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The land tenure system in the United States contains a variety of tenure types. A major characteristic of this tenure system is the continual change of tenure types within a given region. As these tenure types change, problems of a cultural, economic, and legal nature are created and interact with the tenure system.

The purpose of this study is two fold: First, the examination and analysis of the land tenure system in the Calapooia Drainage Basin to determine tenure types, past and present trends of land tenure, and possible future tenure type composition within this region, and second, analysis of selected problems associated with the change in tenure types and the resulting overall effect on the region.

The analysis revealed several trends: the decrease in the number of farms, with an increase in the size of the farms; increased urban migration to rural areas; and increasing single female

(widow) ownership. In view of these trends and related problems, it is concluded that the present grass seed industry would continue its present decline over the next two decades, and that the agricultural land base would be converted to residential home sites and associated urban functions. It is also concluded that if the grass seed industry were to continue in its present form, a number of changes must be instigated. These changes include: (1) effective and enforced county zoning, (2) a more viable rent contract for agricultural land, (3) the revision of the present tax structure to facilitate a proportional distribution of taxes in rural areas.

Problems Associated with Changing Land Tenure in the Calapooia Drainage Basin

by

Dennis Richard Thomason

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PROBLEMS ASSOCIATED WITH CHANGING LAND TENURE IN THE CALAPOOIA DRAINAGE BASIN

INTRODUCTION

Ownership is a basic legal and cultural connection between man and land. It is the form which links the responsibility of land use to a certain individual or individuals. Ownership is a legal principle which determines and regulates the rights to the land. Ownership is also a complex form expressing cultural attitudes and practices. The cultural aspect of ownership is not entirely governed by legal statutes and is subject to a wide range of variability.

Over the preceding 30 year period in the United States, the pattern of rural land tenure has undergone a complex series of changes. These changes are interrelated with the legal system and result from the pressures of urban growth, regional economic change, changes in transportation systems, and cultural attitudes. With these changes in tenure, a variety of problems is created as tenure systems adjust within a finite region.

The purpose of this thesis is to describe the changes in land tenure in the Calapooia River drainage basin and to discuss the consequent problems created by these changes. Based on an analysis of these changes, an attempt will be made to predict the future course of land tenure throughout the drainage basin.

PHYSICAL CHARACTERISTICS OF THE CALAPOOIA DRAINAGE BASIN

Location

The Calapooia drainage system is part of the Willamette drainage system of Western Oregon (Figure 1). This basin contains three physiographic regions and drains 371 square miles of the Willamette River drainage system. These physiographic regions are designated as: Plain, Hill and Valley, and Mountain Regions (Figure 2). Their occurrence within the drainage basin permits a natural division of the basin into three separate regions. Because of the variation in physical characteristics, each of the regions will be discussed individually.

Geomorphic Units

A profile of the Calapooia drainage (Figure 3), displays six main types of geomorphic structure within the drainage system. The Plain Region on the Willamette Valley floor contains four of these geomorphic units: Senecal, Ingram, Winkle, and Calapooia (Balster and Parsons, 1968).[1]

The Calapooia unit is extensive throughout the Willamette Valley floor and is best expressed along the eastern side of the Calapooia

[1] Balster and Parsons (1968) and other workers frequently spell Calapooia, "Calapooyia." I prefer the speeling without the "y".

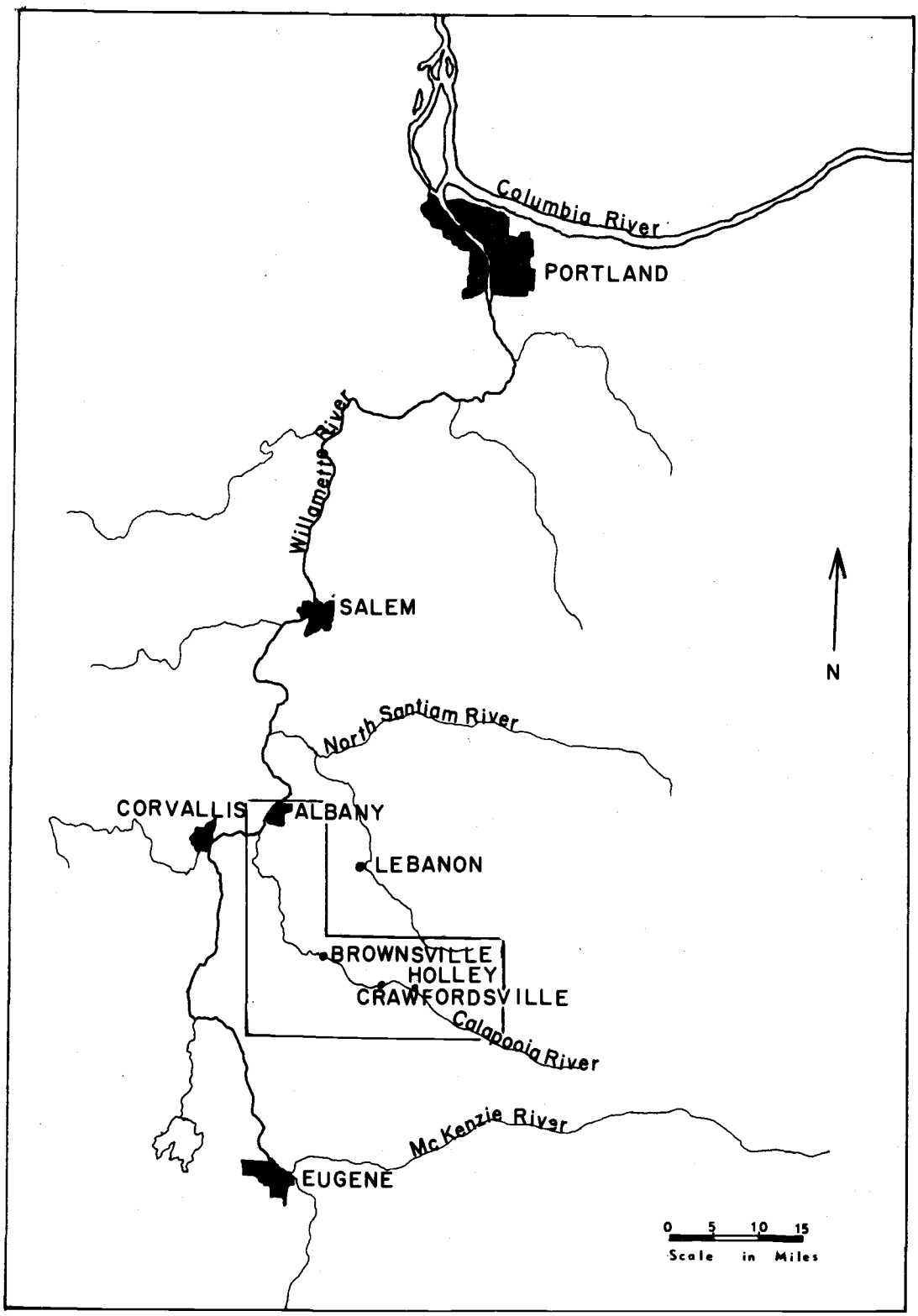

Figure 1. Location of the Calapooia Drainage Basin Study Area within the Willamette Valley Drainage System.

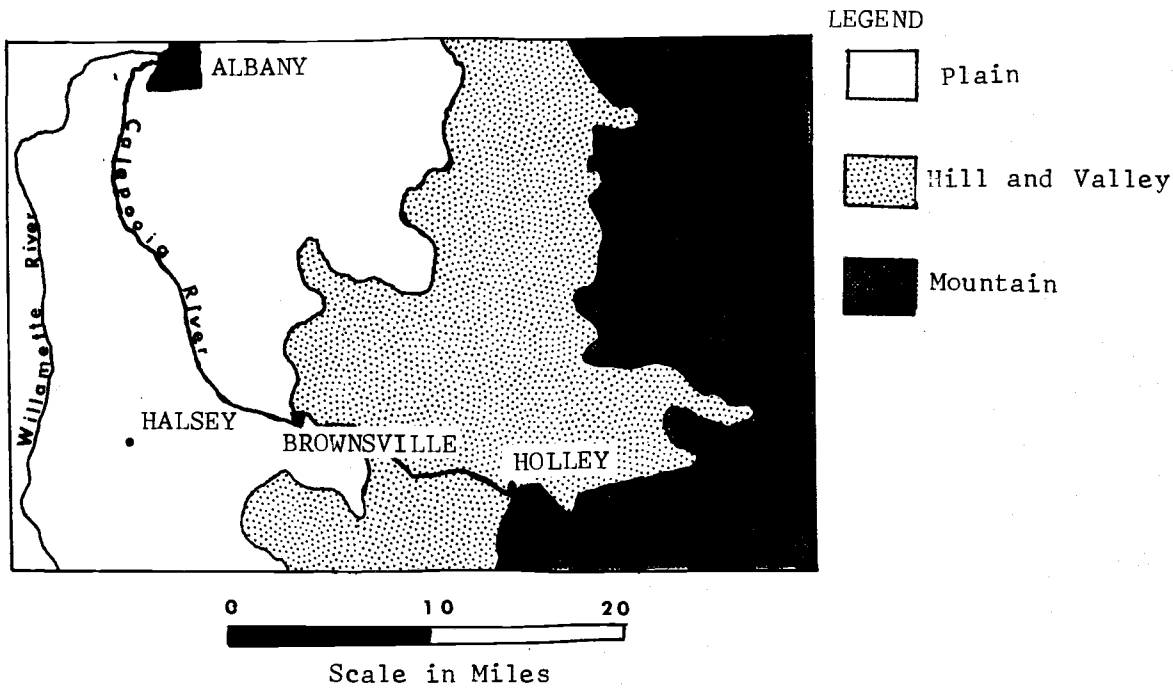

Figure 2. Regions of the Calapooia Drainage Basin.

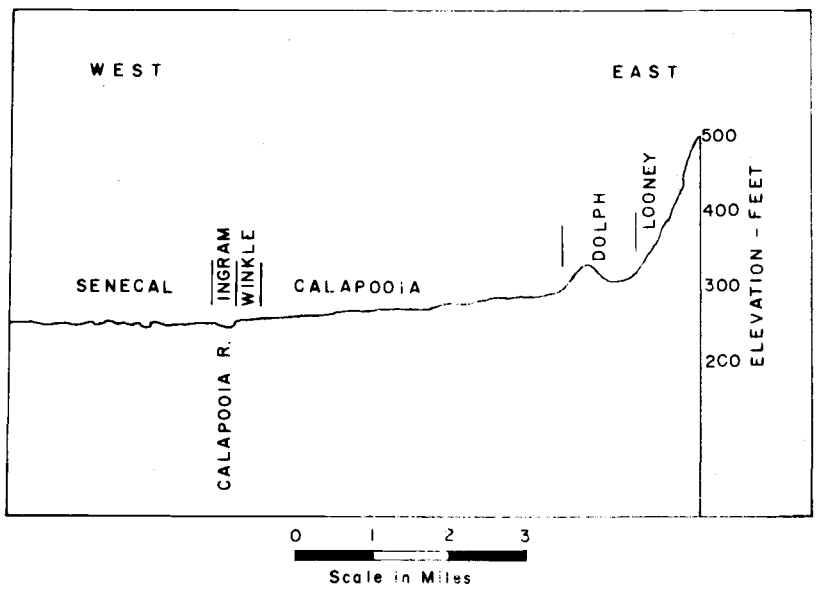

Figure 3. Profile of the Calapooia Drainage Basin at 44° 30' N Latitude Displaying the Geomorphic Units, after Balster and Parsons, 1968.

River. The Calapooia unit topography is characterized by small local relief, maximum relief usually not exceeding two or three feet. The drainage in this flat region is poor and surface water drainage is extremely slow. The Calapooia surface is a product of a thin depositional mantle on a previously eroded valley floor surface. An absolute age for the Calapooia surface is unavailable, but its development probably took place during the late Pleistocene (Balster and Parsons, 1968).

The landscape of the Senecal unit has resulted from minor modification of the Calapooia surface by the development of a drainage system. It appears that the drainage organization of this unit has been produced by overland flooding of major streams shortly after silt deposition. The age of the Senecal unit is probably no greater than that of the Calapooia, dating from the late Pleistocene (Balster and Parsons, 1968).

The Winkle unit is one of the more extensive surfaces on the valley floor. Its type locality is at Winkle Butte, about ten miles south of Corvallis. Most of the Winkle unit has the morphology of abandoned flood plains of aggrading streams. Low relief, subparallel corrugations of old channels are still apparent at many places on Winkle landscapes. They suggest a braided, overloaded stream channel in some localities and generally reflect the size of the channel of the stream that was responsible for their formation. The dependence

of surface morphology on the parent stream explains the variability of the Winkle surface. Several age dates for the Winkle surface and its underlying alluvium have been obtained. Reckendorf and Parsons (1966) studied a hearth site buried beneath the Winkle surface which yielded charcoal radiocarbon dated at 5,250 $\pm$ 270 years old.

The Ingram unit includes the higher of the two flood plain levels of the Willamette River and its tributaries within the main valley floor. The topography of the Ingram surface along the Willamette River typically is undulating with a maximum of about eight feet of relief. The relief is a result of corrugations developed by over bank channeling. A direct correlation has been made with the radiocarbon dating of the Winkle and Ingram units, placing the Ingram age at 555 $\pm$ 100 years (Balster and Parsons, 1968).

The Hill and Valley Region, extending from Brownsville to Holley, contains the Dolph geomorphic unit, and the Ingram and Winkle units previously described. Topography of the Dolph unit is composed of a rolling and complex group of landforms. The characteristics of this unit change over the length of the valley. The more rounded landforms characterize the Dolph surface in the northern parts of the valley. The Dolph surfaces on the eastern margin of the Willamette Valley are expressed in Strath terraces. The age of the Dolph surface is older than Senecal or Calapooia and is considered to be about middle Pleistocene (Balster and Parsons, 1968).

The Mountain Region contains the previously discussed Winkle unit and the Looney geomorphic unit. The Looney unit comprises a complex group of valleys and intervening ridges that form a completely dissected, steeply sloping terrain. Slope gradients may occasionally exceed 100 percent. By far the greatest part of the Looney unit is considered an unstable landscape.

Geology

Plain Region

The mid-Willamette Valley floor is composed of Quaternary alluvium adjacent to the major drainage, and by terrace alluvium deposits elsewhere. Small Tertiary deposits of intrusive rock are found in the northeastern part of the region (Figure 4).

Terrace alluvium. The most extensive geological component of the mid-Willamette Valley floor is underlain by older deposits of clay, silt, sand, and gravel, collectively referred to as terrace alluvium. Over most of the area the terrace alluvium is less than 100 feet thick. The terrace deposits are the result of alluviation followed by downcutting at some places in the valley and accompanied

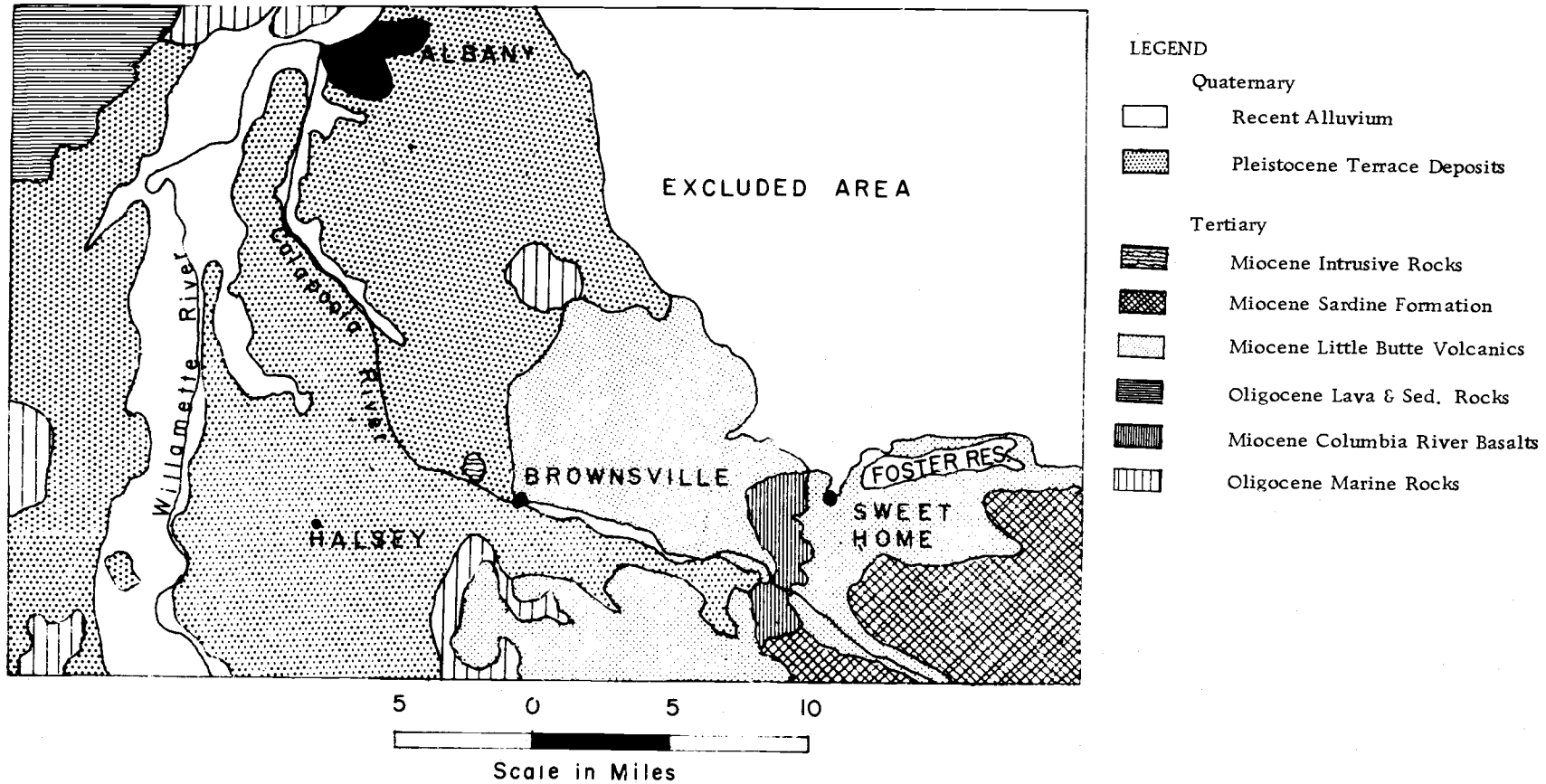

Figure 4. Geology of the Calapooia Drainage Basin, after the Willamette Basin Task Force, 1967.

by erosion of the terrace deposits. The Willamette silt, which underlies large areas mapped as terrace alluvium, was derived almost wholly from the Columbia River drainage system. It was deposited in the Willamette Basin when the basin was flooded to an altitude of nearly 300 feet in Pleistocene time. All materials included in the terrace alluvium are believed to be Pleistocene in age. (Oregon State Water Resources Board, 1963).

Alluvial deposits. Within the mid-Willamette Valley floor the flood plain immediately adjacent to the Calapooia River is underlain by young alluvial deposits composed of beds of clay, silt, sand, and gravel-sized particles, derived from older formations within the particular drainage area where the deposits occur. Thus, the alluvial deposits underlying flood plains of streams that drain areas underlain by sandstone, shale, or siltstone are fine grained, whereas those derived from areas underlain by resistant lavas or other hard rocks are coarser grained (Oregon State Water Resources Board, 1963).

Hill and Valley Region

The geological structure of the Hill and Valley Region is composed of Quaternary terrace deposits previously discussed, and of the Tertiary Little Butte Volcanics. The Little Butte Volcanics are composed of basaltic and andesitic lavas, breccias, agglomerates, and tuffs derived from volcanic vents within the area. All have been

folded, faulted, and altered to a greater or lesser degree. Lavas and breccias generally weather to a rocky clay soil. On the other hand, the tuffs and finer grained agglomerates weather to a deep clay soil having a granular texture at places. Based on the ages of the marine rocks interbedded with the unit and on plant fossils found in the tuff beds, the Little Butte Volcanics range from early or middle Oligocene to early Miocene in age (Oregon State Water Resources Board, 1963).

Mountain Region

The Mountain Region of the Calapooia River Valley is underlain by Tertiary rocks in the Sardine formation, composed largely of andesitic lavas with the remainder being breccias, agglomerates, and tuffs. The Sardine formation is less that 3,000 feet thick at most places and originated from numerous volcanic vents in the Western Cascade Range. On the basis of plant fossils, the Sardine formation is dated as middle and late Miocene, and may extend into the early Pliocene (Oregon State Water Resources Board, 1963).

Soils

The soils of the Calapooia drainage provide a complex pattern of soil types. They have been recently described and mapped by Simonson and Norgren (1969). For the purposes of this discussion

each type or series is placed into one of four groups based on general characteristics. The four groups are quite general and include soils that are dissimilar in characteristics, vegetative cover, and slope relations (Simonson and Norgren, 1969). The following breakdown shows the major use problems associated with the four generalized soil groups in the Calapooia Drainage Basin.

Group A. Lowest potential for runoff, deep, well drained to excessively drained, sandy or gravelly soils with rapid rate of water transmission; Newberg, and Riverwash.

Group B. Moderately deep to deep, moderately well to well drained, moderately fine to moderately coarse-textured soils lacking an impervious layer with moderate rates of water transmission; Chehalis, Malabon, Willamette, and Woodburn.

Group C. Soils moderately deep to bedrock, hardpan, or consolidated sediments; soils with somewhat poorer drainage, and soils with fine to moderately-fine textured layers having slow to moderately slow rates of water transmission; Amity, Coberg, Nekia, Holcomb, Jory, Santiam, and Dixonville.

Group D. Highest potential for runoff, soils shallow to bedrock, very clayey soils with slow rates of water transmission, and poorly drained soils; Aubrey,

Philomath, Dayton, Bashaw and Witzel.

Use characteristics are shown in Table 2 for the principle soil series in the study area. The soil base of the Calapooia study area can be assigned a percentage according to the area occupied by the A, B, C, or D group. The A group comprises ten percent of the soil base, the B group 21 percent, the C group 39 percent, and the D group 30 percent. The A and B groups include the excellent to good agricultural soils, while the C and D groups range from fair to poor in terms of agricultural desirability, therefore, 31 percent of the Calapooia drainage basin has soils rated excellent to good for agricultural purposes. The remaining 69 percent of the Calapooia drainage basin includes soils that range from fair to non-usable.

The regional soil base can also be assigned a percentage, according to the area occupied by the consolidated A and B groups, the excellent to good soil classification, and the C and D groups, the fair to poor soil classification. The soil series within the Plain Region is composed of 25 percent of the A and B groupings, and 75 percent of the C and D groupings. The Hill and Valley Region soil series contains a total of 20 percent within the A and B grouping and 80 percent within the C and D groupings. From these percentages, it can be concluded that the agricultural soil base of the Calapooia drainage basin is lacking in good soils and therefore lacks the diversity of crops that can be grown on such a soil base.

Table 1. Use Characteristics of the Calapooia Drainage Basin Soil Types.[a]

Soil Series	Group	Major Land Use	Drainage Class	Major Limitation	Irrigation Suitability
Amity	C	cultivated	poor	wetness	excellent
Aubrey	D	cultivated	poor	wetness	fair
Bashaw	D	pasture	poor	clay	poor
Coburg	D	cultivated	good	wetness	good
Chehalis	B	cultivated	good	none	excellent
Dayton	D	cultivated	poor	wetness	fair
Dixonville	C	pasture	good	slope	poor
Hazelair	D	cultivated	poor	slope	poor
Holcomb	C	cultivated	poor	wetness	good
Jory	C	woodland	good	slope	very poor
Malabon	B	cultivated	poor	wetness	excellent
Newburg	A	cultivated	excessive	flooding	good
Nekia	C	cultivated	good	slope	good
Philomath	D	pasture	good	depth	poor
Santiam	C	cultivated	good	wetness	fair
Willamette	B	cultivated	good	none	excellent
Woodburn	B	cultivated	good	wetness	excellent
Witzel	D	pasture	good	depth	very poor
Riverwash	A	---	river wash	---	---

[a] Source: Simonson and Norgren, 1969.

Climate and Vegetation

Plain Region

Climate of the mid-Willamette Valley floor is quite uniform as suggested by hte mean annaul data for three representative stations (Table 2). Employing the Köppen climatic classification, the Plain Region would be designated as Csa.

Table 2. Mean climatic data for three stations in the mid-Willamette Valley.[a]

Station	Elevation (feet)	Annual Precipitation (inches)	Annual Temperature (°F)	Variation in Precipitation (inches)
Albany	212	40.67	54.6	24-57
Corvallis	220	40.82	51.8	26-50
Harrisburg	310	39.32	--	29-52

[a]Source: U. S. Weather Bureau Station Bulletin (U. S. Weather Bureau, 1970).

The natural vegetation of the mid-Willamette Valley has been recently summarized by Franklin and Dyrness (1969) and consists of two major vegetation zones (altitudinally conceived climax formations): the Interior Valley Zone and the Tsuga heterophylla Zone. The Interior Valley Zone (Pinus-Quercus-Pseudotsuga) Zone

characterizes the entire Plain Region and much of the Hill and Valley Region. Within this Zone is recognized a wide variety of natural and seminatural community types including Quercus woodland, conifer forest, riparian communities, and grasslands.

Bordering the Calapooia River, its tributary creeks, poorly drained sites, and several recently abandoned channels, are strips of riparian vegetation dominated by hardwood forest. Typifying these forests are Oregon ash (Fraxinus latifolia), black cottonwood (Populus trichocarpa), bigleaf maple (Acer macrophyllum), red alder (Alnus rubra) and several species of willow (Salix).

The original natural vegetation of the mid-Willamette Valley has been reconstructed by Habeck (1961) as consisting of prairie grasslands interspersed by oak savanna, oak woodlands, and occasional patches of coniferous forests. Indian fires have been held responsible for this open vegetation, but with settlement, fire prevention has prevailed and close grown Oregon white oak (Quercus garryana) forests have developed. These in turn have given way to coniferous forests dominated by Douglas fir, grand fir, and bigleaf maple (Franklin and Dyrness, 1969). Grasslands have been created by grazing and forest clearance. With the exception of the riparian vegetation, much of the natural and seminatural vegetation in the Plain Region has been replaced by agricultural fields.

Hill and Valley and Mountain Regions

Climatic data were available only for Holley, the dividing point

between the Hill and Valley Region and the Mountain Region. Data were limited to precipitation, averaging 53.11 inches annually. However, strong relief variations in these regions undoubtedly have profound influence on the local climate. The higher elevations would lead to a lowering of the mean annual temperature.

Within the Hill and Valley Region the plant community types typifying the Willamette Valley floor give way to coniferous forest characteristic of the Tsuga heterophylla Zone. Forest stands are characteristically dominated by Douglas fir (Psuedotsuga menziesii) with an admixture of grand fir (Abies grandis), bigleaf maple (Acer macrophyllum), and western hemlock (Tsuga heterophylla). In moist habitats western redcedar (Thuja plicata) prevails. Although the Douglas fir dominates many of the forest stands in these regions, it is a successional species and gives way to more shade tolerant hemlock. Along creeks, riparian forest is characterized by red alder (Alnus rubra) and bigleaf maple.

Within the Mountain Region the Tsuga heterophylla Zone undergoes a transition to the Subalpine Forest Zone where various species of true fir (Abies spp.) and mountain hemlock (Tsuga mertensiana) replace the Douglas fir and western hemlock.

Agricultural clearing in the level valley floors of the Hill and Valley Region has greatly altered the original natural vegetation. The coniferous forests of the slopes in this region and the more rugged terrain of the Mountain Region are largely managed for forest production.

DEFINITIONS AND CULTURAL IMPLICATIONS OF LAND TENURE

"Land tenure" refers to the manner in which rights to land are held. This definition embraces social relationships created by the individual and groups which have property rights to the land (Smith, 1953). In many contemporary studies, land tenure has been likened to a "bundle of rights." This bundle comprises many complex, flexible, and separable "sticks": Claim powers, privileges and immunities, all of which are typically illustrated in the relation of landlord and tenant under a tenancy agreement (Tiffany, 1940).

In the present system of land tenure in the United States, the control of the land can be dichotomized: (1) private and public interests in privately held land, and (2) private and public interests in publicly held land (Ottoson, 1963).

The public holds certain rights in all privately held land. These rights are retained by the government and traditionally include the right to tax, the power to police, the power of eminent domain, and the right to escheat.

Private interests or rights in privately held land include all of those not held by the public. In general, these rights are regulated by

state law, with each state making its own law within the framework of applicable constitutional powers.

The private interest or rights in privately owned land are influenced by the category of ownership or tenure that is utilized. These kinds of tenancy are as large in variety as the interest or rights held by owners in the land. A classification of United States tenure types is offered in Dicken and Pitts (1963). This classification recognizes the following three major types of rural land tenure in the United States:

1. Freehold tenure, otherwise known as fee simple tenure, generally implies the right to buy, sell, and cultivate as one pleases during ownership.
2. Tenant tenure is classified as the occupation and use of land by individuals who do not own it. In return for these use rights, a tenant may either pay a cash fee or give his landlord a share of the crop.
3. Institutional and corporate ownership refers to land that is owned or operated by government, by legal corporations, or by religious institutions. Among governmental types of ownership, four are distinguished: federal, state, county, and city ownership.

The influence of these types of land tenancy is derived from their continually changing state. As the tenure changes, the use associated with various tenure types may also change. The overall effect of changing tenure and use is one of continual legal, cultural, and economic conflict with non-related tenure and use systems coexisting in finite regions (Fried, 1952).

This thesis is a description and analysis of the tenure systems that have existed within a given region, the trends leading to their present existence, and prediction of the future results of these trends. It is also an effort to describe how the continually changing system of land tenure in the United States creates various legal, cultural, and economic conflicts.

Review of Literature

The literature compiled on the subject of land tenure is extensive. However, the subject matter of books, articles and papers concerning land tenure do not generally include an in-depth analysis of the problems associated with changing land tenure. A general review of publications relating to tenure reveals a repetitious study of the origin of the United States land tenure system; prevalent tenure types, policies, programs and uses; theories, legal aspects and conflicts of water rights and conservation. The few discussions presented on the effects of changing rural land tenure are presented on a national scale and are

associated with national agriculture trends. The U.S.D.A. publication, United States Land Tenure (USDA, 1969), lists the major national tenure problems as: (1) the slowness with which tenure arrangements and procedures are developed to cope with rapidly developing technology: (2) the many farms that yield an annual net farm income less than adequate for an acceptable level of living: (3) the difficulty of intrafamily, intergenerational transfer of high-value farms; (4) the trend toward large operating units leading to future financing difficulties for the individual owner; and (5) the problem facing public land administrators toward developing acceptable arrangements for multiple uses of public land.

Bertrand and Corty (1962) agree with the U.S.D.A. analysis regarding the existence of a national problem of below minimum income for many private tenure types. They also introduce the problem of rural land tenure change, however, their analysis is limited to the depopulation of rural areas and its effect on rural communities.

In none of the literature reviewed was there a specific discussion of the problems associated with changing rural land tenure in the United States on a regional basis.

Tenure Forms

The tenure forms that were identified in this study are listed and defined as follows:

(1) Individual private ownership

(a) Family/marginal farms

(b) Commercial farms

(c) Single female ownership

(d) Residental ownership

(2) Corporation ownership

(3) Public ownership

Individual ownership refers to the freehold tenure previously described and implies the right to buy, sell, and use as the owner sees fit. The family/marginal class includes family farms, marginal farms, part time farms, and subsistence farms. The consolidation of these types into one category is based on the agricultural classification devised by Derwent Whittlesey (1936). Whittlesey's classification is based on the following five criteria:

(1) The crop and livestock association

(2) The methods employed to produce the crop and livestock products

(3) The intensity of application of capital

(4) The fate of the farm produce

(5) The farm buildings and other fixed equipment needed for production

By application of these criteria to the aforementioned farm types, a relationship between each type can be demonstrated.

The crop and livestock association of each type is similar. Crops are generally limited to subsistence row crops or garden production and tree crops. The tree crops vary in type, however the number of any one type of crop is usually restricted to a few trees. The livestock is usually limited to dairy and beef for family use. The sale of calves may also take place if several head of livestock are owned.

The methods employed to produce the crop and livestock are similar in that mostly hand labor is used with machinery usually limited to a truck or pickup, and in some cases a small tractor.

The amount of capital for farm production is limited in all four farm types. Credit is difficult to obtain, which results in a restricted application of capital. Application of capital is usually limited to seed purchase for row or garden crops, the purchase of spring calves to be raised for family beef, or milk, and for minor maintenance of equipment. The limited amount of capital also restricts any major improvements such as the purchase of more land, machinery, or increasing the number and quality of livestock.

The farm produce in each farm type is usually used for family sustenance. In the event of some surplus crop or stock production sale to local markets will take place. The limited amount of surplus produce sold does not provide enough income to maintain a self-sufficient farm and non-farm employment is required to obtain the

remainder of necessary income.

Farm buildings and other fixed equipment are usually limited to a barn and some type of equipment building. The condition of farm buildings in these farm types is generally below the condition of farm buildings on commercial farms. Although serviceable, most of the buildings in these classes observed by the author were in need of maintenance of some type.

The criteria used for the separation of commercial farms from family/marginal farms was the percent of income derived from the sale of farm products. The percent of income selected to represent full time or commercial farming is here identified to be 80 to 100 percent of total income resulting from the sale of farm products. Any individual who receives less than 20 percent of his total annual income from the sale of farm products is not considered a full-time commercial farmer, nor are his holdings considered a commercial farm. The family/marginal farms are those farm operations which produce 20 to 80 percent of the total yearly income of the owner.

The commercial farm classification is therefore defined in the separation of family/marginal farms, and is determined to be those farms that provide 80 to 100 percent of the total annual income. Corporation ownership is that land owned by legal corporations, including individuals who have incorporated their farm acreage, and religious institutions.

Public ownership is that land owned or operated by governmental agencies, including federal, state, county, and city ownership.

METHODOLOGY

Three considerations were prerequisite to the analysis of changing land tenure in the Calapooia River drainage basin: (a) division into more or less homogeneous regions, (b) selection of sample areas, and (c) data collection methods.

Regional Division

The study area of the Calapooia drainage basin includes three distinct physiographic provinces differing in topography, in geologic structure, in soils, in vegetation, and more or less in climate (Figures 5, 6, 7). Furthermore, correlating with these three physiographic provinces are distinct differences in land use, socio-economic and ethnographic characteristics (Hogg, 1967). These regions were recognized and depicted by Hogg and designated as: the lower, middle, and upper Calapooia drainage basin. However, I prefer purely physiographic names and will refer to these three provinces throughout this study as the Plain Region, Hill and Valley Region, and Mountain Region. The entire study area will also be treated as a unit prior to considering the above regional breakdown.

Sampling

Since the study area included 239 sections with several hundred

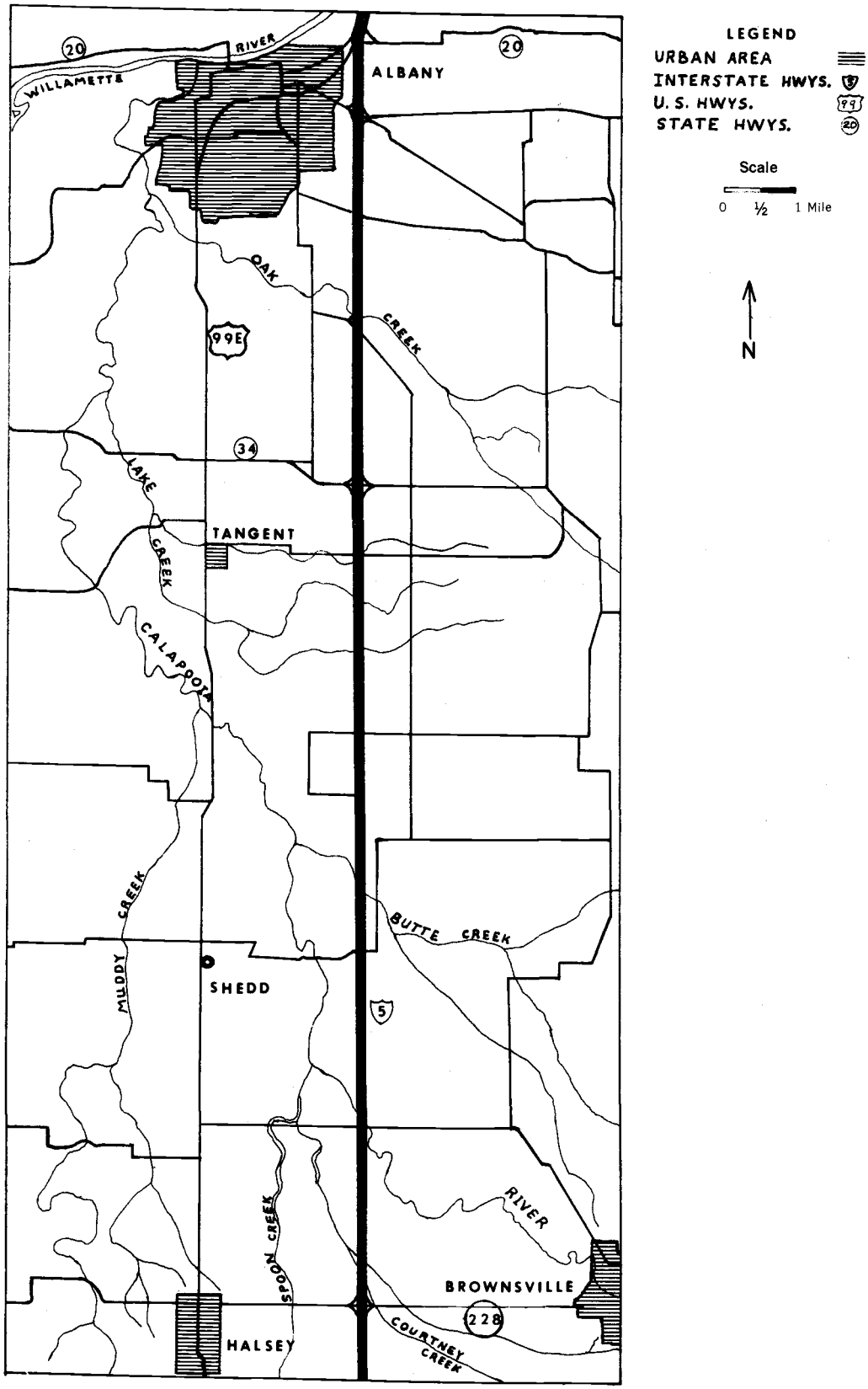

Figure 5. Plain Region Study Area, Calapooia Drainage Basin.

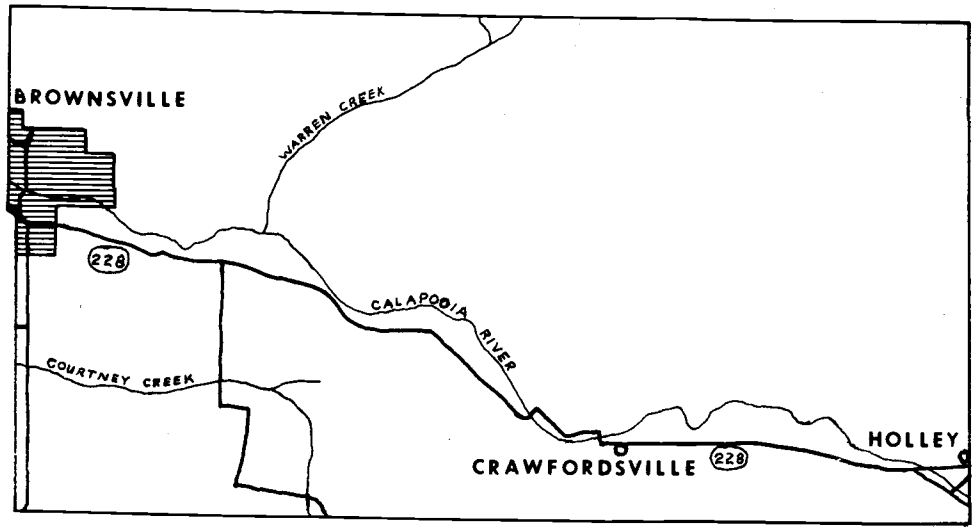

Figure 6. Hill and Valley Region Study Area, Calapooia Drainage Basin.

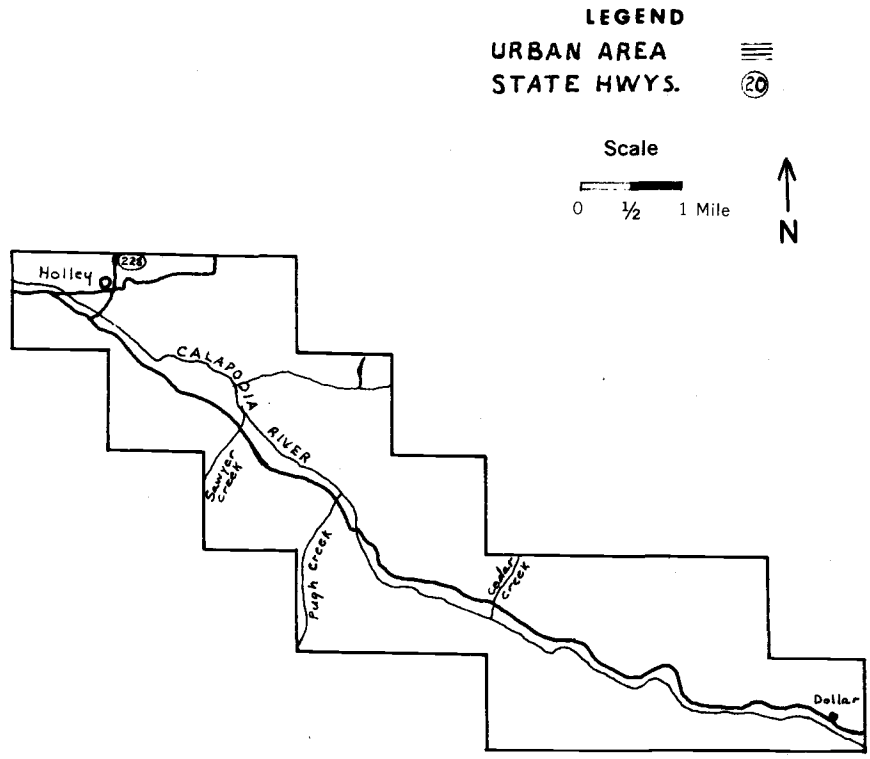

Figure 7. Mountain Region Study Area, Calapooia Drainage Basin.

ownership parcels, it seemed advisable to statistically sample. The section method was employed for the selection of sample sections.

Section Method

The section method consisted of randomly selecting sections throughout the drainage basin. Each region was sampled separately, for if the entire study area had been sampled as one unit the smaller Hill and Valley Region and Mountain Region would have been under-represented. Sections were numbered consecutively one to n in each region. Sections were then selected by use of a five digit random number table. Figures 8, 9, and 10 show those sections selected.

Sample, section cadastral maps, obtained from the Linn County Tax Assessor's Office, were studied for property boundaries and deed number. Current, as well as former, ownership is recorded by deed number indicating the year of purchase or of title transfer. These ownership changes, including subdivisions and sales of land, are also listed in the Assessor's Office record books by Township and Range section numbers.

Although the total drainage area of the Calapooia watershed comprises 361 square miles (State Water Resources Board, 1963), the study area was limited to 221 square miles, roughly 144,640 acres.[2] This reduction was due to two exclusions. First, since almost all the ownership above the hamlet of Dollar was either by U. S. Forest

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[2] See footnote on Table 3, p. 32.

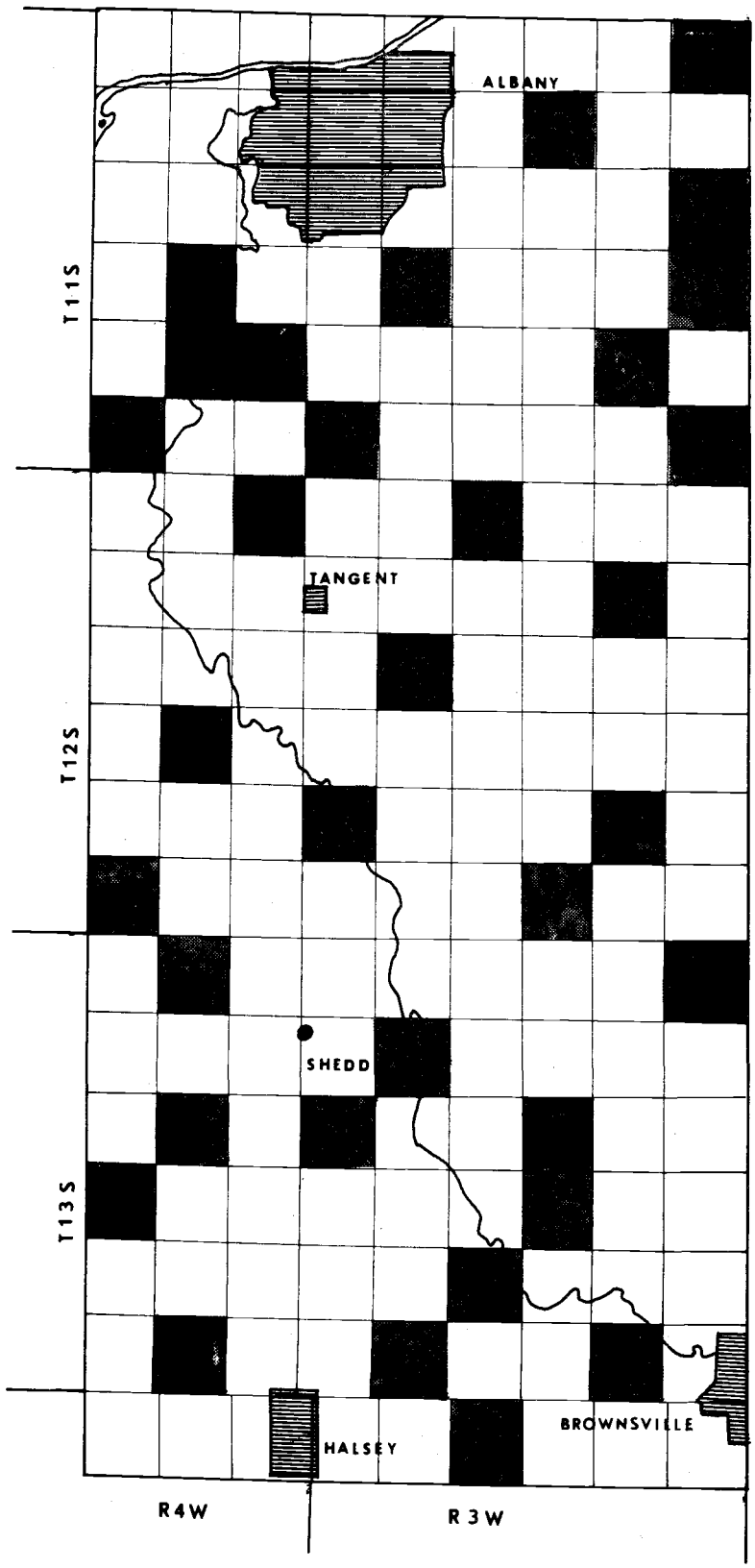

Figure 8. Plain Region of the Calapooia Drainage Basin Indicating the Sections Sampled.

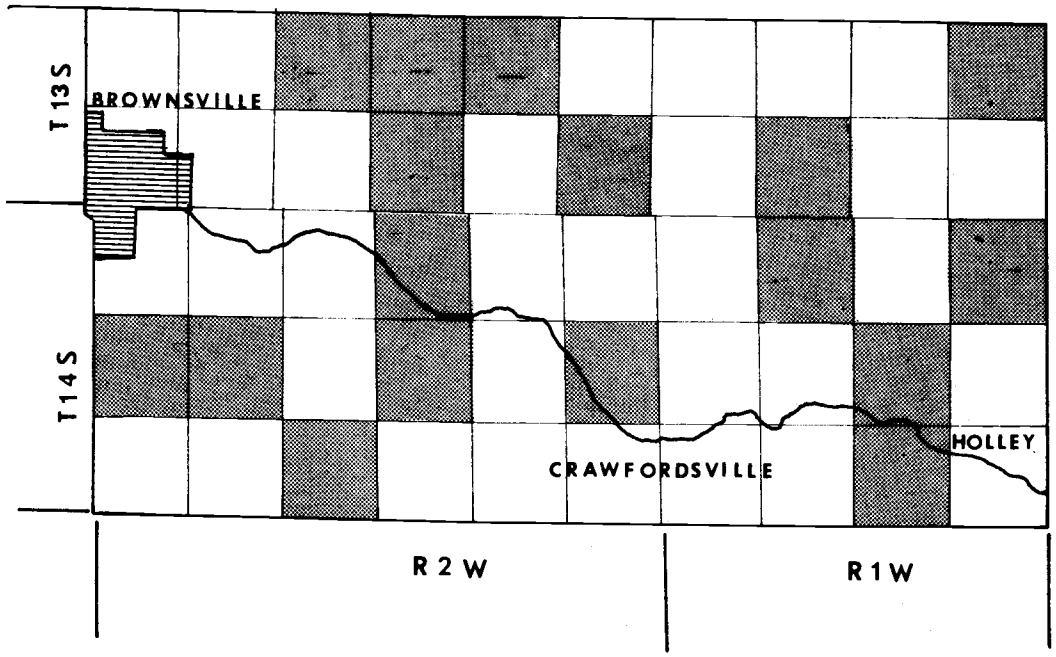

Figure 9. Hill and Valley Region of the Calapooia Drainage Basin Indicating the Sections Sampled.

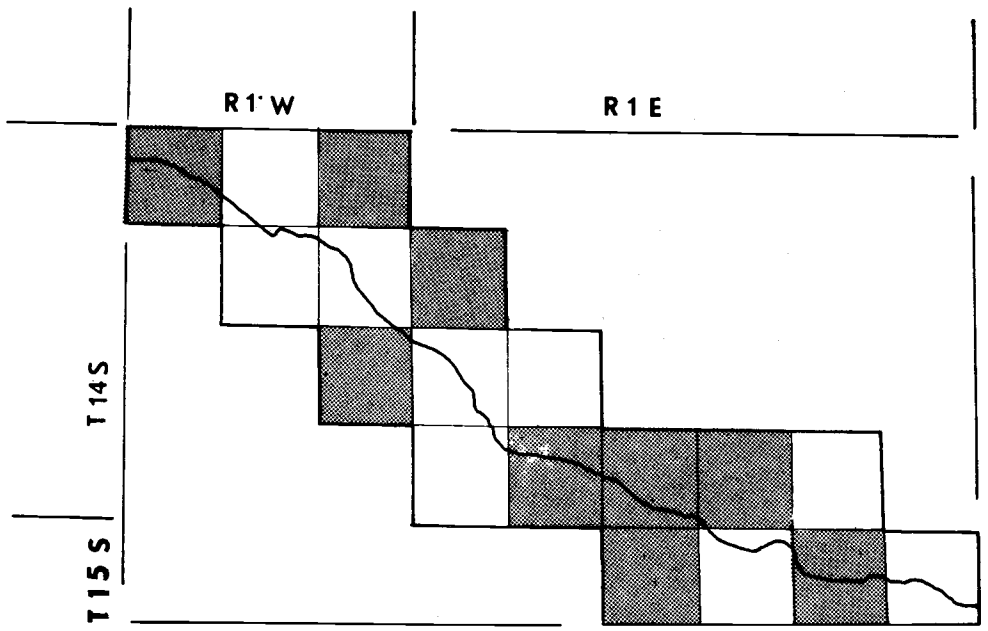

Figure 10. Mountain Region of the Calapooia Drainage Basin Indicating the Sections Sampled.

Service or by Weyerhauser Corporation, 78,080 acres of the upper watershed area was deleted from the Mountain Region. Second, since the study examines rural land tenure, the 1280 acres of the incorporated land of Brownsville, Halsey, Tangent, Shedd, Crawfordsville, and Holley was also deleted.

Data Collection

Data was derived from several sources. Statistical ownership data was obtained from the Linn County Records Clerk. The data collected from the Linn County records was classified for the total study into the following categories:

(a) Number of individual private owners

(b) Number of privately owned land parcels

(c) Acreage in corporation ownership

(d) Acreage in single female (widow) ownership

(e) Acreage owned by federal agencies

(f) Acreage owned by state agencies

(g) Acreage owned by county agencies

The sampling of individual regions and the corresponding land size from each area is shown in Table 3.

Data concerning land tenure problems was derived from 128 field interviews with landowners, tenants, businessmen, merchants, and county officials. The personal interviews varied in relation to

Table 3. Sampling Characteristics for Each Region.[a]

	Plain	Hill and Valley	Mountain	Total
Total Drainage Area (acres)	109,440	32,000	90,240	213,680
Total Sections in Drainage Area	171	50	140	361
Study Area (acres)	102,400	30,720	11,520	144,640
Approximate Number of Sections in Sampled Region	165	48	18	221
Number of Sections Sampled	35	17	9	63
Number of Acres in Sample	21,380	10,719	5,713	37,812
Percent of Study Area Region Sampled	23.1	35.4	50.0	27.8
Number of Sections Excluded	6	2	122	130
Percent of Region Excluded	3.5	4.0	87.1	35.0

[a] There are inconsistencies which appear between the total section acreage and sampled section acreage. These are the result of differences between the theoretical and actual size of a section. In theory, a section should be 640 acres, however, in practice, this is not always the case. Particularly in mountainous regions, sections ranged from 350 to 800 acres on the county cadastral maps. Therefore the 361 sections of drainage basin may not contain 231,040 acres as it theoretically should. The sample figures, however, are factual, having been determined from cadastral maps in the Linn County Assessors Office.

who was being interviewed and what information was desired. For example, if information concerning credit availability was desired, bankers, credit managers, and investment corporations were contacted. The questions asked were directly concerned with credit, its availability, and to whom extended. When information was desired from rural residents, a less straight forward approach was used. No set interview format could be devised as each interview developed its own questions and answers.

During these interviews, many individuals expressed reluctance to respond to questions because they were concerned about their names being published with their statements. Therefore, no names are connected with statements, nor are photographs included.

The categories of ownership for each section were determined for 1940, 1955, and 1969. Ownership for 1969 is depicted in the county records by section maps which indicate the parcel limits and size in acres. Lot subdivisions are also indicated. Since each land parcel has a lot identification number, lot size, and includes the individual owners' name, it was possible to describe the category of ownership as well as to reconstruct ownership patterns for 1940 and 1955. The deed records were examined for 1940 and 1955 to determine if the lot size had increased or decreased, and if there had been a change in the type of ownership within the 15 year period.

Another source of information was the "Preliminary Ethnographic Statement of the Calapooia River Basin", by Hogg and Beard (1967). This report is the source of cultural data concerning age, income, source of income, and other related information. The ethnology conducted by Dr. Hogg was directed toward the total cultural base of the Calapooia drainage basin. From this study the focus on land tenure, its change and associated problems was developed. Dr. Hogg's study contributes cultural information upon which is based the present investigation of Calapooia land tenure.

RESULTS

Calapooia Drainage Basin Study Area

To appreciate the general pattern of land tenure change in the Calapooia River drainage basin over three decades, the data will first be treated collectively. Later, ownership characteristics will be considered independently for the three regional divisions previously described. Table 4 summarizes ownership features for the entire study area for the periods: 1940, 1955, and 1969. The following discussion is based on 27.8 percent sample of the study area.

In 1940, almost the entire Calapooia drainage basin was held in private ownership, as indicated by 92 percent of the sample area being held by 61 private owners. This is an average landholding of 574 acres. By 1955, the total number of owners in the sample area increased to 95 with a related decrease in average parcel size in private ownership. This parcel size decrease of 64 percent over the period 1940-1955 is comparable to the national trend of a 69 percent decrease in rural land parcel size. However, the national average parcel size was considerably smaller than was found in the Calapooia area (a national decrease from 181 acres in 1940 to 125 acres in 1955) (Higbee, 1963). The larger land holdings in the Calapooia drainage basin can be related to the type of local agriculture. The major crop

Table 4. Land Ownership in a Sample of the Calapooia Drainage Basin: 1940-1969.

Year	Private Ownership			Corporation Ownership		Single Female Ownership		
	Area		Number of	Area		Area		Number of
	Acres	Percent[a]	Owners	Acres	Percent[a]	Acres	Percent[a]	Owners
1940	35,066	92	61	2,746	8	3,015	7	23
1955	34,896	91	95	2,936	9	3,934	8	38
1969	24,897	65	250	12,115	34	6,351	30	75

Year	Public Ownership		Total Number of Land Parcels	Percent Increase in Parcels Since 1940
	State (acres)	County (acres)		
1940	0	0	84	-
1955	0	0	139	64
1969	133	510	355	155

[a]Percent area is calculated on 37,812 acres sampled.

is rye and related grass seed grown in extensive fields requiring a large acreage.

During the 30 year study period, private ownership prevailed with an increase in number of owners and corresponding decrease in average land holding size. However, the total land in private ownership decreased from 92 percent of the sample area in 1940 to 65 percent of the sample area in 1969. Land fragmentation noted for the period 1940-1955 continued for the second 15 year period and by 1969 the number of land parcels had increased to 353 with a corresponding increase to 250 private owners, an increase of 277 percent over the 1940 figure. The number of land parcels owned by an individual remained stable during this 30 year period. In 1940, the average number of land parcels for each private owner was 1.3, by 1969 it had increased to 1.4. Therefore, the increase in fragmentation of land parcels did not affect the number of land parcels owned by an individual owner during the 30 year period.

Corporation property constituted eight percent of the sample area in 1940. By 1955 there was a slight increase in corporation ownership to nine percent; however, by 1969, this ownership category represented 34 percent of the sample area. This increase is caused by a number of agricultural enterprises becoming incorporated and is also due to large purchases of forest property by timber corporations. Commercial and rural business purchases, such as gas stations and rural

grocery stores, were insignificant in size and number.

Another significant change is the increased ownership by single females (widows). In 1940, seven percent of the privately owned land was held by this group. By 1969, 30 percent of the privately held lands sampled were owned by single females.

This summary of the Calapooia River drainage basin land tenure data suggests several trends over the period 1940-1969: increased number of owners and related decreased size of land holdings, increased commercial land ownership, and increased ownership by single females.

Data collected from the entire Calapooia River drainage basin study area was considered above. Since the study area contains three, more or less, distinct regions defined by physical characteristics and these physical properties may influence the type and extent of agricultural and other rural activities, each region will be studied individually with regard to land tenure characteristics.

Plain Region

The Plain Region of the Calapooia River study area lies downstream of Brownsville and consists of 102,400 acres of generally low relief, alluvial land (Figure 5). Data pertaining to land tenure change in the 23.1 percent sample in the Plain Region is summarized in Table 5.

Table 5. Land Ownership in the Plain Region Sample, Calapooia Drainage Basin: 1940-1969.

Year	Private Ownership			Corporation Ownership		Single Female Ownership		
	Area		Number of	Area		Area		Number of
	Acres	Percent[a]	Owners	Acres	Percent[a]	Acres	Percent[a]	Owners
1940	21,380	100	48	0	-	2,266	11	20
1955	21,380	100	75	0	-	3,185	16	35
1969	19,278	90	183	1,458	10	5,323	36	67

Year	Public Ownership		Total Number of Land Parcels	Percent Increase in Parcels Since 1940
	State (acres)	County (acres)		
1940	0	0	66	-
1955	0	0	114	72
1969	133	510	273	139

[a] Percent area is calculated on 21,380 acres sampled.

Of the three regions, the Plain Region presents the most striking change in land tenure over the 30 year period investigated. Related to this change is the greatest concentration of tenure connected problems.

In 1940, the sample area of the Plain Region was all privately owned. Private owners numbering 48 controlled 66 individual land parcels, an average ownership of 445 acres; however, this average is probably not a true representation of actual tenure conditions. Urban workers residing in this rural area and owning small properties, often less than five acres, might very well lower the mean acreage ownership.

No change in total sampled private ownership occurred by 1955, however, the number of private owners increased from 48 in 1940 to 75 in 1955, with a concommitant decrease in individually owned acreage from 445 to 285 acres. The increase in the number of private owners can be used as an indicator of the increase in urban workers moving to this rural region. Data is not available to determine the extent of urban workers living in this rural area during the 1940-1955 period; however, interviews with merchants and rural residents suggested that 30 to 35 percent of the rural population was employed in urban occupations during this period. This increase of rural residents not engaged in farming is also substantiated by the increase in

land fragmentation. In 1940, the sample area totaled 66 individual land parcels. By 1955, this had increased to 114 parcels.

A minor change in land tenure took place during the period 1955-1969. The amount of privately owned land in the sample area was reduced by nine percent to 19,278 acres. This decrease was the result of land purchases by State, County, and corporation interests. The State purchased 133 acres during this period for the construction of Interstate Highway 5. Linn County purchased 510 acres for school and park use. The bulk of the reduction of privately held land was due to the development of corporation holdings.

There was no corporation owned land in the Plain Region sample in 1955. By 1969, 1,458 acres were included in this category. This is the result of previously established farms becoming incorporated during the period 1955-1969. Due to the increase of land taxes and general rise in the cost of farm operation during the period 1955-1969, it became beneficial for large farms to incorporate.

Land ownership by single females in 1940 totaled 2,266 acres or 11 percent of the private land sampled. This acreage was held by 20 individuals with a mean ownership of 113 acres. The amount of acreage owned by single females increased slightly from 1940 to 1955, totaling 3,185 acres in 1955. The number of owners also increased from 20 to 35, an increase of 59 percent during this 15 year period.

A significant change in the Plain Region sample for the 1955-1969 period was the increase in land privately owned by single females. In 1955, this acreage totaled 16 percent of the privately held land base. By 1969, 5,323 acres, or 36 percent of the privately owned land base was claimed by single females, an increase from 35 to 67 owners.

Urban to rural migration probably accounted for a major change in tenure from 1955 to 1969. The indicator used for change is the continued fragmentation of land parcels and concommitant increase in the number of private owners. The number of land parcels in the sample in 1955 was 114, distributed among 75 private owners. By 1969, the number of land parcels had risen to 273, an increase of 240 percent from 1955. During this 15 year interval the number of private owners increased from 75 to 183, or 245 percent. Field interviews suggest the acreage necessary to conduct successful grass seed farming during the 1955-1969 period was between 1,000 and 1,500 acres. The conclusion from these figures is that there is a decreasing acreage per farmer at the same time that there exists a demand for increased acreage to maintain a viable commercial farm. It also is concluded that the number of urban workers migrating to rural residence is increasing at an increasing rate.

Hill and Valley Region

Situated between the alluvial Plain Region of the lower Calapooia River drainage basin and the more rugged Mountain Region (Figure 6), the Hill and Valley Region comprises 44,800 acres (excluding the incorporated communities of Brownsville, Crawfordsville and Holley). Data for land tenure over the period 1940-1969, based on a 35.4 percent sample is summarized in Table 6.

The Hill and Valley Region sample in 1940 was almost completely in private ownership and was distributed among ten owners, with a mean ownership of 1,064 acres. As in the Mountain Region, large land ownerships may be expected, as timber was commercially exploited prior to this period and during the interval 1940-1955. This area was also an important grazing, haying, and horticulture region during the same period.

In 1955, 98 percent of the sampled region was still in private ownership. The largest relative change in land tenure during this interval was the increase in the corporation owned property, a change from 75 acres in 1940 to 265 acres in 1955. Five additional private owners were present in the 1955 sample, lowering the mean private ownership to 698 acres per person.

During the period 1955 to 1969, the amount of privately owned land was further reduced from 98 to 45 percent of the sample area,

Table 6. Land Ownership in the Hill and Valley Region Sample, Calapooia Drainage Basin: 1940-1969.

Year	Private Ownership			Corporation Ownership		Single Female Ownership		
	Area		Number of	Area		Area		Number of
	Acres	Percent[a]	Owners	Acres	Percent	Acres	Percent[a]	Owners
1940	10,644	99	10	75	0.7	749	8	3
1955	10,474	98	15	265	2	749	8	3
1969	4,802	45	42	5,960	55	1,028	28	8

Year	Public Ownership		Total Number of Land Parcels	Percent Increase in Parcels Since 1940
	Federal (acres)	County (acres)		
1940	0	0	15	-
1955	0	0	20	25
1969	239	1.8	50	150

[a] Percent area is calculated on 10,719 acres sampled.

the result of increased commercial ownership. In 1955, 265 acres were corporation owned in the region sample. In 1969, this had increased to 5,695 acres, or 55 percent of the sample region. The majority of this increase is the result of farms becoming incorporated. Some corporation ownership also issued from purchases by the major timber corporations. After initial logging of commercially exploitable timber, the region was poorly stocked and is presently being renovated as tree farms.

The number of private owners in the sample also showed a significant increase from 10 in 1940 to 15 in 1955. By 1969, this number had increased to 42 owners.

The amount of acreage held by single female owners in the sample in 1940 was 749 acres. This acreage did not change through 1955. An increase in this category of ownership of approximately 279 acres leading to a total of 1,028 acres was shown in the 1969 sample data. This is 21.4 percent of the privately held land in the Hill and Valley Region sample.

Mountain Region

Upstream from Holley in an area of steep slopes and narrow alluvial strips, is found the Mountain Region (Figure 7). Much of the drainage of this rugged region has been excluded from the study area because it is in Federal ownership (U. S. Forest Service). The

study area comprises 21, 760 acres of which 5, 713 acres comprise the study sample. Table 7 summarizes the land tenure data for the period 1940 to 1969.

Many of the tenure categories used in the Plain, and in the Hill and Valley Regions are not present in the Mountain Region. Population distribution is confined to a narrow ribbon on the valley bottom ranging from 500 to 2000 feet in width. The valley sides have a slope ranging from 20 to 80 percent. Because of the topographic limitations, use types are restricted in number.

In 1940 the privately owned land comprised 53 percent of the sample area. The remaining area was in corporation ownership. By 1955, no change had occurred in the tenure of land, however, the number of private owners increased, reducing the mean private ownership from 1015 to 608 acres per person.

In 1969 a significant change in land ownership had taken place in the sample area. Private ownership had been reduced from 53 to 14 percent of the sample area. At the same time, the number of private owners increased from 5 to 25, while the number of land parcels increased from 5 to 30. The mean number of privately owned acres was reduced from 608 to 32 acres per person. County cadastral maps show subdivisions for these privately held land parcels, the majority of which front on the Calapooia River. A field check showed no new construction on these properties, and it is assumed that these parcels

Table 7. Land Ownership in the Mountain Region Sample, Calapooia Drainage Basin: 1940-1969.

Year	Private Ownership			Corporation Ownership		Total Number of Land Parcels	Percent Increase in Parcels Since 1940
	Area		Number of Owners	Area			
	Acres	Percent[a]		Acres	Percent[a]		
1940	3,042	53	3	2,671	47	3	-
1955	3,042	53	5	2,671	47	5	60
1969	817	14	25	4,697	86	30	250

[a] Percent area is calculated on 5,713 acres sampled.

are future summer residence sites. Increased fragmentation of existing land parcels for summer and permanent residences can be expected with the completion of the Holley Dam Project (see Appendix A).

The preceding analysis of the Plain, Hill and Valley, and Mountain Regions has indicated the following tenure trends in the Calapooia River drainage basin.

(a) Decreasing number of farms with increasing farm size

(b) Increasing migration of urban residents to rural areas

(c) Increasing commercial ownership

(d) Increasing single female ownership

(e) Increasing fragmentation of land holdings

These changes in land tenure are closely tied to the modification of a cultural system. As these changes take place, the system is unbalanced by the pressures of change, and problems are developed. Therefore each trend in land tenure represents a change in the cultural system and either creates or is affected by the resulting tenure problems. The following discussion concentrates on the problems associated with the changes in tenure related to the sample study area in the Calapooia drainage basin.

CHANGING TENURE PROBLEMS

The preceding analysis has examined the tenure data for the three physical regions of the Calapooia drainage basin. From this data, trends of changing tenure have been indicated. As tenure changes, land use associated with various tenure types also changes. The overall effect of changing tenure and use is one of continual legal, cultural, and economic conflict among noncompatible land use systems within a finite region. The following discussion is based on the tenure data analysis, and considers these cultural, economic, and legal conflicts related to changing tenure.

Financial Investment

Eight interviews were conducted with bankers, credit corporation executives, and real estate managers to determine the problems related to the availability of money and credit for capital investment for operation of farms to individuals of the representative tenure types. It was determined that four major cultural factors adversely affect the individual's decision to invest in land improvements.

(1) Lack of motivation

(2) Lack of knowledge

(3) Uncertainty of tenure

(4) Financial inability

Lack of motivation toward capital investments for land improvement is particularly true of older landowners whose lifespan may terminate before the investment provides a substantial return. The age factor is of particular importance among owners of farmland because full ownership is usually not achieved until after middle age.

Hogg (1967) summarized the adult age structure of the Calapooia drainage basin as shown in Table 8. The high percentage of individuals over 50 years suggest prevalence of "motivation" problems related to age.

A small group of owners with little or no motivation toward improvement of land holdings is represented by the life-estate holders. These are individuals who maintain title to the estate only during their lifetime and cannot sell, dispose, or will ownership of the land. Since they hold only a limited ownership interest in the land, existing only for their lifetime, they have little incentive to improve the land beyond its present use value. Also, they are often financially unable to make improvements because of the difficulty of getting credit financing. Although the total number of life-estate holders is unknown, at least three are present in the Plain Region sample.

Lack of knowledge is also a deterrent to the development of the land base. Frequently there is ignorance on the part of the individual land owner concerning the availability of technical knowledge that would further possible improvements in farm operations. It is obvious

Table 8. Adult Age Structure in a Sample of the Calapooia Drainage Basin.[a]

	Age Classes					
	20-35		36-50		over 50	
Region	Number in sampled region	Percent of sampled region	Number in sampled region	Percent of sampled region	Number of sampled region	Percent of sampled region
Plain	32	24	46	33	59	43
Hill and Valley	7	18	14	30	23	52
Mountain	7	23	11	37	12	40
Percent of total sample		21		33		46

[a] Source: Hogg, personal correspondence.

that no one will make improvements about which he has no knowledge.

Tenure uncertainties create reluctance on the part of owners and tenants to invest in improvements that would be profitable to both. A landowner who has tenure uncertainties will usually not invest capital in his property. An owner with a tenant who is skilled in a specialized type of land use may hesitate to provide specialized types of improvements. The owner does not know how long the tenant will remain with him, and finding another tenant with the same skill might prove difficult. Landowners also hesitate to put any improvements on farmland as long as such land is in ready demand without improvements.

Financial inability results when an owner's income is insufficient to support property improvements. This problem is particularly acute if the size of the property, or the volume of business, is too small to provide an income sufficient to furnish the desired level of living and also leave enough capital for desired property improvements.

Problems of capital accumulation and land development are, in part, related to the individual owner. As ownership is generally the responsibility of an individual, the improvements to the land must come as a result of an individual decision on the part of these owners to invest savings, or current and future income, toward financing land improvement projects.

The participation of tenants in capital improvement depends mainly on the type of lease contract. These contracts, either verbal or written, could create uncertainties in the mind of the tenant which would tend to inhibit capital investment in the leased land.

Many of the solutions to these problems lie in educating landowners and tenants. Most of the solutions are known, or can be developed, from existing information. The major hindrance to solving problems is in the lack of communication between those informed individuals and those who apply the solutions. The latter must first be educated and then must accept and implement the necessary solution to each problem.

Speculation

The effects of speculation in rural property could not accurately be determined because of the method of recording used by the Linn County Assessor's Office. Recorded is the address of the full owner, which also indicates if the purchaser is residing on the property. However, if the owner is in the process of buying, or has the option to buy, the address given is that of the real estate agent or lending corporation which holds title to the land. During interviews with seven title corporations and real estate agents, the following facts were learned.

(1) Speculators do not always buy property or become full owners. Often they take options to buy and retain the options by time payment. The speculator is mainly interested in holding tentative ownership to the land so that any increase in value would mean, upon sale, an increase in profit to the speculator.

(2) The Calapooia drainage basin contains a significant amount of land speculation. The seven interviewed real estate agents and title corporations estimated that between 15 and 20 percent of the Plain Region was controlled by speculators.

(3) Much of the speculator held property is leased to commercial farmers on contracts ranging from one to three years. Three year contracts constitute the most common type of contract. Although the contract is assumed to be renewable, it may be cancelled at the expiration date.

The consensus of seven interviews with real estate agents, escrow corporations, and lending institutions, it was generally stated that speculation tends to raise the price of land. This also makes the acquisition of property by local residents difficult as many speculators are willing to, and possess the resources to, pay more than the local market value of the property. The result of this may upset

local land value system, and places some farm acreage beyond the reach of local purchasers.

Since leases are short term, and the speculator has the right to refuse renewal, the farmer leasing the property faces the possibility of being closed out of needed acreage at the end of a lease contract. The owner also has the right to increase the cost of leasing the land at the termination of a contract. With the demand for farm acreage increasing, and the amount of available land decreasing, the farmer must pay increased rent or cease operation. All of these factors place the farmer in an uncertain position regarding his future farming plans.

Speculation is expected to increase in the Hill and Valley Region, particularly in the Crawfordsville area and in the area east of Brownsville. This is due to the proposed construction of the Holley Dam Project (Appendix A). This project will produce a large recreational area. At present, the Mountain Region is being subdivided into river lots for summer homes.

When the recreational potential of the project is realized, the increase in speculation will probably be directed toward housing projects and residences in the Brownsville area.[3] This region is within commuting distance of Corvallis, Albany, Eugene, Lebanon, and

[3]This potential increase is substantiated by the increase in housing development in the Sweet Home area with the completion of the Foster Dam Project.

Sweet Home. It will also be in close proximity to the lake formed by the Holley Dam, making it desirable for home sites. Real estate agents stated that a strong interest in this region was shown by Southern California developers who are waiting for the completion of the Holley Project.

Family/Marginal Farms

The National trend in the United States is toward the discontinuance of family operated farms. The tenure problems associated with this class and similar type operations are multiple.

As previously stated in the section on land tenure classification, the family/marginal class includes family farms, marginal farms, part time farms, and subsistence farms. The consolidation of these farm types into one category is based on the agricultural classification devised by Whittlesey (1936). The family/marginal farms are those operations whose earnings constitute 20 to 80 percent of the total yearly income. Table 9 shows the distribution and percentage of these farm types by region in Hogg's combined sample.

Table 9. Percentage of Commercial and Family/Marginal Farm Type Classes in a Sample of the Calapooia Drainage Basin by Region: 1967. [a]

Farm Type	Plain Region	Hill and Valley Region	Mountain Region
Commercial farm	50	65	50
Family/marginal farm	50	35	50

[a] Source: Hogg, personal communication.

The problems faced by family/marginal farmers can be summarized into seven major points. These points were derived from interviews and from the collected data.

(1) Inheritance laws contain provisions which make the transfer of family farm units between generations difficult.

(2) The inheritance practices lack controls, so that family farms are sometimes placed in the hands of individuals who are neither capable of, nor psychologically prepared for, operating them. This also makes the entrance into farming by persons outside the inheritance line difficult.

(3) Present methods of financing the purchase and operation of family farms are inadequate.

(4) The present tenancy system contains a variety of disadvantages that make it difficult for a tenant farmer to obtain his own family farm.

(5) The present tax structure burdens family farmers and is used ineffectively to promote family farming.

(6) There is a lack of suitable in-service training facilities and programs for prospective family farmers. No vocational training facilities for agriculture exist in the central Willamette Valley.

These seven points are problems faced by the family/marginal class or those desiring to enter into this type of operation. The

family/marginal class also creates land tenure problems.

On a national basis, the family farm class is becoming extinct (Higbee, 1963). The slow decline of this farm type in the Calapooia drainage can be attributed to many factors. A contributing factor to the maintenance of these small farms is the Federal subsidy program. Instead of dying a natural economic death, these small enterprises are maintained at a minimum level by Federal subsidies. The subsidy is generally not enough to allow the owner to create or maintain a self-sufficient, profitable enterprise, but facilitates maintaining present ownership at a marginal or sub-marginal level. The funds used to subsidize this class of farm influence the total Federal agricultural budget by leaving fewer funds for other agricultural programs (Higbee, 1967).

On the state and county level, funds are also utilized by, and for, this farm class in the form of programs of agricultural assistance. Welfare programs are another form of financial support used by this class. The exact amount of welfare funds payed into the area researched were unavailable; however Hogg (personal communication) determined that 20 percent of the family income in his Calapooia drainage basin sample was under $3,200 annually, the present maximum allowable income for welfare recipients.

Merchants who deal in farming materials and supplies generally find it unprofitable to do business with this class of landowner. The

amount of supplies or materials purchased barely pays for the cost of delivery. Another complaint voiced by merchants was that payment for delivered goods was either slow or non-existant.

Several bankers were interviewed to ascertain the credit arrangements or credit reliability of family/marginal farms. The response to questions on this problem were somewhat varied and vague, however, the overall impression was that credit for these farms was difficult, if not impossible, to obtain.

Commercial farmers were more explicit in their views. Family/marginal farms detract from the total land base, and restrain commercial farmers from extending their holdings. This also restricts persons desiring to enter the agricultural business, by restricting the amount of land open to purchase. The general consensus among commercial farmers is that this farm class produces little on a commercial basis, and adds nothing to the economy of the region.

Another common complaint by commercial farmers concerned the farming methods used by family/marginal farmers. Due to lack of investment capital, little improvement is made on the farm acreage. Over a period of time the land base is reduced to a very low quality, and the commercial farmer who may acquire this land must invest a large amount of capital to return the soil to a productive state.

A complaint voiced by many rural residents, including the commercial farming class, was on the general appearance of some of

these farms. Since many farmers find it necessary to supplement their income by working off the farm, very little time is spent in farm upkeep. Others make little or no attempt to improve the home-site or acreage. Field investigation disclosed several areas in which four to six of these neglected farm sites existed in close proximity to each other. This neglect of farm acreage results in the formation of rural slum areas.

Urban to Rural Migration

The use of rural residence by persons employed in urban activities has increased dramatically during the last 15 years. Precise data supporting this statement is difficult to obtain: however, several sources of evidence were used in an effort to substantiate this trend. These sources included: (1) data on the increase in number of owners, (2) land parcel fragmentation data, (3) interviews with rural mail carriers and tax assessors, and (4) interviews with residents.

Table 10 and Table 11 show the marked increase in land fragmentation or subdivision over the last 30 years. Both of these trends seem to be caused by increased rural residence of urban employees.

Increased private owners and increased land fragmentation are largely due to the increase in rural residence.

However, this raises the question of the previous location of these rural residents. To determine if the majority of this increase

Table 10. Change in the Number of Sampled Private Owners: 1940-1969.[a]

Year	Plain Region		Hill and Valley Region		Mountain Region	
	Number of owners	Percent increase[b]	Number of owners	Percent increase[b]	Number of owners	Percent increase[b]
1940	48	-	10	-	3	-
1955	75	56	15	50	5	67
1969	183	144	42	180	25	400

[a] Source: Linn County Assessor's Office.

[b] Percentage increase based on 1940 figure.

Table 11. Change in Land Parcel Fragmentation in Sampled Regions: 1940-1969.[a]

Year	Plain Region		Hill and Valley Region		Mountain Region	
	Number of land parcels	Percent increase[b]	Number of land parcels	Percent increase[b]	Number of land parcels	Percent increase[b]
1940	66	--	15	--	3	--
1955	115	73	20	33	5	67
1969	273	139	50	150	30	100

[a] Source: Linn County Assessor's Office.

[b] Percentage increase based on 1940 figure.

was due to migration from urban areas, interviews were conducted with new residents, rural mail carriers, and property tax assessors. During these interviews it was stated that 50 to 60 percent of the increased population over the preceding 15 year period was related to urban workers moving to rural residence. Interviews with urban migrants were also conducted to determine the reasons for moving from urban areas. The major reasons cited include:

(1) The crowded living conditions, combined with dirty and depressing residential areas of the urban area of origin.

(2) The increasing crime rate and violence in urban areas. Interviewees considered many urban regions unsafe after dark.

(3) Increased taxes and rent, with a decrease in municipal services such as residential streets that go for months without repair, sewer lines incapable of handling the increasing loads, a decrease in fire and police protection, and an apparent lack of concern on the part of city managers.[4]

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[4]The statements concerning the decrease of municipal services by interviewees are perceived decreases. I would be inclined to believe that the decreases are actually the failure to increase the facilities at the same rate as the population increase. Limited city funds prevent many small urban centers from keeping up with the growth of

(4) A desire to raise children in a country environment.

(5) A desire to take advantage of the lower property taxes in rural areas. Savings of 40 to 50 percent of yearly land taxes were stated by interviewees.

With the increase in this tenure class, several conflicts are created. The rise in traffic volume due to the increase in population is a major form of conflict. The urban migrant remains employed in urban areas and therefore must commute daily to and from his job. As most urban employees have the same general working hours, the traffic flow between 7:30 and 8:30 a.m. and 4:30 - 5:30 p.m. increases significantly. The magnitude of this increase is suggested by Figure 11.

The county roads were not designed, nor are they maintained, to carry such peak traffic volume. Farmers driving machinery who attempt to use these roads during high traffic periods place themselves in a very hazardous position. Some of these roads are not well marked and many do not have adequate stop or cross road signs.

The problem of the regional tax base is also an increasing source of conflict among various individuals having different tenure arrangements throughout the Plain Region. The tax base is structured on the

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the city. This is particularly true in urban centers that have shown a substantial population growth. For example, from 1950 to present, Albany's population has increased by 82 percent, Corvallis' by 115 percent, Sweet Home's by 40 percent, and Lebanon's by 17 percent.

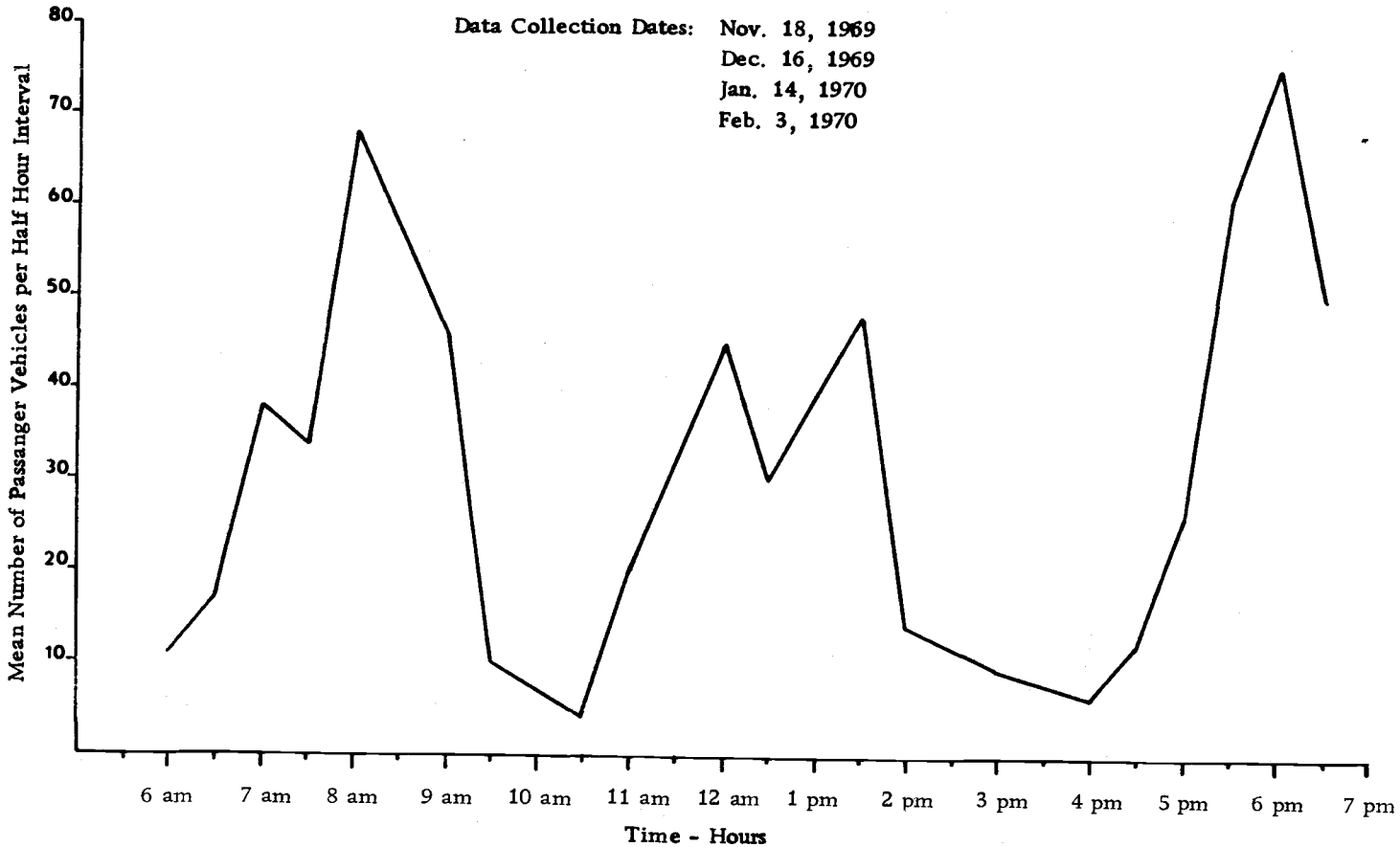

Figure 11. Traffic Flow at the Intersection of State Highway 34 and State Highway 99E.

assessed value of the property. A process referred to as equalization can increase the total tax assessment for some individuals. Tax incured by bonds throughout various school districts is distributed through the equalization system. The bond taxes of school districts that have a low total assessed value are partially paid by the school districts with a higher total assessed value.

The county school system, fire departments, and police (Linn County Sheriff's Department) are all supported in part by this tax structure. As the majority of residents are prior urban dwellers, they are accustomed to, and demand, better fire, police, and school systems. The children of the urban migrants outnumber the resident farmers' children, which places a heavy burden on the county school system. The farmers interviewed voiced strong resentment to the increase in taxes to enlarge the existing school facilities and provide special education programs, as the tax increase is not due to the increase of the farmers' children, but to the continued movement of urban families to rural regions.

Another social conflict relating to this form of land tenure is the social stratification that results when two non-related social groups live in close proximity. Some urban migrants interviewed complained of the smoke from field burning, the smell of freshly fertilized fields,

and other disagreeable farm activities. The interviewed farmers complained of the attitudes displayed by the urban migrants. Even though the farmer and urban migrant live close together, the farmers state that this does not make the urban migrant "neighborly".

The conclusions drawn from interviews and collected data are that this influx of urban migrants will continue. Without a change in the present tax structure, the larger landowners will be forced to pay an increasingly disproportionate amount of the districts' taxes.

Commercial Farmers

The 34 interviews with commercial farmers throughout the entire region showed various types of tenure problems associated with different physical areas.

In the Hill and Valley Region, commercial farmers are generally associated with intensive agricultural land use such as feed lots and poultry farms. Many land tenure problems have yet to come into focus; however, as this region becomes more attractive to the urban/rural migrants and as they Holley project attracts residents and recreationists, this region will develop similar problems to those evident in the Plain Region at the present time.

During the interviews with commercial farmers in the Plain Region, many tenure problems were discussed. However, all of these problems are based on the same trend, that is, the decrease in the available farming land and an increase in the need for more land to support a viable farm.

According to the farmers interviewed, the cost of producing grass seed has shown an increase of between 30 and 60 percent during the preceding 10 years. This includes the cost of purchasing and maintaining machinery, seed, land, labor, fertilizer, and harvesting costs. The tax increase over the same period is in excess of 100 percent. The profit increase during this 10 year period has not shown an increase similar to the increase in production costs. It has become necessary to increase the size of land holdings to maintain or increase a profit margin. In nine interviews with commercial farmers, it was generally agreed that the acreage necessary to maintain a profit of $12,000 to $15,000 annually is 1500 acres of good land under good farm management.

The problem is expanding the present acreage, within a finite region, to meet the necessary land requirements. As discussed in previous sections, urban encroachment withdraws acreage each year

from the rural land base; family/marginal farms comprised up to 50 percent of the region (Hogg, personal communication); much acreage is held by single females; and the urban to rural migration continues to detract land with the increasing movement of urban workers to rural residences. As a result agricultural land is either difficult to obtain, or if obtainable, it is cost prohibitive.

Interviews with representatives of the seed purchasing industry stated that 15 years ago, over 100 seed growers produced 80 percent of the total commercial seed marketed in the Plain Region. At present, 50 commercial seed growers produce 80 percent of the marketed seed. Many factors discussed above have contributed to the reduction of the number of commercial farmers to its present level. It was also stated by the members of the seed purchasing industry that this present number will be considerably reduced within the next decade.

Another problem associated with land tenure is farm management. Interviewed farmers and merchants are concerned about the management practices of some growers. It is claimed these farmers fail to realize the full potential of their acreage. This is the result of less than optimum land use practices. The most serious of these

mis-management practices can be outlined as follows:

(1) Failure to incorporate proper or adequate drainage, resulting in standing water, and flooding of the owner's property and adjacent land.

(2) Failure to utilize all of the acreage, and not clearing brush groves and woodlots. This increases the fire danger during the field burning period and provides a breeding ground for trash seed that becomes incorporated with the domestic seed and lowers the quality of the crop.

Several commercial farmers who employed these poor farming practices were interviewed. The general attitude of the farmer was that his farming operation was extensive, rather than intensive. The farmer therefore placed more emphasis on the quantity of production than the quality of the crop.

The results of this type of operation affect all commercial farmers involved in the local agricultural economy. This is because the extensive use of agricultural land removes more acreage from the agricultural land base, whereas if the land had been more intensively farmed, less land would be used for the same amount of

production. Also, during the past five years, because of low quality seed, growers have been experiencing problems in the export market. This adversely affects the price or profit margin and is passed on to the entire seed growing industry. Some commercial growers interviewed attribute the seed quality and purity problem to the mis-management of a few seed growers.

Expanding Urban Use of Rural Land

The encroachment upon rural land by urban land functions and activities reduces the acreage of the rural land. Urban construction in rural areas is generally associated with a more extensive, rather than intensive, urban land use. Homes, for example, are now built on 65 foot rather than 30 foot lots. Also, the home construction trend is toward single family rather than multiple family structures.

The fringe areas of urban ownership are generally "unfocused" in the sense that they lack concentration of related functions. This sprawl of development leaves open areas of land in between urban business developments. This open area is large enough to be measured in square blocks, acres, and in some cases, square miles. Since this open land is usually held in speculation for future urban development, it is usually left idle for some period of time. This

leap-frog effect can extend urban functions into rural areas over a short period of time, leaving behind a trail of open, idle areas (Higbee, 1963).

The Federal Interstate Highway program, with its large right-of-way requirements has contributed to both the isolation and fragmentation of land. This highway program has had another effect in the Calapooia drainage area. South of Albany, the off-ramps, or access roads across the freeway, and roads running parallel to the freeway, have led to subdivisions for future homesites. As the building along these access and cross roads continues, east and west bands of population are formed, isolating the rural farmland into blocks, five to seven miles long, on either side of the freeway. The net result is the further fragmentation, isolation, and reduction of the intervening rural land.

The expansion of the urban fringe creates the same type of demands on the land base as does the urban to rural migration which was discussed in a previous section. Essentially, it curtails farming activity in the urban fringe regions and subtracts more land from the agricultural land base.

Single Female (Widow) Ownership

Significant land ownership by single females is present on a national scale. Higbee (1963) estimates this category in 1960 to

include 22 percent of the number of private owners in the conterminous United States. For the sample region of the Calapooia, the single female ownership is shown in Table 12.

The recent, marked increase in the total amount of acreage in this tenure category is the basis of several problems.

As indicated in Table 12, 27 percent of the Plain Region sample is in this category. Although in theory the land is available for purchase, in practice this is not always the case. The elderly age of many single female owners sometimes results in a sentimental attachment to the property; as a result, the owner refuses to dispose of the land even though she is not capable of maximizing its agricultural use. Table 12 also shows a marked percentage increase in this type of ownership during the past 30 years. The increase in single female ownership would be difficult to explain in its entirety, however some of its contributing factors may be isolated. On a national basis, in 1966, the average life span of white women was 74.7 years, while the average white male life span was 67.6 years (Statistical Abstract of the United States, 1968). Combined with the average life spans of males and females, are the national trend of young adults migrating to urban areas, and the cyclic fluctuation of population. These factors do not completely explain, but may influence the increase of single female ownership, however, the increase in single female ownership would provide an interesting research topic.

Table 12. Ownership in the Sampled Regions by Single Females: 1940-1969.

Year	Plain Region		Hill and Valley Region		Mountain Region	
	Number of owners	Percent of acreage	Number of owners	Percent of acreage	Number of owners	Percent of acreage
1940	20	10	3	7	0	0
1955	35	15	3	7	0	0
1969	67	27	6	21	0	0

Interviews with four single female owners were conducted. The most common statement regarding the sale of farm acreage was that the farm was family property and, even though she held title to the estate when her husband deceased, she did not feel right about disposing of the land. Another common statement was that the farm was her only home and she either had no other place to go or she would not feel comfortable anywhere else.

An elderly woman owner is likely to be more dependent on income from large land acreage to meet current living requirements than a man would be, as she is generally not capable of regular employment. This leaves less capital available for any form of land improvement. Women owners, particularly those in advanced age, are not recognized as good credit risks beyond the estate value. In many cases, the estate is already under some type of mortgage, which further reduces the amount of credit available. The desire, knowledge, or ability to operate a commercial farm is generally missing.

With the owner's reluctance to sell the farm acreage, combined with an inability, or unwillingness to farm the land, the farmland can revert to several different uses.

(1) The farm acreage can be left idle in which case the taxes are lower, but idle land deteriorates and

the capital required to rehabilitate the land for agricultural use increases.

(2) The acreage may be rented to a tenant farmer. This can also have a serious effect on the land quality. Tenant farmers may be concerned only with the production from the farmland, and invest little capital in rehabilitation of the land base. Since the tenant operates on limited capital and credit base, and his operation is subject to the continuance of his tenancy contract, in many cases it does not seem reasonable to the tenant to invest in land improvements.

(3) The land taxes assessed on these holdings often prove more than the widow can afford on her limited income. The property is then foreclosed by the county in lieu of payment. The holdings are then put up for sale, in which case they can be purchased by paying back taxes and meeting whatever additional terms the county sets. From interviews with officials from the Linn County Assessor's Office, Sheriff's Department, and District Court, it was learned that a large number of these tax foreclosed

properties are sold or rented to people who fall into the family/marginal class.

The major reason given for this is that commercial farmers, in order to acquire the estates, must purchase the entire holding, including the house and other buildings. This adds several thousand dollars to the purchase price. The land is generally in a poor state and requires large capital investment for rehabilitation. In general, rehabilitation is more costly than the expected return, therefore, the purchase of these estates is not regarded as a wise investment. The end result is that the county must pay foreclosure and related costs, usually between $2,000 and $3,000 per estate, then transfer the ownership to another party with the hope that the land will be productively used.

(4) The widow arranges sale of the acreage area to a commercial farmer. This usually leaves the land in productive use. The widow retains her home and the county does not have the expense of dispossessing the property. As the acreage is put into use, it increases in value and adds to the general economy of the region.

CONCLUSIONS

Based on an analysis of statistical data for land tenure over the past 30 years in the Calapooia drainage basin, and upon information acquired through 128 personal interviews with residents, farmers, county officials, and businessmen; the results may be outlined as follows. If present trends prevail, one might expect the following pattern in the next decade.

(1) There will be a continued residential migration of urban workers to rural areas.

(2) The major portion of rural taxes will be borne by large land holding farmers.

(3) The cost of agricultural production will continue to increase while the farmers' net profit will decrease.

(4) There will be a prevailing increase in the acreage owned by family/marginal farmers and single female owners.

(5) The urban uses of rural land will continue to increase.

(6) Land speculation will continue to increase.

If these trends prevail over the next two decades, the grass seed industry will cease to exist within the Plain Region of the Calapooia drainage basin. The Plain Region could develop into an area of residential and industrial land use. Agriculture would be confined to intensive row cropping on the limited soil base which would be compatible with this type of operation.

The data trends for the Hill and Valley and Mountain Regions, together with the assumption that the Holley Reclamation Project will be completed, indicate that these areas will develop into a residential land use for the nearby urban areas. The development of a major recreational facility at the Holley Dam site will attract the services related to recreation.

Intensive forms of agriculture will increase in this region. Present intensive operations are beef feedlot, turkey, and poultry operations. With the irrigation derived from the proposed Holley Dam Project, growth of row crops will also be possible in this region. Row crops are presently not grown because irrigation water is unavailable and land values are too low to justify intensive agriculture.

The major question in any discussion on land tenure or use, relates to the future desires for an area. In this case, the question should be: should the grass seed industry remain as a major part of the region's economy? The problem of maintaining a large rural base for this enterprise calls for severe changes to halt the present trends

in land tenure. The changes necessary to preserve the seed industry would be:

(1) Effective and enforced county zoning to protect the rural farm land from further non-rural encroachment.

(2) Reduction in farm subsidies to the family/marginal farm operation which might facilitate the return of idle and poorly managed acreage to a more productive state.

(3) Revision of the existing tax structure is required if present agricultural land use is to prevail.

(4) A more viable lease or rent contract arrangement to assure the farmer needed acreage over a sustained period of time.

These suggested changes might enable a highly developed grass seed industry to continue, yet allow the necessary area for the increasing demands of urban land needs. The region has a large enough land base to meet the land requirements of both urban and rural economies. However, this is possible only under a well-developed and comprehensive plan to control irregular, undesirable, and harmful forms of land tenure and use that will prove the ultimate destruction of the present rural economy.

BIBLIOGRAPHY

1. Balster, C. A. and R. B. Parsons. 1968. Geomorphology and Soils, Willamette Valley, Oregon. Agricultural Experiment Station, Oregon State University, Corvallis. Special Report 265, 31 p.

2. Bertrand, A. L. and F. L. Corty (eds.). 1962. Rural Land Tenure in the United States. Baton Rouge: Louisiana State University Press. 56 p.

3. Dicken, S. N. and F. R. Pitts. 1963. Introduction to Human Geography. Waltham: Blaisdell, 465 p.

4. Franklin, J. F. and C. T. Dyrness. 1969. Vegetation of Oregon and Washington. U. S. Pacific Northwest Forest and Range Experiment Station. U.S. Forest Service Research Paper PNW 80, 216 p.

5. Fried, Morton H. 1952. Land Tenure, Geography and Ecology in the Contact of Cultures. American Journal of Economics and Sociology 11:391-412.

6. Habeck, J. R. 1961. The Original Vegetation of the Mid-Willamette Valley, Oregon. Northwest Science 35(2):65-77.

7. Harris, Marshall. 1951. Legal Aspects of Land Tenure. Journal of Farm Economics 23:95-115.

8. Higbee, Edward. 1963. Farms and Farmers in an Urban Age. New York: The Twentieth Century Fund, 183 p.

9. Hogg, T. C. and R. W. Beard. 1967. Preliminary Ethnographic Statement of the Calapooia River Basin. Oregon State University. Department of Anthropology, 28 p. (mimeographed)

10. Oregon State Water Resources Board. 1963. Middle Willamette River Basin. Salem, Oregon, 135 p.

11. Ottoson, Howard W. 1963. Land Use Policy and Problems in the United States. Lincoln: University of Nebraska Press, 73 p.

12. Reckendorf, F. F. and R. B. Parsons. 1966. Soil Development over a Hearth in Willamette Valley, Oregon. Northwest Science 40:46-55.

13. Simonson, G. H. and J. A Norgren. 1969. Willamette Drainage Basin General Soil Map Report with Irrigable Areas. Agricultural Experiment Station, Oregon State University, Corvallis. 131 p.

14. Smith, Lynn T. 1953. The Sociology of Rural Life. Rural Sociology 52: 114-148.

15. Tiffany, H. T. 1940. A Treatise on the Modern Law of Real Property. Chicago: Callaghan, 147 p.

16. U. S. Army Corps of Engineers. 1970. Informational Brochure for Comprehensive Water Resource Development in Calapooia River Basin, Oregon. Portland, Oregon. 6 p.

17. U. S. Department of Agriculture. 1969. Land Tenure in the United States; Development and Status. (Economic Research Division, Information Bulletin 338) 38 p.

18. U. S. Weather Bureau. 1970. Climatological Data. U. S. Department of Commerce, Environmental Sciences Administration 76(2).

19. Whittlesey, Derwent. 1936. Major Agricultural Regions of the Earth. Annals of the Association of American Geographers 26: 199-240.

20. Willamette Basin Task Force of the Pacific Northwest River Basins Commission. 1967. Willamette Basin Study, Oregon, Map II-1, Generalized Geology, 1:760,000.

APPENDIX

APPENDIX: A

Holley Dam Project

In 1950, Congress authorized construction of three separate and distinct projects on the Calapooia River (U. S. Army Corps of Engineers, 1970). One was a multiple-purpose reservoir with a total water storage capacity of 97,000 acre-feet at Holley, Oregon. The other two were for channel improvement downstream from Holley. Non-Federal participation was required for each of the channel projects. Purposes of the reservoir were to control floods, to conserve water for irrigation, and to increase low-water flows for navigation on the Willamette River. The channel projects, incidental to providing flood control and major drainage benefits, would have provided the additional channel capacity necessary for postflood evacuation of water stored in Holley Reservoir.

Detailed planning on both the reservoir and the channel improvements was initiated in 1957. Because it was found that the legally required matching cash contribution was not available for the channel improvement projects, which were necessary for flood control operation of the reservoir, planning for both the dam and the channel work was discontinued in 1958. In 1959 the Senate Committee on Public Works adopted a resolution requesting a review study of the Calapooia River by the Corps of Engineers (U.S. Army Corps of Engineers, 1970).

Present study findings indicate that:

(1) The two channel improvement projects for the Calapooia River should be deauthorized.

(2) The authorized reservoir project at Holley should be modified to serve additional project functions not considered in the earlier authorization, thereby increasing the benefit/cost ratio.

Storage capacity at Holley Reservoir would be increased to 145,000 acre feet, and recreation facilities would be provided. The project is supposed to be operated for flood control during the winter flood season and would store water for use during the summer low-water season to provide additional benefits.

Extensive flooding of agricultural land in the lower basin occurs during periods of heavy runoff. Flooding resulting from storm rainfall that often is augmented by melted snow, is compounded by the flat stream gradients and the meandering, constricted river channel in the lower extremities. A modified reservoir project including channel improvement would have reduced the peak Calapooia flood stage 1.6 feet at Albany, 4.7 feet at Shedd, and 12.4 feet at Holley during the December 1964 flood. However, even with full flood control at Holley, overbank flow may occur frequently in the lower basin because of the flatness of the land and the substantial runoff from the

drainage area downstream from the reservoir. (U. S. Army Corps of Engineers, 1970).

Limited summer rainfall and the resulting low stream flow now prevent full realization of the basin's agricultural potential. Holley Reservoir would provide sufficient stored water to irrigate approximately 8,700 acres located between the reservoir and Brownsville, Oregon. Lands downstream from Brownsville can be irrigated with water stored in the South Santiam River watershed..

Estimated future annual demand for municipal and industrial water would be accomodated by joint use of 1,100 acre-feet of reservoir storage. Water could be taken directly from the river at any convenient point downstream.

Summer flows of the Calapooia are now both too small and too warm to provide satisfactory habitat for anadromous and resident cold-water fish in much of the lower river. Stored water would be used to increase flows to satisfactory levels. The temperature of water released for that purpose would be regulated by withdrawal from selected levels in the reservoir. This would create anadromous and resident fishery benefits downstream from the reservoir. Hatchery facilities would be constructed in lieu of fish passage at Holley Dam. Also, there would be a reservoir trout fishery.

Increased flow from the Calapooia River would assist in augmenting Willamette River navigation flows during low water periods.

During the summer, reservoir size would more than triple the Calapooia's average minimum flow. In addition to benefiting fisheries, this augmented flow of good quality water would improve the aesthetic qualities of the river for landowners and recreationists. Within three years after completion of the project, recreational use may reach 125,000 man-days annually. Usage beyond that time may also be expected to increase.

Holley Dam Project Statistics

Location: Figure 12

General:

Stream: Calapooia River

Drainage area total: 375 square miles

Drainage area, upstream from dam: 105 square miles

Dam:

Height above river bed: 154 feet

Length: 5,960 feet

Reservoir:

Full pool (elevation 679 feet): 2,680 acres

Maximum conservation pool (elev. 677 feet): 2,226 acres

Minimum conservation pool (Elev. 634 feet): 1,450 acres

Storage Capacity:

Full pool: 145,000 acre feet

Maximum conservation pool: 139,500 acre feet

Minimum conservation pool: 51,000 acre feet

Shoreline length:

Maximum conservation pool: 21 miles

Minimum conservation pool: 13 miles

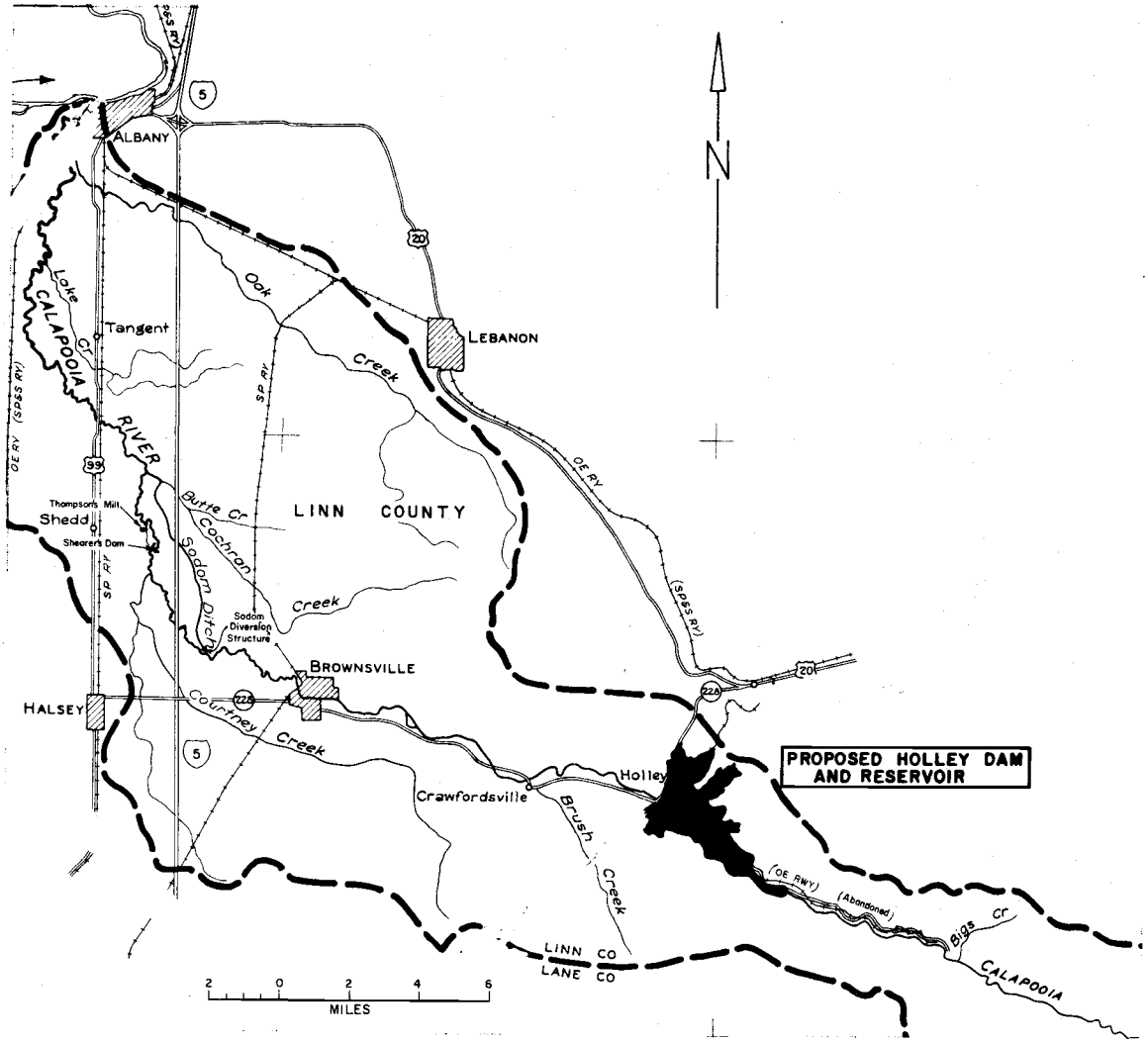

Figure 12. Location Map of the Proposed Holley Project (after U. S. Army Corps of Engineers, 1970).