised Statute 271.710 authorizes the state, county, city or park and recreation district to obtain easements to preserve historical places. In 1977, ORS 97.740 prohibited tampering with native Indian burial grounds and ORS 273.990 classified the removal of archeological or historical materials from state lands as a Class B misdemeanor.

ORS 358.475 declares that it is state policy to preserve and maintain property of state historical significance. It established a tax relief mechanism that can make preservation of an historical site economically possible in that property on the National Register may qualify for a tax freeze for 15 consecutive years. Information on this tax freeze, Federal match-money and eligibility for National Register may be obtained from the State Historic Preservation Office. Historic Preservation Loan Information is available from the Department of Housing and Urban Development.

Archaeological sites in the County have not been systematically explored and have usually been discovered by accident. Land cultivated, road and house building and drainage ditches have uncovered and sometimes destroyed artifacts in the County. Often these sites are explored, artifacts extracted, and intended modern day use is continued. Thus, the potential for future study of many of these sites has been destroyed. Basketry, weapons (mainly arrowheads) and domestic tools of stone and bone are the most common objects found. Prehistoric camps have commonly been established near streams but there seems to be no distinct pattern of where archaeological finds take place. Artifacts have been found scattered throughout the County and many were discovered in isolation. It is not desirable to reveal specific site locations due to potential destruction by amateurs.

These archaeological findings can be seen at University of Oregon’s Anthropology Department, Eaton Hall at Willamette University, Horner Museum at Oregon State University, Oregon Historical Society’s exhibit in Portland and in numerous private collections.

**TABLE NO. 27**  
**HISTORICAL SITES IN RURAL MARION COUNTY**

Abiqua Trail\* - prehistory - Major travel route for numerous Indian tribes before written records of Marion County History. Still visible in some places.

Alexio Aubichom House - early 1840 - Oldest Oregon home still on original site.

Aurora Colony Historic\* NR - 1857-77 - Christian Communal Society Farming community. At least 21 original buildings remain including an octagonal building used for musical instrument storage.

Sam Brown House NR - 1856 - Classical revival architecture. Formerly an inn convenient to the transport routes of the railroad and Salem-Oregon city road.

William Case Farm NR - 1860 - Classical architecture. Shows early use of brick kilns and lumber frame barns.

Champoeg Area\* (Champoeg State Park) - 1830's - fur trade. Site of formation of Provisional Government of Oregon, 1843.

Champoeg Cemetery\* - 1826 - Burial place of early French prairie settlers.

Rice Dunbar House - 1851 - Classical revival. A foundation of handhewn fir and native rocks, original woodwork and doorknobs brought "around the Horn" are some lasting features Dunbar included.

Gallon House Bride\* - 1916 - Covered wooden bridge.

Geer Fruit Farm - 1851 - Meetings related to statehood were held here prior to 1859. 1880 stone fruit house and original fireplaces are still used.

Halls Ferry and Landing\* - 1868.

Hauxhurst Mill Site\* - 1835 - Located on Champoeg Creek, this is one of Oregon's first grist mills.

Hoefler and Zorn House - 1870 - Includes original furnishings and 1896 additions of a bell and windmill tower. Site of 1847 grist mill.

Butteville\* - 1830's - Settled by retired fur trappers from Hudson Bay Company. It was an important mercantile center in 1845.

McCallister House - 1906.

Daniel MacCleay School - 1893 - Presently used as a community center.

George McCorkle House NR - 1851 - Classical revival style. A two-story central hall home, prevalent in Marion County.

Donald Manson Farm Site - 1858 - Fur trade. An 1860 barn is the only structure remaining.

Mt. Angel Abbey Library\* - 1970 - International architecture. Designed by Alar Alto, renowned Finnish architect.

Mt. Angel Monastery Chapel\* - 1884 - Located in the cemetery, this is the oldest seminary west of the Rockies.

Port Manning House NR - 1884 - One of the best remaining examples of Italianate architecture. Originally located in Salem at Ferry and Winter Streets.

Robert Newell House\* - 1852 - Classical architecture. Presently restored as a public museum.

Niagara Dam Site\* (Niagra County Park) - 1890 - Continuous floods contributed to the demise of this former townsite and hopes of producing hydroelectric power here.

Pleasant Grove Presbyterian Church NR - 1858 - Vernacular architecture. An example of the once numerous small churches in the meeting house tradition. Still occasionally used.

John and Thomas Kirk Residence - 1882.

Willamette Post Site\* - 1813 - Fur post established as a depot and dispatch point to Fort Astoria. All traces lost in flood of 1861.

Schrum House - 1848 - Western Colonial. Schrum was a member of the Oregon constitutional convention in 1857. A barn on this property was the hiding place for five senators in 1860 who were boycotting the majority supported anti-slavery vote.

John Stauffer House and Barn\* NR - 1865 - One of the oldest remaining log structures in Oregon. Associated with the Aurora colony, it features handhewn logs chinked in Pennsylvania-German tradition.

Waldo House - 1852 - Waldo is credited with achievements in education and industry in the County.

Wheatland Ferry\* - 1884 - Grain, produce, freight and passengers utilized the ferry services when river transportation was a major mode. An updated ferry still operates.

Willamette Mission site\* (probable location) - 1834 - Initial base of Methodist Missionary action throughout the Columbia Basin.

George Boone Miller Barn NR - 1864 - Sole remaining agricultural building built by French Canadian settler Joseph Laderaute and Syprian Belleque. Unique detail and design of sloped roof and joinery.

Fairfield Landing - 1851 - An important shipping center on the Willamette River during the steamboat era. A former store is now converted to a grainery and the former saloon is now used as a residence.

Hamilton Campbell House NR - Classical revival. Campbell was listed as an architect for the Oregon Mission. Arriving in 1840 he worked on several mission buildings. He became a local preacher to Indians speaking their dialects. In 1849, he engraved the first dies for coins issued by the provisional government.

James Mechlin Anderson House NR - 1855 - Classical revival. Built with 1849 Gold Rush savings, it has unique parlor trim and dairy cellar.

Miller Cemetery Church NR - 1882 - Constructed primarily for use as non-denominational burying church. Sloping floor, reverse entry and dual doors are some adaptations designed for this use.

St. Louis Catholic Church - 1845 - Rebuilt in 1880. Still in use. Built on the site of the original St. Louis Cemetery. The remains of Marie Dorian, who was the guide and only woman of the 1811 Astor Expedition (Hunt Party), are buried underneath the church.

Santiam Pass\* - 1859 - (State Highway 22). A major early route linking eastern and western Oregon.

\* - Indicate sites generally open to the public.

NR - Identifies sites listed on the National Historical Register. These sites are open to the public at least once each year.

## WILLAMETTE RIVER GREENWAY

### History

The initial Willamette River Greenway legislation was established in 1967 as a system to acquire lands for scenic and recreational purposes along the river. It was called the Willamette River Park System.

In 1973 the State Legislature enacted the present law, ORS 390.310 to 390.368, establishing the Willamette River Greenway. This law required the State Department of Transportation (DOT), in cooperation with units of local government, to prepare a plan for the development and management of the Greenway. The State Parks Division contracted with a planning firm from San Francisco to develop the Greenway Plan. Public hearings were held and advisory committees were formed. As a result, a book was prepared entitled Preliminary Willamette River Greenway. The document contained a good deal of inventory and analysis and other background data, as well as a plan section. The DOT staff then revised and edited the plan portion and produced a second document entitled the Willamette River Greenway. This plan was then adopted by the Oregon Transportation Commission in April, 1975.

The State Law also required the Land Conservation and Development Commission (LCDC) to review the Plan and give approval before implementation. The LCDC determined that the Plan was not consistent with the Greenway law and adopted the Greenway Goal No. 15, as well as an Interim Greenway Order controlling land use within the Greenway boundary. The program was then sent back to the DOT and local government to revise the boundary and to develop management and land use plans for the Greenway, consistent with the State Goals and Guidelines. The County is responsible for implementing the controls required by the Greenway Order until replaced by the Greenway Plan and implementing ordinances.

The Greenway program is made up of the following elements:

1. Greenway law - ORS 390.310 to 390.368
2. LCDC Greenway Goal
3. LCDC Interim Order
4. DOT Greenway Plan
5. Local Comprehensive Plans
6. Implementing Management Program

All of these elements come together at the County Comprehensive Plan level, where the State Goals and Guidelines must meet in compliance.

### Greenway Law

Before the Willamette Greenway can be accomplished, it is necessary to understand the basic provisions of law. ORS 390.310 through 390.368 is the legislation, which provides the authority for the Greenway program. The 1973 State Legislature found that there was a need to establish a program of river-lands control that would "...protect and preserve the natural, scenic and recreational qualities of lands along the Willamette River..." as well as significant historical

sites. The legislature made the following findings and policies regarding the intent of the Greenway.

1. The existing development shall continue but that some limitation be placed upon future intensification and change of land use to ensure compatibility with the existing qualities of the river.
2. Farming is compatible with the intent of the Greenway and should not be restricted.
3. There is no need for public ownership of all lands along the river.
4. There is a need for coordinated planning for such Greenway through the cooperation of the State DOT and local government.

The law requires that a Greenway boundary be drawn which shall include “...all lands situated within 150 feet from ordinary low water line on each side of each channel of the Willamette River and such other lands along the Willamette River as the Department and units of local governments consider necessary for the development of such Greenway; however, the total area...shall not exceed, on the average, 320 acres per river mile...”

The Department of Transportation, in cooperation with units of local government, is required to develop a Greenway plan that shows the Greenway boundary. The DOT is also required to show those lands presently acquired for park and recreation purposes, or where the State has an interest in acquiring the lands for the Greenway. The Plan shall also show those areas where the acquisition of scenic easements would be sufficient to accomplish the Greenway.

The acquisition of lands within the Greenway boundary is limited by the law. The use of the powers of eminent domain or condemnation is limited to the five state parks identified by the Legislature in Section 8A, Chapter 558, Oregon Law, 1973, and for scenic easements on non-farm lands. Willamette Mission is the only area within Marion County where condemnation for state ownership can legally occur within the Greenway. Any other lands that the State or County may wish to acquire in fee title must be negotiated with a willing seller.

A majority of land is presently in private ownership and the policies of the Legislature indicate that it should remain that way. The Greenway law specifies that the following information be included as a part of the Greenway Plan:

- “(2) The Plan shall depict, through the use of descriptions, maps, charts and other explanatory materials:
  - (a) The boundaries of the Willamette River Greenway.
  - (b) The boundaries of lands acquired or to be acquired as state parks and recreation areas under ORS 390.338.
  - (c) The lands and interests in lands acquired or to be acquired by units of local government under ORS 390.330 to 390.360.

- (d) Lands within the Willamette River Greenway for which the acquisition of a scenic easement, as provided in ORS 390.332, is sufficient for the purpose of such Greenway.
- (3) The plan shall include the location of all known subsurface mineral aggregate deposits situated on lands within the boundaries of the Willamette River Greenway.”

The Greenway law establishes clear policy direction on the intent of the Greenway, but provides little explanation of how the plan and management program should be accomplished.

### LCDC Goal

Because of the insufficiency of the law to fully explain the jurisdictional interests in the Plan and how it should be accomplished, the LCDC adopted a Greenway Goal. The Goal is similar to the other 19 State Goals and Guidelines, and will help coordinate planning effects of the nine counties and 19 cities along the 255-mile length of the Greenway, as required by ORS 197. This goal sets up the framework for establishing the Willamette River Greenway through property comprehensive planning programs at both the state and local levels. This will assure that all planning efforts will be consistent with each other and the Greenway law. The State DOT has developed a state interest Greenway plan while Marion County will incorporate the Greenway into the Marion County Comprehensive Plan.

The overall LCDC goal statement is “To protect, conserve, enhance, and maintain the natural, scenic historic, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.” The goal requires extensive inventories of resources, uses, and rights associated with the Greenway area, as well as an extensive list of considerations and requirements that must be addressed in planning for the Greenway.

The goal requires that Greenway planning be consistent with all of the State Goals and Guidelines and that the program shall include:

- “a. Boundaries within which special greenway considerations shall be taken into account;
- b. Management of uses on lands within and near the Greenway to maintain the qualities of the Greenway;
- c. Acquisition of lands or interests in lands from the donor or willing seller or as otherwise provided by law in areas where the public’s need can be met by public ownership.”

The goal further outlines the required contents of the DOT Greenway plan and the comprehensive plans of cities and counties. Implementation measures are also required as a part of the planning process. The “Greenway Compatibility Review” process must be established by County ordinance for the review of intensification, change of use or developments within the Greenway boundary.

The Greenway goal is the mechanism for clarifying the various state and local interests in the Greenway, while providing a central objective for achieving the intent of the legislation.

### DOT Greenway Plan

To help clarify the State's interest in the Greenway, the LCDC goal specifies what the DOT plan should contain:

- “1. The boundaries of the Willamette River Greenway;
2. The boundaries of the areas in which interests in property may be acquired. These shall be depicted clearly on maps or photographs together with the nature of the acquisition such as fee title or scenic easement; the general public purposes of each such area, and the conditions under which such acquisition may occur.
3. Use Intensity Classifications for the area acquired by the State for Greenway purposes; and
4. The locations of public access, either already existing or to be acquired.”

The Department of Transportation, through its State Parks Branch, has developed a proposal for the State's interest in the Willamette River Greenway. It is not a comprehensive plan of the Greenway, but is an explanation of the State's acquisition and development desires.

The DOT proposed Greenway boundary and possible acquisition areas are shown on 1" = 400' aerial photos. The proposed acquisition areas are also classified according to their intended use-intensity by number. The Class numbers 1 through 6 are explained as follows:

“Class (Position in this list does not imply priority)

1. Land with legal access from the river and/or trails which offer opportunities for public day use such as picnicking, fishing and hunting and convenience facilities (sanitation, potable water, etc.).
2. Land with legal access from the river and/or trails offering the above and in addition opportunities for limited overnight use such as primitive camping.
3. Land which could provide legal and physical access from the uplands to the river bank areas offering opportunities for public use as in (1) above.
4. Land which could provide legal and physical access from the uplands to the river bank for boat launching facilities and/or trail heads.
5. Land suitable for trail corridors between upland access points and/or other land in public ownership.
6. Land which should be acquired in fee to assure adequate protection of natural, scenic, historic, archeologic and scientific (biologic, geologic, etc.) values.

Classes 1 through 5 identify lands that have potential for the public recreational uses shown, should acquisition occur through negotiation with a willing seller. These five classes might, in some cases, be found suitable for acquisition of easements (not scenic easements) allowing restricted public use. Such use easements, again, could be acquired only by negotiation with willing sellers.

Areas within the proposed Greenway boundary not covered by one of these six classifications are considered to be lands on which acquisition of a scenic easement, not providing for any public use, would be sufficient for Greenway purposes (ORS 390.318 (2) (d)).”

The DOT has identified 19 sites totaling approximately 970 acres in Marion County for potential purchase. These purchase proposals are qualified on “...whether the owner is willing to sell and whether the state has funds available for purchase. Also, the areas shown on the photos and described in the text here are those areas the Parks branch is interested in purchasing given today’s land use patterns and mixes of ownership. As these conditions change, so may the desirability of a listed parcel. If no other land has been purchased near a particular parcel, purchase of that parcel may be of high priority. But if successful purchases are negotiated near a listed parcel, the need for purchase of that parcel too may be reduced or eliminated.”

The written text boundary shown on the DOT proposal was reviewed by LCDC and approved in October 1977 with only slight modifications. The approved DOT Greenway Plan is included as part of this Plan and is on file with the Marion County Planning Department and with the County Recorder.

### Marion County Greenway Program

The LCDC goal clarified the County’s role in planning the Greenway by indicating that it should be a part of the Comprehensive Plan and should include the following:

- “1. Boundaries: Boundaries of the approved Willamette River Greenway shall be shown on every comprehensive plan.
2. Uses: Each comprehensive plan shall designate the uses to be permitted for the rural and urban areas of each jurisdiction which uses shall be consistent with the approved DOT Greenway Plan, the Greenway Statutes and this Goal.
3. Acquisition Areas: Each comprehensive plan shall designate areas identified for possible public acquisition and conditions under which such acquisition may occur as set forth in the approved DOT Willamette Greenway Plan and any other area which the City or County intends to acquire.”

The Comprehensive Plan is a policy guide in determining appropriate land use controls to achieve the County and State land use goals. The Willamette Greenway program has important land use implications that need to be understood and dealt with in the Plan. As specified in ORS 197, not only are the citizens and local jurisdictions required to comply with adopted comprehensive plans, it also provides a guide that the State agencies must follow. Therefore, the County Comprehensive Plan provides a key role in establishing, coordinating and implementing the Willamette River Greenway.

### Purpose and Intent of the Greenway

The Greenway law and LCDC goal indicate that the purpose of the Willamete River Greenway is to protect, preserve, and maintain the natural, scenic, historical, agricultural, economic, and recreational qualities of the lands along the Willamette River. These qualities presently exist

along the river in Marion County, and it is the intent of the program to control the adverse impact of changes of use or development on lands that make up the river environment. The control of these lands will be exercised through County land use control programs and by public acquisition of certain properties that can meet the needs of the Greenway. To identify the area of concern and needed control, a Greenway boundary must be established as a line on the map. It is also necessary to identify the type and extent of controls necessary, as well as those areas proposed for public ownership. With the affected lands, control measures, and acquisition areas identified, the implications of the affects of the Greenway on individual properties can be better determined.

### Greenway Land Use Control

The County's main role in the Greenway is to control land use activities to be compatible with the intent of the Greenway program and be consistent with the Comprehensive Plan. Control will be exercised through the planning process, starting with the Comprehensive Plan and being implemented through zoning and subdivision review, flood plain ordinances and other management tools.

At present the County is exercising land use controls that limit the kinds of activities that can take place along the river. A large majority of the lands along the Willamette River are designated in the Comprehensive Plan as Primary Agriculture and Flood Plain Management. These lands are also zoned for farm use and are located within a floodplain overlay zone. These ordinances, along with County rural land use policies, are helping to maintain the lands along the river in an open and undeveloped condition. This indicates that minimal or very limited additional control should accomplish the Greenway program in Marion County.

There does exist, however, certain limited development activities, such as land divisions and conditional uses for non-farm homesites and the administrative review of building in the floodplain, that could have a negative impact on the natural and scenic qualities of the river. These limited, potential activities would be controlled by the establishment of a compatibility review process. This process would determine the compatibility of any change of use or development within the Greenway Boundary. The County has developed a Greenway Compatibility Review Ordinance that will apply to all lands within the Greenway Boundary. The procedure requires a review of proposed development or change of use, and the imposing of conditions necessary to assure compatibility with the intent of the Greenway. This review is accomplished simultaneously with other conditional use procedures presently required. The compatibility review made for each application will include a determination of compliance with the Greenway Goal, policies of the Comprehensive Plan and use management considerations contained in the Greenway Ordinance.

### Acquisition Proposals

One of the most direct methods of controlling and determining the use of land is by outright purchase. The State Parks and Recreation Branch of the Department of Transportation has identified several areas along the river in Marion County that the State would like to acquire and manage for the Greenway purposes.

The location of these areas is indicated in the proposed DOT Greenway Plan. These parcels are classified in the Greenway Plan for a variety of uses. The majority of these lands are proposed for some form of public recreation at various intensities. There are also acquisition areas proposed for special protection of scenic or natural qualities. The County does not at this time propose to acquire any additional land for Greenway purposes.

Any land that is purchased within the Greenway must be negotiated with a willing seller. The only acquisition allowed by condemnation is for scenic easements that are necessary to accomplish the intent of the Greenway. The use and development acquisition areas must be in compliance with the County Comprehensive Plan and are subject to zoning control.

It is not the intent of the Greenway, nor is it necessary, to acquire all of the land adjacent to the Willamette River for public ownership. Continuous trails or other extensive public use of the lands would be detrimental not only to the Greenway program but would have serious effects on agricultural activities. It is also unnecessary to place a majority of the riverbank in public ownership simply to keep it in a natural or scenic condition. The Willamette River is presently being managed throughout its length primarily by private property owners. The majority of farmers along the river know and understand the nature and power of the river and respect it. Much of the present day vegetation is there either as a result of selection from removal, or due to intentional planting to maintain bank stabilization. It is a controlled and managed river that exhibits intrinsic natural and scenic characteristics.

### Greenway Boundary

It is necessary to identify the lands on which the Greenway considerations, controls, and acquisition will occur. These areas are included within a Greenway boundary drawn on a photo map for easy identification on the ground. The location of the boundary is based upon the purpose and intent of the Greenway, and upon the need to establish Greenway compatibility controls.

The State Law (ORS 390.318) requires that all lands within 150 feet of the ordinary low water line, on each side of the Willamette River, be included in the Willamette Greenway. In addition, other lands will be included that accomplish the purpose of the Willamette Greenway, with the maximum area being 320 acres per river-mile.

So that we may better identify those lands along the river that should be included within the boundary beyond the 150-foot minimum, criteria were developed to evaluate specific areas. The following criteria should provide the necessary standard of evaluation to determine which lands should be included in the boundary.

1. Areas of riverine vegetation bordering the river channel.
2. Areas of historical, archeological and cultural significance directly relating to the river.
3. Significant natural and scenic areas, to include fish and wildlife habitat associated with the river.
4. Lands with the potential for public recreational use and access to the river, where the potential for vandalism and trespass on private lands can be minimized.

5. Areas presently acquired for public parks.
6. Farmland should be excluded from the Greenway where there are assurances that it will remain in farming.
7. Other areas that do not meet the above criteria but are necessary to carry out the purpose and intent of the Willamette River Greenway Goal.

The County's intent in establishing the boundary is to include those lands that are necessary to accomplish the program while limiting the need to exercise additional land use controls to only those areas that have a potential to adversely effect the river scene.

Marion County recognizes the practical problems involved with using a measurement from "mean low water" to determine the minimum Greenway Boundary. The specific location of this initial point is difficult to find most of the year due to the erosional and depositional characteristics of the river during high water flows.

Therefore, the Greenway boundary attempts to follow terrain features or some other identifiable feature that can be located on the ground. Where a minimum boundary is indicated, the line is drawn as close as possible to 150' from mean low water line while keying off of natural features. Since the Greenway program is aimed at maintaining the scenic qualities of the river, and the vegetation makes up a majority of this value, the inclusion of this vegetation is important to the Greenway. The specific location of the Greenway Boundary is shown on the Marion County Zoning Maps and on aerial photo maps on file with the Planning Department.

#### Greenway Resource Inventories

In conformance with Goal 15 of the Land Conservation and Development Commission, the following items have been inventoried as they relate to objectives of the Willamette River Greenway. It is the purpose of this information to determine the nature and extent of the resources, uses and rights associated directly with the Greenway. The inventories also aid in determining which lands are suitable or necessary to inclusion within the boundaries of the Willamette River Greenway and the policies adopted for Marion County's Greenway Program. The inventories shall serve as a reference to insure that future development and changes in land use can be limited and will be permitted only after considering the resources within the Greenway boundary that will be affected.

A series of 18 maps covering the entire 67 miles of Willamette River in Marion County have been produced and are on file in the Marion County Planning Department. These maps have been used to locate inventory items including land use, historic sites, river access, state acquisition area, public ownership, flood plain, aggregate sties and zoning.

Agricultural Land - Land in agricultural use has been identified and mapped using 1" = 800' = 400' aerial photos. Approximately 80% of the rural land along the river is in agricultural use. All the land along the river is comprised of Class I through IV agricultural soils and is dominated by Class II and III soils, as shown in the soils section of this report.

Timber Resources - Timber resources have been located and mapped with the aid of aerial photos and have been verified with the assistance of maps from the Timber Assessment and Appraisal Division of the Department of Revenue. A border of timber and brush stretches along

the banks of a majority of the Willamette as it flows through Marion County. This vegetative cover serves as an important factor in bank and farmland stabilization. It is a major element in the scenic quality of the river and also serves as a primary wildlife habitat. A limited amount of this timber can be considered as marketable.

Aggregate Resources - All aggregate excavation and processing sites, and the known extractable aggregate sources, have been located and mapped. Information, including maps and lists of permit holders, was obtained from the Oregon Concrete and Aggregate Producers Association (OSAPA) and Montagne and Associates who serve as waterway resource consultants.

There are two types of gravel extraction within the Greenway: 1) upland, or land above the low waterline, including gravel bars; and 2) riverbed, or below the low waterline.

Historic Sites - There are 16 identified historic sites in close proximity to the river in Marion County. Ten of these sites are along one five-mile stretch in the Butteville/Champoeg vicinity.

During the colonial period, the Willamette River served as a transportation route for people as well as produce and supplies. Homes, missions, ferry crossings and towns were located along its banks. Some of the buildings, and sites where buildings stood, remain to remind us of those early days.

<b>TABLE NO. 28</b>	
<b>WILLAMETTE RIVER GREENWAY</b>	
<b>Historic Sites in Marion County</b>	
<u>River Mile</u>	<u>Name of Site</u>
43.0	Butteville
43.0	Alexis Aubichon House, Butteville
44.6	Champoeg Cemetery, Champoeg Vicinity
45.0	William Case House, Donald Vicinity
45.0	Hauxhurst House, Champoeg
45.2	Casper Zorn House, "Champoeg Farm", Champoeg
45.5	Donald Mason Farm Site, Champoeg
45.8	Champoeg Townsite
45.8	Robert Newell House, Champoeg
48.4	Willamette Post Site, Newberg Bridge Vicinity
55.5	St. Paul Roman Catholic Church, St. Paul
55.5	St. Paul Cemetery, St. Paul
67.4	Fairfield Landing Site
72.0	Wheatland Landing & Ferry
72.1	Willamette Mission Site, Wheatland Vicinity
91.5	Halls Ferry & Land Site

Areas of Flooding - The Flood Plain Overlay zone has been mapped on Marion County's Willamette River Inventory Maps. This zone consists of the 100-year flood plain, as identified and discussed in the development limitations section of this report.

Marion County has adopted a Flood Plain Control ordinance that limits the placement of structures within the 100-year flood plain. The area subject to flooding covers approximately

90% of the lands along the river, thereby severely limiting the development potential of these lands.

Land Currently Committed to Industrial, Commercial and Residential Use - With the aid of aerial photos and a field survey of the land along the river, individual dwellings have been located on the Greenway maps. There are no commercial or industrial activities along the river in Marion County, other than gravel operations and farm related activities.

The Ownership of Land and Riparian Rights- The 1" = 800' scale maps, used to map the resources inventoried along Marion County's portion of the Greenway, were compared with current Assessor's maps to show present property lines. The Assessor's maps also identified property in public ownership.

Oregon recognizes the changing ownership of land along a river by accretion. A landowner may gain or lose land as a result of erosion or soil being deposited.

An 1874 act granted submersible land (that is the land between low and highwater marks) to the landowner. This ownership of land to the low water mark is still recognized for land that was in private ownership at the time of the 1874 grant. This includes 90 percent of the privately owned land along the river. The act was repealed shortly after it came into effect and land that was later sold by the state, granted ownership only to the high water line.

These riparian rights would affect a landowner only if he were to sell the gravel on his property. Royalties must be paid to the state for gravel removed from land they own. The state owns the riverbed.

Current Public Recreation Sites, access points and future recreational needs - An inventory of existing parks and recreation facilities within Marion County's portion of the Greenway can be seen in Table No. 29. This includes a breakdown by park: listing the type of park, who administers it, the number of acres and facilities for each one.

There are presently seven parks within the Greenway, including five regional parks totaling 2,055 acres, and two wayside parks totaling 23 acres. Six areas are being considered for expansion or development within Marion County's portion of the Greenway. Points of public access to the river have been located on the Greenway inventory maps.

Hunting and Fishing Areas - According to Mr. Ives of the Northwest Regional Game Department, people can hunt and fish unprotected non-game species from a boat throughout the year. Hunting on private property along the river must be with the consent of the property owner.

Greenway land, purchased by the State Parks Division of the Department of Transportation, is open to hunting only with shotguns and bows and arrows.

Significant Natural and Ecologically Fragile Areas - The Nature Conservancy has identified 31 areas in Marion County which they feel represent the most significant unique natural features known in the County. Eleven of these sites are along the Willamette River. Some of the areas have not been verified by research or field study but are considered potentially significant. These areas, which include two protected areas, have been identified and mapped by the Nature Conservancy in the Marion County portion of the Oregon Natural Areas Report.

These sites have been located on Marion County's Greenway Maps and protection of site's unique characteristics are important when considered in any land use decisions affecting the area.

**TABLE NO. 29  
GREENWAY NATURAL AREAS  
INVENTORY LIST - MARION COUNTY**

RIVER MILE	SITE NAME/DESCRIPTION	LOCATION SEC., TOWN., RANGE	STATUS			
			S	UV	UU	PA
44-46	Champoeg State Park Natural Areas Wildlife habitat along stream bank; scenic, recreation, education values	S 2 T4S		X		X
58	Candiani Island-Willamette River Great blue heron rookery; good old growth cottonwoods; island and slough habitat	S E1/2 22 T4S R3W		X		
64	Feasters Rocks Canyon; chasms; fairly wild bank along Willamette	S1 T5S R3W				X
71	Wheatland Bar on Willamette River Riparian vegetation; great blue heron rookery	S POR 27, 34 T5S		X		
72-74	Willamette Mission Proposed Natural Areas	S POR 3, 4, 9, 10 T6S R3W S26 27, 34		X		
78	Willow Lake Swan wintering area along Willamette River	S33 T6S R3W		X		
85	Minto Island Heronry (Willamette River) Great blue heron rookery; distrubed but good study area close to Salem	S26, 32, 33 T7S R3W S5		X		
95	Independence Bend Geese wintering area and great blue heron rookery	S22, 27 T8S R4W		X		
99	Tyson Island-Willamette River Riparian vegetation; great blue heron rookery; birds of prey	S35 T8S R4W		X		
103-105	Ankeny Bottom	S16, 17, 20, 21 T9S R3W				X

Key: S = Surveyed  
UV = Not Surveyed, verified  
UU = Not surveyed, unverified  
PA = Protected Area

Source: Oregon Nature Conservancy

**TABLE NO. 30  
PROTECTED AREAS WITHIN MARION COUNTY'S PORTION OF THE GREENWAY**

<u>Program</u>	<u>Name of Site</u>	<u>Acres</u>
Federal Agency (U.S.) National Wildlife Refuge System	Ankeny NWR	2,796
State Agency (Oregon) Primary Resource Protection Areas	Champoeg State Park Natural	84

Fish and Wildlife Habitats- An inventory of significant fish and wildlife habitats along the Willamette River was done by the Oregon Department of Fish and Wildlife. These habitats are listed by river-mile for the length of the river. Furbearer and waterfowl nurseries, and hunting areas are identified, as are sloughs, warm water fishing areas and spawning areas.

The Willamette River serves as a passageway for salmon and steelhead in reaching the tributaries where they spawn. Some fish spawn in the Willamette itself, including fall chinook that spawn near Wheatland Ferry.

Sloughs and backwaters in Marion County, as well as in other areas, serve as habitat for warm water fish such as bass, crappies and spine rays. Six heronries and one osprey nest have been identified along the Willamette River in Marion County as listed below.

The meandering course of the river through the County has created excellent wildlife habitats. Gravel bars, backwaters, islands, riparian vegetation, and especially sloughs are essential components of this unique ecosystem. Wherever these natural features remain they must be preserved or wildlife populations will vanish.

<b><u>HERONRIES:</u></b>	<b><u>River Mile</u></b>
Candiani Island	58.3
Wheatland Bar	71.1
Minto Island	84.3
Independence Bend	94.2
Tyson Island	98.7
Ankeny Bottom	104.3
<b><u>OSPREY NEST</u></b>	
Ankeny Bottom	101.6

Hydrolics

The Willamette River formed by the confluence of the coast and middle forks near Springfield has a length of approximately 187 river miles. The Willamette is a mature river flowing through a relatively flat alluvial valley. The river meanders widely within its flood plain, which is marked by cut-off meanders, oxbow lakes, braided and distributary channels and sloughs. The gradient of the Willamette River flattens from 6 feet per mile to 5 feet per mile as it flows through Marion County. As the river approaches the County it slows down in velocity. This

slowing in velocity results in the river being unable to carry the coarser materials it held upstream. It is only able to carry fine-grained sediments which are evidence of the rich bottom lands that are tributary to this reach. The river being more stable, no longer moves about at random among braided channels. The channel is better established and more fully developed meanders appear. Below Salem these processes continue as the river flows between well-defined banks that are over topped only in the higher floods. The characteristics of a meandering river, such as oxbow cut-offs, become more pronounced.

Flow in the Willamette River is controlled to some degree the year around by numerous reservoirs on its headwaters and tributaries. The major affects of this upstream control was to establish more stable flow conditions. This permits a higher flow in the river during the summer and allows water to be stored in peak run-off periods.

Since runoff peaks are stored in the reservoirs during the winter these must be released after a storm in order to make room for the next one. Thus the flow is higher for a longer period of time than under non-regulated conditions. This limits the possibility of extremely high water to change the course of the river but the overall increased flow has increased bank erosion along low lying areas near the river.

The average temperature of the river near Salem ranges from 43-44 degrees in January and February, up to 68 degrees in the warm summer months. The temperature varies along the course of the river and is generally 3 to 5 degrees warmer at Salem than at the point where the Santiam joins the Willamette at Jefferson.

The average annual precipitation in the Willamette Basin is 63 inches. This results in a volume of more than 40 million acre-feet of water falling on the basin annually. A major portion of this water finds its way to the Willamette and its tributaries.

The regulated minimum flow of approximately 6,000 cubic feet per second (cfs) measured at Salem is needed to assimilate accumulated waste effluents even after a high degree of secondary treatment. This is the treatment level and flow combination currently in effect that meets water quality standards in the river.

The 6,000 cfs minimum flow in the Willamette River is now partially provided by storage reservoirs in the upper drainage basin. Without augmented flows, the river discharge would drop to approximately 3,500 cfs every summer. Without the augmented flow, secondary treatment of industrial and domestic wastes would not have been sufficient to bring the river up to standards. It must therefore be noted that adequate base flows are essential to the establishment and maintenance of an effective water quality management plan.

Turbidity, a measurement of particulate, is seasonally high from land runoff. This runoff results in exposure of new gravel areas and the movement of gravel down the river.

The Willamette River meets the State of Oregon Department of Environmental Quality standards for levels of turbidity, BOD (biological oxygen demand) and DO (dissolved oxygen). BOD is the oxygen demanded to support life in the river and DO is the amount of dissolved oxygen actually in the river. PH is measured on a scale of 1 to 10, 7 being neutral, 10 completely alkaline and 1 completely acid.

BOD levels increase in areas where there are organic effluents released from industries and at times when bacterial levels are high due to land run-off. The BOD level varies between 8.5 and 11.5 MG/L (milligrams per liter). PH measured at Wheatland Ferry is generally neutral, 7.0, but may vary from 6.7 to 7.1.

### Wildlife Summary

The meandering course of the river through the productive Willamette Valley has created excellent wildlife habitat, gravel bars, backwaters, islands, riparian vegetation and especially sloughs are essential components of this unique ecosystem. Much of this important habitat has already been destroyed by man's attempt to channelize the river.

A straight-running, even-banked waterway is orderly, but relatively unproductive biologically. Wherever these natural features remain, they must be preserved or wildlife populations will vanish.

Some species, such as mink and kingfishers, are found throughout the river system in fairly even distribution. Some, like beaver and wood ducks, appear in concentrations where habitat is favorable and only move through the less-productive areas. Others like turtles occur only in limited small areas. Beaver and deer are representative of the thirty-one species of mammals found along the river, and provide more recreation than the others. Ninety-nine species of birds use the area, including upland game, waterfowl and a great variety of other birds, from eagles to hummingbirds. Twenty-five species of reptiles and amphibians live in or near the river.

Some of these wildlife species live out their lives here while others are seasonal visitors. All are a part of the river environment and add substantially to the quality of the outdoor experience of the human visitor, whether he is boating fishing, hunting or trapping. The thousands of days of recreation these animals provide now will increase rapidly hence their value will grow each year.

A study of the Willamette River was done by the Oregon Department of Fish and Wildlife. Significant areas of interest are listed by river mile. Information regarding Marion County's portion of the Greenway was obtained from Joe Wetherbee, Fishery Biologist, and Jim Heines, Wildlife Biologist.

### Development Limitations

Physical geography has always been an important, and many times a controlling factor in the determination of suitable locations for developed land uses. The elements of terrain, soil conditions, surficial geology, surface water bodies and drainage patterns, and groundwater are included among the important developmental factors that need to be considered. The effects that the characteristics of these elements have upon man and his development range from potential dangers to life and property to just plain nuisances. Areas that pose hazards to human life and property naturally must be avoided or the characteristics must be altered if possible.

While man has increased his ability to alter and shape the natural landscape and is able to alleviate many of the physical problems he encounters, he does so at a cost – sometimes measured only in financial terms, other times in both financial and environmental terms. Development in harmony with the characteristics of the natural environment offers both financial

and environmental benefits. Historically, development patterns have not reflected total consistency with natural environmental characteristics. The annual loss of life and property through flooding in many parts of the United States attests to this fact. Where development has been contrary to environmental characteristics it has often been due to shortsightedness and lack of knowledge of the long-range implications of actions. But, the results of such actions often involve long-term social and environmental losses. This section concerns development limitations within the County that must be considered to avoid such losses in planning for future development.

To simplify the analysis and presentation of information, individual development factors have been considered as they apply to four general limitation categories: flood plains, building site limitation, septic tank filter field limitations, and landslide areas. These four general categories cover all of the physical elements previously mentioned as important developmental factors. Among the factors considered within the building site limitations category are land slope and soil characteristics such as bearing strength, shrink-swell potential, composition and depth to bedrock. Soil characteristics such as permeability and groundwater table are considered in the septic tank filter field limitations category. Factors considered in the other two categories are self-explanatory.

The State Geology Department has completed a study of the geologic hazards of four selected areas of Marion County.<sup>1</sup> These areas are where the more significant geologic hazards exist and where present and future development might cause problems. They are the South Salem Hills, East Salem- Aumsville area, Abiqua Creek area, and the North Santiam and Little North Fork of the Santiam area.

The areas of floodplain, landslide and steep slope hazards are shown on the map "Development Limitations". The areas of building site and septic tank limitations are defined by the general soils associations shown on the general soils map in this report. Tables 4, 5, and 6, taken from the Geologic hazards report, provide general guidance in reviewing land use activities for potential problems. These tables indicate the level of concern for activities proposed in identified hazard areas.

It should be emphasized that this information is not for detailed site evaluation. This information should be used to identify potential problem areas relative to proposed development. More site-specific information will need to be included in each proposal for development. The following paragraphs analyze and describe the nature and extent of the problems of development limitations in Marion County.

### Floodplains

Historically, waterways have been attractors of growth. The level land adjacent to streams and rivers provided opportunities for agricultural production while the waterways themselves provided a source of water supply and transportation. Urban centers naturally developed in such locations. However, the choice of such sites many times resulted in a conflict between man and

<sup>1</sup> Geologic Restraints to Development in Selected areas of Marion County Oregon, Herb Schlicker, Engineerig Geologist, Oregon Department of Geology and Mineral Industries, 1977

nature. When called upon to carry greater than normal quantities of water, streams and rivers occasionally inundate the comparatively flat areas immediately adjacent to the normal stream channels. In actuality, these areas are only extensions of the normal stream channels and are commonly referred to as floodplains. Conflicts inevitably arise when urban centers or other developed uses are constructed in a flood plain. Flooding of such areas involves a hazard to both life and property.

In Marion County, several urban centers have encroached upon the floodplain. The largest amount of urban encroachment is present in the Salem urban area. As a consequence of this encroachment, the floods of the 1964 season resulted in property damage and losses of \$8,482,000 in the Salem area.<sup>1</sup> Flooding necessitated the evacuation of Salem Memorial Hospital and affected many parts of the city and surrounding suburbs. More than 36 separate areas experienced localized flood damage. Floodwaters were 9 feet deep in Keizer and 2 feet deep in West Salem. Backwaters from the Willamette River prevented run-off through Shelton Ditch, Pringle Creek, Claggett Creek and other discharge streams, creating further damage.

Within the last fifty years, attempts have been made to reduce flood damages in this nation through structural control of the floodwaters, i.e. by keeping the floodwaters away from man. Such projects as dams and reservoirs, levees revetments and channel improvements have been used for this purpose. In addition, flood forecasting, evacuation and floodproofing have also been used to reduce flood damages. While all of these efforts unquestionably have been of value in reducing flood losses, the fact remains that flood damages have continued to rise because of increased development in the flood plains. This indicates that control of floodwaters is not the total solution to flood damage reduction. Increasing recognition is being given to the need to keep man away from the floodwaters. Quite logically, there would be no more conflicts if this were to be accomplished. However, it is recognized that total accomplishment of such an objective is probably unrealistic as it would place severe restrictions on many of man's activities. The current approach to flood plain management combines structural control measures with land use regulation. Such management is designed not only to reduce flood damages but to safely permit certain uses of the flood plain.

Flood control structures are primarily the realm of the U.S. Army Corps of Engineers since their costs and scope are beyond the capabilities of local or state government. Land use controls are, on the other hand, best accomplished at the local level through city and county zoning ordinances. The major impetus to the adoption of local control ordinances has come from the enactment of the National Flood Insurance Program by the U.S. Congress in 1968. This program, administered by the Federal Insurance Administration in cooperation with the private insurance industry, made insurance against flood caused losses available to residences of participating jurisdictions. In 1973, the program was amended to make flood insurance mandatory in flood hazard areas by requiring federal agencies and federally backed lenders to require flood insurance for all projects and loans. In return for making low cost flood insurance available to existing development in flood plains, the County is required to enact land use control measures to minimize flood damage to new development. This process involves enactment of County flood plain development control ordinances specifying activities allowable in the

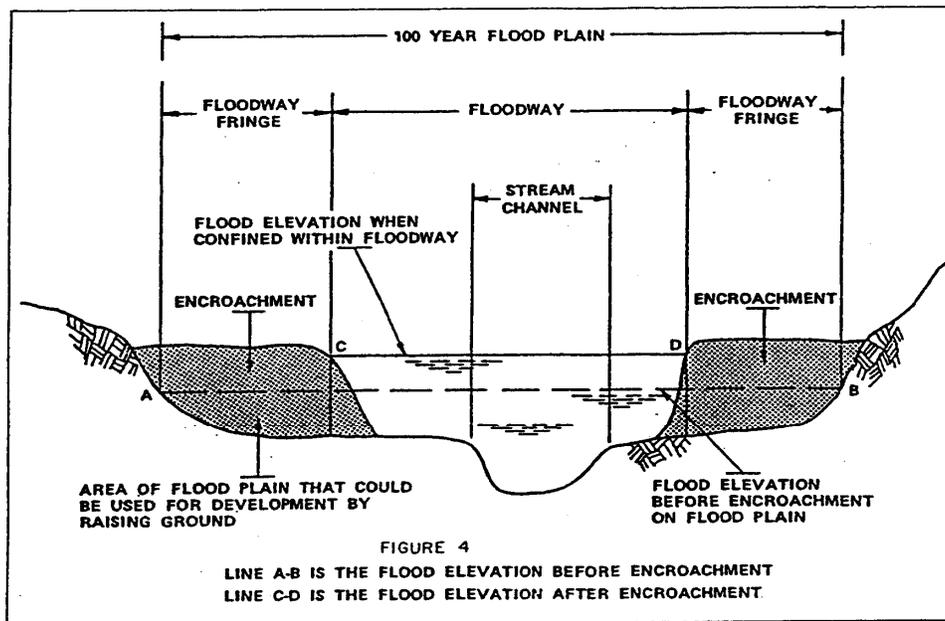
<sup>1</sup> “Postflood Report, December 1964 – January 1965 Flood”, U.S. Army Corps of Engineers, Portland District

identified flood prone areas. To accomplish this, it is necessary to identify specifically the area of potential inundation and the expected flood height. The flood plain area applicable to the insurance program and local land use control is that area which is a flood that may occur on a one percent chance in any one year.

Marion County entered into the preliminary flood insurance program by adopting a flood plain ordinance in 1974 that controlled development in the 100-year flood plain of the Willamette River, Santiam River and parts of their tributaries.

To effectively accomplish the program the FIA developed flood plain delineation maps and report with assistance from the US Army Corps of Engineers. By performing analysis of the hydrological characteristics of all flood prone areas, detailed flood plain maps of Marion County were produced showing the location of the floodway and floodway fringe in addition to the flood elevation on special areas. Detailed studies were done of areas where development is more likely to occur while approximate information is presented in most rural resource lands. When this data was completed, Marion County was then placed into the final or permanent flood insurance program in August 1979. This required the revision and updating of the County land use control ordinance contained in the Zoning Ordinance. The FIA flood plain maps provide the basis for defining the area and elevation data to implement the County ordinances.

The following diagram shows the various flood plain characteristic areas used on the flood maps.



Within the total land area inundated by a flood, the degree of hazard involved may vary considerably from place to place. Some areas are subject to the movement of a large volume of high velocity waters, while others are merely subject to the storage of relatively shallow, slow moving waters. For the purposes of understanding the different nature of areas within a flood, the channel and adjacent floodplain that is needed to adequately discharge the waters of the 100-year flood. It is within this area that the major volume of floodwater is discharged. Water depth and velocity are usually both relatively high. Open land uses such as agriculture are the best uses of this area so as not to impede the floodwaters. The floodway fringe is that portion of the flood

plain lying outside of the floodway but within the flood limits. Structures erected within this area do not create significant hazards. Structures constructed in this area are required to have floor elevations above the flood level or be flood proofed. Urban or concentrated development is not appropriate in this area.

A hydrological study of the areas of special concern for their flood damage potential was done by engineers contracted to the FIA. Where a detailed study was not made, the general data supplied by the Corps of Engineers is used.

The program allows the more shallow flood fringe areas to be developed, built upon and filled provided any development is above the calculated flood elevation when confined within the floodway (Line C-D in Figure 4).

Those areas shown as being subject to flooding are shown on the Development Limitations Map that generally indicates the limits of the 100 year flood level. The more specific flood plain data is shown on the Federal Insurance Administration flood plain maps on file in the Marion County Planning Department.

To give full perspective to the flooding issue it is important to point out that a flood larger than the 100-year level may occur. A 500-year flood is the most severe flood that could occur resulting from a simultaneous occurrence of the most critical meteorological conditions. These are extremely rare and are not accounted for in the flood protection program. It should also be pointed out that major floods of an infrequent probability may occur in two or more consecutive years and more than one major flood may occur in any one year. An example of the latter case is the December 1964 and January 1965 floods in Marion County and the Willamette Valley, both of which were major floods. It also needs to be stressed that the flood plain is subject to constant change due to modifications in the topographic pattern of land, modifications of the drainage pattern, urban developments which cause added run off and construction of water storage projects. Consequently, it is not possible to predict the exact limits of inundation during future floods. However, precautions against damage of the 100-year flood will sufficiently protect the vast majority of the flood plain development.

### Landslide Areas

Areas of landslide activity or unstable slopes are usually unsuitable for development because of hazards to human life and property from earth movement. The areas within the County identified by the State Engineering Geologist as active or inactive landslide areas are shown on the Development Limitations Map. A major active landslide area is located on the west-facing slope of the Salem Hills. The slides in this area have developed on steep slopes of soils originating from the marine sedimentary bedrock units. Landslides also occur in the canyon of Abiqua Creek about five miles east of Silverton and along the slopes of the Little North Fork of the Santiam River. In these areas, the slides are developed in deeply weathered tuffs of the Mehama Volcanics. Landslides may also occur in the clay soils overlying the Columbia River Basalt in the Salem Hills area and in the Waldo Hill Silverton Hills area, if slopes are artificially over steepened.

Steep slopes associated with landslide activity areas are themselves a deterrent to high-density development. But, such areas of steep and unstable slopes may be attractive to low density residential development because they have a view or because they possess other site amenities. In any case, development in any identified active or inactive landslide area should be reviewed on an individual site basis. Special engineering geology studies may be required to determine if proposed development can be safely accommodated.

### Building Site Limitations

As mentioned previously, among the factors that should be considered when determining limitation for building or development are land slope and soil characteristics such as bearing strength, shrink swell potential, composition, and depth to bedrock. A high groundwater table may also involve certain construction difficulties. The foregoing limiting factors, and others, have been used by the Soil Conservation Service (in cooperation with the Oregon Agricultural Experiment Station) in analyzing and rating soil limitations for various uses.

The classification system used by SCS involves the rating of a soil association for a particular use by degree of limitation for that use: slight limitation, moderate limitation, or severe limitation. Slight limitations either do not require any special planning, design, or management, or the restrictions are easily overcome. Moderate limitations have restrictions that can be overcome with planning, careful design, and good management. Severe limitations indicate that this use is doubtful and generally unsound.<sup>1</sup> It should be understood that these ratings and their application to soil associations, which generalize the detailed soil units, are suitable only for large-scale general planning purposes. Only limited consideration has been given to possible corrective measures which might be employed to alleviate the limitations noted, the design criteria for such corrective action and, in general, the economic feasibility of undertaking such corrective action. More detailed information on each soil type is included in the Marion County Soils Survey.

All 23 soil associations in Marion County are listed and rated for degree of building site use limitations in Table No. 31. The limiting factors that cause a particular association to have a rated limitation are listed beneath the table. The percentage figures listed next to the ratings indicate the amount of land area within the soil association that has that particular degree of limitation. For example, 40 degrees of the land area within the Chehalis Cloquato soil association has only slight limitation for building site use. However, 60 percent of the association area is rated as having a severe limitation for building site use. The limiting factors (8 & 9) causing the severe rating are a high fluctuating water table during winter and early spring and flood hazard.

<sup>1</sup> Soils Survey of Marion County Area, Oregon, United States Department of Agriculture, Soil Conservation Service, in cooperation with Oregon Agricultural Experiment Station, September, 1972  
The location of these soil associations is shown on the General Soils Map.

Many of the soil associations occurring on the alluvial terraces are treated as having severe limitations for building site use because of a seasonally high groundwater table. This factor requires special precautions to protect basements of houses and buildings from water infiltration. Either basement floor slabs and walls must be designed to withstand hydrostatic uplift pressures or water levels must be controlled. Hydrostatic uplift can also damage swimming pools unless water is retained in the pools during the high groundwater season or unless the structure is designed to withstand uplift pressure. Another situation that should be anticipated in these areas is the collection of groundwater in shallow extractions. In such instances, special precautions may be required to protect the excavation slopes.

Some soil associations, again principally on the alluvial terraces, have limiting factors related to soil stability and the ability to bear the loads of buildings. A high shrink swell potential is a problem in the Bashaw, Concord-Dayton-Amity, Santiam, Steiwer-Chehulpum-Hazelair, and McCully Associations. The last two associations are not on the alluvial terraces, but are low foothill associations. In addition to a high shrink swell potential, these two foothill associations also have soils within them that possess poor stability. Low shear strength is an additional problem in the Steiwer-Chehulpum-Hazelair and Wapto-Waldo associations. Soils possessing any of the foregoing characteristics will obviously present special problems to providing adequate building foundations. Required solutions may prove to be economically infeasible.

The degree of hazard to life and property resulting from the foregoing building site limitation factors is obviously less than the degree of hazard related to flooding. Generally, the hazard involved relates to property damage or increased building costs. In normal construction practice, many of the limiting factors cited are taken into account and corrected. This should be apparent from the amount of developed land occupying areas rated severe – much of the Salem area has a seasonally high groundwater table as a building site limitation factor.

**TABLE NO. 31**  
**SOIL CONSERVATION SERVICE RATINGS OF SOIL LIMITATIONS**  
**FOR BUILDING SITE AND SUBSURFACE SEWAGE DISPOSAL USE**

	<u>Soil Association</u>	<u>Building Sites</u>	<u>Limiting Factors</u>	<u>Septic Tank Filter Fields</u>	<u>Limiting Factors</u>
1.	Chehalis-Cloquato	Slight 40% Severe 60%	- 8,9	Slight 40%* Severe 60%*	- 8,9
2.	Cloquato-Newberg	Slight 5% Severe 95%	- 9	Slight 5% Severe 95%*	- 9
3.	Cloquato-Newberg Camas	Slight 90% Severe 10%	- n.g.	Slight 85% Slight 15%	- n.g.
4.	Bashaw	Severe 100%	7, 34	Severe 100%*	8,13
5.	McAlpin-Abiqua	Moderate 95% Severe 5%	8,34 n.g.	Severe 100%*	8,12

6.	Wapato-Waldo	Moderate 5% Severe 95%	n.g. 7,9,36	Severe 100%*	7,8,9,13
7.	Semiahmoo-Labish	Moderate 15% Severe 85%	n.g. 7,8,9	Moderate 15% Severe 85%	n.g. 7,8,9
8.	Concord-Dayton Amity	Moderate 10% Severe 90%	n.g. 6,7,8,34	Moderate 5% Severe 95%	n.g. 6,7,8,12
9.	Amity	Severe 100%	6,8	Severe 100%	6,8,12
10.	Woodburn	Slight 10% Moderate 75% Severe 15%	- 1,8 n.g.	Slight 10% Severe 90%	- 1,8,13
11.	Clackamas	Slight 25% Moderate 65% Severe 10%	- 6,8 n.g.	Slight 25% Severe 75%*	- 8,12
12.	Sifton-Salem	Slight 90% Moderate 5%	- n.g.	Slight 90%* Severe 10%*	- n.g.
13.	Courtney-Clackamas	Slight 35% Moderate 15% Severe 50%	- 6,8 7	Slight 35% Severe 65%*	- 8,12,13
14.	Santiam	Moderate 80% Severe 20%	1,8,34 n.g.	Severe 100%	1,8,13
15.	Steiwer-Chehulpum- Hazelair	Moderate Severe 50%	1,2,3,25,35 4,8,13,34,36	Severe 100%	1,8,12,13, 25
16.	Jory-Nekia-Salkum	Slight 35% Moderate 55% Severe 10%	1,2,23 1,3,23	Severe 100%	1,12,13,23
17.	Nekia (gentle to strong slope)	Moderate 100%	1,15,23	Severe 100%	1,12,23
18.	Nekia (gentle to Steep slope)	Moderate 50% Severe 50%	1,15,23 1,23	Severe 100%	1,12,23
19.	McCully	Slight 30% Moderate 10% Severe 60%	1,15	Severe 100%	1,8,12,13
20.	Hult-McCully	Moderate 15% Severe 85%	1,33 1	Severe 100%	1,12
21.	Kinney	Slit.-Mod. 30% Severe 70%	1,15 1,4	Severe 100%	1,11
22.	Horeb	Slit.-Mod. 75% Severe 25%	1 1	Mod.-Severe 100%	1,11

23. Whetstone-Henline Severe 100% 1,23 Severe 100% 1,23

n.g. - Not Given

\* Pollution to water supplies is a potential hazard

### LIMITING FACTORS

1. Excessive slope
2. Moderate erosion hazard
3. High erosion hazard
4. High slide hazard
5. Moderately well drained
6. Somewhat poorly drained
7. Poorly drained
8. High fluctuating water table during winter and early spring
9. Subject to flooding
10. Rapid or moderately rapid permeability (2.0 to 20 inches hr.)
11. Moderate permeability (0.63 to 2.0 inches/hr)
12. Moderately slow permeability (0.20 to 0.63 inches/hr.)
13. Slow or very slow permeability (less than 0.2 inches/hr.)
14. Gravel throughout soil
15. Stony or cobbly in surface layer or subsoil
16. Very gravelly substream at 20 to 40 inches
17. Silt loam surface layer or subsoil
18. Silty clay loam or clay loam surface layer or subsoil
19. Clay surface layer or subsoil
20. High organic matter
21. Bedrock at less than 20 inches
22. Basalt bedrock to 40 to 100 inches
23. Basalt bedrock at 20 to 40 inches
24. Sedimentary rock at 40 to 100 inches
25. Sedimentary rock at 20 to 40 inches
26. Pervious compacted permeability
27. Poor compaction characteristics
28. Limited supply of suitable material
29. Thick overburden
30. Excessive fines
31. A-4 or A-5 Aasho engineering classification
32. A-6 or A-7 Aasho engineering classification
33. Moderate shrink swell potential
34. High shrink swell potential
35. Poor stability
36. Low shear strength
- 37.

### Septic Tank Filter Field Limitations

Sewage disposal by means of a septic tank and filter field system is one alternative that may be used when no public sewage collection and treatment system is available. This method of subsurface sewage disposal has been common practice in rural and suburban areas of Marion County for a number of years – as it has been in many other areas of Oregon and the United States. As the name implies, there are two major functional parts of the system: the septic tank

and filter field. The tank receives the sewage and other wastes through a sewer line from the house (or other source), the solids settle within the tank, the liquid sewage (effluent) overflows into a drain-tile field, and through perforations in pipe the effluent is released to the surrounding soil where it is absorbed and filtered. The septic tank maintains an anaerobic environment (without oxygen) in which bacterial action takes place to digest the solids. However, within the drain-tile and filter field just the opposite condition is required. An aerobic environment (with oxygen) is necessary for proper operation of this part of the system. Oxidation of the effluent and treatment by anaerobic bacteria is necessary in addition to the filtering of suspended solids as the effluent passes through the soil. In the absence of oxygen within the soil, a rich black-matter (ferrous sulfide) may form around the drain-tiles and clog them.<sup>1</sup>

Because this system of sewage disposal utilized the soil as an integral part of the system, the characteristics of the soil determine whether or not this system can be used. Soil suitability for subsurface sewage disposal depends largely on the absorptive ability, or permeability, of the soil. But there are several other soil characteristics that may affect soil suitability, such as groundwater level, depth of soil, types of underlying material, slope of the land surface, proximity to streams or lakes, and flooding.

Permeability is the rate of water movement through the soil. Naturally, the greater the porosity of the soil, the faster the rate of water movement and the greater the permeability. Soil permeability is many times referred to in general terms such as slow, moderate or rapid; but it may also be measured in terms of the amount of water which will percolate through the soil over a given period of time. To be suitable as an effluent filtering medium, a soil must be within a certain minimum and maximum permeability range. The absorptive quality of the soil must be great enough to handle the volume of effluent discharge to it but not so great that the soil will not filter the effluent. Several publications give a suggested range of percolation rates that can be used when determining the suitability of a soil for filter field use.

A high groundwater table (temporary, seasonal, or year-round) within an area can render a soil unsuitable for filter field use. If the water table reaches the level of the drain-tile, the sewage effluent will be forced upward to the soil surface. This creates a health hazard, and under these circumstances the filter field obviously cannot operate properly. Even if the water table does not rise to this height, it must remain sufficiently low to prevent the effluent from reaching the groundwater. The State of Oregon regulations governing septic tank usage indicate that, "A temporarily perched water table shall not come in contact with the absorption facilities effective sidewall during any season of the year."<sup>2</sup> This means that the water table should not be closer to the ground surface than four feet for prolonged periods during the year.

In order to provide adequate soil depth for the filtration and purification of septic tank effluent, rock formations should be at least four feet below the bottoms of the trenches of the filter field.

<sup>1</sup> Economic Analysis of Sewage Control for Residential Suburbs, August, 1966, Carter W. Harrison, Stanford University, Palo Alto, California.

<sup>2</sup> Regulations Governing the Subsurface Disposal of Sewage, 1978, Department of Environmental Quality page 29, 71-030 (1) (d)

Slopes of less than 12 percent usually do not create serious problems in either the construction or maintenance of filter fields, provided the soils are otherwise satisfactory. On steeper slopes, trench filter fields are more difficult to lay out and construct. In addition, there may be a serious problem in controlling the lateral flow of the effluent to the downhill soil surface. This downhill flow may reach the soil surface before the effluent is properly filtered creating a potential health hazard. The problem of controlling lateral flow on steep slopes may be compounded if a layer of dense clay, rock, or other impervious material is encountered. If exposed on the hillside, the impervious layer will channel the unfiltered effluent to the ground surface downslope from the filter field.

Oregon Law requires that filter fields located at least 100 feet from any stream, open ditch, lake, or other watercourse into which unfiltered and contaminated effluent can escape and spread. Even with this limited precaution, it should be recognized that the natural filtering and treating effect of the soil cannot be depended upon to remove all bacteria from polluted groundwater, and extreme care must be exercised in locating a filter field in any area that is a potential source of water supply.

The Soil Conservation Service ratings of soil association limitations for septic tank filter field use, and the limiting factors considered in their analysis are included in Table No. 7. This is the table containing the information on building site limitations discussed in a previous section. As with the building site limitation information, only the soil association with at least 50 percent of their area rated as severe have been mapped on the development limitations map. Likewise, two categories of limitation based on area coverage within the association have been shown. Unlike the information on building site limitations, the information on septic tank filter field limitation indicates that almost all of the soil associations have at least 50 percent of their area rated severe, and most of them have over 75 percent of their land area rated severe.

Limiting factors for filter field operation within the soil associations of the alluvial bottomlands are generally a flooding potential and a seasonally high groundwater table. On the alluvial terraces, the soil associations are also limited by a high groundwater table. In addition, many of the soils in level areas of the terraces (such as those within the Corcord-Dayton-Amity association) are poorly drained and have slow permeability. In the soil associations of the low foothills, the limiting factors are generally excessive slope, inadequate permeability, or insufficient soil depth. Limiting factors in the mountain footslope soils are generally excessive slope and insufficient soil depth.

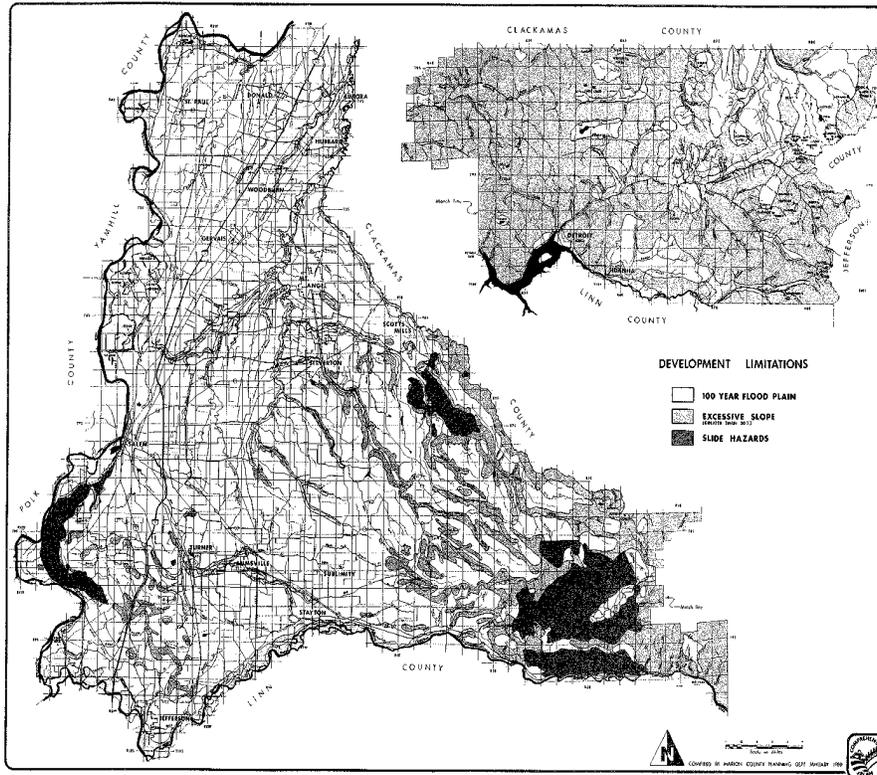
Considering other limiting factors for septic filter field use reduces the list of suitable soils even further. Of the twenty-five soils with suitable permeability, seven are definitely unsuitable for septic filter field use because of steep slopes. Another seven soils are of questionable suitability because of slope limitations.

It should be noted again that the soil association information is quite generalized and is suitable only for the most general, area-wide use. There may be isolated areas within the affected association which do not share the development limitations; also, corrective actions may be possible in some instances. However, past experience in the Salem area (and other communities within the County) indicates that concentrated or suburban density development using septic

tanks is only a short-term solution to the problem of sewage disposal. Maintenance of proper sanitation standards and good land use planning practice argue for the provision of public sewer services to areas of urban expansion prior to or simultaneously with their development.

Low-density (acreage) residential uses may be accommodated in many parts of the rural region by use of septic systems; however, only in limited numbers. Based on an analysis of the limitations within different physiographic areas of the County, it appears the low foothills have the fewest limitations for low-density residential use.

The potential pollution of ground and surface water from septic tank malfunction is a significant concern of the water quality planning program. The 208 Waste Treatment Management Plan being developed by the Mid-Willamette Valley Council of Governments will identify pollution problems relating to septic tanks and, hopefully, develop management proposals to minimize the problems.



## ENERGY

The availability and use of energy is a significant factor in the development of the land use pattern of Marion County. The present location and form of the residential, commercial and industrial centers have their basis in an abundance of relatively inexpensive energy.

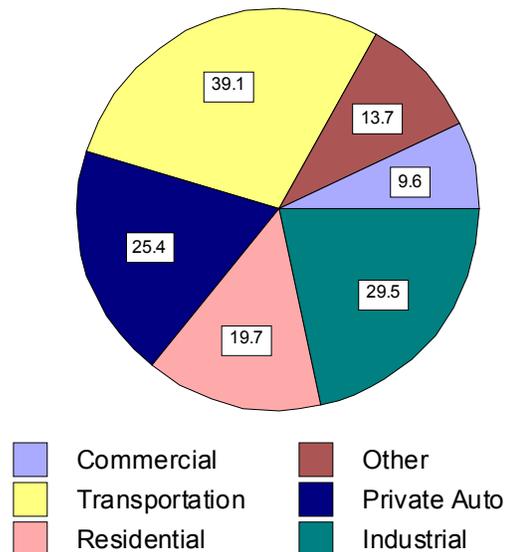
Since energy consumption is increasing more rapidly than energy production it is becoming more important to conserve as much energy as possible. To accomplish this, we must first analyze our energy consumption and resources and then devise a strategy to minimize energy waste. It is estimated that over one half of all energy used in this County is wasted.<sup>1</sup> Revising the land use and transportation patterns to more energy efficient can help.

### Energy Consumption

There is no identified consumption data specifically for Marion County, therefore, data on the State as a whole is presented. Since energy use is fairly consistent through out the State, the data should present a reasonably accurate statement of the situation in Marion County.

Figure No. 5 shows the direct total energy use by the major sectors.

**Figure 5**

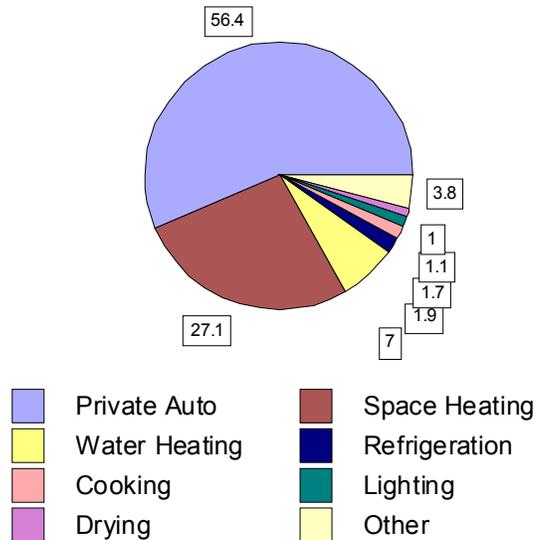


Source: Oregon Department of Energy

<sup>1</sup> Oregon Department of Energy, Community Energy Planning

It is important to note that nearly 40 percent of all direct energy is consumed by transportation. Of that amount, 65 percent is attributed to private automobile use. In addition, personal consumption of energy accounts for 45 percent of total direct energy used. Figure No.6 shows that the combination of the use of the private auto and space heating accounts for 86 percent of the typical family's energy used.

**Figure No. 6**



Source: Oregon Department of Energy

These two areas of energy use are where land use planning considerations can have the most significant impact on energy conservation. These impacts can be exerted through efforts to minimize travel distances and by maximizing efficiency of residential siting. The siting of residences in rural locations far from job opportunities and needed service facilities is one area that is of significant concern to energy conservation.

Policies that deal with the concerns of energy conservation and the land use relationship in Marion County can be found in the energy section of the Comprehensive Plan Policy document.

Inventory of Energy Sources

In addition to consumption data it is also important to inventory local energy sources for their potential future development. In the summaries that follow, each energy source is discussed in terms of its present and potential energy significance within Marion County. Alternative sources will be examined considering the likelihood of their development in the County.

## Hydroelectric

There are two hydroelectric generating plants in Marion County. Detroit Dam is located at the western end of Detroit Lake and Big Cliff Dam is located just downstream from the Detroit facility. Detroit Dam has a total capacity of 100,000 kilowatts from two generating units and Big Cliff Dam has a capacity of 18,000 kilowatts from two units.

In response to the need for increasing power development the U.S. Army Corps of Engineers identified several alternative measures to increase power generation in Marion County. Of these, it was determined that four warranted further study.

The alternatives involve developing additional generators at Detroit and Big Cliff Dams, increasing regulated storage at Big Cliff Lake or building a new generator downstream of the Big Cliff facility.

Detroit Lake presently provides 340,000 acre-feet of storage capacity and is a popular recreation area. In addition to storing water for power generation, the Dam serves to control floods and irrigation. Regulated flow is also essential in maintaining fish and wildlife habitats along the course of the Santiam.

The construction of additional generators would require a drastic reduction in the water level of Detroit Lake for at least one year. This would result in serious environmental and economic concerns. There would not be enough water retained in the reservoir to augment stream flows during the spring season. This would result in the loss of one year's hatch of salmon and steelhead.

The river and lake would have such low-water levels that their recreational quality would also be seriously affected during construction. There is virtually no additional potential for hydroelectric development in Marion County.<sup>1</sup>

## Solid Waste

The combustion of municipal solid waste is a means of reducing the volume of waste for landfill disposal. It is also a means of generating energy in the form of steam. The feasibility of developing this potential energy source in Marion County was explored in a study titled "Resource Recovery from Solid Waste for Salem, Marion and Polk Counties."

Approximately 85 percent of the area's waste could be converted into refuse-derived fuel provided that markets were available. The cost of building a facility to separate and shred solid waste and the cost of converting burners presently using other types of fuel also limit the possibility of developing this energy source.

<sup>1</sup> Review of Power Planning in the Pacific Northwest by the Pacific Northwest River Basins Commission, May, 1975. Water Resources Development for Oregon prepared by US Army Corps of Engineers. Paul Wemhoener, Water Resources Planning Section, US Army Corps of Engineers.

Although it is doubtful that solid waste will be used to generate energy in Marion County in the near future, the separation and recycling of that waste could be very effective in conserving energy. For example, only 15 percent of the energy used to produce aluminum is needed to recycle it.

A major transfer site for the separation of recyclable waste is presently being planned.<sup>1</sup>

### Wind

To generate electricity from wind requires an average constant wind of 10 miles per hour. There are very few places in Marion County that could meet this requirement. These sites would be in the foothills of the Cascades and could probably only generate enough electricity for a single household. (Cost, \$1,106,000 for a home generator could produce 110 kilowatts). (Large machines can generate 13 megawatts.)<sup>2</sup>

### Nuclear

There are no nuclear reactors in Marion County and it is not likely that a nuclear plant will be built here in the foreseeable future. The Energy Siting Council has mapped areas it would consider unsuitable for nuclear power plants. These include prime agricultural land, natural resource areas, densely populated areas and areas of potential geologic hazards. Most of Marion County falls into one of these categories, only the area between Range 2 and Range 6 East could be considered for a nuclear plant.<sup>3</sup>

### Solar

Solar energy is presently being used as an energy source in Marion County primarily for heating and water heating in many homes and Chemeketa Community College. At the present time the cost limits its application to a limited number of users. There are however, several programs that provide financial incentives for its use. A "solar tax credit" as well as HUD (Housing and Urban Development) and ERDA (Energy Research and Development Association) grants for solar energy systems are presently available in the Stayton area.<sup>4</sup>

<sup>1</sup> "Resource Recovery from Solid Waste for Salem, Marion and Polk Counties, 1976." Russell Fetrow, Department of Environmental Quality, State of Oregon.

<sup>2</sup> Bob Baker, OSU Department of Atmospheric Sciences

<sup>3</sup> W. Kelly Woods, Energy Facility Siting Coordinator

<sup>4</sup> Oregon Department of Energy

## Geothermal

Marion County has known geothermal resource areas. Within the Willamette National Forest there are 44,282 acres considered to have geothermal potential in the Breitenbush area. An environmental statement was completed in January 1978 by the National Forests describing the area and the potential benefits and hazards for the development of the resource.

The Mt. Hood National Forest has approximately 17 leases outstanding that cover 46 square miles. Leases are obtained from the United States Department of Forestry and must be renewed and reevaluated at each phase. These phases range from preliminary exploration through the development of the resource.

Measurements of subsurface temperatures indicate that electric power generation is not economically feasible at this time. There does exist a potential for industry or space heating.<sup>1</sup>

## Gas and Oil Resources

Gas and oil leases can be obtained and have been issued in Marion County. They are under the regulation of the Department of Environmental Quality. Permits for drilling in areas that have been leased must be approved by the Department of Fish and Wildlife, Water Resources Department and the Marion County Planning Commission. Several exploratory wells have been drilled in Marion County and all of them have been dry.<sup>2</sup>

## Pump Storage Potential

Pumped storage is basically a refinement of conventional hydro-generation. It involves storing energy by pumping water into a storage reservoir during off-peak periods at night, weekends and during high stream flow periods and releasing it when peaking power is most needed.

Five sites were originally taken under consideration for their pumped-storage system in the County. It is assumed that this alternative will become more attractive as energy demands and costs increase over the next few years.<sup>3</sup>

<sup>1</sup> Al Prigge and Vern McLean, Willamette and Mt. Hood Ranger District. C.E. Wassinger, District Geothermal Supervisor U.S. Department of Interior.

<sup>2</sup> Environmental analysis record for oil and gas leasing within the Santiam Resource Area, Bureau of Land Management, April, 1976.

<sup>3</sup> J.C. Heutter, Army Corps of Engineers, Portland, Oregon. Pumped-Storage Inventory of the Pacific Northwest part of the Columbia River Tributaries Review Study (Report No. 26), January, 1976

## Bethel Turbine Plant

The Bethel Turbine Plant is located east of Salem. It is a standby system that is used to generate electricity only in the event of a major power outage or in a limited power situation. The Plant is capable of generating half of the amount of electricity normally consumed by the City of Salem.

The system consists of two generators, each of which is powered by two fixed turbine engines. These engines can run on natural gas or oil. Each generator is capable of producing 56,700 kilowatts per hour. When both generators are operating at full capacity, the Plant can produce 113,400 kilowatts per hour.

The system was used for a short period of time in 1976 when the Trojan Nuclear Power Plant was shut down. It would have been used again in the same year if the drought situation had continued.<sup>1</sup>

Marion County is an energy importer since there are no renewable energy resources present and only a small amount of the renewable energy resources have been developed. Renewable resources include water, solar, wind, geothermal and municipal, forest and farm waste. Non-renewable energy resources are petroleum, natural gas, coal and nuclear fuels. Since most of the renewable resources have not yet been utilized, they will play an increasingly important role in Marion County's energy future.

The conservation of energy is considered one of the most important energy sources since it costs approximately six times more to produce new energy than conserved energy costs. Conserved energy is the most economical form of energy available and has the greatest potential for meeting much of future energy needs.

## **CITIZEN INVOLVEMENT PROGRAM**

The Citizen Involvement Program of Marion County will insure the opportunity for citizens to be involved in all phases of the planning process. The program consists of:

1. Responsibilities of the Board of Commissioners, Planning Commission, Planning staff, Committee for Citizen Involvement, Area Advisory Committees and general public.
2. Revitalization of existing Area Advisory Committee system.
3. Methods and techniques for the education of the public concerning land use planning and communication of information and technical data necessary for meaningful citizen input into the planning process.
4. Methods and techniques for the collection, analysis and evaluation of citizen input.

<sup>1</sup> Dave Calvert, Portland General Electric

5. Provision for the disclosure of the rationale behind land use decisions.

### Responsibilities

The responsibilities of the Board of Commissioners, Planning Commission, Planning staff, Committee for Citizen Involvement, Area Advisory Committees and general public are covered in the rules to govern the conduct of business of the Area Advisory Committees (Appendix B).

### Revitalization of Area Advisory Committees

Fourteen Area Advisory Committees (AAC) were appointed by the Board of Commissioners in 1967 to involve citizens in the planning and zoning process. During the following two years these committees were an integral part of the program to develop a County-wide zoning program. However, since that time, participation of AAC members has fallen off and is in need of being revitalized.

The program will recognize the existing Area Advisory Committees and will again use the AAC system as the primary mechanism for citizen involvement. Their immediate responsibility will be in the update of the County Comprehensive Plan in accordance with the Goals of the Land Conservation and Development Commission (LCDC) and subsequently to remain involved in local land use decisions, identifying and communicating public attitude and periodically reviewing the Comprehensive Plan.

### Subsequent AAC Meetings

AAC meetings will be held as often as necessary to provide public input on the Comprehensive Plan Update and other land use issues of local interest. The AAC will be given sufficient time to respond to Planning Commission requests through cooperation with the Planning staff in the collection and analysis of public input and subsequent review of staff alternatives as outlined in the following sections. AAC meetings will be held in accordance with the Rules to Govern Conduct of Business of the Marion County Area Advisory Committees (Appendix B).

### Public Education and Information

The general public shall be provided, through the mass media and more intensively through the AAC, the necessary education, technical information assistance to provide meaningful input on land use decisions. The Planning staff will provide technical, financial and human assistance to the AAC in performing this function. The extension office should assist in providing necessary educational material for AAC use.

### Methods and Techniques

### Direct Mailings

Direct mailings, because of cost factors, will be utilized on a broad scale only for the initial education of the public and solicitation of new AAC members. Use of this method on a local basis may be warranted depending upon the importance of the issue as determined by the AAC.

Direct mail will be utilized in maintaining communication with AAC members and those citizens contributing input as discussed in the citizen input section.

### Mass Media

The mass media will be utilized primarily for giving general background information, informing the public of the opportunity to be involved in the planning process and, most importantly, to announce AAC meetings, Planning Commission meetings and the location of more detailed information. The above information will be provided two weeks prior to each AAC meeting.

### Public Information Center

Information that would assist citizens in identifying and comprehending the issues will be made available at a library or other suitable public place and also in the County Planning Department. The mass media will be utilized to advertise these locations in conjunction with AAC meeting announcements.

This information will be updated by the Planning staff prior to consideration of new issues and as deemed necessary by the AAC.

The Planning Department will keep AAC meeting records including any minutes and also a summary of public input and a written record of the rationale used to reach land use policy decisions. Methods for analysis, summarization of input and disclosure of decision rationale is covered in subsequent sections.

### Special Interest Groups

Special interest groups, to include educational institutions, will be advised by direct mail of the opportunity to be involved in the planning process. Educational and informational material shall be made available by the Planning staff with instructions to channel input through the AAC system. Direct mail will be necessary only for initial contact with reliance on the mass media thereafter.

### Agencies and Institutions

Local institutions, such as elementary and secondary schools, community colleges and universities shall be requested to provide education on land use planning as part of their curriculum. The Marion County extension office should provide assistance and coordinate local AAC educational efforts with the Planning Department.

### Area Advisory Committees (AAC)

The primary method for education of the public and dissemination of technical information will be through the AAC's. The Planning staff will provide the necessary manpower, finances and education so that the AAC may function to meaningfully involve citizens in all phases of planning.

Education of AAC members will be an on-going process with representatives of each AAC attending regularly scheduled planning seminars; the cost to be covered by funds appropriate for citizen involvement. The on-going training of AAC members will obviate the need for staff presence at most AAC meetings.

### Collection, Analysis and Evaluation of Citizen Input

It is the intent of the Program to establish the Area Advisory Committee as the primary channel through which citizen input will be collected prior to the formal public hearing process. Citizen input from individuals, special interest groups, etc. will be collated with the input from the AAC during the preliminary planning phase before formal hearings are scheduled by the Planning Commission.

### Collection of Input

#### Area Advisory Committee

Upon definition of an issue and request for AAC input, the chronology of planning activities will be as follows:

1. Announcement via mass media defining the issue, the location of the public information center where background information is provided and inviting interested citizens to attend the AAC meeting.
2. Presentation of the issue by a Planning staff representative or qualified AAC member at the AAC meeting. All pertinent background information, data, etc., concerning the problem is presented and a request for AAC input made. Requested input is summarized and a majority vote is taken to gain a specific recommendation.
3. The final AAC recommendation is forwarded to the Planning Commission and, with the summary of public input, placed in the public information center.

The AAC process as described may be amended to suit various situations, e.g., joint AAC meetings may better satisfy Countywide issues, a condensed sequence of meetings and workshops may satisfy well-defined local issues.

## Public Hearings

Formal public hearings conducted by the Planning Commission and/or Board of Commissioners will comply with existing methods and applicable state statutes. However, handling of public input should conform to methods outlined in this section.

## Analysis of Input

Public input, whether through the AAC or public hearings, will be analyzed in a systematic manner which does not allow mixing, weighing, or evaluating the input. Different kinds of input will be summarized separately, e.g., the results of workshops will not be combined with individual letters; responses of special interest groups will not be combined with individual opinions, etc. This approach will allow for evaluation based on the unique implication of the type of input.

The Planning staff will employ some type of content analysis which provides for quantitative summaries of opinions expressed and qualitative descriptions of reason given to support opinions.

## Evaluation of Input

A systematic analysis of input will provide the decision making body with the best position from which to consider and weigh the various sources and content of citizen input. It is not within the scope of this program to indicate the weight given to citizen input, but rather to suggest guidelines for its consistent consideration.

1. Assumptions concerning the weighing of public input should be made clear, e.g., if secondary input, such as form letters will be regarded as less important than primary input, such as personal letters; if quality of input outweighs quantity, etc.
2. Indicate how citizen input through the Citizen Involvement Program relates to other factors, such as legal, fiscal, political and environmental considerations, etc.
3. The method of evaluation should be consistent and logical, making for a comprehensive record of how citizen involvement was treated in the decision making process.

## Disclosure of rationale behind land use decisions

A full disclosure of the rationale behind decisions at the various levels of planning will help maintain public confidence in the decision making body. It will also aid public understanding of, and reaction to, subsequent higher levels of decision-making. The rationale used by the Planning staff, Area Advisory Committees (AAC), Planning Commission and Board of Commissioners shall be made a part of the public record and be communicated directly to the AAC and contributing citizens.

# APPENDIX

EXTENSION SERVICE  
Marion County Office



Marion County Health & Service Bldg.  
3180 Center Street NE,  
Room 160  
Salem, Oregon 97301 (503) 588-5301

January 2, 1980

MARION COUNTY, OREGON  
1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS

The attached estimates of cash receipts from marketing farm products in Marion County totaled \$162,339,000. This amount, 19% above 1978, and the highest ever for any Oregon county, indicates the importance of Marion County's agriculture to our communities and our state.

Many cooperated in developing these estimates. Major contributors included individual growers, first handlers, lending agencies, farm and commercial warehouses, food processors, Oregon Crop and Livestock Reporting Service with USDA cooperating, OSU Extension Agricultural Economists, and Marion County Extension Agents..

Cash receipts, compared with 1978, are summarized as follows:

Small Fruits, Tree Fruits, Nuts	\$ 13,990,000	- 17%
Nursery, Greenhouse, Other Specialty Horticulture Crops (Bulb, Turf Sod, Mushrooms, Holly, Vegetables and Flower Seeds)	25,085,000	+ 26%
Vegetables	32,609,000	+ 13%
Grass and Legume Seeds	18,306,000	+ 41%
Grain and Forage Crops	18,328,000	+111%
Specialty Field and Forestry Crops (Beet Seed, Potatoes, Hops, Mint, Dill, Forestry)	17,875,000	+ 9%
Livestock, Dairy, Poultry	36,152,000	+ 11%
	<hr/>	
	\$ 162,339,000	+ 19%

Remember, these are gross receipts. The County's highly diversified agriculture typically shows gains and reductions, shifting to different enterprises from year to year. This was also true in 1979. While many growers enjoyed a good year, for some 1979 was less than prosperous.

May 1980 be a successful and prosperous year for all!

Prepared by County Extension Agents Ken Brown, Steve Cleary, Mike Gamroth, Gale Gingrich, Gene Pirelli, Wayne Roberts, Wilbur Bluhm

Sincerely yours,

Wilbur L. Bluhm  
Marion County Extension Office



Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, and Marine Advisory Programs  
Oregon State University, United States Department of Agriculture, and Marion County cooperating

**MARION COUNTY, OREGON**  
**1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS**

**SMALL FRUITS**

CROP	ACRES	YIELD_ LBS/A	TOTAL PRODUCTION (LBS)	AVERAGE PRICE/LB	CASH RECEIPTS
Strawberries	1,800	7,400	13,320,000	\$0.33	\$4,395,000
Red Raspberries	120	5,000	600,000	0.70	420,000
Black Raspberries	40	2,000	80,000	0.90	72,000
Tame Blackberries	1,000	6,000	6,000,000	0.58	3,480,000
(Evergreen, Marion)					
Boysenberries	400	3,000	1,200,000	0.80	950,000
Loganberries	340	3,000	1,020,000	0.62	632,000
Blueberries	120	7,000	840,000	0.40	336,000
Gooseberries	10	6,000	60,000	0.22	13,000
Currants	25	4,000	104,000	0.35	36,000
Elderberries	15	6,200	93,000	0.25	23,000
Grapes				\$600/T	<u>60,000</u>
<b>TOTAL SMALL FRUITS</b>					<b>\$10,427,000</b>

**TREE FRUITS AND NUTS**

CROP	TOTAL PRODUCTION	AVERAGE PRICE	CASH RECEIPTS
Apples	95,000 boxes	\$ 5.60/box	\$ 532,000
Sweet Cherries	2,000 tons	460.00/ton	920,000
Sour Cherries	200 tons	1,000.00/ton	200,000
Peaches	70,000 boxes	10.00/box	700,000
Bartlett Pears	500 tons	174.00/ton	87,000
Winter Pears	40 tons	200.00/ton	8,000
Prunes and Plums	900 tons	140.00/ton	126,000
Filberts	950 tons	1,000.00/ton	950,000
Walnuts	40 tons	1,000.00/ton	<u>40,000</u>
<b>TOTAL TREE FRUITS AND NUTS</b>			<b>\$3,563,000</b>

**MARION COUNTY, OREGON**  
**1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS**

**SPECIALTY HORTICULTURAL CROPS**

Nursery Products (ornamental, fruit and nut trees; broad leaved evergreens; conifers; deciduous shrubs; herbaceous plants).

Potted Plants, Cut Flowers, Florist Greens, Bedding Plants

Bulb Crops

Other Specialty Crops (flower and vegetable seed, holly, mushrooms, turf, sod).

TOTAL SPECIALTY HORTICULTURAL CROPS \$25,085,000

**VEGETABLES**

CROP	ACRES	AVERAGE YIELD T/A	TOTAL PRODUCTION	AVERAGE PRICE/TON	CASH RECEIPTS
Processed Vegetables					
Beans, Snap	23,140	4.4	101,820T	\$ 150.00	\$15,273,000
Table Beets	50	18.5	930	54.05	50,000
Broccoli Processed	480	5.2	2,495	280.00	699,000
Cabbage Processed	255	28.5	7,270	39.00	281,000
Carrots, Processed	235	24.3	5,700	60.00	342,000
Cauliflower, Processed	1,190	5.0	5,950	300.00	1,755,000
Cucumbers	465	11.5	5,350	134.00	717,000
Peas, Processed	4,525	2.0	10,410	157.00	1,634,000
Squash-Pumpkin	320	23.6	7,530	33.00	245,000
Sweet Corn	18,400	7.8	143,350	60.00	8,600.00
Fresh Market Vegetables					
Garlic	350	3.0	1,160	220.00	254,000
Onions	1,550	375cwt	581,000cwt	3.50cwt	2,034.000
All Other Fresh Market Vegetables					<u>725,000</u>
TOTAL VEGETABLE CROPS					\$32,609.000

**MARION COUNTY, OREGON  
1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS**

**GRASS AND LEGUME SEEDS**

CROP	ACRES	AVERAGE YIELD LBS/A	TOTAL PRODUCTION LBS	AVERAGE PRICE LBS	CASH RECEIPTS
Bentgrass	9,250	280	2,575,000	\$1.94	\$4,994,000
Marion Bluegrass	1,950	740	1,467,000	1.01	1,467,000
Chewing Fescue	7,800	650	5,070,000	.75	3,803,000
Red Fescue	4,500	600	2,700,000	.73	1,971,000
Tall Fescue	700	850	595,000	.28	167,000
Annual Ryegrass	800	1,500	1,200,000	.09	108,000
Perennial Ryegrass	9,000	950	8,550,000	.46	3,933,000
Orchard Grass	850	850	722,000	.48	347,000
Crimson Clover	3,800	250	950,000	.68	646,000
Hairy Vetch	100	650	65,000	.40	26,000
Common Vetch	500	500	250,000	.20	50,000
Austrian Peas	3,000	1,800	5,400,000	.11	535,000
White & Ladina Clover	150	400	60,000	1.00	60,000
Miscellaneous Grass and Legume Seeds					<u>75,000</u>
TOTAL SEED CROPS					\$18,300,000

**SPECIALTY FIELD CROPS AND FARM FORESTRY**

CROP	ACRES	AVERAGE YIELD	TOTAL PROD.	AVERAGE PRICE	% SOLD	CASH RECEIPTS
Potatoes	310	280cwt/A	87,000cwt	\$3.25 cwt	93	\$262,000
Mint for Oil	6,500	53 lb/A	342,000 lb	10.00/lb	100	3,420,000
Dill for Oil	150	60 lb/A	9,000 lbs	6.00/lb	100	54,000
Hops	4,890	1,450 lbs	7,090,000 lbs	1.15/lb	100	8,154,000
Dry Beans	200	15.5 cwt/A	3,100 cwt	19.00cwt	100	59,000
Sugar Beet Seed	1,400	2,830 lbs	3,962,000 lbs	36 lb	100	1,426,000
Farm Forest Products						<u>4,500,000</u>
TOTAL SPECIALTY CROPS AND FARM FORESTRY						\$17,865,000

**MARION COUNTY, OREGON**  
**1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS**

**FORAGE CROPS**

CROP	ACRES	AVERAGE YIELD	TOTAL PROD.	AVERAGE PRICE	% SOLD	CASH RECEIPTS
Alfalfa	4,500	5.0 T/A	22,500 T	\$75.00/T	40	\$675,000
Hay	13,000	2.5 T/A	33,750 T	60.00/T	20	405,000
Corn Silage	3,000	20.0 T/A	60,000 T	20.00/T	33	400,000
Grass and Grain Straw			10,000 T	25.00/T	100	<u>250,000</u>
TOTAL HAY CROPS						\$1,730,000

**GRAIN CROPS**

CROP	ACRES	AVERAGE YIELD	TOTAL PROD.	AVERAGE PRICE	% SOLD	CASH RECEIPTS
Wheat	46,500	85 bu/A	3,952,500 bu	\$4.00/bu	97	\$ 15,336
Barley	4,000	62 bu/A	248,000 bu	2.40/bu	85	506,000
Oats	7,800	80 bu/A	624,000 bu	1.60/bu	64	640,000
Rye	300	45 bu/A	13,500 bu	2.96/bu	95	38,000
Corn	400	90 bu/A	36,000 bu	2.89/bu	75	<u>78,000</u>
TOTAL GRAIN CROPS						\$16,598,000

**MARION COUNTY, OREGON**

**1979 ESTIMATED CASH RECEIPTS FROM FARM MARKETINGS**

**LIVESTOCK, DAIRY AND POULTRY PRODUCTS**

		CASH RECEIPTS
Cattle and Calves		\$ 6,247,000
Swine		1,866,000
Sheep and Lambs		1,121,000
Dairy Products		16,525,000
(1) Farm Chickens	\$ 110,000	
(2) Broilers	2,150,000	
(3) Chicken Eggs	6,534,000	
(4) Miscellaneous	<u>30,000</u>	
	TOTAL POULTRY & POULTRY PRODUCTS	\$8,824,000
Miscellaneous Livestock		
(1) Wool	114,000	
(2) Mink-39,600 pelts @30.30/pelt	1,200,000	
(1) Honey and Beeswax	85,000	
(2) Horses and Mules	150,000	
(3) Rabbits	<u>20,000</u>	
	TOTAL MISCELLANEOUS LIVESTOCK	\$ 1,569,000
	TOTAL LIVESTOCK, DAIRY, AND POULTRY PRODUCTS	\$36,152,000

# APPENDIX B

## **RULES TO GOVERN THE CONDUCT OF BUSINESS OF THE MARION COUNTY AREA ADVISORY COMMITTEES**

Pursuant to the provisions of ORS 197.160(2),  
ORS 215.046(1) and (2), and Statewide Planning  
Goals and Guidelines Authorized by ORS 197.040(2)(a) and (b)  
the following rules were adopted by the  
Board of Commissioners on

### ARTICLE I. AUTHORITY

The Marion County Area Advisory Committees were created by the Marion County Board of Commissioners.

### ARTICLE II. PURPOSE

The purpose of these by-laws, the Area Advisory Committee, and the Citizen Involvement Program is to insure the opportunity for citizens to be involved in all phases of the planning process.

### ARTICLE III. MEMBERSHIP

- A. Each Area Advisory Committee shall consist of no fewer than seven (7) and no more than twenty (20) members who shall be appointed by the Board of Commissioners for two (2) year terms or until their respective successors are appointed.
- B. A member of an Area Advisory Committee shall be a resident of the Area Advisory Committee Study Area of which he/she is a member. Maps of the Area Advisory Committee Study Area boundaries are located in the Planning Office.
- C. Any vacancy shall be filled by the Board of Commissioners. The Board of Commissioners may remove any member for misconduct or non-performance of duty. Un-excused absences from three (3) consecutive meetings or un-excused absences from more than fifty percent (50%) of such meetings held during a calendar year constitutes a non-performance. An excused absence may be obtained by contacting the Chairman of the Area Advisory Committee or Planning Department Office at least twenty-four (24) hours prior to any scheduled meeting of the Committee.

- D. Members of the Area Advisory Committees shall serve without compensation.
- E. In considering new members to the Area Advisory Committee, the Board of Commissioners shall:
  - (1) Utilize available media to notify persons of the opportunity to serve on the committees.
  - (2) Appoint members broadly representative of geographic, occupational, age, sex and minority representation always striving for a balance of input.
  - (3) Publicize appointments and individually notify applicants of the selections.
  - (4) Provide the opportunity for the Area Advisory Committees to recommend additional members.

#### ARTICLE IV. DUTIES AND RESPONSIBILITIES

- A. The Board of Commissioners shall:
  - (1) Adopt and publicize a program for citizen involvement that clearly defines the procedures by which the general public will be involved in the on-going land-use planning process in accordance with recommendations of the Committee for Citizen Involvement.
  - (2) Assure that technical assistance and information necessary to reach policy decisions is available in a simplified, understandable form at a location easily accessible to the Committee.
  - (3) Respond to recommendations from the Area Advisory Committee by providing a written record of the rationale used to reach land use policy decisions.
  - (4) Obtain and/or provide as a component of the planning budget adequate human, financial and informational resources to make citizen involvement an integral part of the planning process.
  - (5) Utilize local libraries or other public places easily accessible to the public to display and disseminate information which would assist citizens to identify and comprehend the issues.
- B. The Planning Commission shall:
  - (1) Provide the opportunity for citizens to be involved in all phases of the planning process.

- (2) Refer proposals for land conservation and development to those affected Area Advisory Committees.
- (3) Allow sufficient time for the Area Advisory Committee to review and report prior to formal action on any land conservation and development action within their respective area and any other that the Commission deems appropriate.
- (4) Consider recommendations and reports from the Area Advisory Committees in formal actions before the Commission.
- (5) Provide the Area Advisory Committees a written record of the rationale used to reach land use policy decisions.
- (6) Meet annually with the Committee for Citizen Involvement to evaluate and update the Citizen Involvement Program.
- (7) Utilize local libraries or other public places easily accessible to the public to display and disseminate information that would assist citizens to identify and comprehend the issues.

C. The Committee for Citizen Involvement shall:

- (1) Assist in developing a citizen involvement program to create opportunities for participation of a broad cross-section of people in land use planning.
- (2) Assist in implementing the citizen involvement program, although the Committee for Citizen Involvement need not be involved in the actual day-to-day process for meeting the citizen involvement implementation.
- (3) Evaluate the success of the Citizen Involvement Program and suggest new approaches.

D. The Area Advisory Committees shall:

- (1) Have the opportunity to be involved in all phases of the planning processes.
- (2) Receive, review and report on any proposal for land conservation and development within the Committee's study area in accordance with Section (a)-(c) of this subsection.
  - (a) Prior to any formal action, the Area Advisory Committees shall receive from the Planning Director, applications, policy proposals and other such proposals as the Planning Director and Board of Commissioners deem appropriate for Area Advisory Committee review.

- (b) In reviewing any proposal the Area Advisory Committees shall take into account the following criteria:
- (i) The Oregon Revised Statutes as they relate to land use planning.
  - (ii) The goals and guidelines for land use planning of the State Land Conservation and Development Commission.
  - (iii) The Marion County Comprehensive Plan including its goals, policies and map.
  - (iv) The procedures as outlined in the Marion County Citizen Involvement Program.
  - (v) The Ordinance adopted by Marion County relative to the development of land; and other such ordinances as adopted by the Board of Commissioners.
  - (vi) The precedent established by previous and similar applications.
  - (vii) The demonstration of public need.
  - (viii) The surrounding land uses.
  - (ix) The use of alternative sites.
  - (x) The appropriateness of the proposed site design.

It is recognized that the above criteria listing may not in every case apply to the proposals submitted to the Committee. The Committee shall determine relevance of these criteria as they relate to specific proposals being reviewed by the Committee.

- (c) The minutes of the meetings shall constitute the Committees' official report on proposals and be submitted to the Planning Director for inclusion in the staff report prior to formal consideration by the Board of Commissioners or Planning Commission. All reports and supplementary material shall be kept on file at a local library or other public place easily accessible to the public.
- (5) Report to the Committee for Citizen Involvement periodically on the citizen involvement program and activities.
- (6) Utilize available media to inform the public of their activities and solicit public opinion.

- (7) Provide assistance to federal, state and regional agencies and special purpose districts.
- (8) Utilize local libraries or other public places easily accessible to the public to display and disseminate information that would assist citizens to identify and comprehend the issues.

E. The Planning Staff shall:

- (1) Assist the Committee for Citizen Involvement in developing the Citizen Involvement Program.
- (2) Implement the Citizen Involvement Program as adopted by the Board of Commissioners.
- (3) Provide technical information and assistance to the Area Advisory Committee.
- (4) Collect, analyze, and evaluate citizen input from the AAC and propose alternative planning solutions.
- (5) Submit alternative planning solutions to the AAC based on the evaluation of citizen input.
- (6) Conduct annual workshops for education of AAC members in land use planning.
- (7) Assist AAC's in conducting meetings as requested by the AAC.
- (8) Provide, as requested, any other assistance necessary for the Board of Commissioners, Planning Commission, Committee for Citizen Involvement, Area Advisory Committees to meet their responsibilities with respect to citizen involvement.

F. The General Public shall:

- (1) Be afforded the opportunity to be involved in all phases of the planning process as provided for the County Citizen Involvement Program.
- (2) Have established the Area Advisory Committee as the primary public forum, but also have the opportunity for director input at all levels of planning.

## ARTICLE V. ORGANIZATION

- C. Each Area Advisory Committee shall select from among its members a chairperson, vice-chairperson and secretary whose terms shall be for one (1) year, and the committee may create and fill such other offices as it may determine.
- D. The Chairperson of the Area Advisory Committee shall be presiding officer at all Area Advisory Committee meetings. The Chairperson or Secretary shall be authorized to sign all documents on behalf of the committee.
- E. The Vice-Chairperson shall be the presiding officer in the absence of the Chairperson.
- F. The Secretary shall be responsible for the preparation of the Committee minutes.
- G. The Area Advisory Committees may establish such subcommittees as it deems advisable and assign each subcommittee specific duties or functions. The Chairperson of the Area Advisory Committee shall designate the members of each subcommittee and shall name the chairperson of each subcommittee. Notwithstanding the power granted to the Chairperson herein, the Committee may, by simple majority vote exercise such power.

## ARTICLE VI. MEETINGS

- A. All Area Advisory Committee meetings shall be open to the public and be publicized by the appropriate method.
- B. The Committee shall hold such meetings as the committee and/or the Board of Commissioners deem necessary.
- C. Special meetings may be held, provided each member is notified at least three (3) days in advance.
- D. A quorum shall consist of fifty percent (50%) of the members of the Committee but not less than four (4). Should there not be a quorum present, the members present shall adjourn to the next regular meeting or an earlier date. Any meeting conducted in the absence of a quorum shall not be an official meeting of the Committee, and any recommendation or action taken by the group of members not constituting a quorum shall constitute a recommendation of the individual members only and shall not constitute a recommendation of the Committee.
- E. The presiding officer of the Committee may limit the time during which persons appearing before the Committee may speak, provided that the minimum limit shall not be less than one (1) minute per person and that said officer shall announce the time limit prior to opening the meeting to the particular items on the agenda to which the time limit applies.
- F. The order of business at all meetings shall be as follows:

- (1) Except as provided in subsection (2) hereunder, the order of business shall be as follows:
  - (a) Roll call.
  - (b) Approval of minutes of previous meeting.
  - (c) Communication to the Committee.
  - (d) Consideration of matters presented by the Planning Department.
  - (e) Other business.
  - (f) Adjournment.
- (2) The Chairperson of the Committee may alter the order of business designated in subsection (1) above to better serve the convenience of the applicants, officials of agencies who are called upon to testify, and the general public.

G. The minutes of the Area Advisory Committee shall include:

- (1) Type of meeting being held.
- (2) Date, time and place of the meeting.
- (3) Roll call.
- (4) The person making and seconding motions.
- (5) Summary of discussion and presentation.
- (6) The outcome of any vote and the method of voting.
- (7) The signature of the Secretary and Chairperson upon approval of the minutes.
- (8) Any other information deemed appropriate in accordance with the latest edition of Robert's Rules of Order Revised.

## ARTICLE VII. VOTING

- A. Voting on all docket and other items shall be by roll call, voice vote or other method as deemed appropriate by the Chairperson.
- B. Each voting member of the Committee shall be entitled to vote at all regular and special meetings of the Committee, except that any actual or potential interest shall be disclosed at the meeting of the Committee where the action is being taken.
- C. The Chairperson of the Committee or the presiding officer shall, before the vote is taken, state the question before the Committee in exact terms, and shall announce the decision of the Committee after each vote.

## ARTICLE VIII. PARLIAMENTARY AUTHORITY

In cases not provided for by these rules, the Committee shall be governed by the law and practices laid down in the latest edition of Robert's Rules of Order Revised.

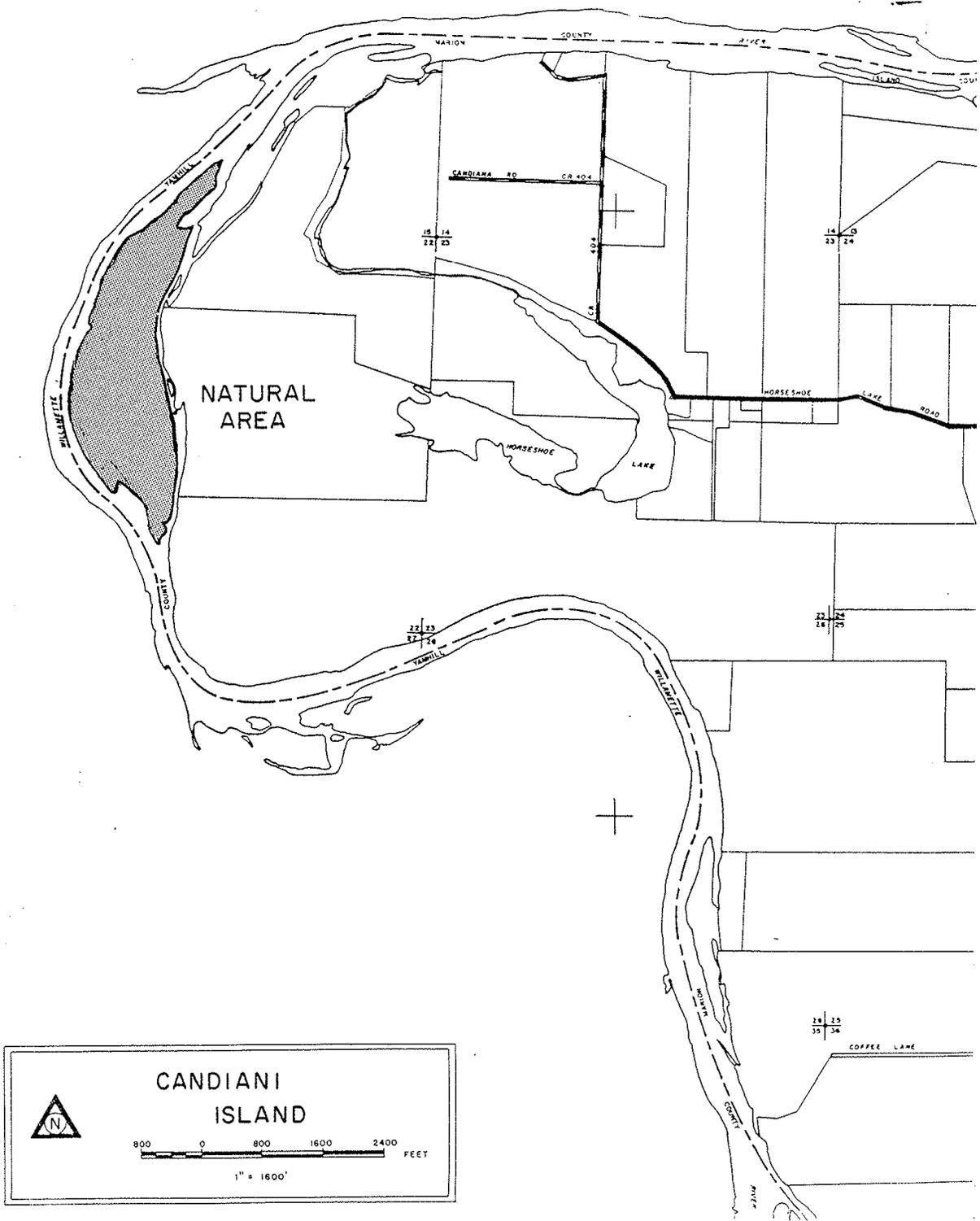
ARTICLE IX. AMENDMENTS AND SUSPENSION OF BY-LAWS

No rule shall be altered without the concurrence of the Board of Commissioners and no additional rule or rule amendment shall be made without the giving of at least thirty (30) day notice to the members of the Area Advisory Committees.

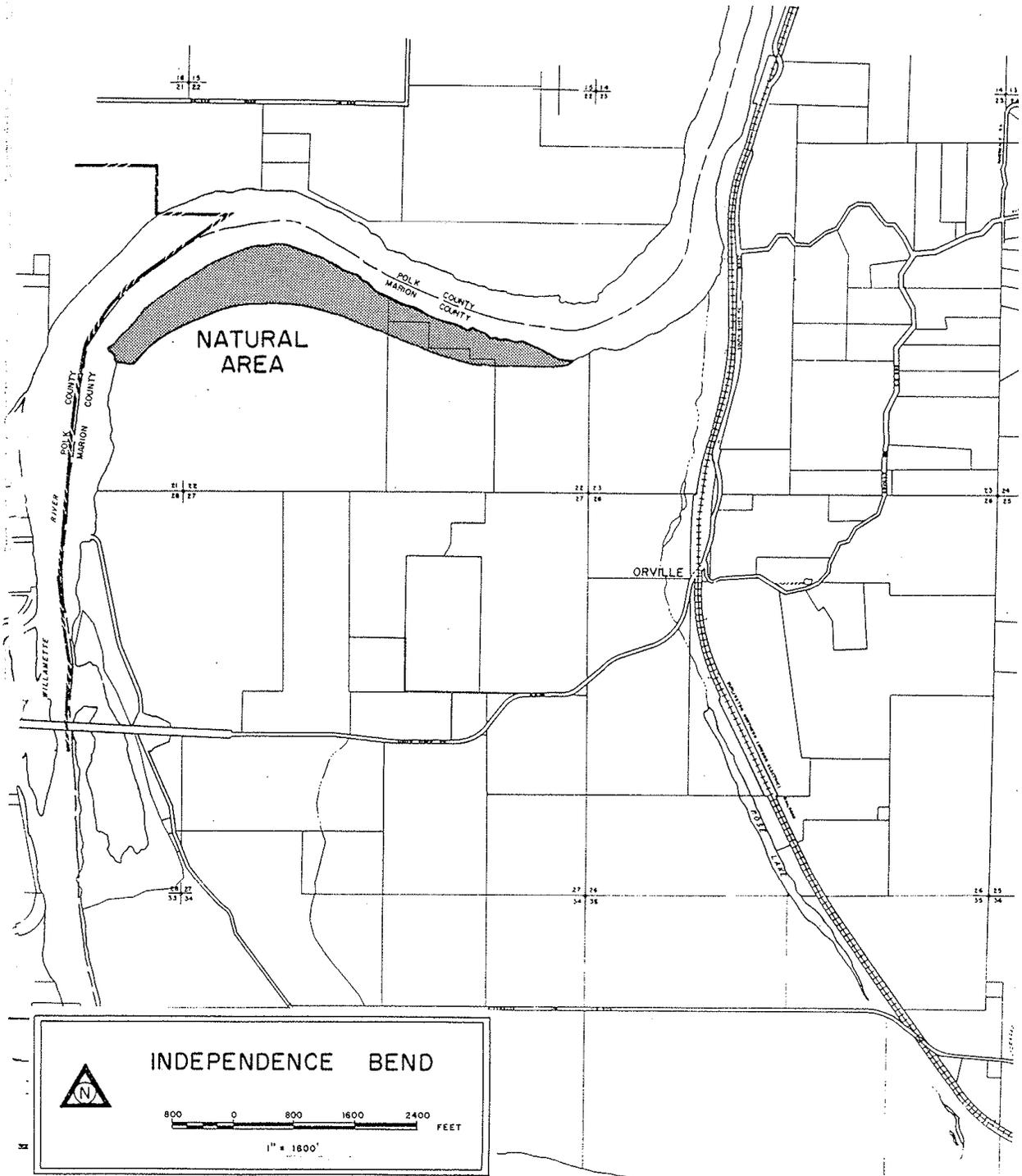
# **APPENDIX C**

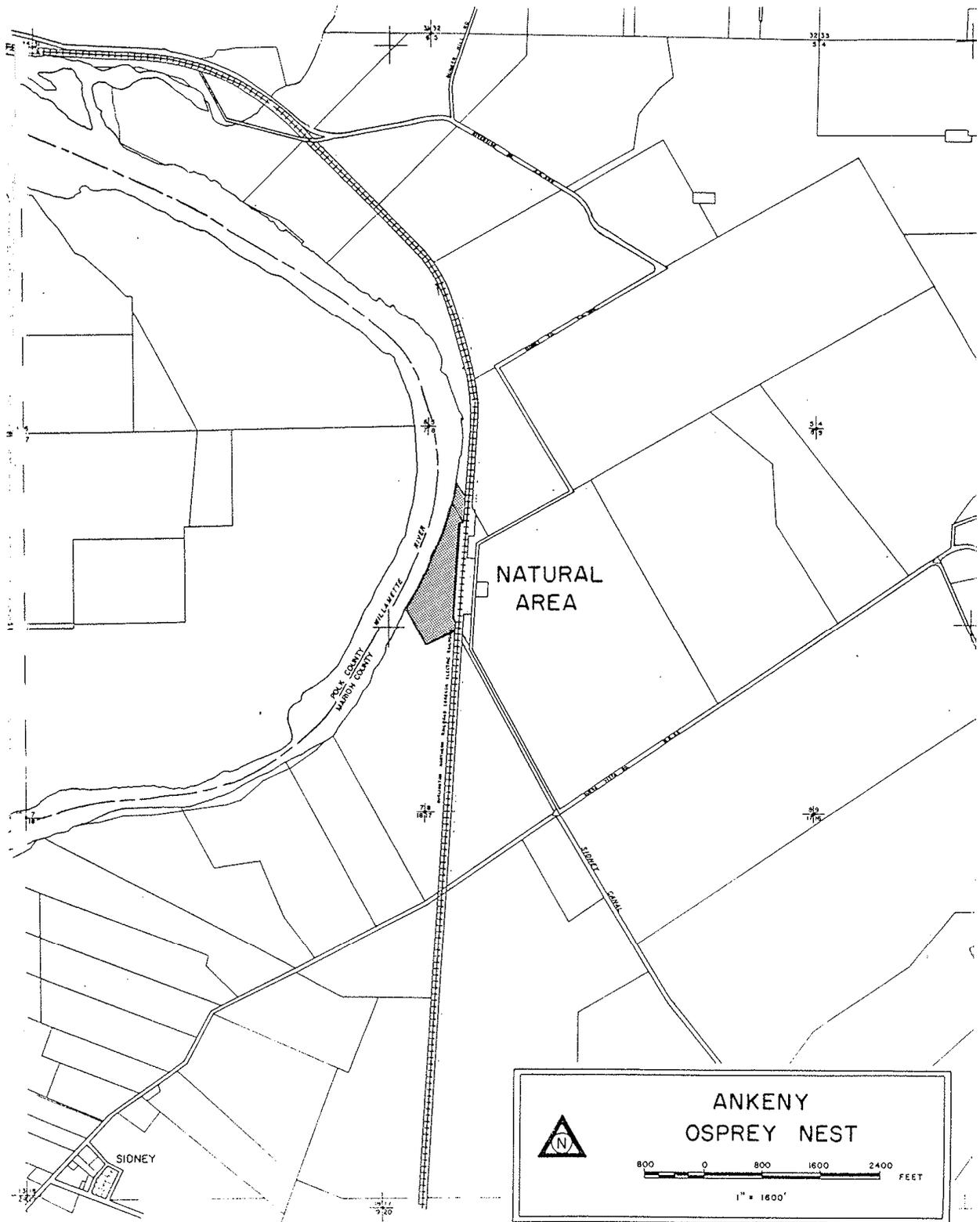
## **Background and Inventory Report Marion County Comprehensive Plan**

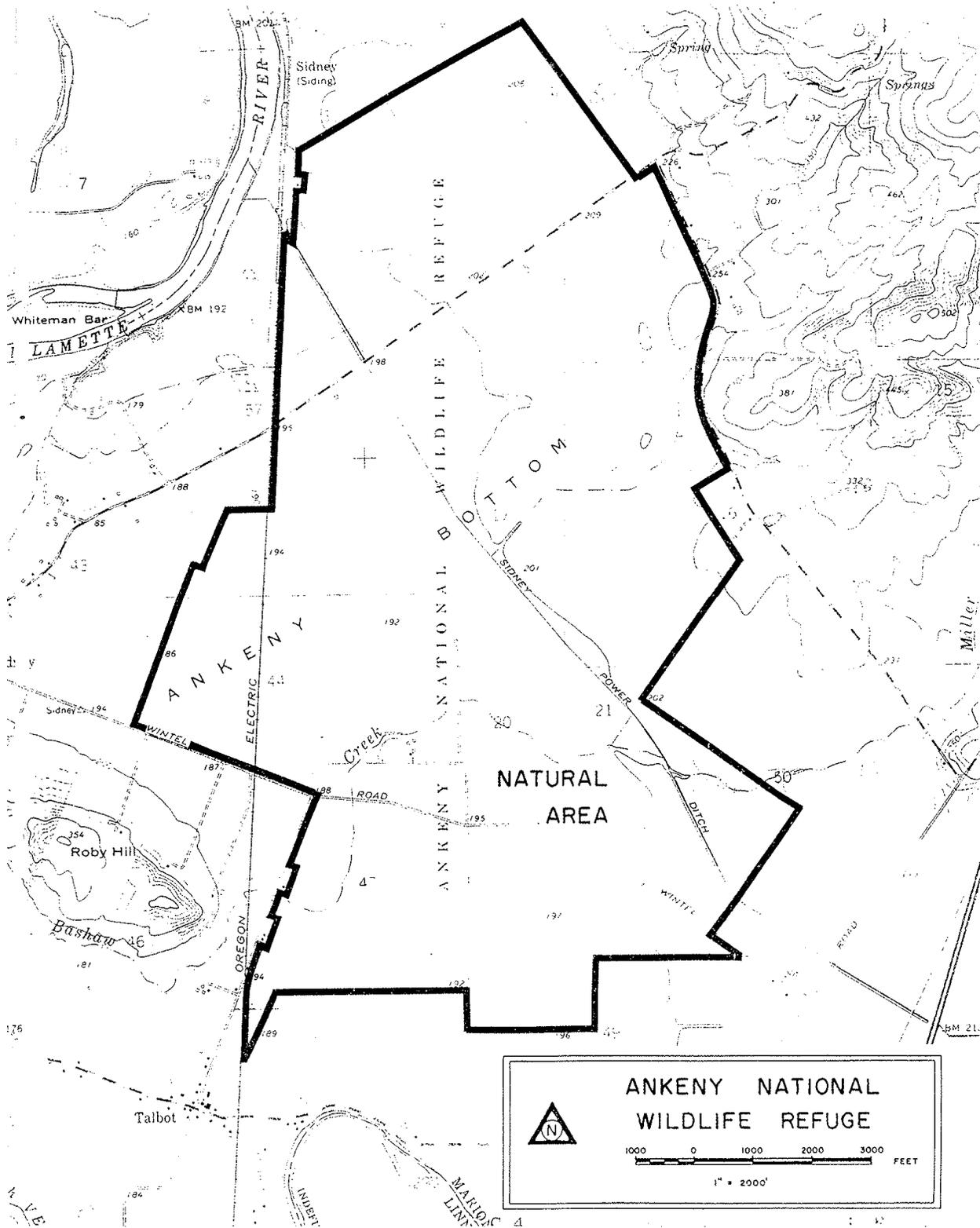
### **LOCATION AND DESIGNATED NATURAL AND SCENIC AREAS**

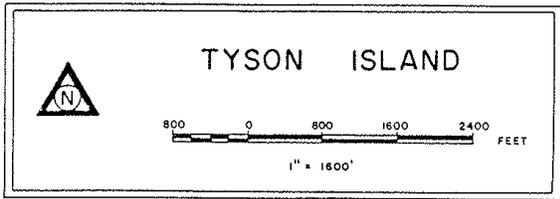
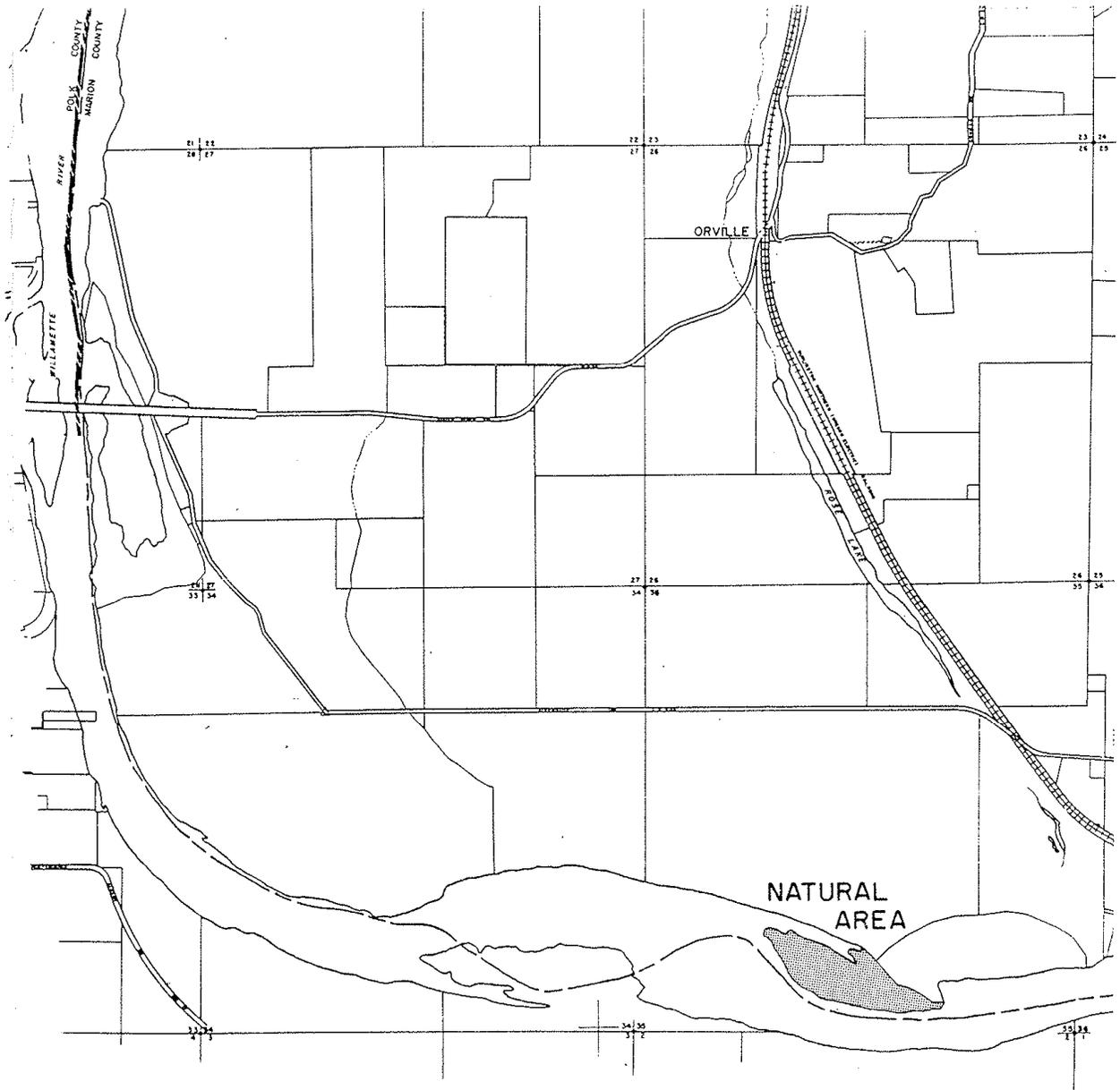


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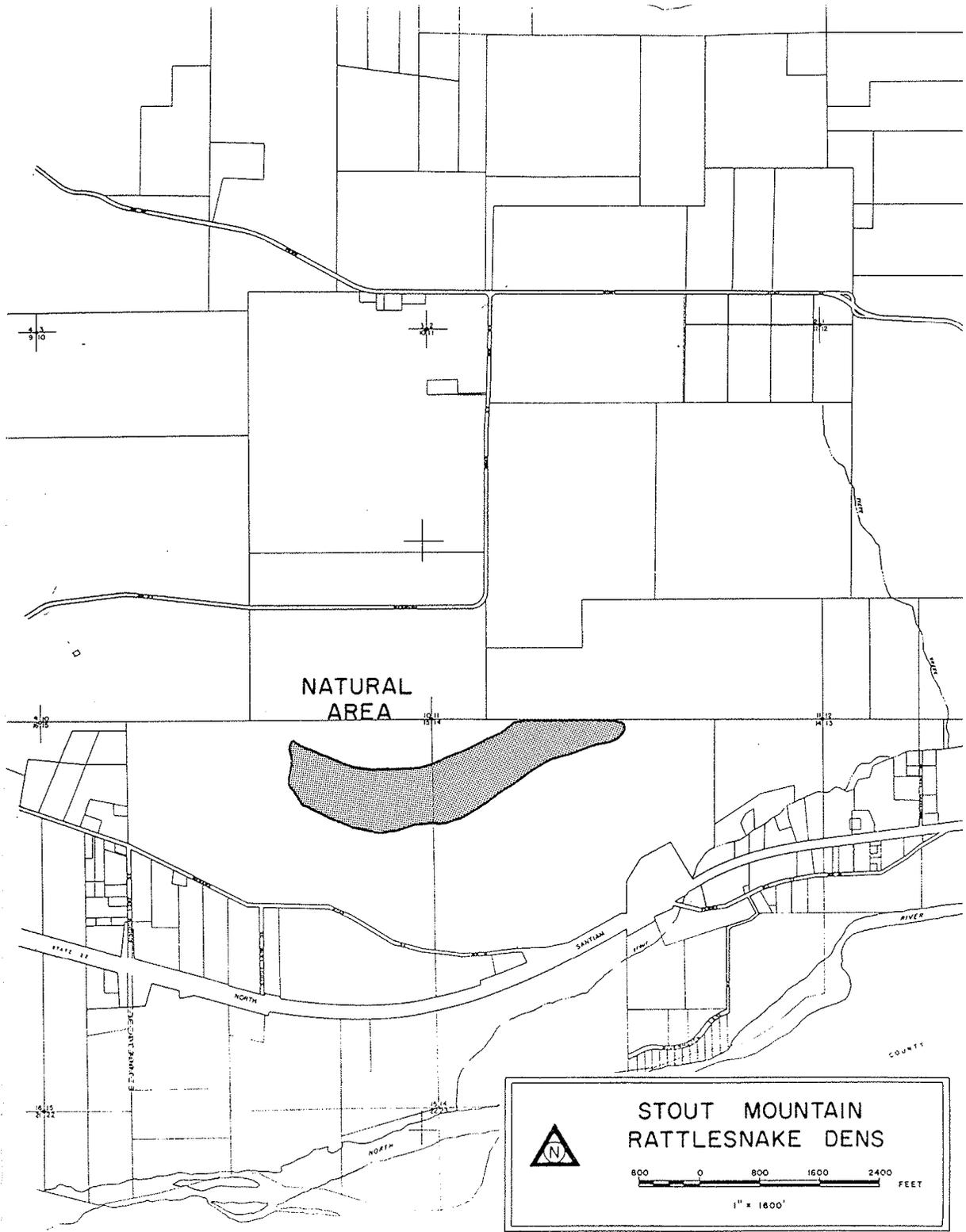




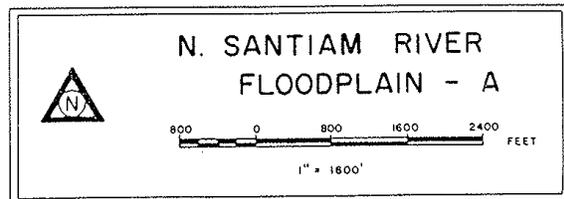
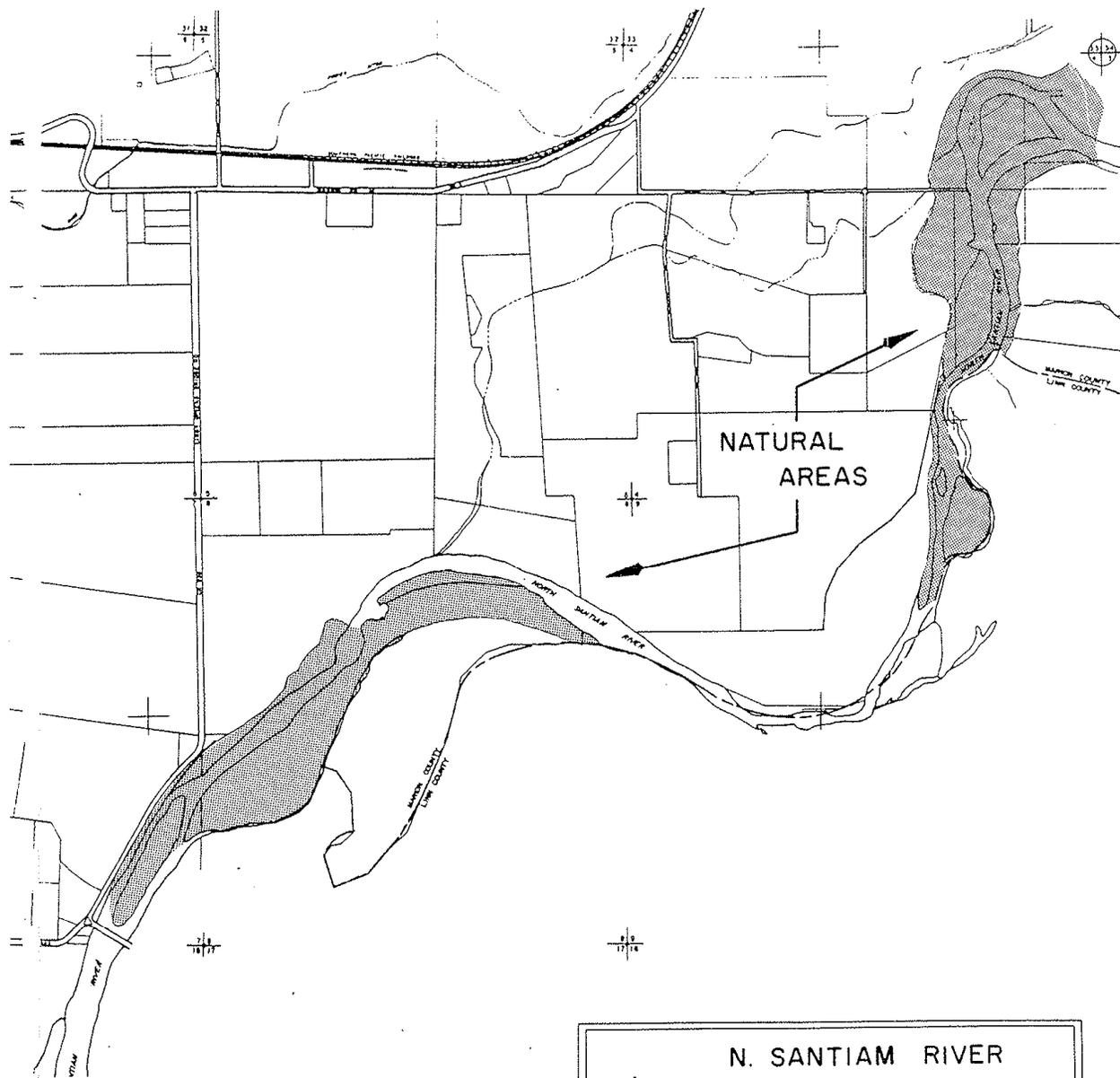




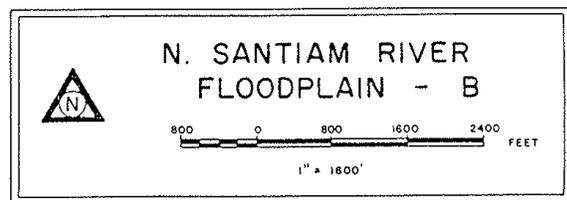
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C. 6

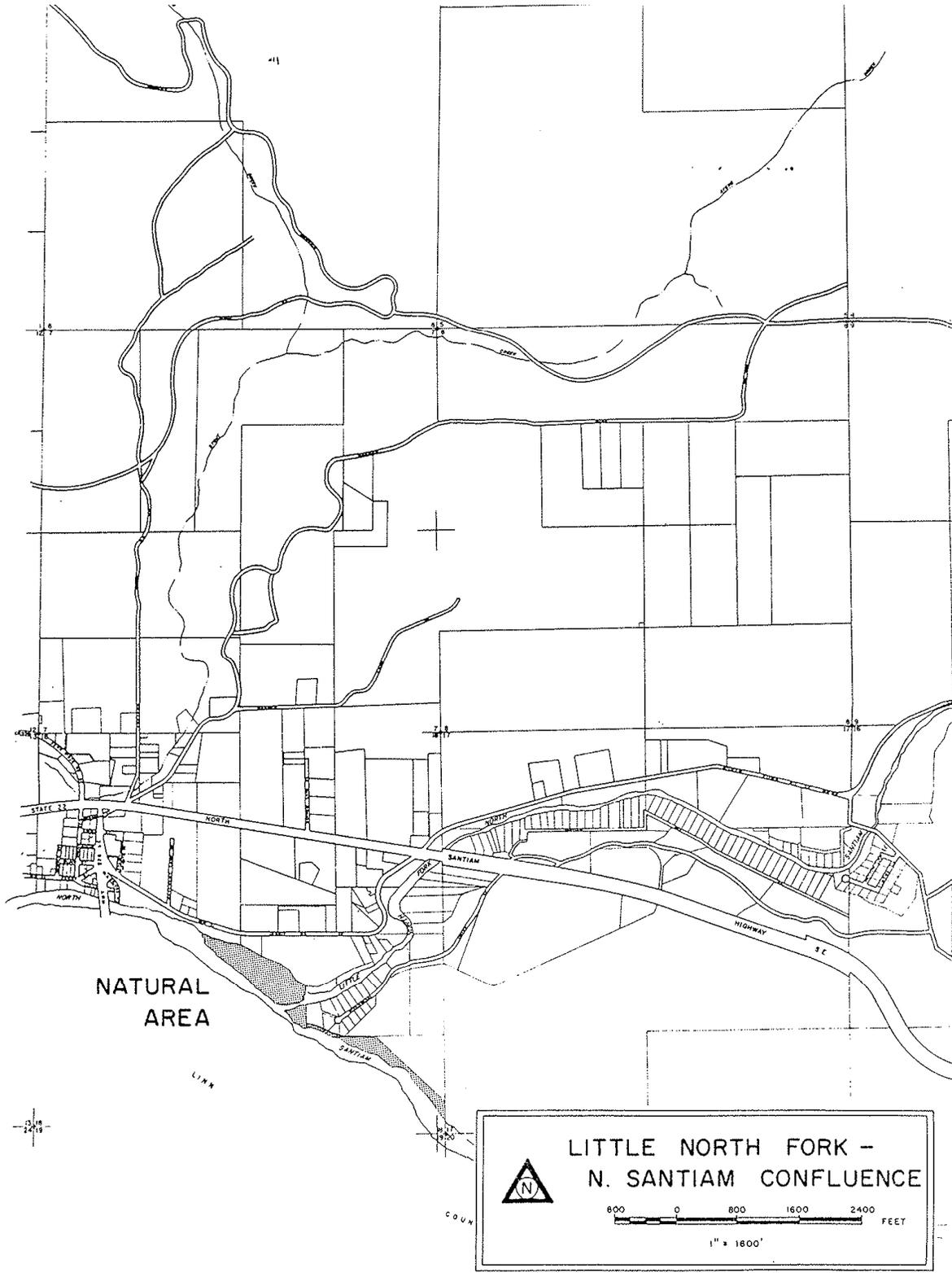


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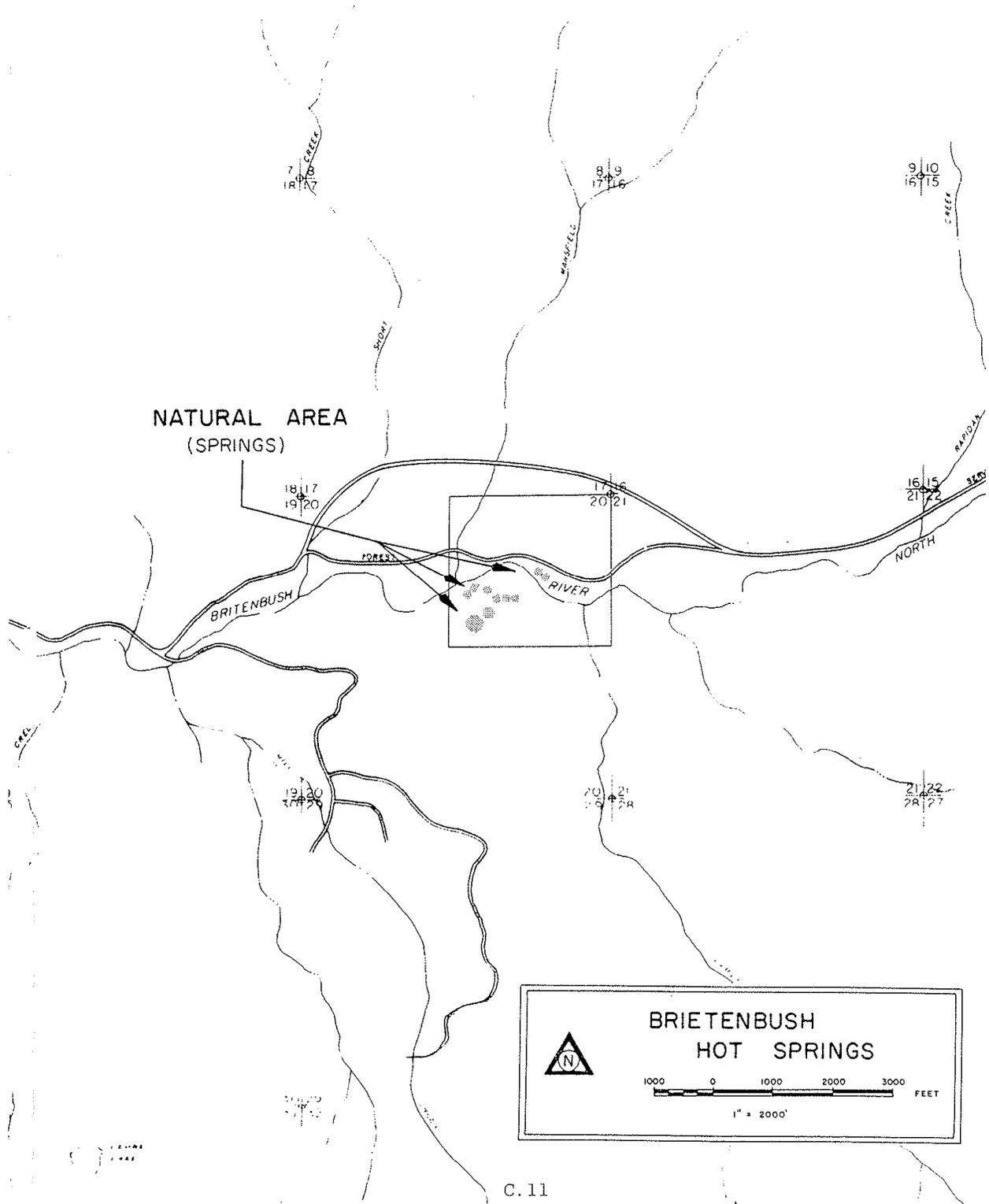


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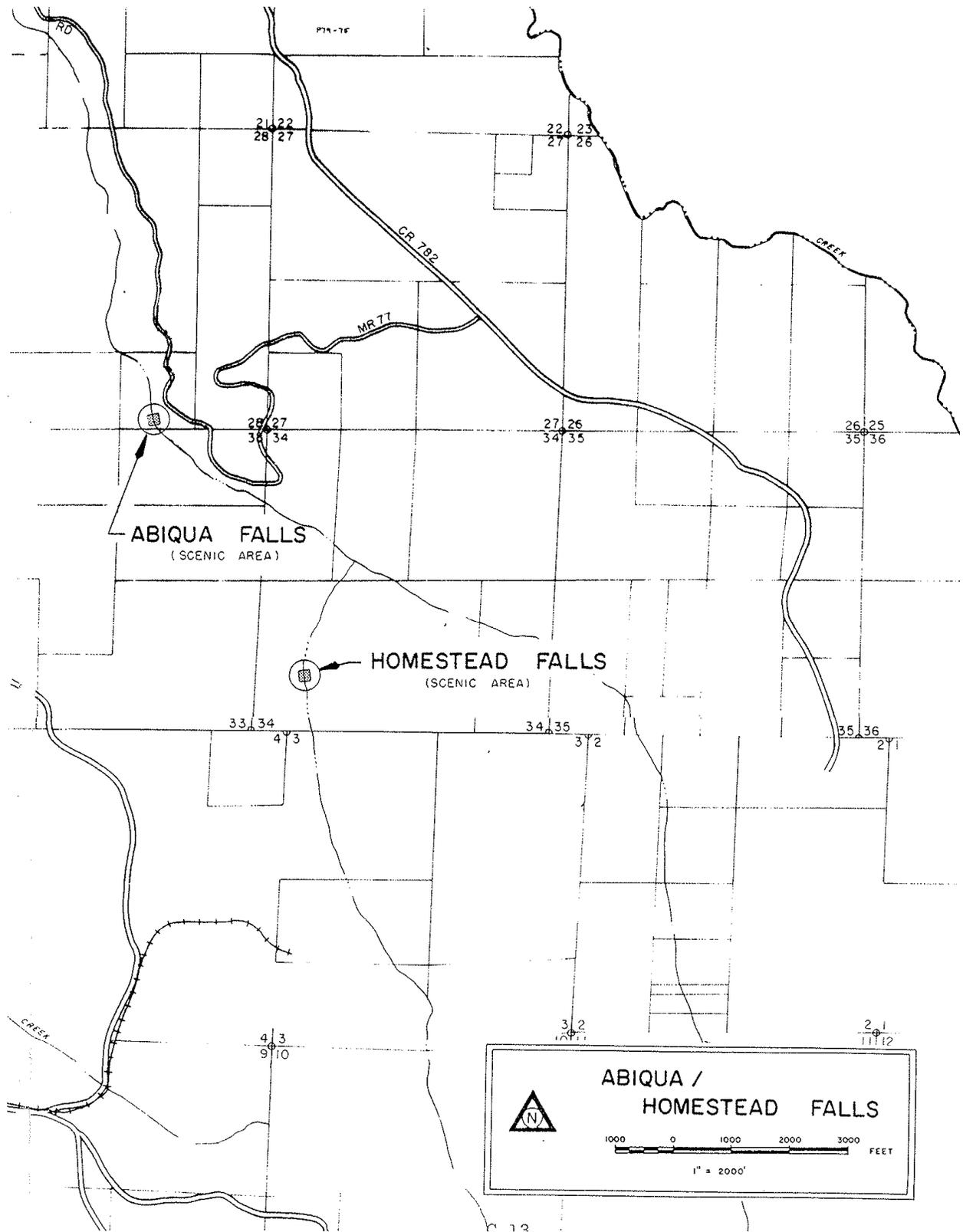


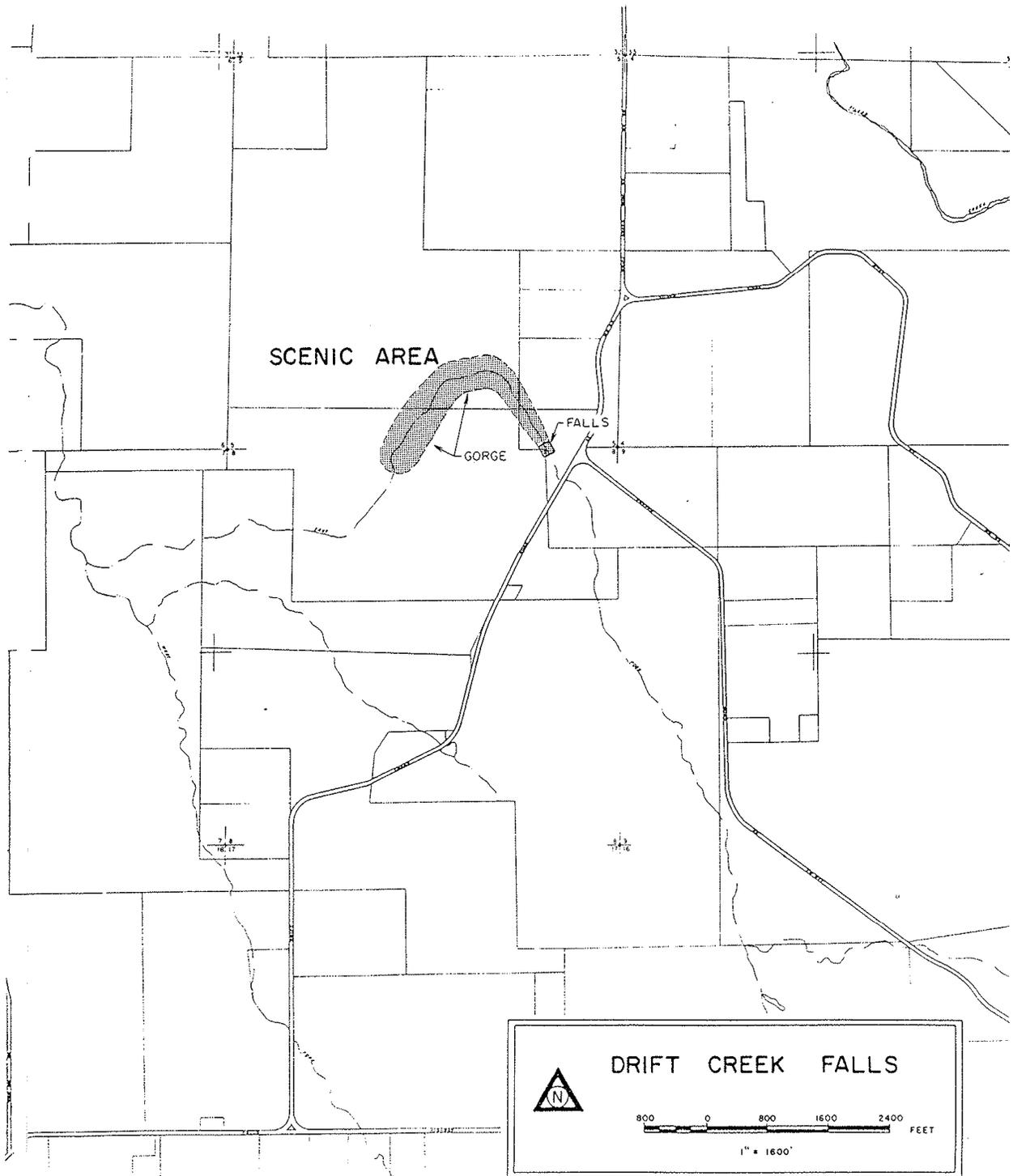


CO. 10

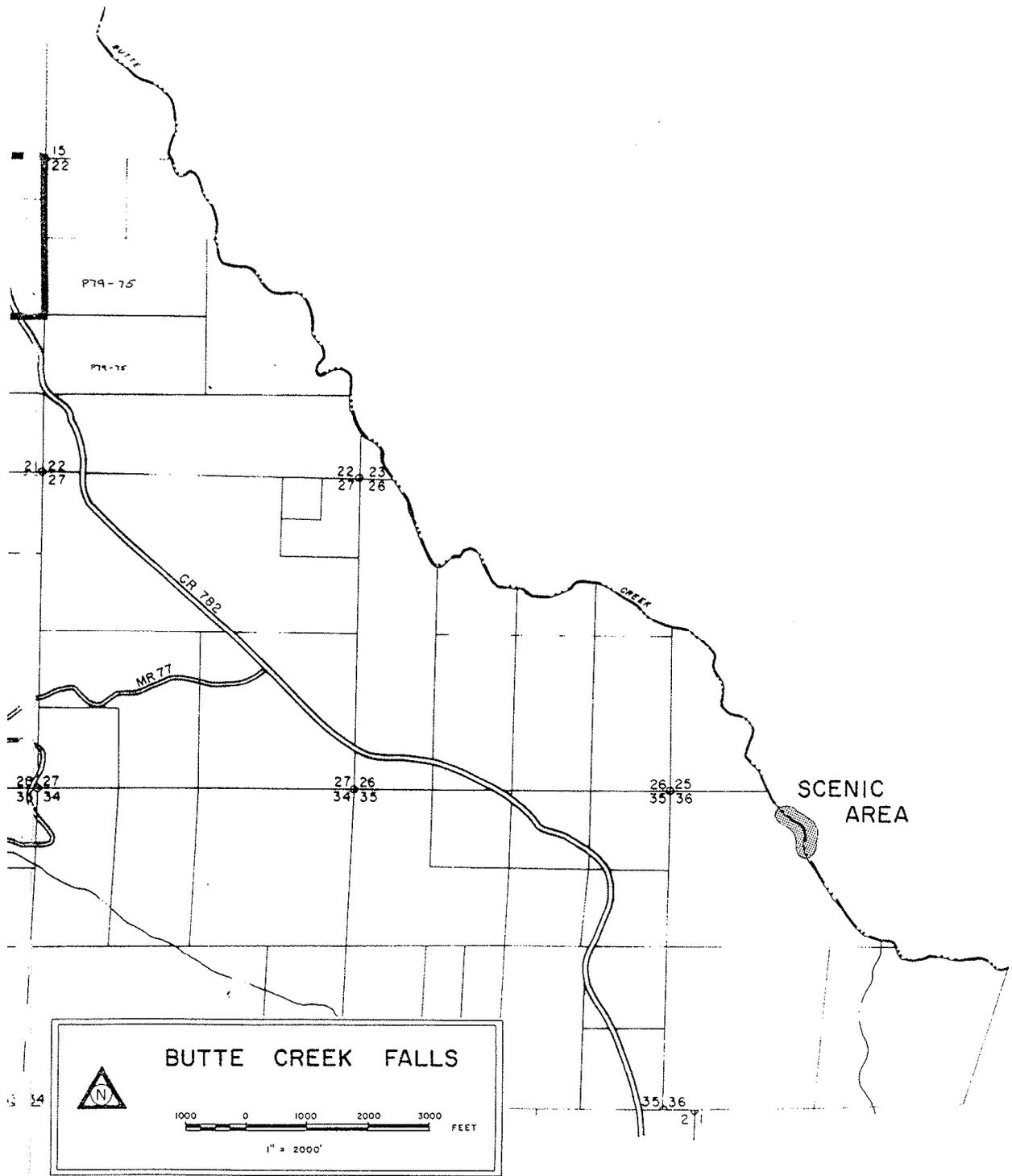




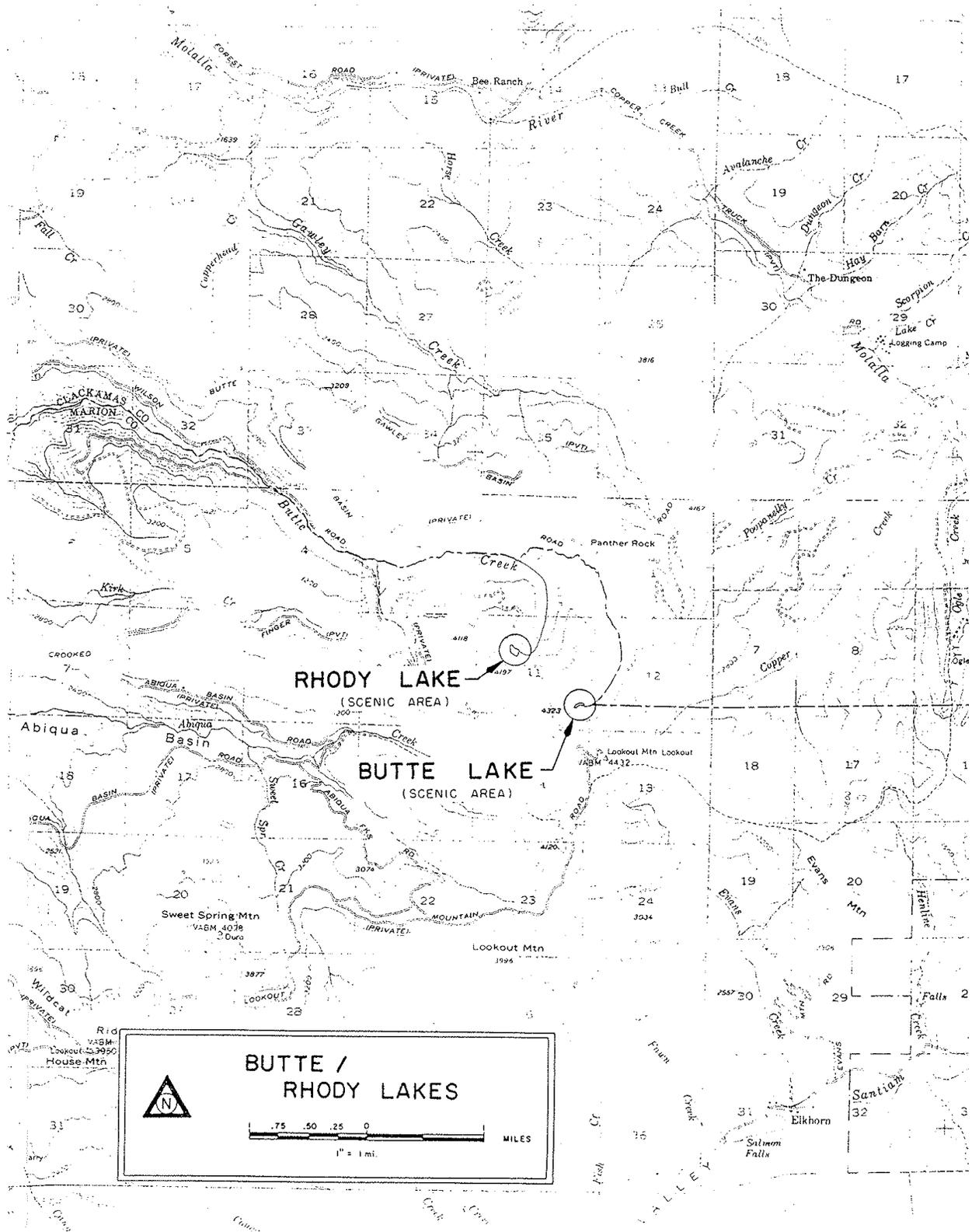




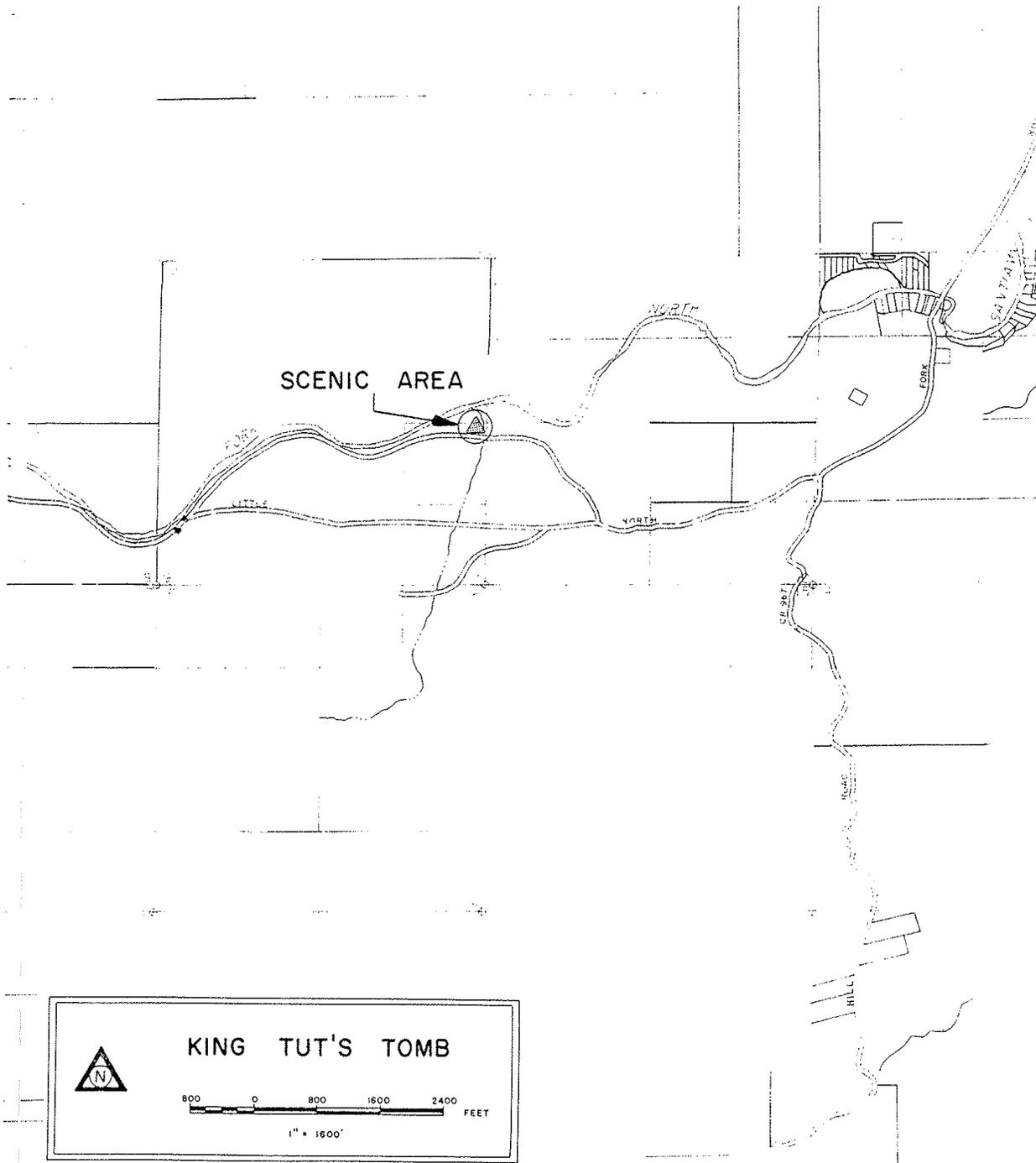
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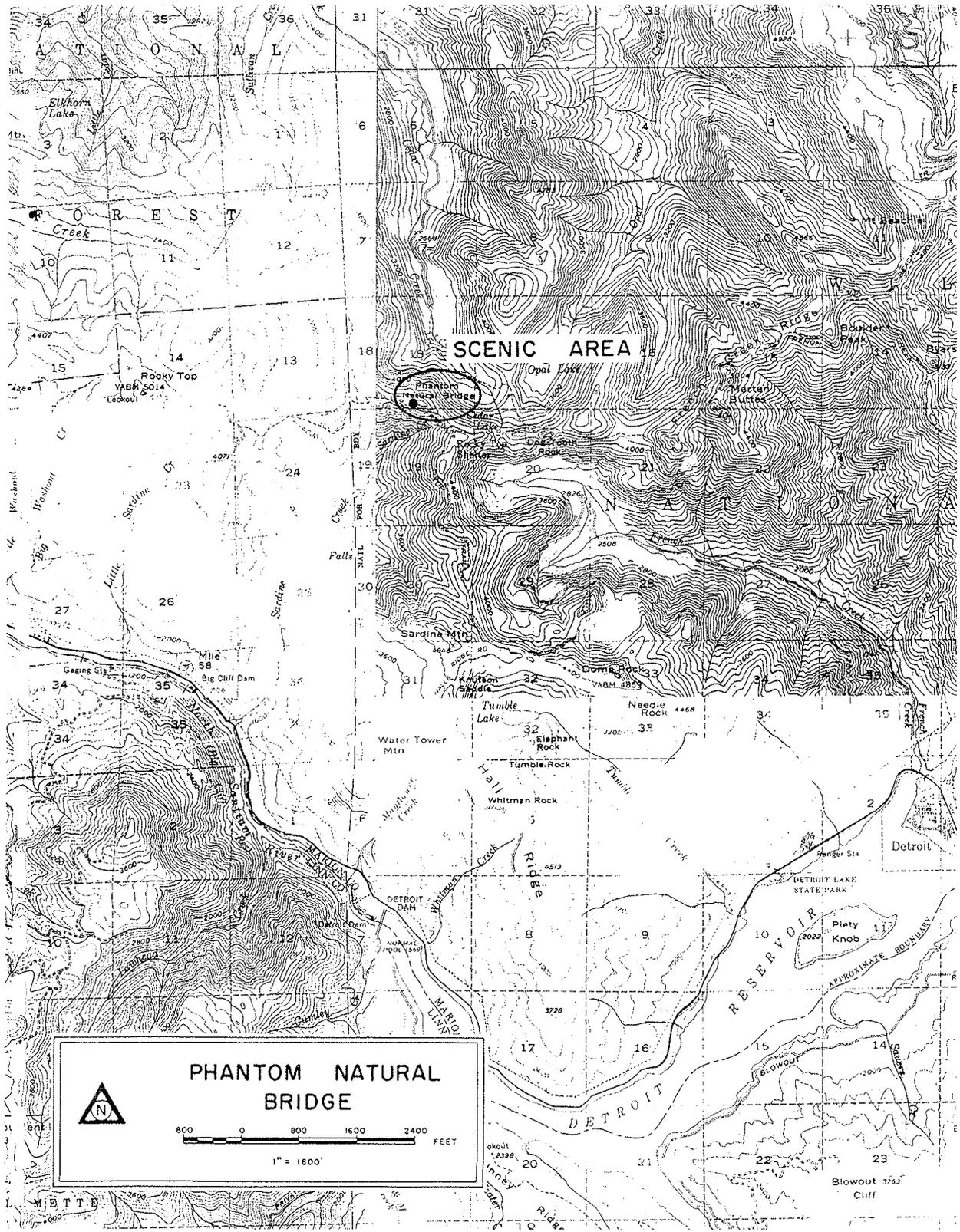


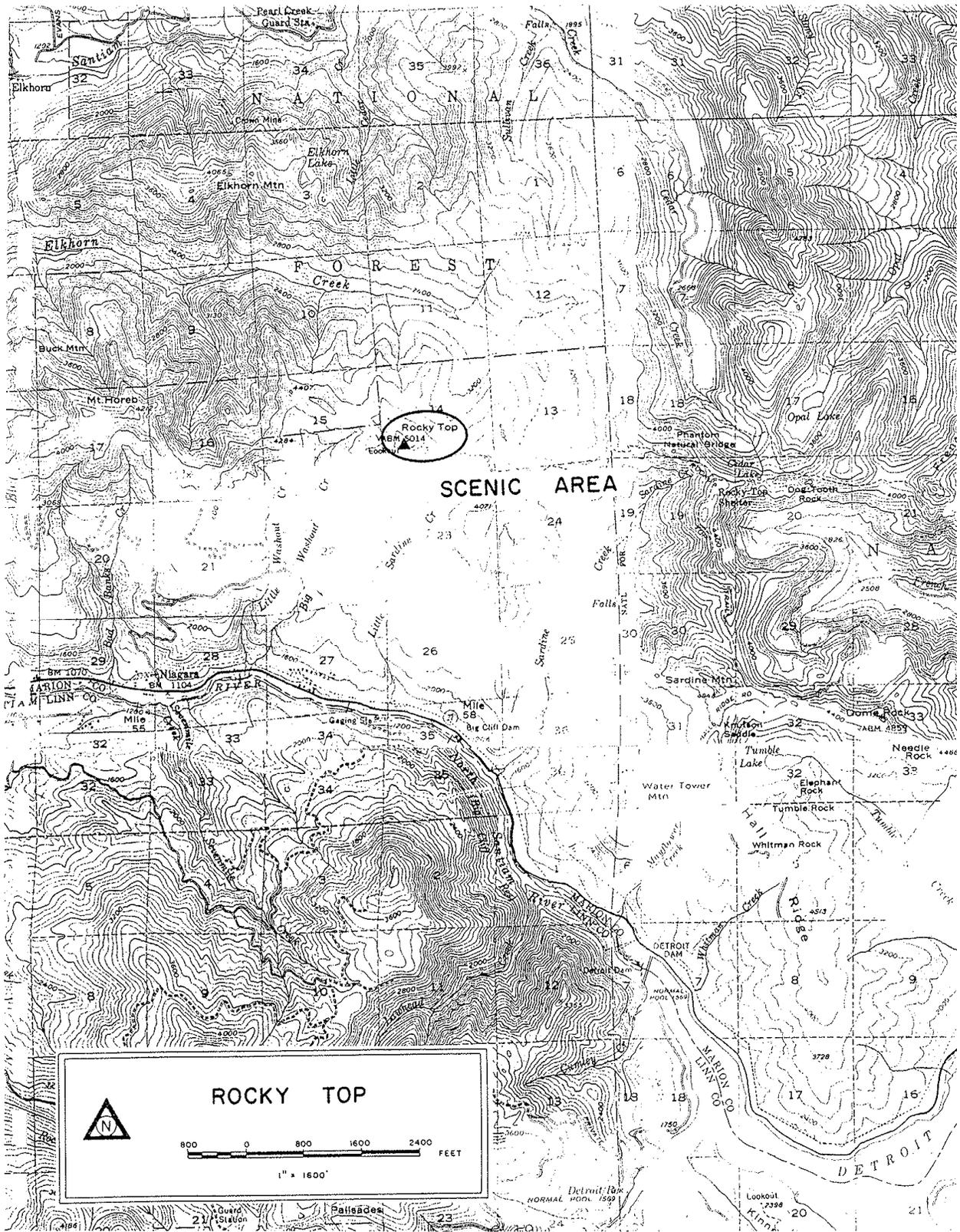
C.15



C.16







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