

LAND USE CHANGES OF THE NORTH CORVALLIS  
AREA BETWEEN 1963-1978

by

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LAND USE CHANGES OF THE NORTH CORVALLIS  
AREA BETWEEN 1963 AND 1978

ABSTRACT. Corvallis has been growing steadily in terms of population and functions of the city while the biotic resources of the immediate environs have declined. This study sought to examine land use changes of North Corvallis rural-urban fringe area between 1963 and 1978 by interpreting the changes from aerial photographs. The study explains the amount of land use changes, spatial distribution of changes and physical quality of land being changed in terms of soil capability and topography.

INTRODUCTION

Benton County and Corvallis, its county seat, are in the Mid-Willamette Valley which is a major agricultural region for Oregon and the nation. The economic base of the county includes agriculture, lumber and research and development.<sup>1</sup> Its agricultural land base occupies more than one-third of the county area.<sup>2</sup> Agriculture has been important to the county economy from early days of settlement, evolving from early acquisition by white men to an extensive agrarian society and more recently to intensification and diversification of land uses.<sup>3</sup> Since 1960's, there has been significant changes of

population and economic resources. Agriculture still continues to be important, but agricultural land has decreased markedly. Land in farms decreased from 207,633 acres in 1964, a proportion of 48.6% of the whole county area to 130,012 acres or 30.4% of the county area in 1974.<sup>4</sup> Farm number and cropland dwindled steadily around fast-growing urban centers. Meanwhile, the county population increased by 75.67% between 1960-1978, and Corvallis population increased by 95.94%.<sup>5</sup> Corvallis is the largest city and chief trading center in Benton County (Table 1). The economy of the city and the immediate surrounding area is based strongly on tertiary industries. The principal elements are trade and services, particularly education services, followed by such secondary sector activities as calculator, lumber and wood-product manufacture. Employment in the primary sector is relatively minor (Table 2). Trade and services of the city, particularly educational services, computer service and wood-related manufacturing have grown rapidly since 1960's. The growths in population and economic functions of Corvallis induced strong demand for more residential, commercial, industrial and recreational land. And, they had impact on land uses of the Corvallis rural-urban fringe on both the north and south sides.

The north Corvallis rural urban fringe has gone through phases of development from low level to extensive. Most of the area was in agriculture and forests in the early 1960's. From 1963 to 1977, however, the area underwent 20 annexations, indicating changes to more

TABLE I  
 POPULATION OF CORVALLIS, OTHER CITIES IN  
 BENTON COUNTY AND ALBANY

<u>Year</u>	<u>Benton County</u>	<u>Adair Village</u>	<u>Corvallis</u>	<u>Monroe</u>	<u>Philo- math</u>	<u>Albany</u>
1940	18,629	-	8,392	311	856	5,654
1950	31,570	-	16,207	362	1,289	10,115
1960	39,165	-	20,669	374	1,359	12,926
1970	53,776	-	35,153	443	1,688	18,181
1978	68,800	550	40,500	500	2,400	26,510

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Source: see Footnote 6.

TABLE 2

## INDUSTRY OF EMPLOYED PERSONS IN CORVALLIS, 1970

	<u>1970</u>	<u>Percent of total</u>
Total employed	12,547	100
Agriculture, forestry and fisheries	518	4.13
Mining	15	0.12
Construction	434	3.46
Manufacturing:	1,043	8.31
Lumber and wood products	369	2.94
Food and kindred products	107	0.85
Printing and publishing--and allied industry	146	1.16
Metal industry	131	1.04
Others	290	2.31
Transportation and communication	283	2.26
Utility and sanitary services	170	1.35
Trade (wholesale and retail)	2,108	16.80
Business and personal services	1,466	11.68
Hospital and health services	569	4.53
Educational services	4,576	36.47
Professional and related services	489	3.90
Public administration	615	4.90
Welfare, religious and nonprofit organizations	261	2.08

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Source: U.S. Bureau of the Census, Census of Population, 1970.

extensive, irreversible urban uses. This period of major activity is encompassed in this study. Conveniently, aerial photographs which were major sources of data for the study were available for this period.

The objectives of this study were:

1. to identify the general pattern of land use changes of North Corvallis area,
2. to determine amount of changes of land uses,
3. to identify the physical quality of land being changed.

The term "North Corvallis Area" as used in this study refers to that portion of Corvallis north of Walnut Boulevard and south of Lewisburg Road. The boundaries of the study area were combinations of natural, cultural and arbitrary boundaries. To the west was McDonald State Forest boundary which provides an important constraint to the growth of the city. To the east was another constraint, the Willamette River and Linn-Benton county boundaries. To the north were Lewisburg and Granger Roads. Arbitrary lines were drawn connecting Lewisburg Road to McDonald State Forest boundary, and from the intersection of Granger Road and U.S. Highway 20 southward to Linn-Benton County boundary. Walnut Boulevard, Highway 99W and Dixon Creek formed the southern boundary of the study area with an arbitrary line drawn southward from McDonald State Forest boundary to Walnut Boulevard. The total area was 9026.50 acres.

The primary data for the study were based mainly on aerial photograph interpretation and field survey. The black-and-white aerial photographs used were of three different years: 1963, 1970 and 1978. The 1963 photographs had the scale of 1:12,000, whereas the photographs of the other two years had the scales of 1:20,000. All of the photographs were flown for the U.S. Agricultural Stabilization and Conservation Service. Land use maps of the three different years were prepared from aerial photographs. Interpretation and mapping were done by using a pocket stereoscope and transparent mylar. Each land use type was classified according to the USGS Land Use and Land Cover Classification System for Use with Remote Sensor Data.<sup>6</sup> The detail of land uses was at level I to IV, slightly modified to meet the conditions in the study area. The accuracy of aerial photographs interpretation was field-checked by car and by bicycle from every road that was accessible. For comparative purpose with the Benton County soil map and land use maps of 1970 and 1978, the scale of 1963 aerial photographs was reduced to 1:20,000 by using a zoom transferscope. Acreage of land uses was then computed by using a sonic digitizer. The land use maps were then compared with other maps to appraise spatial distributions. The other maps were topographic map and soil capability class map which was generalized from Benton County Soil map in 1970.

## LAND RESOURCE BASE

Topography

The study area is on the west bank of the Willamette River north of Corvallis. The area is a combination of alluvial floodplains, a gently sloping valley floor and hilly terrain contiguous to McDonald State Forest. Average relief is 225 feet and the highest elevation is 872 feet. The floodplains in the study include the Willamette River 100-year floodplain along the river, and another, considered a part of the former, created by tributaries running through Crescent Valley.

The area has a well-developed drainage system: the Willamette River and its tributaries. Frazier Creek, Jackson Creek, Fork 1 and Stewart Creek run through the study area, while Dixon Creek borders to the south. There are several depressions and lakes on the floodplains. A large area of wetland is located between U.S. Highway 20 and Highway 99W. A strip of wetland, called Stewart Slough, extended along Stewart Creek. In addition, there are Stewart Lake south of the slough and an ox-bow lake called Asbahr Lake.

Climate

The climate of Corvallis area is modified marine climate thanks to the Coast Range and Cascade Mountains. White Coast Range modifies marine air masses from the Pacific Ocean, the Cascades block direct flow of more extremely hot or cold continental air into the valley.

Winter is cool and summer is warm. Minimum and maximum temperatures in January are 32-45<sup>o</sup>F and in July 51-81<sup>o</sup>F. Annual precipitation is 40.7 inches, with 70 percent of it falling from November through March. Measurable precipitation occurs on an average of 150-160 days per year.<sup>7</sup> Average frost-free period is 194 days per year starting from 22 April to 2 November.<sup>8</sup>

### Soils

Thirty-five soil units are found in the study area. Most of them are silt and clay loams. Only three are sandy or gravelly loams which are used exclusively for mining. They are Camas gravelly sandy loam, Newberg fine sandy loam and Pilchuck fine sandy loam. All three of them are scattered adjacent to the river.

In terms of productive capability, most of the area consist of soils suitable for agriculture. Approximately 80.97% of the area belongs to Class I, II and III soils which are simply considered prime agricultural land if they are cultivated. About 90% of the area consists of soils that can be put into agriculture, that is, soils of capability Classes I, II, III and IV. They differ in degrees of limitations, most of which are wetness and erosion potential.

Class I soils are found mainly on the river terrace between the Southern Pacific Railroad and U.S. Highway 20. Most of the areas are used for agriculture such as cropland, orchard and nursery. However, rural residences and sand-and-gravel mining started expanding on this

quality soil during the study period. Class II soils, which are most abundant, are found throughout the river bottomlands, terraces and foothill slopes. They are extensively put into agricultural, forestry and urban uses. Class III and IV soils are found on floodplain and foothill slopes. They are soils of severe to very severe limitations--wetness and erosion--and can be considered marginal. Other classes of soils contribute a very small percentage of the area; all are found on either foothills or floodplains where wetness and erosion are major limitations (Table 3, Figure 1 in pocket).

#### General Pattern of Land Uses in 1963

With flat and slightly undulating valley floor topography, favorable climate and good to moderate soils, it is not surprising that the area was dominated by agricultural use at the beginning of the study period. Almost two-thirds of the area in 1963 was in agriculture, whereas forests and rangeland utilized a quarter of the area (Figure 2; Figure 3 in pocket).

More than half of the study area was in cropland which spread throughout floodplains and river terraces. Crops grown were grains, hay, grass seeds and other field crops. Other types of agricultural use included pastures, orchards, a nursery (Garland Nursery), a Christmas tree farm and other horticultural areas. Pastures appeared on the transitional zone between floodplains and foothill slopes of Crescent Valley. The others appeared on both sides of Highway 20.

TABLE 3  
ACREAGE OF SOIL CAPABILITY CLASSES

<u>Capability Class</u>	<u>Acres</u>	<u>Percent of Total Area</u>
I	808.02	8.95
II	4881.12	54.15
III	1613.20	17.8
IV	1387.92	15.38
V	268.11	2.97
VI	42.15	0.47
VII	18.97	0.21
Total	9026.50	100

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Source: Data calculated from soil map using sonic digitizer.

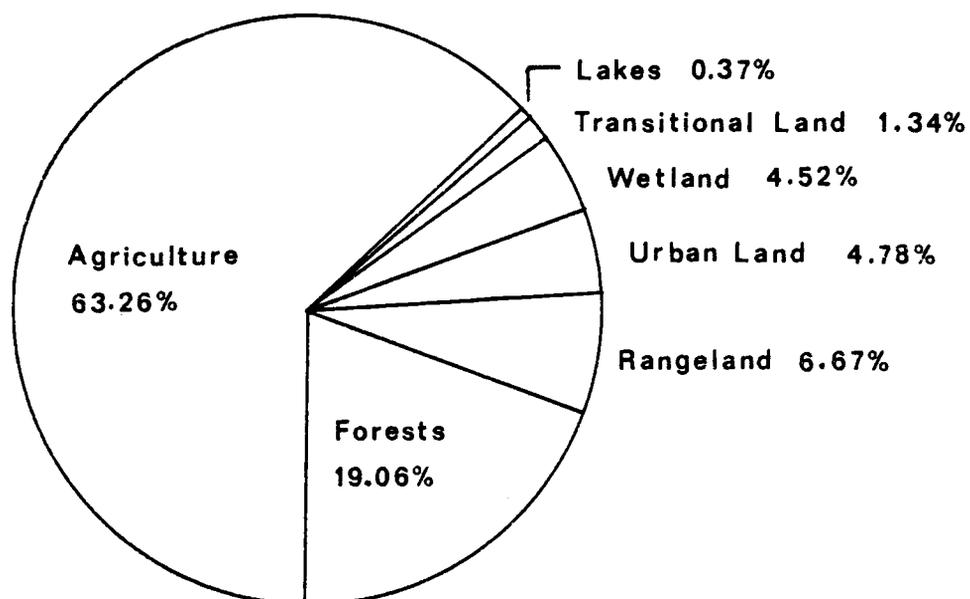


FIGURE 2  
COMPOSITION OF LAND USES IN 1963

Most of agricultural areas occurred on Class I and II soils. The area east of Highway 20 and south of Seavy Road mainly contained very good soils. Land uses in this area corresponded well to soil capability. A small amount of cropland in the study area, however, was on inferior soils facing excessive moisture. Such area tended to be associated with drainage area of Frazier and Stewart Creeks.

Forest and rangelands were the second and third largest land uses in 1963. Evergreen forests and rangelands, which were contiguous to McDonald State Forest, dominated the western foothills whereas

deciduous forests occurred in floodplains.

Two urbanizing areas occurred on the north and south of the study area, one on the city edge and the other at Lewisburg intersection. These land uses were already diverse but they were scattered and still small in acreage. Some rural subdivisions, in addition, scattered along Highway 20 and Highland Drive. It appeared that the area in 1963 was still largely rural with low and scattered urbanization.

#### PATTERN OF LAND USE CHANGES DURING 1963-1978

##### Changes in Population and Economics of Corvallis

During this fifteen-year period, the population and economy of Corvallis expanded and diversified. Between 1960 and 1970, Corvallis population increased by 70.08% with annual compound growth rate of 5.46%.<sup>9</sup> Student population grew more rapidly than nonstudent population, with compound growth rate of 7.5% compared with 4.5% of nonstudent population. The increase came primarily from net migration which was 11,451 compared with natural increase of 3,033. The net migration resulted from two distinct but related forces: increase in number of students enrolled at Oregon State University (Table 4); and increase in employment of which Oregon State University was also the most important employer.<sup>10</sup>

Population growth, however, slowed down between 1970 and 1977. The compound growth rate of population decreased sharply to 1.32%.

TABLE 4  
POPULATION COMPOSITION OF CORVALLIS

<u>Year</u>	<u>Non-Student Population</u>	<u>Student Population</u>	<u>Total</u>
1940	8,392	4,759	13,151
1950	11,342	4,865	16,207
1960	14,607	6,062	20,669
1970	22,738	12,415	35,153
1977	24,398	14,140	38,538

Sources: City of Corvallis Planning Department.

Student compound growth rate was 1.0%, while non-students' rate was 1.9%. Net migration was 2,353. Nevertheless, total employment during 1970-1978 increased by 41%. Manufacturing employment increased by 1600 (67%), while non-manufacturing employment increased by 6190 (40%). The primary cause of the increase in manufacturing sector was Hewlett-Packard calculator assembly company. Within the non-manufacturing sector, the five areas noting the greatest percentage increases were: state and local public administration (141%), finance, insurance and real estate (96%), service and miscellaneous (75%), and trade (59%).<sup>11</sup>

On the whole, changes in the fifteen-year period indicated population expansion as well as increasing economic trend towards industry,

trade and services. These growths in urban population and functions were a primary cause for rising demand of land.

#### LAND USE CHANGES BETWEEN 1963-1970

This period marked the rapid decline and conversion of biotic resources in contrast to the extensive urban development.

In terms of urban or more intensive development, residential use expanded at the most rapid rate, gaining more acreage than commercial, industrial or other urban uses. Single-family residential land increased by 6.7 times within seven years, and mobile home parks by 4.6 times. Multifamily dwellings, which did not exist in the study area in 1963, began to appear. The expansion of both mobile home parks and multifamily dwellings indicated a need for more intensive use of residential land to satisfy increased demand. Land for school and sewage treatment utility also enlarged. Crescent Valley High School and Cheldelin Junior High School were established. Undeveloped urban land and transitional land also showed increases by 81.99% and 130.69%, respectively. Though their rates of changes were slower than those of residential, school, and utility, they subtracted the most acreage from biotic resource group. They waited for more profitable, intensive use since development potential was high (Table 5, Figure 4 in pocket).

The biotic resources, however, decreased but at a slower rate than

TABLE 5  
LAND USE ACREAGE BETWEEN 1963 AND 1970

<u>Land Uses</u>	<u>Acreage in 1963</u>	<u>Acreage in 1970</u>	<u>Acreage Changes</u>	<u>Percent of Changes</u>
Total	9026.50	9026.50	-	-
Single family residential	16.37	110.09	93.72	572.63
Multifamily residential	-	8.76	8.76	-
Mobile home parks	13.04	61.07	48.03	368.46
Rural nonfarm	48.95	86.57	37.62	76.84
Rural subdivision	175.64	199.02	23.38	13.31
Other related urban use	-	17.95	17.96	-
Commercial and services	20.80	26.25	5.45	26.23
Schools	49.28	131.12	81.85	166.10
Hospitals	2.60	4.04	1.44	55.49
Mines	34.31	56.73	22.42	65.35
Processing industry	7.29	7.82	0.53	7.22
Fabrication industry	6.30	6.12	-0.18	-3.00
Water utility	18.64	15.61	-3.03	-16.24
Sewage treatment utility	7.33	17.80	10.47	142.74
Radio	5.02	5.02	-	-
Parks and race tracks	12.25	12.15	-0.10	-0.77
Cemeteries	5.21	5.21	-	-
Undeveloped urban land	8.74	15.89	7.15	81.99
Cropland	5088.20	4781.89	-306.31	-6.02
Pasture	193.07	122.71	-70.36	-36.44
Orchards and groves	124.09	151.27	27.18	21.90

<u>Land Uses</u>	<u>Acreage in 1963</u>	<u>Acreage in 1970</u>	<u>Acreage Changes</u>	<u>Percent of Changes</u>
Nursery and tree farm	213.33	160.99	-52.34	-24.53
Horticulture	7.63	9.37	1.74	22.85
Farmstead	83.88	91.65	7.77	9.27
Rangeland	602.50	665.77	63.27	10.50
Deciduous forests	685.07	603.85	-81.22	-11.86
Evergreen forests	892.04	886.91	-5.13	-0.57
Mixed forests	142.94	142.98	0.04	0.03
Lakes	33.06	30.35	-2.71	-8.21
Forested wetland	408.15	312.89	-95.26	-23.34
Transitional areas	120.77	278.61	157.84	130.69

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Source: Data derived from calculation of land use maps using sonic digitizer.

urban development. Cropland suffered the greatest loss in terms of acreage even though the percent change was relatively low among agricultural uses. Pasture, nursery and tree farm decreased at a greater percent of change, while rangeland, orchards and horticultural area increased. Forest and forested wetland area also showed decrease, especially deciduous forests and wetland, the former because of agricultural expansion and the latter because of urban expansion.

#### Spatial Pattern of Changes During 1963-1970

Most changes in land uses occurred on river terraces and parts of floodplain. Urban changes were mainly on river terraces except Crescent Valley High School and rural residences on Highway 20 (between Seavy and Conifer streets) which were on floodplain. Changes on the floodplain primarily dealt with agriculture, either gain of cropland from depleted forests or shift of agricultural practices such as change from cropland to orchards on Garden Avenue. The Wildish Sand and Gravel Company mining area also expanded on floodplain by 65.35%. There were relatively few changes on foothill slopes. The only place where such changes occurred was in the northwest corner of the study area, to the west of Crescent Valley Drive. They involved expansion of rangeland and rural nonfarm residences.

Urban or built-up land. There were expansions and intensification of urban land uses along major transportation routes, especially those near Corvallis' northern city limits. Residential, commercial,

vacant and transitional land became more diverse and densely developed in areas between Walnut Boulevard and Highway 99W as well as at Lewisberg intersection. In Walnut Boulevard area, there were expansions of single-family dwellings, Wilson Elementary School and a mobile home park. On Highway 99W, there were the Pepsi-Cola Bottling Company, some new commercial units and another mobile home park. The Elk Club was also added near Highway 99W. Most of the changes in this area occurred in Class II and III soils. The land was originally cropland on river terrace with good and moderate soils for cultivation.

The more distinctive irreversible conversion of biotic resources appeared on newly built Conifer Street which joined Highway 99W and Highway 20. Consequently, cropland and wetland on both sides of the streets were converted to transitional land, a school (Cheldelin Junior High School), single and multifamily dwellings, mobile home park and sewage treatment pond. Single-family dwellings and mobile home parks occurred more in this area than in Walnut Boulevard and Highway 99W area. The changes occurred mostly on soils of poorer quality--capability Class IV, and some of capability Class II. Soils in these areas were Bashaw clay, Dayton silt loam and Woodburn silt loam. All of them had serious wetness problems. From agricultural perspectives, it seemed better to use land of lesser productive capacity, or marginal land, for more intensive, irreversible uses. However, there were also severe limitations for residential and commercial uses, sewage lagoons and even playgrounds since these soils

had seasonal high water table and poor drainage. Although there were problems of site, the situation factor made it suitable for urban expansion since the area lay close to urban center and was linked by a good transportation network.

Growth of rural residential areas, particularly rural subdivision, tended to scatter along Highway 20, Lewisburg Road, Highland Drive. Almost all of the new rural residences were gained from cropland except two areas. Some rural subdivisions on Lewisburg Road were former Christmas tree farm areas, and rural nonfarm residences west of Crescent Valley Drive were built upon rangeland and evergreen forest lands. Most of the changes occurred on Class I and II soils of river terraces which have good characteristics for either residential or agricultural uses.

Forests and forested wetland. Both types of these biotic resources faced declination in acreage. Deciduous forests lost more acreage than evergreen and mixed forests since they were on floodplains where agricultural expansion occurred. Loss of deciduous forests to cropland and orchards tended to occur on the floodplain east of Highway 20. Wetland was also lost partly by cropland expansion and mostly by conversion to residential, educational and vacant land in the Conifer Street area.

Agriculture. There were losses of cropland and Christmas tree farms on good soils--capability Classes I, II, and III--especially

near urban areas. Loss of cropland on better-quality soils appeared to be close to loss of cropland on poorer quality soils of Class IV. However, the former were more scattered, suggesting potential future expansion. Cropland of poorer quality soils were apparently converted only in two places--Crescent Valley High School and Conifer Streets areas.

While agriculture gave way to urban uses, it also gained some acreage on land that was quite far from developing areas. There were gains of cropland and orchards on Class I and II soils each of Highway 20. Cropland there replaced some of the deciduous forests and farming on small acreage, like orchards, grew in this area. There was also a shift of agriculture from pasture to cropland on the steeper slopes of Highland Drive and Lewisburg area. A small area of marginal soils of wetland, capability Class IV, was also used for agriculture although losses and gains of agricultural land tended to occur more on better quality soils than marginal soils.

Between 1963 and 1969, values of sales of all tree fruits and nuts in Benton County went up from \$166,000 in 1963 to \$410,000 in 1969. Values of sales of grass seeds also went up from \$1,663,000 in 1963 to \$3,284,000 in 1969, whereas production and values of sales of grains and hays tended to decline.<sup>12</sup> These facts might be related to agricultural expansion in the areas, although grain and hay statistics might be misleading. However, it was very difficult to judge within the limited scope of this study and for such a small area of

Benton County.

On the whole, gains of agriculture and shifts of agricultural practices during 1963-1970 tended to occur on places far from urbanizing centers at the expense of deciduous forests and forested wetland. At the same time, more intensive urban uses tended to spread out, to scatter, intensify and diversify on areas of convenient access regardless of the productive quality of soils and previous land uses as profitable development potential went up. However, the conversion of the Lewisburg area was not as rapid and widespread as that of the northern fringe of Corvallis.

#### LAND USE CHANGES BETWEEN 1970-1980

During this period of time, there was continuing decline of agriculture, wetland, forests and rangeland. Cropland decreased steadily by the same percent as previous period (Table 6, Figure 6). Smaller changes occurred on Christmas tree farms; but orchards which increased during 1963 and 1970 reduced in acreage between 1970-1978. Other horticulture was an exception. During the 1970-1978 period, the acreage of horticulture tripled and values of sales went up. For example, in 1971 values of sales for vegetables for fresh market sales in Benton County was \$2,429,000 and \$4,452,000 in 1975.<sup>13</sup> Mixed forests appeared to be stable during the whole period, 1963-1978, but evergreen and especially deciduous forests continued to decrease. The losses seemed to slow down during 1970-1978. Rangeland which increased

TABLE 6

## LAND USE ACREAGE BETWEEN 1970 AND 1978

<u>Land Uses</u>	<u>Acreage in 1970</u>	<u>Acreage in 1978</u>	<u>Acreage Changes</u>	<u>Percent of Changes</u>
Total	9026.50	9026.50	-	-
Single family residential	110.09	240.86	130.77	118.79
Multifamily residential	8.76	31.34	22.58	257.69
Mobile home	61.07	108.62	47.55	77.86
Rural nonfarm	86.57	70.35	-16.22	-18.73
Rural subdivision	199.02	302.55	103.53	52.02
Other related uses	17.95	34.64	16.69	92.94
Commercial and services	26.25	47.60	21.35	81.28
Schools	131.12	131.04	-0.08	-0.06
Hospitals	4.04	55.51	51.47	1273.22
Mining	56.73	61.59	4.86	8.50
Processing industry	7.82	9.95	2.13	27.29
Fabrication industry	6.12	92.17	86.05	1407.14
Water utility	15.61	33.18	17.57	112.49
Sewage treatment utility	17.80	15.55	-2.25	-12.66
Radio	5.02	5.02	-	-
Parks and race tracks	12.15	30.25	18.10	148.95
Cemeteries	5.21	5.21	-	-
Undeveloped urban land	15.89	43.39	27.50	172.93
Cropland	4781.89	4458.47	-323.42	-6.76
Pastures	122.71	140.19	17.48	14.24

<u>Land Uses</u>	<u>Acreage in 1970</u>	<u>Acreage in 1978</u>	<u>Acreage Changes</u>	<u>Percent of Changes</u>
Orchards and groves	151.27	120.02	-31.25	-20.66
Nursery and tree farm	160.99	151.73	-9.26	-5.76
Horticulture	9.37	35.64	26.27	280.13
Farmstead	91.65	73.04	-18.61	-20.30
Rangeland	665.77	612.28	-53.49	-8.03
Deciduous forests	603.85	572.42	-31.43	-5.21
Evergreen forests	886.91	868.68	-18.23	-2.06
Mixed forests	142.98	142.89	-0.09	-0.06
Lakes	30.35	31.62	1.27	4.19
Forested wetland	312.89	230.63	-82.26	-26.29
Transitional areas	278.61	270.07	-8.54	-3.07

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Source: Data calculated from land use maps using sonic digitizer.

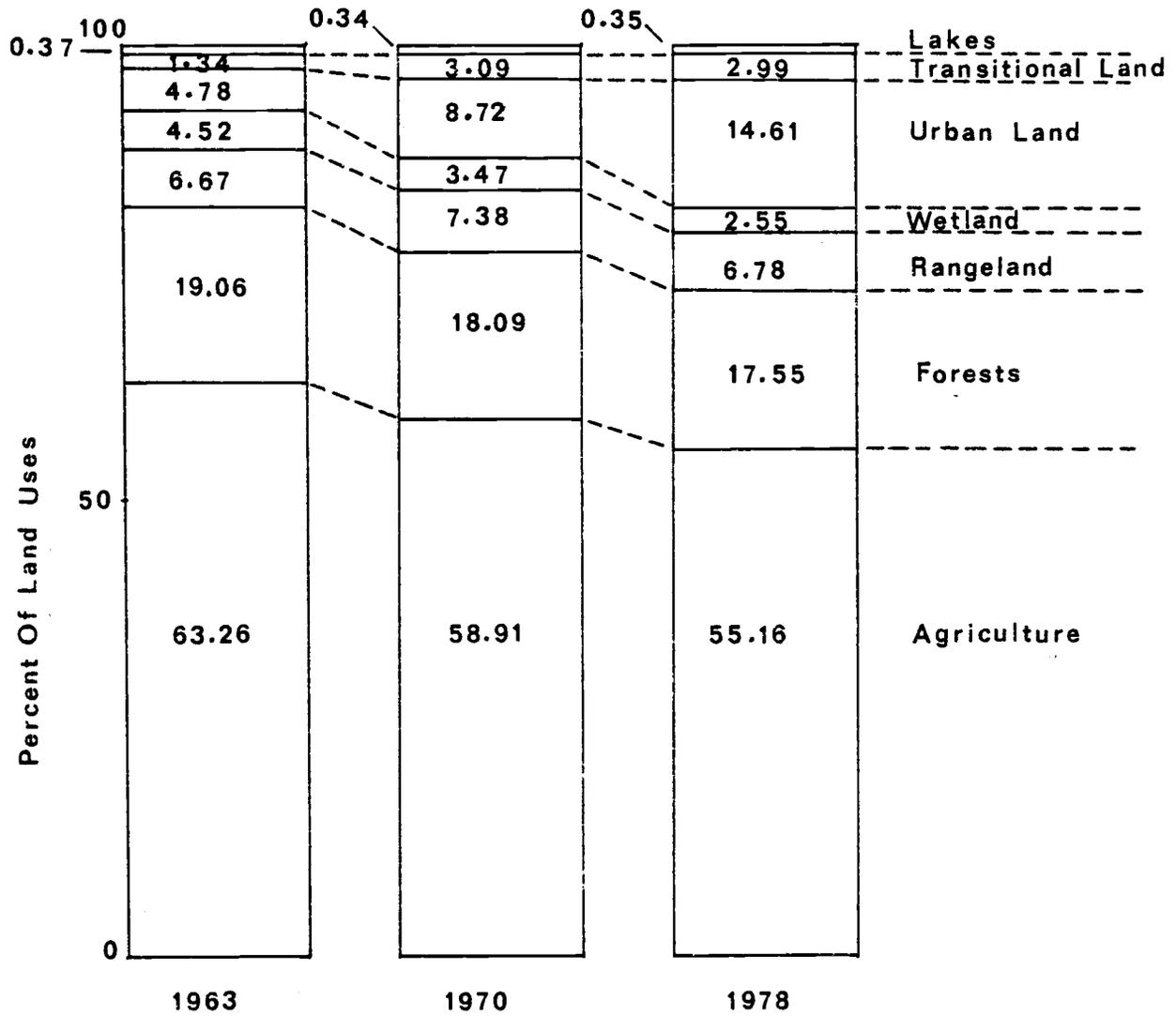


FIGURE 6

CHANGES IN LAND USE ACREAGE FROM 1963 TO 1978

between 1963-1970 experienced some losses in acreage to multi-residential dwellings on Walnut and 29th streets and to rural nonfarm residences which dotted on the foothill slopes west of Crescent Valley Drive (Figure 5, in pocket).

Urban land uses by contrast increased sharply. This was principally because of the establishment of Good Samaritan Hospital and Hewlett-Packard calculator assembly plant. At the same time, single-family and multifamily dwellings, water utility and parks gained more acreage in spite of slower rates of changes. Undeveloped urban land still showed increases at the intersection of Walnut Boulevard and Highland Drive, whereas transitional land decreased by the development of the already existing vacant land, particularly in the Conifer Street area.

#### Spatial Pattern of Changes During 1970-1978

Most changes still took place on river terraces, but more and more changes spread onto floodplains and up foothill slopes in small scattered patches. They included vacant urban land and multifamily housing on the western end of Walnut Street, rural nonfarm residences west of Crescent Valley, which existed already during the previous period, rural subdivisions on Highland Drive, more cropland and orchards and less forests east of Highway 20. Though the changes on floodplains and foothill slopes varied, it appeared that residential uses tended to take place on rolling terrains along and west of

Highland and Crescent Valley drives, and that agricultural uses tended to take place on floodplains east and west of Highway 20. Also, this seemed to agree with Benton County Zoning Ordinance in 1974 which specified Lewisburg and areas west of Highway 99W to be urban residential district and areas east and west of Highway 20, except areas from Seavy Road up to Children's Farm Home, to be exclusive as a farm use district.<sup>14</sup>

Urban Land Uses. On the river terraces where most changes appeared, urban land uses spread, intensified and diversified. More croplands were converted to single-family residential, commercial and undeveloped urban and transitional land. This was natural for a growing city. The more important changes were the hospital and fabrication industrial land uses, which increased by 13 and 15 times, respectively. Good Samaritan Hospital moved to a new site on Satinwood Road and was zoned as planned development. Hewlett-Packard, which created new jobs and caused migration to Corvallis, replaced cropland and race track areas on Circle Boulevard Street. The processing industry also gained more land in Lewisburg, but sand and gravel mining areas grew by a decreasing rate on the floodplain. Commercial land expanded by 81.28% at Highway 99W's commercial strip, including Robert C. Wilson Contractor, Corvallis Disposal Company, Self-Stor, and Pumite Building Supply Company. On Conifer Street, new single and multifamily dwellings were added and a new park, Williams Field, was established. Rural subdivision expanded more

rapidly than between 1963-1970 along Highway 20, Lewisburg Road and Highland Drive. There were more diversifications in the Lewisburg area. A new mobile home park, Terrace Park, was added and commercial and industrial land expanded, such as Applied Theory computer service, Jerry's Carpet, Evans Products Company (Permaglass Division) and McLagan Company.

In terms of land quality, changes in the Lewisburg area converted croplands of prime agricultural importance, Class II and small parcels of Class I soils. However, the situation factor seemed to rule out the site factor as Lewisburg is located at the intersection of Highway 99W, Lewisburg-Granger Roads and Portland-bound Southern Pacific Railroad. This facilitated transportation to and from the area. As for areas around the city, the converted lands were mostly from croplands of Class II and III soils except Conifer Street area where soils were of Class IV, due to seasonally excessive water. Here again, the situation factor seemed to be much more important as urban pressure increased. On the other hand, rural nonfarm dwellings, which gained more land from rangeland and forests, were located on poorer soils of Class II to IV which were subject to erosion.

Agricultural Land and Rangeland. Although overall acreage of cropland decreased as much as it did during 1963-1970, there were some gains over wetland and deciduous forest areas west and east of Highway 20. All of the gains were on floodplains and within exclusive farm use

districts according to 1974 Benton County Zoning Ordinance. Most of the gained appeared to be marginal land from wetland, but some was on Class I and II soils east of Highway 20. Loss of cropland was due to, first, urban development of Corvallis and Lewisburg, and, second, shift of agricultural practices. Most of the losses of cropland occurred near urban areas of Corvallis and Lewisburg and also on expanding rural subdivisions on Highway 20 and Highland Drive. Urban growth took away Class II and III soils from cropland and Christmas tree farms, whereas cropland on Class I and II soils was converted to more intensive and diversified agricultural uses such as orchards, horticulture and nurseries. There were decreases as well as increases in orchards, suggesting a shift of agriculture rather than real irreversible loss. As for rangeland, there was a decrease in acreage due to multifamily and rural nonfarm dwellings which, though scattered, did not take away much acreage.

Forests. Deciduous forests and evergreen forests still continued to decrease, but at a slower rate. Mixed forests did not change much through time. Though forest acreage dwindled, the general spatial pattern of forests was not much different from that of 1963. It appeared that forests changed slightly and slowly through fifteen years and the changes occurred primarily on floodplains for agriculture.

## CONCLUSION

Through the whole study period of 1963 to 1978, all biotic resources of the north Corvallis area declined steadily. Urban, built-up land and transitional land expanded at a greater speed, encroaching upon the biotic resources, especially cropland and forested wetland. Four areas of active urban development were the Corvallis northern edge, Highway 20, Highland Drive-Lewisburg-Granger roads and Crescent Valley Drive. The last three areas were developed in scattered pattern while the first was a contiguous development area. Most urban encroachment and biotic resource conversion occurred on river terraces and involved good to moderate soils of Class I to IV. Only a few urban expansions like rural residences and school uses began to spread on foothills and floodplains. Agriculture still occupied most of the floodplains where good soils were. While there was a loss of good land for agriculture, more forests were replaced by cropland. Another trend which went up during 1970-1978 was the gain of agriculture from marginal land which used to be forested wetland.

## FOOTNOTES

- 1 Secretary of State, Oregon Blue Book 1979-1980, p. 233.
- 2 U.S. Bureau of the Census, Census of Agriculture (U.S. Government Printing Office, 1961, 1967, 1972, 1974).
- 3 For a discussion of phases of development see Longwood, Franklin Russell, "A Land Use History of Benton County, Oregon," unpublished Master's Thesis, Oregon State University, 1940.
- 4 U.S. Bureau of the Census, op. cit., p.
- 5 Secretary of State, op. cit., pp. 255-258.
- 6 For a discussion of the classification system, see Anderson, James R. et al., A Land Use and Land Cover Classification System for Use with Remote Sensor Data, Geological Survey Professional Paper No. 964 (Washington, D.C.: U.S. Government Printing Office, 1976).
- 7 Soil Conservation Service, Soil Survey of Benton County Area, Oregon, U.S. Department of Agriculture Soil Conservation Service in cooperation with Oregon Agricultural Experiment Station, July 1975, pp. 110-111.
- 8 Data acquired from Crop Science Department, Hyslop Field Lab Weather Station.
- 9 City of Corvallis Planning Department, Economic Study for the City of Corvallis, July 1979, p. 11.

- 10 *ibid.*, p. 15.
- 11 *ibid.*, pp. 30-32.
- 12 Oregon State University Extension Service, Commodity Data Sheet.
- 13 *ibid.*
- 14 Benton County Board of Commissioners, Benton County Zoning Ordinance of 1974, adopted by Benton County Board of Commissioners on July 3, 1974, effective on August 2, 1974.

## APPENDIX I

USGS Land Use and Land Cover Classification SystemFor Use With Remote Sensor Data

## 1. Urban or built-up land

## 11 residential

111 single family residential

112 multifamily residential

113 mobile home park

114 rural residential

1141 rural nonfarm

1142 rural subdivision

115 others (e.g., clubs, recreational units)

## 12 commercial and services

121 commercial units

123 schools

124 hospitals

## 13 industrial

131 extraction industry

132 processing industry

133 fabrication industry

## 14 communication and utilities

141 water utility

142 sewage treatment utility

144 radio

- 17 other urban or built-up land
  - 171 parks and race tracks
  - 172 cemeteries
  - 175 undeveloped urban land
- 2. Agricultural land
  - 21 cropland and pasture
    - 211 cropland
    - 212 pasture
  - 22 orchards, groves, nurseries, ornamental or horticultural areas
    - 221 orchards or groves
    - 222 nurseries and tree farms
    - 224 horticulture
  - 24 other agricultural-related land
    - 241 farmsteads
- 3. Rangeland
  - 31 herbaceous rangeland
- 4. Forest land
  - 41 deciduous forests
  - 42 evergreen forests
  - 43 mixed forests
- 5. Water
  - 52 lakes or ponds
- 6. Wetland
  - 61 forested wetland
- 7. Barren land
  - 76 transitional areas

## APPENDIX 2

Soils in the Study Area

<u>Soil units</u>	<u>Capability unit</u>
Amity silt loam	II W-1
Bashaw clay	IV W-4
Bellpine silty clay loam, 3-12% slopes	II e-2
Bellpine silty clay loam, 12-20% slopes	III e-2
Bellpine silty clay loam, 20-30% slopes	IV e-1
Camas gravelly sandy loam	IV w-2
Chehales silty clay loam	II w-2
Cloquato silt loam	II w-2
Coburg silty clay loam	II w-3
Concord silt loam	III w-1
Dayton silt loam	IV w-1
Dixonville silty clay loam, 3-12% slopes	II e-2
Dixonville silty clay loam, 12-20% slopes	III e-1
Dupee silt loam, 3-12% slopes	III e-2
Hazelair silt loam, 3-12% slopes	III e-2
Hazelair complex, 3-12% slopes	III e-2
Hazelair complex, 12-20% slopes	III e-1
McBee silty clay loam	II w-5
Mixed alluvial land	VII w-1
Newberg fine sandy loam	II w-4
Newberg loam	II w-2

<u>Soil units</u>	<u>Capability unit</u>
Pilchuck fine sandy loam	IV w-2
Price silty clay loam, 3-12% slopes	II e-2
Price silty clay loam, 12-20% slopes	III e-1
Price-Ritner complex, 20-30% slopes	IV e-1
Price-Ritner complex, 30-60% slopes	VI e-2
Riverwash	VIII w-1
Waldo silty clay loam	III w-1
Wapato silty clay loam	III w-1
Willamette silt loam, 0-3% slopes	I - 1
Witham silty clay loam, 2-7% slopes	III e-2
Witzel very cobbly loam, 30-75% slopes	VII s-1
Woodburn silt loam, 0-3% slopes	II w-3
Woodburn silt loam, 3-12% slopes	II e-4