

**THE IMPACT OF ECONOMIC AND INSTITUTIONAL  
FORCES ON FARMER ADJUSTMENTS IN  
THE NORTH UNIT DESCHUTES PROJECT**

**by**

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CHAPTER I

INTRODUCTION

The North Unit of the Deschutes Irrigation Project is comprised of 50,000 irrigable acres lying within the boundaries of the North Unit Irrigation District, a landowners organization originally established in 1916. The district is located in the Deschutes River basin of the broad intermountain plain of west central Oregon adjacent to and east of the deep gorges of the Deschutes and Crooked Rivers. The North Unit was authorized for construction under the Bureau of Reclamation on November 1, 1937.

The first water was delivered to the Project for the crop year of 1946. By 1949 water was available for all of the project lands. The project was divided up into 642 ownership units with an average size of 77 acres. From the very beginning owners found it profitable to combine ownership units into larger operating units. The original units were formed to further the fundamental objectives of Federal Reclamation: (1) to provide opportunity for the maximum number of settlers on the land; (2) to distribute widely the Government involved interest-free funds for irrigation; and (3) to promote

the family farm as a desirable way of life (19, p. 54). The objective of economically efficient units was not part of Reclamation policy.

Between the time the farm units were planned in the early forties until complete settlement, conditions had changed so that the average size unit was not adequate to provide a comparable level of income for the farm family. Family income and the cost of living had increased considerably in the 1940's throughout the whole country. The originally planned levels of farm income were no longer adequate to support a farm family. With changing farm costs and prices the planned income was not even obtained in many cases. The planned family-type farms relied heavily on the value of home produced foods and diversified livestock farming (16, p. 84). Each farm was to have some dairy cows, chickens, and hogs. Due to markets, technological developments and price changes, family subsistence farms did not develop as was anticipated.

During the first few years of the project, potatoes and Ladino clover seed production were very profitable. Prices were considerably above longtime averages and yields on the newly irrigated land were excellent. In many cases this initial prosperity lasted only long enough to encourage new farmers to go into heavy debt or

to make excessive purchases of equipment and automobiles. Some of the farmers on small units never recovered their financial health after 1952 when the prices dropped drastically.

For the 1947 and 1948 crop years, Ladino clover prices reached a record high of \$1.84 per pound, potato prices were relatively high at \$3.20 and \$2.35 a hundred-weight, and hay sold at the relatively good price of \$24.60 and \$27 per ton. Ladino clover prices fell to less than one-third of the '47-'48 prices after 1952. The lowest Ladino clover price occurred in 1957 when the price dipped to \$0.30 a pound. Potato prices averaged \$1.73 and baled hay prices averaged \$21.50 during the 1953 to 1959 period.

Nationally, the increase in prices paid by farmers in the 1948 to 1953 period amounted to 7.3 percent. Farmers in the North Unit experienced the same general rise in their costs. Many suffered greater income declines than was indicated by the drop in the Oregon crop parity index of 10 percent between 1948 and 1953 because of the importance of clover seed, hay, and potatoes in the project area. These crops suffered a greater price decline than the average. For example, the Oregon parity index for potatoes dropped from 120 to 73 in the 1948-53 period.

After World War II new technology allowed higher

production and greater efficiencies if the farmer adopted the new technology. With improved equipment such as automatic balers and self-propelled grain and potato combines, a larger acreage was required to utilize efficiently the usually more expensive equipment. Specialization was profitable even at lower product prices because increased production and larger acreages spread the investment in equipment over a greater output. Farmers who were unable to specialize or did not have sufficient acreage to utilize the new techniques found their income declining as crop prices declined. Other farmers bought specialized equipment without having enough land to pay for the equipment. In other words, they were over-invested in machinery.

With improvements in equipment a farmer could handle more acres than was possible in the past. Lower agricultural prices made more acres necessary for each farmer if his operation was to be profitable. Since total acres were limited in the project area, more acres per farmer also meant that there would have to be fewer farmers. Farmers who were the most efficient found it possible and profitable to buy or rent land from less efficient farmers. Inefficient farmers had to seek employment off the farm or accept a substandard level of living from reduced farm income.

Changes in commodity prices, such as Ladino clover and potatoes, made it imperative for farmers to change to different combinations of crops. Also, higher-valued varieties of clover and grass for seed and speciality crops, such as mint, were introduced.

Another solution to declining farm income is to add livestock enterprises especially if additional land is unavailable or alternative crops are not profitable. Dairying is often suggested as a good enterprise for a farmer with a small acreage of cropland. However, the change in the nature of the dairy business precluded the development of small dairy farms in the area. Rapid transportation made possible the supplying of milk and other dairy products from outside the project area. Consequently, a local milk processing plant was not built. Without a local market, grade A milk production did not develop in the area.

#### Objective of Study

The purpose of this study is to provide economic information and analyses useful for farmers and farm advisers in making adjustments in farm size and operation on the North Unit Project. It is also hoped that the analysis will be of value in the future planning and evaluation of government reclamation projects.

The first objective was to appraise the present farm situation in terms of income, farm size and organization, and the financial situation. The purpose of this was to determine if the area had achieved a measure of stability or further adjustments could be anticipated.

The second objective was to identify the causes of maladjustments in the farm organizations. The hypotheses were as follows: (1) The project was originally divided into uneconomic farm units; (2) Capital, owned or borrowed, was not available in adequate quantities to properly develop and operate the new units; (3) New settlers lacked necessary irrigation farming experience; and (4) Unusual price relationships prevailed at the time of settlement.

The third objective was to appraise or evaluate some of the farm and off-farm adjustment possibilities. Examples of adjustments to be considered are: (1) On-farm adjustments such as (a) shifting resources among enterprises, (b) specialization, (c) introduction of livestock, (d) increasing farm acreage; (2) part-time off-farm work; (3) full-time non-farm work.

The fourth objective was to analyze the obstacles to needed adjustments. In some cases, obstacles would be of a personal nature such as age, individual abilities, and preferences. Other obstacles would be lack of land or capital for expansion of the farm business or lack of off-farm employment possibilities.

## CHAPTER II

### METHODOLOGY

North Unit Project farm operators were interviewed in the summer of 1958. The field schedule was designed to obtain the present costs, returns and farm organization for the operating units on the project. Questions were also asked to provide a basis for analyzing adjustment possibilities and opportunities.

For sampling purposes, the North Unit Project was divided into three areas as originally established by the Bureau of Reclamation (Figure 1): (1) Agency Plains, (2) Metolius and Culver, (3) Mud Springs. These areas differ in land capability, soil types, farm organization, and size of farm units. Farms in the Trail Crossing area were excluded because they differed considerably from the farms in the other areas. There were only 26 total commercial farms in that area. All operating units under 30 acres were excluded because they were considered to be too small for a commercial operation. After the above exclusions, 346 farm operating units remained out of the original population of 407. The population was obtained from the North Unit Irrigation District water office. It was arrayed according to area and farm size. Three

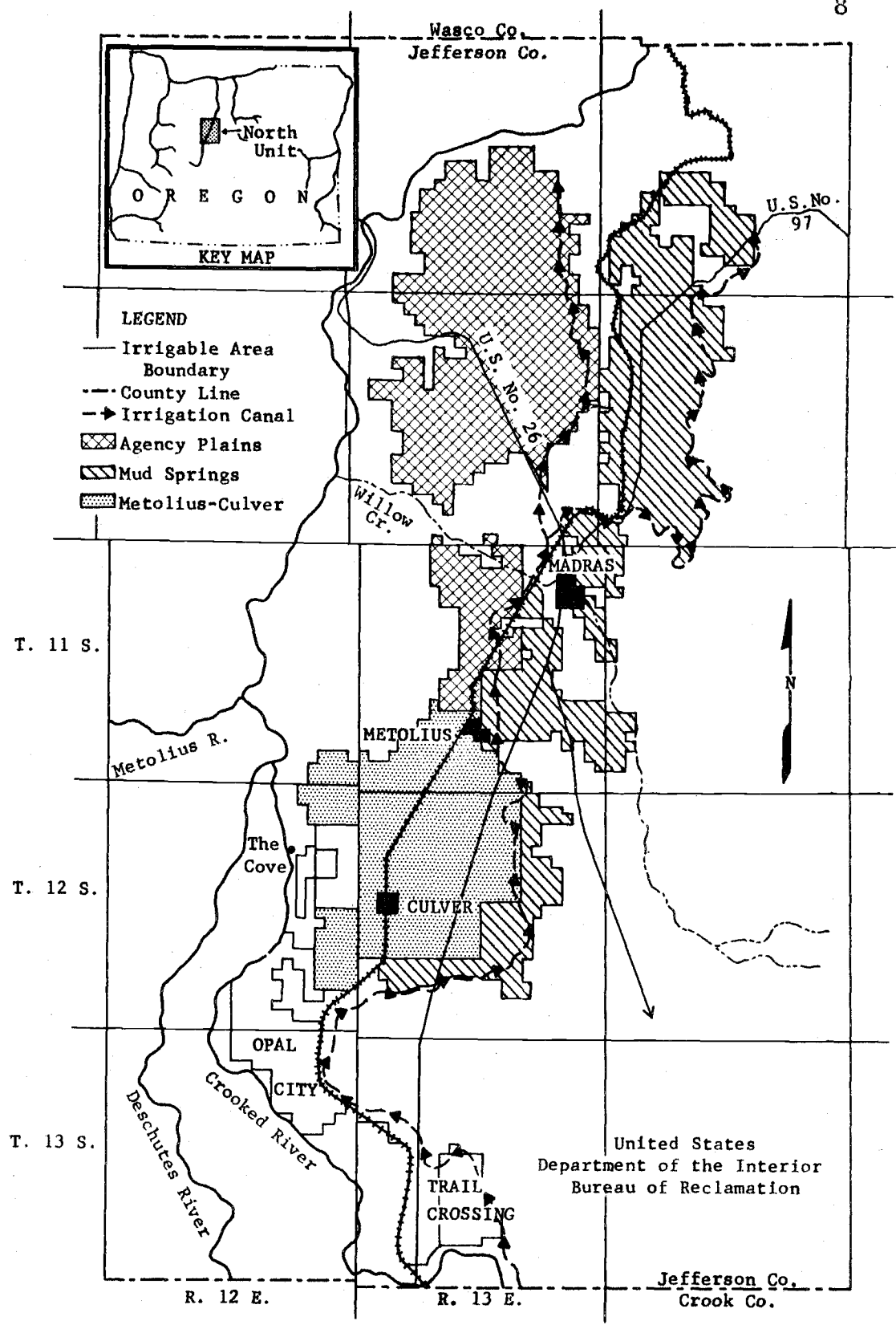


Figure 1. Deschutes Project, Oregon, North Unit, General Map.

size groups were selected as follows: 30 to 89.9, 90 to 159.9, and over 160 acres. A card was prepared for each farm and numbered randomly within each of the nine classifications. Using a table of random numbers a total of 60 sample farms plus 30 alternates was selected. Usable farm records were obtained from 56 farm operators.

Typical farm organizations were prepared from the survey data for each area and size group. Farm costs and returns were analyzed. The amount of capital and labor used was calculated. The actual farm situation of 1957 as represented by the farm survey was the basis for the technical coefficients and the resource limitations used in determining optimum farm organizations.

A comparison of optimum farm organizations with limited labor and capital to the actual situation was made to determine the extent and nature of profitable adjustments for project farmers. In addition to finding optimums with 1957 price-cost relationships and average management, a high level of management was assumed with 1957 to 1959 average prices. The value of an additional dollar of operating capital and one hour of labor was calculated to determine the profitability of expansion beyond the maximum size imposed by the limitations.

The farm organizations found in the area were analyzed with regard to possible adjustments indicated

by budgeting. Obstacles to these adjustments such as personal factors, capital, credit, and availability of land were identified.

The surveyed farms were compared with the 1950 Bureau of Reclamation farm budget projections in order to isolate differences. A comparison was made of budgeted and actual yields, organization, acreages, and prices. The differences between actual and planned development indicated the need and possibilities for improved future planning.

Oregon State and United States Census and other statistical data were used to analyze the impact of the project upon the economic development of the area. Comparisons of the project area with similar areas were made to evaluate the development that could be directly attributed to the irrigation project. A historical analysis of the area development including development of the community permitted estimates of future on-farm and off-farm adjustment possibilities. This also suggested the obstacles and problems that were likely to be encountered in attaining these adjustments.

### CHAPTER III

#### HISTORY AND DESCRIPTION OF AREA

##### Geographical Features of Area

Irrigable lands of the North Unit Deschutes Project lie within the boundaries of the North Unit Irrigation District. The District, containing 133,000 acres, extends 28 miles north and south and is 12 miles wide. The District lands, at elevations from 2,400 to 2,700 feet above sea level, are subject to minor variations in temperature, rainfall, and growing season due to topographical irregularities.

The North Unit occupies a lava plateau bounded on the west by the Deschutes River. The Deschutes River flows in a deeply cut canyon northward about 72 miles into the Columbia River. Forty miles to the west, the Cascade Mountain Range with peaks as high as 10,500 feet parallels the Deschutes River. On the east lies the rough, broken terrain of the Ochoco Mountains.

The North Unit has an arid, relatively moderate climate with an annual rainfall averaging about 10 inches. At Madras the summer rainfall averages only 1.15 inches. July temperatures average 66 degrees and January temperatures 31 degrees. The recorded extremes

are 112 degrees and a minus 45 degrees.

The average growing season of 130 days is long enough for hardy field and row crops. The total seasonal heat units of 3,000 degrees above 42 during the growing season is relatively low compared to other irrigated areas in the West. Warm season crops cannot be successfully grown under these conditions (16, p. 16).

The topography of the land is extremely varied, being strongly influenced by the underlying formations. The major portion of the area is underlain with erupted volcanic materials bedded with lava flows. On the west canyon rims, the basalt is exposed or underlies the soil for a considerable distance back from the rims. The eastern part of the project is characterized by older geologic formations giving rise to the formation of benches and ridges. Generally, the surface of the irrigable lands is smoothly undulating to gently rolling, with a few shallow basins and some sharply breaking slopes. The bulk of the soil was transported from many sources and shallowly laid down by wind and water on top of basalt or the highly diverse, usually cemented geologic formations. Two-thirds of the area consists of sandy textured soils, largely sandy loam, and fine sandy loam. The remainder of the soil is principally loam. Fragments of pumice are common to most of the soils,

making the soil light and friable. The shallow depth of the soil is the most serious limitation to soil productivity.

The North Unit was divided into five land type areas based on soil type, productivity, and topography. About 41 percent of the irrigable land is in the Agency Plains area, 27 percent in the Mud Springs area, 22 percent in the Culver area and the remaining 10 percent in the Opal City and Trail Crossing area. The project map, Figure 1, shows the location of these areas.

The Agency Plains area consists of a large body of gently sloping land prominently situated above the surrounding area. The soils are heavier but more shallow than in the Culver area. The Culver area lands are gently rolling with occasional flat basins. In both areas, the heavier subsoil is underlain with a lime hardpan. The Mud Springs area is characterized by irregular benches and ridges sloping downward from the rough eastern project border to smoother lands similar to the rest of the project.

#### Development of Farming in Area

The North Unit area was devoted almost exclusively to sheep grazing in its early days. As a favorable weather cycle developed, dryland grain-fallow farming

gradually replaced sheep raising. By 1900 dry farming was moderately prosperous although there were frequent droughts. At this time, the North Unit area was mostly settled in holdings of 160 acres or more with complete sets of farm buildings. In 1926, about 40,000 acres of North Unit Irrigation District land were being dry farmed.

Rainfall averaged about 10 inches between 1900 and 1920, which was favorable to grain-fallow farming. However, there was a pattern of gradual decline in rainfall. Between 1922 and 1935 the average rainfall had declined to 7.57 inches annually. The usual wheat yield was 10 bushels an acre with an occasional exceptionally high yield of 30 bushels (22, p. 10). In many seasons a considerable acreage of seeded land was not harvested. In 1934 there was a complete crop failure on account of drought.

The U.S. Census of Agriculture showed that the proportion of cropland used for crops decreased from about 60 percent to 40 percent during the dry thirties. In 1939, only about 12 percent of the cropland was harvested. Of the harvested acreage, 6 percent was hay, 4 percent wheat, and the balance was in barley, rye, oats, and insignificant amounts of corn and potatoes. The number of farms dropped one-third during this period, as declining crop acreages and yields

bankrupted many farmers.

Many of the first farmers settling in the central Oregon Deschutes Basin realized that irrigation would be of great benefit. Water was first diverted for irrigation west of Redmond in 1871. The first major construction in the Deschutes Basin was initiated in 1900 under provisions of the Cary Act for the irrigation of 45,000 acres now known as the Central Oregon Irrigation District. Water was diverted by the installation of a dam directly south of the city of Bend. In 1901 work was initiated on the Walker Basin project of over 30,000 acres. Poor soil and climatic conditions led to the later abandonment of all but about 200 acres on this project.

Other districts which were organized in the Deschutes Basin include the Arnold Irrigation Company, Tumalo Irrigation District, the Sisters Irrigation District, the Lone Pine Irrigation District, and the Suttle Lake Irrigation District (16, p. 8).

Early irrigation in the area was carried on primarily to provide supplemental feed for range livestock and for production of food products for local consumption. A railroad was constructed in 1911 linking the central Oregon Deschutes area with the main line along the Columbia River, thus opening up the West Coast markets. World War I encouraged increased production and gave impetus to plans for further expansion of irrigation in

the Deschutes Basin.

### Project Development Plans

Irrigation of the North Unit lands had been considered prior to 1900. The Oregon Cooperative Work Plan of 1913-1915 was the first serious study of the possibilities of irrigating the area. Several subsequent plans were devised which were similar to this first plan.

The Oregon Cooperative Plan for the Deschutes River outlined a program for the irrigation of 99,300 acres in the Deschutes River Basin. Engineers investigated the water supply and a soil survey was made under the direction of Oregon Agricultural College. Since the Deschutes River flow was not adequate to supply irrigation water in the summer months, the main feature of the plan was storage of excess winter and spring flow of the river by building dams at Benham Falls and Crane Prairie sites. The major construction costs would be for the canals from the reservoirs to the project land.

Interest in irrigation was strong enough that in 1916 the "North Unit Irrigation District" was formed. Unfortunately, only \$90,000 worth of bonds were sold out of 5 million dollars needed for the planned project. These funds were used to pay for a private engineering investigation and cost estimation of the project. The resulting plan by Herrmann and Wiley was similar to the

Oregon Cooperative report. They estimated that 106,250 acres of land could be irrigated with a construction cost of \$70 per acre. The plan was based on storage at Benham Falls which was examined and pronounced physically suitable by the "highest geological authority!" (9, p. i-iii). A detailed canal survey was not available for the Herrmann-Wiley report; had it been so, the resulting estimate of cost would probably have been quite different.

In 1922 a revision of the previous plans was made by C. C. Fisher, a Bureau of Reclamation engineer. The plan was similar to the Herrmann-Wiley plan except that irrigable acres were reduced to 80,000 (7, p. ii). This limitation was imposed by the State Water Board because of the limited water supply in the Deschutes basin. Total construction cost for the North Unit was estimated at \$7,630,000, an average of \$95.40 per acre.

Land repayment ability for construction charges was estimated as follows: It was assumed that the net income from an acre of alfalfa would adequately represent feasible repayment ability. Alfalfa would yield 4.5 tons per acre and was valued at \$6.00 per ton. The long-time earning value of land was estimated at \$33 per acre for each ton of hay produced. Other improvements per acre of land were estimated at \$50, which was deducted from the income value of the land. The remaining \$98.50 was

considered to be the upper limit of feasible construction cost (7, p. 7-8). Therefore, the project was considered feasible. This method provided a conservative earning capacity value since most other crops that could be grown would return a higher income per acre than alfalfa.

In 1921 the North Unit Irrigation District was negotiating with private interests for the financing of the project construction. The private concern had purchased the \$90,000 worth of District bonds to finance the Herrmann-Wiley investigation. After the Fisher report of 1922 a Federal appropriation of \$500,000 was secured for the beginning of the project. A meeting between land owners and the Director of the Reclamation Service was held in Madras to discuss the required terms of the contemplated construction contract. The owners informally rejected the Bureau of Reclamation plan because they objected to the condition that land owners would have to sell all land in excess of 160 acres at the government appraisal price. The private interests had offered to provide the necessary funds without restrictions if the government offer was rejected. The \$500,000 Reclamation offer was withdrawn and a short time later the private offer was also withdrawn (4, p. 8-9).

The project lay dormant until the Bureau of Reclamation made allotments in 1934 and 1935 for the

investigation of storage possibilities in the Upper Deschutes Basin and for an investigation of the North Unit. C. C. Fisher was again in charge of the investigations. The results were published in 1936 (6).

The project features were similar to the previous reports except that the Benham Falls reservoir site was rejected as too leaky for successful use. The Wickiup Reservoir site, lying nearly 30 miles further upriver from the project, was selected as the principal storage reservoir. The water supply would be adequate for 50,000 acres instead of 80,000.

Total planned construction cost increased to \$9,025,000 or \$180.50 per acre, nearly double the previous estimate. The proposed construction would result in a water supply of 3.8 acre-feet per irrigable acre. The expected loss in delivery of 37 percent allowed 2.4 acre-feet available for delivery to the land. This quantity was considered adequate by the Oregon Agricultural College soil specialist (6, p. 52). The annual construction charge without interest would amount to \$4.50 per acre, payable annually for 40 years. Operating and maintenance charges were estimated at \$1.25 per acre, each year.

The finding of feasibility under which the North Unit was authorized was signed by the President on November 1, 1937. Total cost to be charged to irrigation

users amounted to \$8,000,000. The finding of feasibility indicated that the reimbursable portion of the cost of construction would be returned within the maximum period of 40 years fixed by Reclamation Law. CCC camp labor was to be utilized to supply \$2,005,000 worth of labor, leaving about six million dollars to be repaid by water users.

The feasibility finding stated that individuals could own only 40 acres, and families, 80 acres of irrigable land. This stipulation probably stemmed from the Columbia Basin Project Anti-Speculation Act of 1937 (50 Statute, 208). The limitation was imposed and accepted without any kind of an economic study in the Deschutes area as to the size of farm requisite to success. The owners, who might have 200 or 300 acres of land well suited to irrigation, were not eager to sell all of their land except 40 acres at government appraised prices, but they were obliged to do so under their contract before they could receive any irrigation water. In October 1937 the water users voted almost unanimously to accept the 40 and 80 acre limitations as part of their repayment contract.

Depression and drought had reversed farmers objections to acreage limitations. Fifteen years before, they had turned down a 160 acre limitation, but in 1937 they

didn't object to a 40 acre restriction. Reclamation law in effect in 1937 would allow 160 acres per adult. However, the Bureau of Reclamation had decided 160 acre farms were too large because their experience had shown that "on projects having similar climatic and marketing conditions, forty to eighty acres are usually required to provide sufficient revenue for the repayment of the project costs"(17, p. i ).

In February of 1944 the water users formally requested that the limitation on land holdings be increased to 160 acres for man and wife. The Commissioner of Reclamation concurred with their request, stating that the original limitation had no economic justification.

The basis for his recommendation was a comparison of the land and climate in the North Unit with the Columbia Basin where detailed economic studies had been made. With the generally superior conditions in the Columbia Basin, the optimum farm sizes were considered to range from 45 to 160 acres. The Commissioner estimated that an average of 70 acres would be required in the North Unit Deschutes Project. He recommended that the limitation be stated in terms of the maximum permissible, 160 acres. The Bureau could not control actual ownership acres to less than 160 but could encourage and promote

smaller units on better land by laying out the irrigation system to serve units ranging in size from 80 to 160 acres (17, p. 3-4).

In 1945 a study was made by the Bureau on farm size in the North Unit in support of the presently effective 160 acre maximum limitation per farm ownership unit (9). The report showed that the 40 acre limitation was unduly restrictive, as evidenced by experience in the nearby Central Oregon Irrigation District and the Ochoco Irrigation District. As a result of this study, the acreage limitation was doubled to 80 acres per person or 160 acres per family.

Costs of Project development had increased due to the war. Consequently, the new 1945 contract with the 160 acre provisions also required the repayment of \$9,500,000 in 40 years. By the time water was available for the whole project in 1949, additional costs raised the total obligation to \$11,050,000.

No economic study had been made up to 1950 on the earning capacity (repayment ability) of project lands. Since expenditures and project settlement were virtually completed in 1949, a study was undertaken to determine repayment ability for Class I, II and III land. The study indicated that the construction cost could be paid off in 64 years. Net earnings of \$3.90 for Classes

I and II lands and of \$2.50 for Class III land would only be forthcoming if there was a completely adequate supply of water (6, p. 97-98).

Project lands were first classified as to quality in 1914 to determine the number of irrigable acres in the North Unit. In 1921 Herrmann and Wiley surveyed the area to delineate irrigable and nonirrigable lands. Lands were reclassified in 1924 by a committee of three representing the Bureau of Reclamation and the State of Oregon. Nearly 100,000 acres were considered suitable for irrigation.

After the Bureau's 1934 and 1935 investigations of storage facilities indicated that water would be available for only 50,000 acres, a more intensive land classification was undertaken. Surveys were made in 1938 and 1944 by an appraisal board appointed by the Secretary of the Interior. These land appraisals were made to provide proper guides for locating and laying out the irrigation distribution system. These surveys also set up land quality standards which served as guides for the sale value of excess lands. The land was classified on the basis of topography, depth, and soil texture.

Land was classified very rapidly with the assistance of the previous studies. Land class lines usually followed legal rather than natural boundaries. This

practice, together with little consideration of soil problems as related to irrigation, was the basis of subsequent landowners' requests for reappraisals and reclassification.

In 1948 the land was again reclassified previous to the drawing up of the 1949 repayment contract. Field checks were made to adjust and correct previous land class boundaries. Irrigable lands were classed 1, 2, and 3. Class 1 lands were highly suited for irrigation farming, Class 2 lands were moderately suitable but usually limited by shallow soil over hardpan, and Class 3 lands had distinct limitations for irrigation because of soil and topography characteristics. Three percent of the irrigable land was placed in Class 1, 65 percent in Class 2 and 32 percent in Class 3 (16, p. 109-10).

None of the North Unit Project surveys were as accurate as regular detailed land classification procedures would have been. More extensive surveys would have provided a better basis for the irrigation system and farm unit layout and many of the subsequent protests over land classification could have been avoided.

The 1950 Economic Report and Repayment Plan assumed that adequate domestic and stock water would be furnished by reconstructing the present inadequate system.

Ground water supplies were such that individual wells were not feasible. The domestic water system was over 30 years and in poor condition. It was built when the area was dry farmed and was inadequate to supply the greatest number of irrigated farms. During cold periods the woodstave pipeline had frozen, necessitating hauling of water. Many farmers were unable to establish livestock enterprises due to the uncertainty of adequate stock water throughout the winter months.

The cost of rehabilitating the domestic water system was over 3.5 million dollars (15, p. 3). Farmers were unwilling to obligate themselves for this additional expense and the program was not undertaken.

During the first few years of Project operation, ample irrigation water was available for successful cropping except during peak demands. Operating experience had shown that it took up to five days for water released from Wickiup Reservoir to reach the North Unit. Crops could be damaged during this interval. Also, water would be wasted through the Diversion Dam or canals when a reduced flow was required at the Project area. To rectify this situation an equalizing reservoir was constructed on the project. Haystack Reservoir was authorized in 1954 at a cost of \$1,600,000 (18, p. 17). This cost was added to the original project costs. An amended

repayment contract was entered into between the North Unit Irrigation District and the Bureau of Reclamation for a total amount of \$12,130,000 to be paid in 78 annual payments. The assessments began in 1957.

Project construction was finally completed and first payments made in 1957, 20 years after the finding of feasibility. The average charge for construction per acre increased about 50% from \$160 as stipulated in the 1938 contract to \$243 as the final charge. The long time period between authorization and completion and the inadequacy of the originally authorized water system were two of the reasons that gave rise to the need for the contract adjustment.

### Farm Size

As was mentioned previously, the Bureau of Reclamation planned the farm size to average around 80 acres. The law did not prevent farmers from increasing their operating units by renting additional land but the water district attempted to limit the operating unit size to 160 acres. In spite of the size restrictions farmers began increasing operating unit size during the first two years of project settlement.

The original 50,000 acres in the North Unit were divided into 642 ownership units with an average of 77

acres per unit. Figure 2 illustrates the distribution of original units by size groups. Nearly 60 percent of the ownership units were under 80 acres with 23 percent containing less than 40 acres. In 1949, when water was available for the whole project, the 642 ownership units had been combined into a total of 550 operating units (Appendix Table 1).

Practically all of the combination of ownership units occurred in the less than 80-acre size classes. There was a decrease of 62 units in the 40 to 80-acre size class. After combination some of the smaller units remained in the 40 to 80-acre size class. Over 180 units were combined to reduce the number of operating units to 92 fewer than ownership units.

In 1949 44 percent of the operating units were under 80 acres with 14 percent being less than 40 acres. In 1957 40 percent of the operating units contained less than 80 acres. The 40-80 acre size class had decreased by 68 operating units. The less than 40 acre units decreased by only 4 units. Little expansion occurred in the less than 40 acre size farms because they were too small to provide income necessary for further expansion and they were usually operated by a person who had an off-farm job.

There were 38 percent of the original ownership

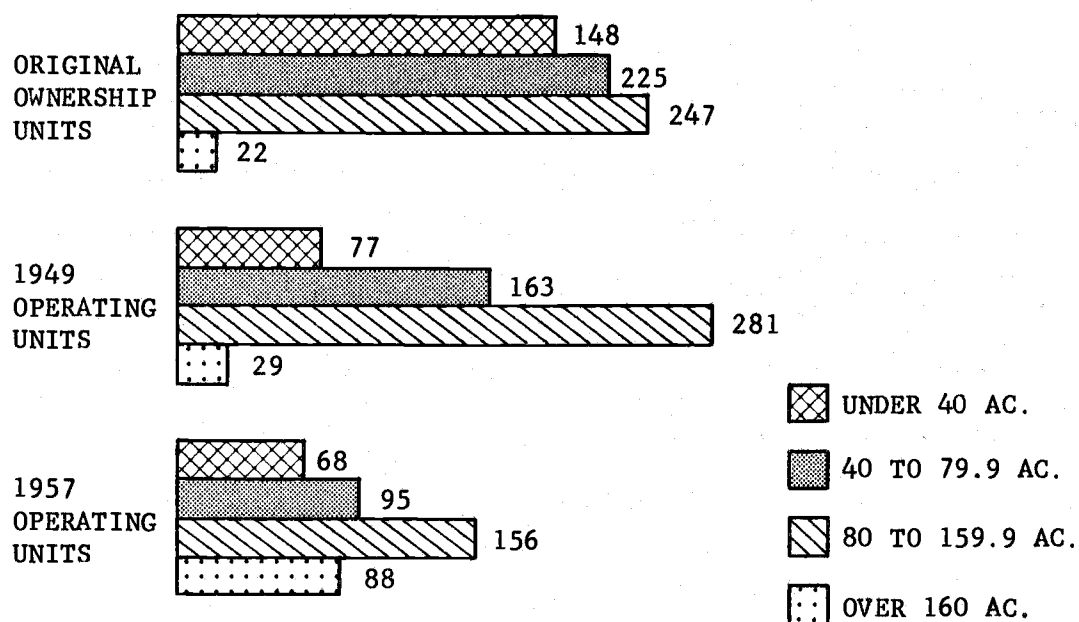


Figure 2. Number of farm units by size class for selected years, North Unit Deschutes Project, Oregon.

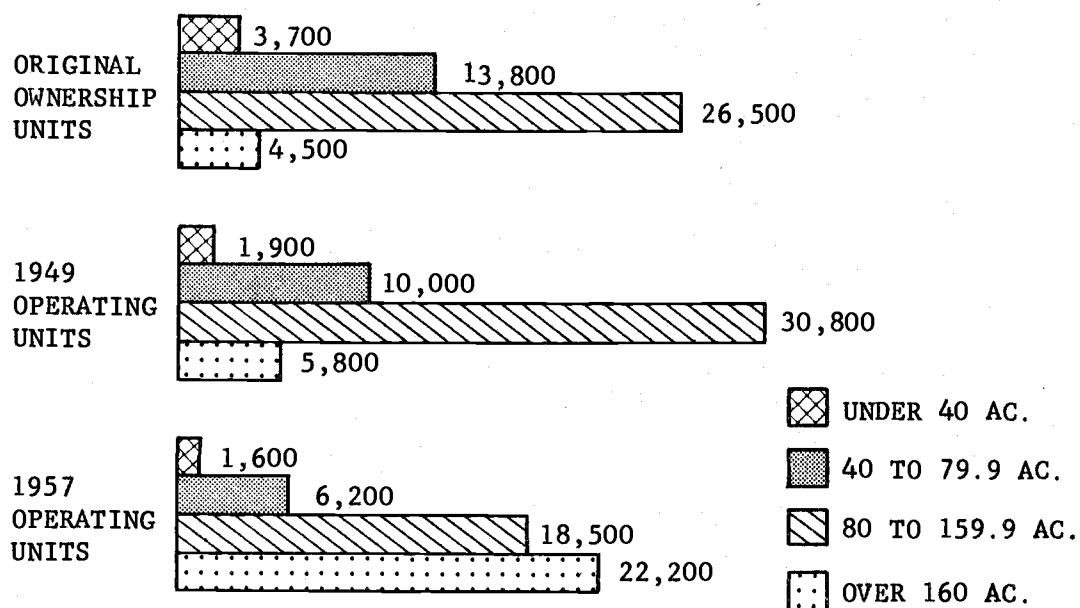


Figure 3. Total irrigated acreage in various farm size classes for selected years, North Unit Deschutes Project, Oregon.

units in the 80 to 160 acre size class and 4 percent in the over 160 acre class. Early consolidation shifted an additional 13 percent of the operating units into the 80 to 160 acre size class by 1949. In the over 160 acre size class there were seven more operating units than ownership units in 1949, with a total of 29.

By 1957 the major shift in operating unit size had been to farms of over 160 acres. The percentage increased from 5 percent of the total operating units in 1949 to 22 percent in 1957. At the same time, the percentage of 80 to 160 acre units had decreased from 51 percent to 38 percent or by 125 operating units. The farm survey indicated that all of these units had been combined or absorbed into units of over 160 acres in the nine-year period. In 1949 three farms contained 300 or more acres. In 1957 17 farms had between 300 and 900 acres.

Figure 2 graphically illustrates the shift in original ownership units to larger operating units in 1949. There were fewer operating units in 1957 than in 1949 in all size classes except the over 160 acre class which increased from 29 units to 88 units.

Changes in farm size can also be illustrated by total number of project acres falling into the various size classes (Figure 3). The number of acres in the under 40 acre class has steadily decreased from eight

percent in the 1949 ownership units to three percent in the 1957 operating units. Similarly, in the 40 to 80 acre class the decrease has been from 29 percent to 13 percent. In general, these small farms of less than 80 acres have not provided the income necessary for their survival.

There was 54 percent of the acreage in the 80 to 160 acre ownership unit size class and 63 percent in the operating units in 1949. Acreage in this size class decreased to 39 percent by 1957.

The decreased acreage in the first three size classes was balanced by the increased acreage in the over 160 acre size class in 1957 when 45 percent of all project irrigable acreage was in farms of over 160 acres (Appendix Table 1). Only 16 percent of the acreage remained in farms of under 80 irrigable acres in 1957.

The 1949 operating units averaged 13 irrigable acres more than the original ownership units; the 1957 average operating unit was 45 acres larger (Table 1). The median farm size increased 31 acres in the same period.

A comparison of means and medians indicates that farm unit size distribution was fairly uniform in 1949. In 1957 the mean value was considerably higher than the median because there were fewer farms above average size than below (the median value is the size of the middle

farm when they are arranged from the smallest to the largest). A few farms were becoming very large, which raised the mean or average value above the median.

Table 1. Arithmetic Mean and Median of Farm Acreage in Selected Years, North Unit Project, Oregon.

Farm Unit	Mean	Median
	<u>Acres</u>	<u>Acres</u>
Original owner	77	73
1949 operating	90	88
1957 operating	122	104

Stated in another way, there were more farms smaller than average in size than above. The farm survey indicated that this pattern of farm consolidation would continue. In the eight years from 1949 to 1957 the number of operating units declined from 550 to 407 or a decline of 26 percent. However, the number of operating units in 1957 were about 37 percent less than the number originally planned for.

#### Area Growth

Since farm consolidations are likely to continue and small scale farmers will need off-farm employment, an analysis of area growth was made to determine if

there would be off-farm job opportunities in the area. An analysis of area growth also provided information relative to the project's effect on the business community. The impact of the project on the rest of the economy is known as indirect or secondary benefits.

An analysis of indirect benefits by Otto Eckstein led him to conclude that from a national point of view, indirect benefits can only occur when there are immobile or unemployed resources or when there is under-utilized capacity in associated activities (5, p. 212). However, indirect benefits accrue within a region without the above stated conditions when considered only from a regional viewpoint. A project will lead to new industries; the increased purchasing power of settlers will trigger the development of other businesses to provide goods and services (5, p. 213).

The development of the North Unit created new and more productive farms. Consequently, agricultural production in the area increased considerably. Farmers bought more machinery, fertilizer, fuel and other farming and living items. The whole community enjoyed an increase in business and services. Businesses engaged in handling and processing the additional farm commodities were established or expanded.

When irrigation development takes place in an area that has had little previous commercial development, as was the case in Jefferson County, the increase in local business is very apparent. The establishment of new farms induced new investments in businesses to serve the new farms. This investment acted as an accelerator on the business activity of the whole community. By contrast, older established areas could absorb much of the increased business without the expansion of commercial facilities.

Data are available to measure and evaluate area benefits brought about by the development of the North Unit project. County figures are appropriate since all of the project lies within Jefferson County. Also, practically all of the irrigated land in the county lies within the project. Therefore, county data such as reported by the Department of Commerce and the State of Oregon can be utilized to analyze area growth.

The entire state of Oregon experienced great economic progress after World War II. With or without an irrigation project, Jefferson County would normally have shown population, agricultural, and commercial growth. In order to delineate growth due to the North Unit Project, areas similar to Jefferson County, but having mature irrigation projects, were used for comparison. The

neighboring Counties of Deschutes and Crook were selected for this purpose.

Most of the agricultural land suitable for irrigation in Deschutes and Crook Counties was being irrigated prior to 1940. Total acres irrigated have changed very little over the past 20 years (Figure 4). Both counties are primarily irrigated farming areas with over 70 percent of the plowable land under irrigation. By contrast, only 9 percent of the cropland in Jefferson County was irrigated prior to 1940.

The counties have much in common as far as natural resources and climate are concerned. However, Jefferson County differs from the other two in that it had a larger area of high quality land suitable for irrigation, although irrigation was first developed in the other two counties. The similarities between the three counties make comparison of growth useful in spite of some differences in the quality of land.

Census data on commercial farms indicates that the farmers in the three county area of central Oregon have increased the size of their farm business considerably. This has come about by an increase in the per acre value of output and by an increase in the average number of acres per farm. Although the total number of farms is decreasing, the number of farms with gross incomes

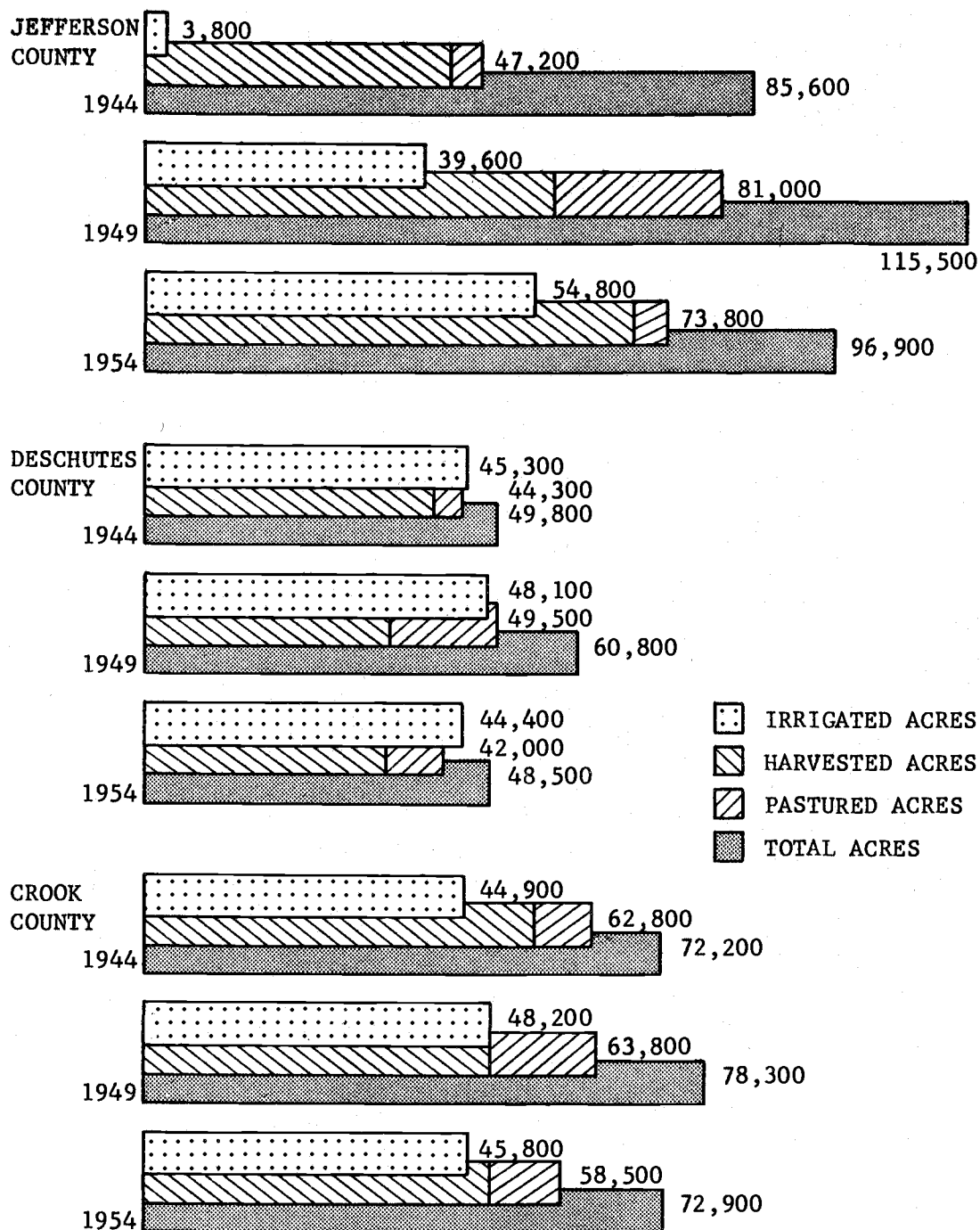


Figure 4. Cropland acreage by use for selected counties and years.

Source: U.S. Census of Agriculture.

of over \$10,000 is increasing.

Adequate family income would not be a given sum such as \$3,000 for all people. Families require different amounts to achieve what they consider an adequate level of living. In addition, some people are willing to give up monetary returns for other satisfactions such as living on their own farm or being their own boss. Others expect the farm to pay them at least as much as they would obtain from off-farm employment. Still others are willing to subsist under sub-standard conditions with the expectation of developing a profitable farm over time. It was assumed that most farmers would require at least \$10,000 gross farm income to provide a minimum income for family living.

The total number of commercial farms (as defined in the Census of Agriculture) decreased 33 percent during the 1944 to 1959 period for Jefferson, Deschutes, and Crook Counties (Table 2). In the same period, the number of farms with gross farm incomes of more than \$10,000 increased by 164 percent. The proportion of farms with incomes of over \$10,000 increased from 13 percent in 1944 to 52 percent in 1959 for the three counties.

Table 2. Total Number of Commercial Farms/<sup>1</sup> and Farms with Gross Incomes of More Than \$10,000 for Selected Counties and Years.

County	Year	Total farms	Farms with gross income over \$10,000	
			Number	Percent
Jefferson	1944	230	40	17
	1949	478	153	32
	1954	487	242	50
	1959	368	262	71
Deschutes	1944	866	72	8
	1949	604	101	17
	1954	529	96	18
	1959	439	142	32
Crook	1944	430	89	21
	1949	358	128	36
	1954	324	134	41
	1959	221	127	57
-----				
TOTAL	1944	1526	201	13
	1949	1440	382	27
	1954	1340	472	35
	1959	1028	531	52

<sup>1</sup> All farms classed commercial when sales were over \$250 except when sales were less than \$1200 and the operator worked more than 100 days off farm, or the off-farm income was greater than farm income for the years 1949 and 1954. For 1959 if the farm contained over 10 acres and had sales of over \$50, it was classified as a commercial farm; if under 10 acres sales were over \$250. For 1944, all farms with incomes over \$250 are included.

Source: U.S. Census of Agriculture

In the 1949-59 period the total number of commercial farms in Jefferson County decreased 23 percent, while the number of farms with incomes of over \$10,000 increased from 32 percent to 71 percent of the total commercial farms. This was a 70 percent increase in the number of farms with gross incomes over \$10,000 for the ten-year period. A comparison of the data for the three counties indicates adjustments are being made in the size of the farm business to a much greater extent in the more recently irrigated Jefferson County than in the other two counties. The more profitable crops in Jefferson County provided the incentive and the means for expansion.

In 1944, before the project, there were 282 farms of all types in Jefferson County (Table 3). Within the next five years, the project was completed and the number of farms had increased by 100 percent. Irrigated acreage increased 10 times. Sixty percent of the dry farms of 1944 were irrigated in 1949. The total number of dryland farms decreased from 261 to 107 because only the best land was included in the project and most of this land was in dryland farms before the project.

During the 1944-49 period, the number of farms in Deschutes and Crook Counties remained nearly constant. There was an insignificant decrease of 4 percent in the number of irrigated farms. The actual acres irrigated

increased by about 6 percent.

**Table 3. Comparison of Agricultural Growth in Jefferson, Deschutes, and Crook Counties in Selected Years.**

Item	Year	County		
		Jefferson	Deschutes	Crook
Number of farm units	1944	282	1,002	472
	1949	567	937	472
	1954	590	1,067	393
	1959	450	892	327
Number of irrigated farms	1944	61	910	373
	1949	460	865	365
	1954	493	965	330
	1959	378	757	271
Acres irrigated	1944	3,800	45,300	44,939
	1949	39,635	48,079	48,211
	1954	54,789	44,424	45,818
	1959	53,176	44,161	40,299
Number of farm workers <sup>/1</sup>	1944 <sup>/2</sup>	397	1,215	800
	1949 <sup>/2</sup>	1,177	1,530	812
	1954	858	1,606	835
	1959	580	1,224	624

Source: United States Census of Agriculture.

<sup>/1</sup> Includes farm operator, family workers and regular hired workers.

<sup>/2</sup> Includes seasonal workers.

During the 1950's the total number of farms in Jefferson County decreased about 20 percent. The number of dryland farms decreased 30 percent. After reaching a

high of 493 units in 1954, irrigated farm numbers decreased 23 percent in the following five years. Farm numbers in Deschutes and Crook Counties also decreased between 1954 and 1959 but by a smaller amount, 20.6 percent.

During the 1949 to 1954 period, the irrigated acreage in Jefferson County increased by 13,500 acres. After 1954 there was a small decrease in irrigated acreage (Table 3). Total irrigated acreage increased by one-third in the 1949 to 1959 period. During the same period, the total acreage irrigated in Deschutes and Crook Counties decreased 12 percent.

From 1954 to 1959, average irrigated acreage per farm increased from 111 to 141 acres in Jefferson County. The other two counties increased from 70 to 82 acres per irrigated farm.

Table 3 shows that the number of farm workers varied directly with the number of farms, but the percentage change was greater in each instance. During the 1944 to 1949 period there was a threefold increase in the number of farm workers in Jefferson County due primarily to the development of the North Unit. Between 1954 and 1959, the number of workers decreased 32 percent, while the number of farms decreased 23 percent. Consequently, the number of workers per farm decreased from

an average of 1.7 in 1954 to 1.5 in 1959.

Deschutes and Crook Counties also had 1.7 workers per farm in 1954 and 1.5 average in 1959. However, the average acreage in Jefferson County was about 70 percent larger than in the other two. As a result, there was an average of 94 irrigated acres per farm worker in Jefferson County compared to only 55 acres per worker in Deschutes and Crook Counties.

In 1944, before the North Unit Project, the total value of agricultural production in Jefferson County was less than half that of either Deschutes or Crook Counties (Table 4). In just ten years, Jefferson County's value of production was slightly more than that of Crook and Deschutes Counties combined. The difference can be attributed primarily to the newly irrigated North Unit Project land in Jefferson County.

In Jefferson County, the total value of farm production and the value of crops sold per acre increased over five times in the 1944-54 period (Table 4). Deschutes and Crook Counties averaged less than one-tenth of the Jefferson County increase. Data compiled by county agents show that between 1954 and 1959, gross farm income continued to increase in the area. The increase was more than 50 percent in Jefferson County and more than 60 percent in Crook County.

Table 4. Dollar Value<sup>/1</sup> of Crops and Farm Products Sold in Jefferson, Deschutes and Crook Counties, Selected Years.

Item	Year	County		
		Jefferson	Deschutes	Crook
Value of farm products Sold (\$1,000)	1944	\$ 1,713	3674	3787
	1949	4,565	3838	5047
	1954	9,628	3841	5217
Value of crops Sold per acre	1944	\$ 18.31	32.89	24.82
	1949	64.67	31.28	44.70
	1954	107.25	41.51	41.02
Value of products Sold per farm	1944	\$ 6,074	3667	8023
	1949	8,051	4096	10693
	1954	16,319	3600	13275

Source: United States Census of Agriculture

<sup>/1</sup> Adjusted to the 1949 Oregon prices received index.

The large increase in the total value of farm products sold in Jefferson County was due primarily to the increase in irrigated acreage. The value of crops sold per acre increased sixfold in the 1944 to 1954 period, whereas in the other two counties with a relatively constant amount of irrigated land during this period, the increase of the crop value per acre was 42 percent.

Table 4 also shows that the value of products sold per farm increased much more in Jefferson County than in the other two. From 1944 to 1954 the average value increased by 169 percent. By contrast, Deschutes County farmers had a smaller average income in 1954 than in 1944. The percentage increase in gross income per farm in Jefferson County was over 10 times greater than the state average increase in the ten-year period. Jefferson County's average income per farm was 142 percent greater than the state average in 1954.

The creation of new farms in the North Unit Project attracted people from outside the vicinity of Jefferson County. Some obtained new irrigated farm units, others came in as farm laborers, and most of the remainder settled in the small town of Madras within the project boundaries. During 1944 to 1949, the period of project settlement, the county population more than doubled (Table 5).

The increase in population in the late forties was in sharp contrast to the situation in Jefferson County in the 1930's. Low farm income had caused the abandonment of many farms and the population dropped by 10.7 percent. At this time, the economy of the county was primarily agricultural with 42 percent of the employed working in agriculture (Table 6). There was no other

source of industrial employment.

Table 5. Population Growth in Selected Counties and Years, Oregon.

Item	1940	1944	1949	1954	1958
<u>Jefferson County</u>					
Number	2402	2500	5500	5890	7790
Decile change/ <u>1</u>	-10.7	----	171.1	----	40.0
<u>Deschutes County</u>					
Number	18631	19600	21700	21700	19850
Decile change	26.3	----	17.1	----	-9.0
<u>Crook County</u>					
Number	5533	6000	8900	9220	9110
Decile change	65.9	----	62.5	----	1.3

Source: United States Census of Population and Oregon State Board of Census.

/1 Decile percentage changes are average changes over the 10 preceding years. The 1950 to 1960 change was estimated by projecting the first 8 years of the period.

Between 1930 and 1940 the neighboring counties of Deschutes and Crook had a population increase of 26.3 percent and 65.9 percent respectively (Table 5). Their economy did not depend on dryland farming. Also, they had larger communities and a lumber industry. These counties continued to grow in the forties but at a

slower rate than in the thirties (Table 5). Table 6 shows that the increased employment in forestry and lumbering accounted for nearly all of the increase in total employment. Agricultural employment had actually decreased during this period.

Table 6. Employment in Agriculture and Forestry in Selected Counties and Years, Oregon.

Item	Jefferson		Deschutes		Crook	
	<u>1940</u>	<u>1950</u>	<u>1940</u>	<u>1950</u>	<u>1940</u>	<u>1950</u>
Total	781	2128	7193	8597	2249	3339
<u>Agriculture</u>						
Number	326	1002	1118	1120	830	728
Percent	42	47	16	13	37	22
<u>Forestry and lumber</u>						
Number	11	179	392	1956	174	1122
Percent	1	8	5	23	8	34

Source: Census of Population, United States Department of Commerce.

As was mentioned above, the greatest increase in population in the area occurred in Jefferson County due to the settlement of the North Unit Project in the late forties. During the 1950's the number of persons working

in agriculture in the three counties started to decline after having increased during the forties as was shown in Table 3. Table 5 shows that there was net loss of population in Deschutes and Crook Counties after 1954. From 1950 to 1958, 1450 and 455 persons migrated from Deschutes and Crook Counties respectively.

In contrast to the decreasing population in Deschutes and Crook Counties, the total population of Jefferson County increased by 40 percent during the fifties. According to state census estimates, 950 persons immigrated into Jefferson County. In general, these were not farm settlers since all of the project had been previously settled and the number of farms and farm workers had been decreasing. These immigrants were the workers who, with their families, were mainly engaged in the trades, construction, and service occupations.

The increase in non-farm workers in Jefferson County can be attributed directly to the irrigation development in the area. There was no other major industry in the area. Lumbering employment did increase from 11 to 179 in the forties, but did not increase after 1950.

The Census of Manufacturing shows that the greatest number of manufacturing employees in the three-county

area were in wood and lumber industry. In 1954 there were only nine firms with 100 or more employees and all of these were wood and lumber manufacturers. Only one of these was in Jefferson County (Table 7). There was little growth in manufacturing employment in the 1947 to 1954 period. Although the number of firms increased from 48 to 99, the number of employees increased by only about 200 in the three counties.

Table 7. Number of Manufacturing Establishments and Production Workers for Selected Counties and Years, Oregon.

Item	Establishments		Employees
	Total	With more than 100 employees	
<hr/>			
<u>Jefferson</u>			
1947	3	1	168
1954	5	1	D
<u>Deschutes</u>			
1947	32	2	2067
1954	70	3	1601
<u>Crook</u>			
1947	13	3	653
1954	24	5	1310

Source: United States Census of Manufacturing, Department of Commerce.

D: Withheld to avoid disclosing figures for individual companies.

In Jefferson County, the number of firms increased from three to five with the same single firm employing over 100 persons in both 1947 and 1954. Total employment in 1954 is not available because of the small number of firms in the county. It can be assumed that it was not a great deal more than the 1947 employment since four of the five firms in 1954 had fewer than 20 employees.

Three new firms with fewer than 20 employees were started in Jefferson County in the 1947 to 1954 period. One, a food processing firm could be attributed to the increased agricultural production. The other two, a clay products and a metal manufacturing concern, developed to meet the increased building activity in the area.

Unlike the situation in Jefferson County, lumbering has played an important role in the change in employment in the other two counties. In Crook County, most of the 61 percent increase in employment came in the lumber industry during the 1947-58 period (Table 8). Deschutes County experienced a loss of 44 percent in lumber employment. Consequently, total employment in Deschutes County increased only 2 percent.

State employment statistics in Table 8 for the 1947-58 period show that the greatest increase in the number of workers in Jefferson County was in the wholesale and retail trades. Here the increase of 188

Table 8. Number of Workers Employed in Industries Covered by Unemployment Compensation for Selected Oregon Counties./1

Item	Total	Wood and lumber manufac- ture	Wholesale and retail trade	Construction	Finance real es- tate and service
<u>Jefferson</u>					
1947	307	139	66	74	8
1958	875	168	254	126	82
Percent change	185	21	285	70	925
<u>Deschutes</u>					
1947	3717	1805	824	198	406
1958	3787	1013	1095	141	443
Percent change	2	44	33	29	9
<u>Crook</u>					
1947	1072	592	231	63	136
1958	1728	1051	269	28	148
Percent change	61	78	16	56	9

Source: "Oregon Covered Employment and Payrolls by Industries, County, and Month," Oregon State Unemployment Compensation Commission.

/1 Data are given for month of March.

employees accounted for over one-third of the total increase in county employment. Only eight people were employed in the service, finance, and real estate occupations in 1947. By 1958, there were 82. Employment in the construction industry increased by 52 persons or 70

percent during the 11-year period. Total non-farm employment increased by 567 workers or 185 percent during the 1947 to 1958 period.

In 1939 there were relatively few retail businesses in Jefferson County. By 1958 the number of retail businesses had more than tripled. In 1958, 99 retail firms averaged about \$97,000 in gross incomes. This income was 50 percent greater than the average income of the 60 firms existing in 1947.

Comparing Jefferson County to Deschutes and Crook Counties, we find that the average amount of business per firm was less in every year in Jefferson County than in the other two. However, by 1958 the average dollars of trade per business establishment was not greatly different with Deschutes and Crook averaging \$102,195 while Jefferson County averaged \$96,909 (Table 9).

Of more importance than these average income figures is the fact that the number of businesses and the volume of trade grew much faster in Jefferson County than in the neighboring counties. The percentage change of dollars in trade was much greater in Jefferson County for each time period. Comparing the 1947 to 1958 period we find that volume of trade increased 150 percent in Jefferson County while Crook County increased 56 percent and Deschutes County increased by only 2 percent. As

Table 9. Retail Trade Establishments and Dollars of Trade for Selected Counties and Years in Oregon.

County	Retail establishments	Dollars of trade	Change in dollars of trade
	<u>Number</u>	<u>Thousands</u>	<u>Percent</u>
<u>Jefferson</u>			
1939	32	561	
1947	60	3,854	587
1954	72	7,736	101
1958	99	9,594	24
<u>Crook</u>			
1939	55	1,498	
1947	87	6,625	342
1954	94	10,767	63
1958	105	10,348	-4
<u>Deschutes</u>			
1939	277	8,668	
1947	335	30,503	252
1954	339	27,611	-10
1958	300	31,014	12
Source: United States Department of Commerce, United States Census of Business.			

was pointed out previously, the most important reason for the high rate of business growth in Jefferson County was the development of the North Unit Project.

Large retail stores did not exist either prior to or subsequent to the establishment of the project. In 1958, 32, or one-third of the retail stores were single

proprietorships without employees. Auto dealers accounted for 27 percent of the retail business. Food stores ranked second with 25 percent of the trade. The next three leading groups of stores, building materials and farm equipment, eating and drinking, and gasoline and service, each accounted for about nine percent of the retail trade. Even though the stores were small, the community had a wide variety of stores, thereby providing a complete shopping area for the whole county.

Prior to the North Unit Project, many Jefferson County farmers had traveled to a nearby community in Deschutes County to buy much of their family living items and farm operating supplies. After project and community development, farmers were more likely to shop in Madras. In the 1947 to 1954 period part of the ten percent reduction in retail trade in Deschutes County could be attributed to this shift in buying.

The growth of farm and business activity in Jefferson County is reflected in the volume of banking in the area. Table 10 gives the bank growth in Madras which is a good indicator of the growth of the community wealth. Living, farming, and business expense money is normally held as demand deposits. That is, it is put into a checking account. People with money in excess of these needs will put it into some type of savings of which

bank time deposits is only one. Increased demand deposits indicated an increase in business activity while the volume of time deposits indicated the accumulation of wealth in the community.

Table 10. Dollars of Deposits and Loans for Madras Branch, United States National Bank of Portland, Oregon, for Selected Years.

Item	Year			
	1945	1950	1955	1960
	<u>Thousands</u>	<u>Thousands</u>	<u>Thousands</u>	<u>Thousands</u>
Deposits:				
Time	101	286	781	2,120
Demand	925	2,125	3,228	3,590
Total	1,056	2,411	4,009	5,710
Loans	52	1,454	3,045	3,147

In the 15 years between 1945 and 1960 demand deposits increased by over 288 percent. Although some of this increase may be due to some increase in the use of checking accounts rather than cash, and a general rise in prices, most of the increase can be attributed to the increased volume of trade. For example, data presented in Table 9 showed retail trade increased over 17 times between 1939 and 1958 and 150 percent between 1947 and 1958. The general price increase accounted for about 20 percent of the 1947-58 increase (13, p. 423). Data in Table 4 showed farm income which provided

a base for additional trade, increased more than five times in the 1944 to 1954 period.

Time deposits increased spectacularly from \$101,000 to over \$2,120,000 or a twenty fold increase in the 1945 to 1960 period. As area residents had more income, they were able to deposit a larger portion of their money in time deposits rather than checking accounts. In 1945 the ratio of time to demand deposits was 1:9; in 1960 the ratio had narrowed to 1:17.

Along with increased dollar volume of deposits, the number of savings and checking accounts increased. In the 1955-60 period the number of checking accounts increased to 1,656 which was a 44.5 percent increase in the five-year period. Since nearly all of these accounts are from within Jefferson County, it is apparent that a large portion of the families had bank savings. There was an average of one savings account for each 4.6 persons in the county in 1960.

Bank loans increased from only \$53,000 in 1945 to over three million dollars in 1960. Not all of this tremendous increase was due to the North Unit Project but due to a change in bank ownership and policy in 1945. However, the irrigation water development did bring with it a great increase in the demand for bank credit. There were nearly 1½ million dollars of credit

outstanding in 1950. This amount doubled in the next five years. With completed farm development in the 1955 to 1960 period, the increase in bank loans was much smaller, being 3.3 percent.

While the stimulus to the substantial growth of banking in Jefferson County was provided by the irrigation development, loans in the late 1950's were made more for consumer expenditures than for farm expenses and investments. By 1960, over 40 percent of the bank loans were made for consumer credit where automobiles and appliances purchases made up a large portion of the loan purposes. Several other credit sources were available for farm loans such as Production Credit Association, Farmers Home Administration, Federal Land Bank, insurance companies and private individuals.

Since 1944, before the North Unit Project settlement began, all three counties have grown at varying rates in the categories analyzed. Growth has taken place not only in population, volume of trade, manufacturing, and farm output, but also in the value of real estate, machinery and equipment, inventories, and other business and farm properties.

Oregon State Tax Commission reports shown in Table 11 give the value of all taxable farm and commercial property. Personal household property and licensed vehicles are not included as taxable property.

In other respects the figures reflect the increase in the normal market value of property in the three areas.

Table 11. True Value of Taxable Property in Selected Counties for Various Years, Oregon./1

Year	Jefferson		Deschutes		Crook	
	Amount	Change	Amount	Change	Amount	Change
	Thousand Dollars	Percent	Thousand dollars	Percent	Thousand dollars	Percent
1944	5,835	---	20,331	---	10,473	---
1949	9,338	60.0	28,973	42.5	15,322	46.3
1954	16,893	80.9	43,551	50.3	24,832	62.1
1958	31,724	87.8	73,755	69.4	40,499	63.1
1944-58	---	443.7	---	262.9	---	286.7

Source: Oregon State Tax Commission, Biennial Reports.  
/1 Equalized by County Board of Equalization.

Property values increased from 5.8 million in 1944 to 31.7 million in 1958 in Jefferson County. There were large increases in Deschutes and Crook Counties also. However, Jefferson County's property values increased by a greater percentage than the other two. The percentage change was over 443 percent for Jefferson County compared to 263 percent for Deschutes County and 287 percent for Crook County. While there was a large gain in property values for the whole area, Jefferson County led the other two by a 20 percent greater increase for

each five-year time period as shown in Table 11.

### Area Growth Conclusions

The various measures of area growth and development presented above indicated that Jefferson County outgained the other two in all categories. Since the three counties were similar except for the newly irrigated North Unit, it was concluded that the higher rates of growth in Jefferson County resulted from the development of the North Unit Irrigation Project.

Direct or primary project benefits were indicated by the increased value of farm products sold. Both the total value and the per acre value of crops sold increased more than five times from 1944, before the project, to 1954, five years after water was delivered to the whole project. The value of farm products sold was nearly \$8,000,000 greater in 1954 than in 1944. By comparison Deschutes County farm income increased by \$167,000 and Crook County by \$1,430,000 during the same period.

The large increase in farm income for the project stimulated other commercial activity in the community. Employment in trade, construction, finance, real estate, and service increased from 148 to 462 persons in Jefferson County as compared to a change of 1,858 to 2,124 in the same categories for Deschutes and Crook Counties

combined. Crook County, taken by itself, had an employment increase of only 15 persons in the three categories.

Changes in farm income also affected the volume of retail trade. Increased income from irrigation farming was accompanied by increased farm expenditures. Annual volume of local retail trade increased by \$9,000,000 between 1939 and 1958 in Jefferson County. 'In the 1947 to 1958 period trade increased by \$5,740,000; by comparison the other two counties had an average increase of \$2,117,000.

A study by Marts of indirect benefits for the Payette, Idaho reclamation project indicated that the indirect benefits would be 1.27 times the direct benefits (11, p. 38). Indirect benefits measured were net entrepreneurial income, labor income, and property income. A Montana study showed that the ratio of non-farm employment to farm employment was a good indicator of indirect benefits. It was concluded that 1.30 was a conservative estimate of indirect to direct benefits (10, p. 25).

In the present study data were not obtained to determine the increase in non-farm income after the North Unit Project was settled. County comparisons indicated only that Jefferson County had grown more than its neighbors in all categories considered. If

the Montana technique is used for the 1958 employment figures, it can be concluded that indirect benefits amounted to about 1.4 times the direct farm benefits.

As a result of increased per capita income from the North Unit Project, additional employment occurred in the tertiary industries such as trade and services. At the same time the proportion of persons employed in secondary industry such as manufacturing was decreasing. In 1947, 75 percent of the employment in secondary and tertiary industries was in the secondary industries. By 1957 only 47 percent of the employment was in secondary industries. During the fifties, employment in agriculture, a primary industry, was decreasing. These shifts in employment indicated that Jefferson County was maturing.

The more mature economy will not be as vulnerable to fluctuations in economic activity. A drop in economic activity will lead to underemployment in tertiary industries. Workers may still be employed if only part-time or at a lower income. The situation would be different in the secondary industries where a decrease in economic activity would lead to unemployment. Personal incomes would drop more than would be the case for tertiary industries.

The growth of tertiary industry employment indicated that about one-half of the local job opportunities occurred in trade and service industries.

## CHAPTER IV

## ANALYSIS OF INDIVIDUAL FARM OPERATIONS

Area data from the North Unit Irrigation District water office indicated that one-third of the original ownership units had been combined into larger operating units by 1958. The farm operators surveyed in 1958 started with an average of 111 acres of irrigated cropland. By 1958 their average size had increased to 152 acres. Usually, farms were enlarged by buying or renting a complete ownership unit. In a few cases farm operators would rent a part of an ownership unit for growing potatoes.

The survey could not indicate the number of original ownership units that were combined into 1958 operating units because in about half the cases, the original farm operator was no longer operating the farm. However, it was possible to trace the enlargement activities of the farm operators who were surveyed in 1958.

In the 30-89.9 acre farm size class, none of the farm operators acquired additional acreage. Their 1958 units were the same size as when they began their farm operations (Table 12). One-half of the ownership units had changed hands at least once; the other half were still being farmed by the original operators. Average

Table 12. Total and Irrigated Acreage by Farm Size and Area, and Number of Farms and Acquisitions per Farm Operator, North Unit Project, Oregon.

Size group	Area	Beginning Acreage		1958 Acreage Irrigated	Number of farms	Units per farm/ <u>1</u>
		Total	Irrigated			
40-79.9 acres	Agency Pl.	110	62	71	6	1.00
	Met.-Cul.	75	63	57	6	1.00
	Mud Spgs.	82	61	61	6	1.00
	North Unit	89	62	63	<u>18</u>	1.00
80-159.9 acres	Agency Pl.	151	129	142	6	1.17
	Met.-Cul.	164	110	133	8	1.25
	Mud Spgs.	196	116	131	<u>7</u>	1.12
	North Unit	171	117	135	<u>21</u>	1.19
Over 160 acres	Agency Pl.	347	151	279	8	2.25
	Met.-Cul.	472	149	331	4	2.75
	Mud Spgs.	279	154	190	<u>5</u>	2.20
	North Unit	356	151	267	<u>17</u>	2.35

1 Average number of farm units acquired by present operator.

farm size in 1958 was 63 irrigated acres.

Six of the 21 farm operators in the 90 to 159.9 acre class had enlarged their farms. Four operators had acquired one additional farm unit each. The other two developed 30 acres of previously owned, non-irrigated acres. Average irrigated acreage increased from 117 to 135 acres while under the control of the 1958 operator. The average number of acquisitions for each operator was 1.19. Eleven operators of 21 had farmed the original ownership unit from the time water was first available between 1946 and 1949. Two of these 11 were renters. Of the 10 non-original operators, four were renters, the other six had purchased farm units from the previous owners. Two one-unit owners also rented an additional farm ownership unit. Only two operators owned more than one original unit. Both of these operators started with an 80 acre unit and acquired an additional 80 acre unit.

Twenty-two percent of the farm operators had over 160 irrigated acres and 45 percent of the project land was in farms of over 160 acres in 1958 (Appendix Table 1). All of the farms in this size class should be made up of more than one original units since the 1945 contract specified that each owner would be limited to 80 acres or 160 acres for a family. Actually, two of the original owner operators had land in excess of 160 acres when they

first acquired water in 1948 and 1949. One had 170 acres, the other 175 acres. This situation arose because the farmer was able to irrigate lands that were not originally classified as irrigable.

Ten of the 17 farm operators in the over 160 acre size class obtained a farm unit when water was first available. Of these, eight were owners, one a corporation manager, and the other a renter. Four of the remaining seven operators started as owners, the other three began as renters. In 1958 there were four full owners, eight who both owned and rented land, four renters, and one corporation farm manager. Owners farmed an average of 184 acres per farm, renters 253 acres, and owner-renters had the largest acreage averaging 306 acres for each operating unit.

Farmers in the over 160 acre size class began their operations as early as 1946 and as late as 1957. Only six farmers started operations with over 160 acres, the largest being 260 acres. Four started with 80 acres or less, the smallest being 27 acres. The average beginning farm operating unit contained 134 acres. By 1958 farm operators had doubled their beginning farm size to 267 irrigated acres.

Of the six farmers who started with over 160 acres, only one subsequently enlarged his operation. It was

the second largest in the survey, over 500 acres. The largest operation in 1958 was started in 1948 with 80 acres. Two additional purchases were made totaling 240 acres. Two years later this operator rented 240 additional acres.

The sample of 56 North Unit operators represented a total of 83 acquisitions or an average of 1.48 parcels of land per operator. The sample ratio of acquisitions per operator of 1.48 is close to the ratio of the number of original ownership units to 1957 operating units, 1.58. This should hold true if the sample adequately represented the population, and further, if acquisitions were usually of original ownership units. The survey results give strong support to the correctness of the above premise.

#### Farm Organization and Operation

Survey data were obtained for acreage and yields of crops grown in 1957. The crops grown the previous two years were also recorded. Inspection of the records indicated that the most prevalent rotation for the 56 sample farms was 3 years alfalfa, 2 years grain, and 1 year potatoes. This proportion of crops grown agrees closely with crop acreage distribution as shown by the district water office records (14). The total acreage

of crops in 1957 were as follows:

<u>Crop</u>	<u>Acres</u>
Legumes and pasture for hay.....	16,372
Legumes for seed.....	<u>3,369</u>
Total.....	19,471 (42%)
Potatoes.....	7,477 (16%)
Grain.....	14,639 (32%)
Seed Crops.....	3,306 ( 7%)
Other.....	<u>1,403</u> (3% )
Total.....	46,566

Other cropping rotations determined from the field schedules were:

3 years alfalfa	3 years alfalfa
2 years potatoes	3 years grain
1 year grain	
1, 2 or 3 years legumes for seed	4 years Merion bluegrass for seed
1 year potatoes	1 year potatoes
1 year grain	1 year grain

Three-fifths of the farmers surveyed owned live-stock. Feeder cattle were reported on 41 percent of the farms, dairy cows on 18 percent, ewes on 9 percent, and beef cows on 5 percent

Livestock income made up 16 percent of the 1957 average gross income of \$23,752. The average livestock sales for 25 farms reporting livestock income was \$8,772. Three farmers had more livestock than crop income.

The importance of livestock enterprises has

Table 13. Percent of Farms with Livestock and Average Number of Feeders and Cows per Farm with Each Type of Livestock, North Unit Project, Oregon, 1958.

Size of farm	With live- stock	<u>Feeder Cattle</u>		<u>Dairy Cows</u>	
		% of farms	Av. no. per farm	% of farms	Av. no. per farm
<hr/>					
	<u>Percent</u>				
30.0-89.9 acres	44	17	46	22	9
90.0-159.9 acres	71	48	38	29	9
over 160 acres	<u>65</u>	<u>59</u>	<u>88</u>	<u>6</u>	<u>9</u>
All farms	61	41	61	18	9

increased since early project years as evidenced by the increase in livestock investment from \$1125 per farm in 1948 (20, p. 27) to \$5,420 in 1958 (Table 17).

Over one-half of the average crop income of \$19,836 per farm was from potatoes. One-fourth of the income was from grains with wheat comprising 80 percent of this income. About 10 percent of the income was from seeds and 6 percent was from peppermint oil.

Net farm income averaged a minus \$3,500 for the two least profitable farms to over \$50,000 for the two most profitable farms. Average net farm income for the 30-89.9 acre farm was \$1,198. The highest three farms in the 30-89.9 acre group averaged \$4,400 above operating costs and depreciation. Even this highest income for the

small farm group was inadequate to support a family, pay debts and have any reserve for contingencies.

Many farmers in the 90 to 159.9 acre size group had an adequate net farm income in 1957. Average income was \$6,059 with a range from minus \$3,500 to over \$14,000. Five operators had more than \$10,000 net farm income while at the low end of the scale, eight had net farm incomes of less than \$4,000.

Average net income to farms over 160 acres was a substantial \$19,461. However, large size did not guarantee a large income. Five farms had incomes of less than \$3,000. One of these had a minus \$2,000 income. By contrast, four farms had incomes over \$30,000.

The two largest farms had the highest net income and ranked first and third in average net income per acre. They also had the greatest number of feeder cattle. However, after the two largest farms the direct relationship between size and income no longer held. The eighth largest farm ranked second in returns per acre and fourth in total income. By contrast, the third largest farm ranked ninth in per acre returns and fifth in total income. Size of farm, livestock program, cropping program, land quality, and management were important factors influencing net farm income.

In order to make income comparisons between areas

and farm size, farm budgets were prepared using average yields, prices, and inputs as found by the farm survey.<sup>/1</sup>

Three farm sizes were selected that represented the range of sample farms in each size class as follows:

60 acres....30 to 89.9 acre size class

140 acres....90 to 160 acre size class

240 acres....160 acres and over size class

The Agency Plains area was combined with the Metolius-Culver area because there was no significant difference between the inputs and yields for the two areas. Table 14 summarizes the costs and income for the different areas and size groups. A residual to labor and management was obtained by subtracting from net farm income a 6 percent charge for machinery investment and a 5 percent charge for capital invested in land, buildings, and improvements.

If a farmer owned all of his capital, the charge for capital would be income available for the family expenses or reinvestment. If he had machinery, equipment, or real estate debts, part of the capital charge would have to be paid as interest on his debts. If he was a renter, the capital charge on the land would be paid as rent to the owner of the land.

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<sup>/1</sup> For complete details, see reference 4, p. 20-37 or reference 3, p. 8-19.

Table 14.

Budgets for Three Farm Sizes, North Unit Project, 1957.

	Agency Plains and Metolius - Culver Areas			Mud Springs Area		
Acres	60 acres	140 acres	240 acres	60 acres	140 acres	240 acres
Alfalfa	30	70	120	30	70	120
Potatoes	10	23	40	10	23	40
Wheat	15	15	15	15	15	15
Barley	5	32	65	5	32	65
Capital Investment						
Irrigated land	\$ 15,000	\$ 35,000	\$ 60,000	\$ 15,000	\$ 35,000	\$ 60,000
Buildings	2,320	2,600	6,350	2,320	2,600	6,350
Improvements (leveling)	1,500	3,500	6,000	--	--	--
Machinery & equipment	6,400	11,700	23,900	6,200	10,300	23,950
<b>Total</b>	<b>\$ 25,220</b>	<b>\$ 52,800</b>	<b>\$ 96,280</b>	<b>\$ 23,520</b>	<b>\$ 47,900</b>	<b>\$ 89,400</b>
Production						
Alfalfa	126 T	294 T	504 T	126 T	294 T	504 T
Potatoes	180 T	414 T	720 T	160 T	368 T	640 T
Wheat	840 bu.	840 bu.	840 bu.	840 bu.	840 bu.	840 bu.
Barley	350 bu.	2240 bu.	4550 bu.	300 bu.	1020 bu.	3900 bu.
Sales						
Alfalfa	\$ 1,953	\$ 4,557	\$ 7,812	\$ 1,953	\$ 4,557	\$ 7,812
Potatoes	4,311	9,915	17,244	3,832	8,314	15,328
Wheat	1,747	1,747	1,747	1,747	1,747	1,747
Barley	344	2,204	4,477	295	1,399	3,838
<b>Total</b>	<b>\$ 8,355</b>	<b>\$ 18,423</b>	<b>\$ 31,280</b>	<b>\$ 7,827</b>	<b>\$ 17,007</b>	<b>\$ 28,725</b>
Expenses						
Variable Costs						
Labor - monthly	\$ --	\$ --	\$ 1,500	\$ --	\$ --	\$ 1,500
hourly	105	132	1,504	105	132	1,356
Custom work	1,627	2,658	--	1,527	2,428	379
Machine rentals	97	225	70	80	184	--
Fertilizer	627	1,457	2,508	496	1,152	1,934
Seed	460	1,016	1,732	460	1,016	1,732
Crop supplies	60	432	744	--	294	504
Irrigation water charge	334	779	1,336	334	779	1,336
Gas, oil & grease	310	610	1,035	300	570	1,005
Potato sorting, weighing, inspection	1,080	2,484	4,320	960	2,208	3,840
Interest on operating capital	60	130	265	60	130	265
Fixed Costs						
Overhead <sup>/1</sup>	162	202	298	162	202	294
Vehicle licenses	16	32	52	16	32	52
Insurance - vehicle, property, liability	112	120	262	112	120	262
Taxes - real estate & personal property	274	567	1,049	271	559	1,037
Repairs - building	46	52	127	46	52	127
machinery	256	468	956	248	412	922
Non-cash Costs						
Depreciation - machinery	539	1,071	2,168	526	939	2,125
building	58	66	159	58	66	159
<b>Total expense</b>	<b>\$ 6,223</b>	<b>\$ 12,501</b>	<b>\$ 20,085</b>	<b>\$ 5,761</b>	<b>\$ 11,295</b>	<b>\$ 18,976</b>
<b>Net farm income</b>	<b>\$ 2,132</b>	<b>\$ 5,922</b>	<b>\$ 11,195</b>	<b>\$ 2,066</b>	<b>\$ 5,712</b>	<b>\$ 9,847</b>
Less return for capital investment	\$ 1,203	\$ 2,557	\$ 4,644	\$ 1,118	\$ 2,354	\$ 4,300
Return to labor & management	\$ 929	\$ 3,365	\$ 6,551	\$ 948	\$ 3,358	\$ 5,547

<sup>/1</sup> Electricity, telephone, office expenses, market information, and Social Security.

Budgeted crop income to farms of the same size was about the same in both areas. However, due to lower yields of potatoes and barley, net income in the Mud Springs area was about 3 percent less for the 60 and 140 acre farms and 12 percent less for the 240 acre farm.

Small farms as represented by the 60 acre farm budget returned about \$2,100 to capital, labor and management. Even a full owner without debt may be unwilling to subsist on such a low income.

Farm budgets for 140 acres of irrigated land showed about \$5,800 net farm income above operating and depreciation expenses. This income would be adequate for many farm operators; for others, it would not. For example, a tenant farmer's income would be reduced by nearly \$2,000 assuming the landlord earned 5 percent on his real estate holdings. In addition, interest payments on capital loans could reduce available income up to \$600. The remaining income of \$3,200 would have to be distributed between capital expenditures for both home and farm, any savings or insurance, and family living expenditures.

Farm budgets for the 240 acre size farms showed net incomes of \$11,195 and \$9,847 for the two area groups. Deducting a charge for capital, the returns to labor and management amounted to \$6,551 and \$5,547.

Off-farm Income

The budgets and survey both demonstrated that many farmers had inadequate net farm incomes to achieve their desired goals. However, North Unit farmers had several other sources of income in addition to farm income from the project. Farmers on 30-89.9 acre farms had \$4,012 non-project income, nearly four times as much as their incomes from farming project lands. Farmers with over 90 acres averaged about \$2,000 non-project income (Table 15).

Table 15. Sources and Average Dollars of Income per Farm by Farm Size in the North Unit Deschutes Project, Oregon, 1957.

Item	30-89.9 acres	90-159.9 acres	over 160 acres
Non-project income:			
Dryland farming	48	17	112
Land rental	587	502	615
Off-farm work:			
Operator	2185	694	591
Family	770	131	63
Other income	<u>422</u>	<u>641</u>	<u>657</u>
Total	4012	1985	2038
Net farm income	<u>1198</u>	<u>6059</u>	<u>19461</u>
Total family income	5210	8044	21499

Nine North Unit farmers received some income from dryland farming. This land lay outside of, but nearby,

the project. The average dryland gross income for the nine farmers amounted to \$1381. Net income was estimated to be \$350, an insignificant amount compared to irrigation farming income.

Several project farmers rented land to other farmers. Both project and non-project land were rented out. Average rental income for the farms sampled was \$560. There was little difference in average rental income between the three farm size groups.

Over one-fifth of the non-project income was from sources other than off-farm work or non-project farm income. A major portion of the average of \$571 other income was from government payments and gas refunds. The balance came from receipts on investments.

The most important source of non-project income was from off-farm work. The average income per farm unit for the operator and family was \$1,456 of which \$1,142 was earned by the operator.

A breakdown of type and days of off-farm work is given in Table 16. The number of days worked for each group was directly related to the income received as would be expected if similar rates of pay were earned by all workers. Wage earners in the three size classes earned substantially the same daily wage, about \$16.00. The average off-farm daily earnings of the middle size group was about \$10.00 greater than the other two

because of two farmer-businessmen who earned about \$7,500 each from their part-time businesses.

Table 16. Off-farm Work by Farm Families in the North Unit Deschutes Project, Oregon, 1957.

	30-89.9 acres		90-159.9 acres		over 160 acres	
	No.	Average days	No.	Average days	No.	Average days
Operator:						
Farm labor	7	116	5	24	2	54
Other labor	6	128	2	72	3	129
Other	2	225	2	77	-	---
Family:						
Other labor	5	109	1	60	1	90
Other	<u>3</u>	<u>237</u>	<u>1</u>	<u>180</u>	<u>-</u>	<u>---</u>
Total persons	23	141	11	57	6	97
Farms	18	182	21	31	17	34

In general, persons living on smaller farms worked more days off-farm than those on larger units. There were 23 people working an average of 141 days off the farm from the 18 small size farms. By contrast, six persons from the 17 large size farms worked an average of 97 days each and 11 persons from the medium size farm group averaged 57 days off-farm work. The average days off-farm work by farm units was 182 for the small, 31 for the medium, and 34 for the large.

In the small size farm group of 18 operators, 15

worked off the farm; eight family members also worked off the farm. In only one instance was neither the operator nor a family member working off the farm in the small farm group. Four operators worked less than two weeks off-farm. The farm operators averaged 135 days and eight family members averaged 157 days off-farm work. Five operators and three family members had full-time off-farm jobs.

Nine operators and two family members of the middle size farm group worked off the farm. None of the operators and only one family member had a full-time off-farm job. Not only did fewer operators work off the farm than in the smallest group, but they also averaged fewer days of work for each off-farm worker, 46 days as compared to 135 days as mentioned above. The two family workers averaged 120 days off-farm work.

Five of the largest size group operators worked off the farm. One worked full-time due to special circumstances. He did not work off the farm in 1958. Without this case, the average days for operators working off-farm would have been under 60 days instead of the average of 99 days.

Twenty-nine (52 percent) of the operators worked off the farm. Twenty-five operators worked as laborers (14 farm and 11 non-farm laborers). Five operators had

off-farm income from non-labor employment. The 29 operators averaged 101 days off-farm employment.

None of the eleven family members who worked off-farm performed farm labor. They were employed in such jobs as potato sorters, store clerks and office workers. They averaged 144 days per year on the job.

The survey indicated that small scale farmers not only needed supplementary off-farm income but also that they were able to obtain off-farm employment. Nearly half of the operators' off-farm job opportunities was labor on other North Unit farms.

#### Farm Investment

Average investment per farm operating unit has increased steadily since the beginning of the project. Average investment increased from \$13,446 in 1948 to \$51,680 in 1958, a more than fivefold increase (Table 17). Contributing factors to this large increase included: average size increase of 71 acres per operating unit; (2) higher prices for machinery, equipment, and building materials; (3) increasing land values; and (4) more livestock on each farm.

Average investment for each irrigable acre increased from \$166 in 1948 to \$340 in 1958. About 50 percent of the increase resulted from higher land purchase price. Farmers who obtained their land as unimproved dryland

Table 17. Comparison of Average Dollars Invested per Acre and per Farm by Farm Size and Year, North Unit Deschutes Project, Oregon.

Item	All farms		1958 farms by size		
	1948/ <sup>1</sup>	1958	30-89.9 acres	90-159.9 acres	over 160 acres
Land purchase	28	117	113	126	117
Land develop- ment	16	25	15	27	17
Residence	34	40	116	37	23
Farm buildings	8	38	44	45	34
Machinery and equipment	66	84	99	76	85
Livestock	14	36	31	28	42
Investment per acre	166	340	418	339	318
Acres per farm	81	152	63	135	267
Investment per farm	13,446	51,680	26,334	45,765	84,900

<sup>1</sup> 1948 data obtained from reference 20, p. 27.

had the lowest purchase price and the highest land improvement costs. Just the reverse was true for farmers who bought completely developed units after the project had been in operation for several years.

Land purchase prices ranged from zero for two homesteaders to \$300 an acre for top quality land bought after 1954. Buyers of unimproved project land paid the Bureau of Reclamation's appraised price, the maximum being \$23 per acre for Class I irrigable land. The much higher land purchase price prevailing in the mid-fifties

reflected not only the general rise in land values but also original owners' investments in land improvements, such as irrigation systems, land leveling, stock ponds, fencing and permanent legume and grass stands. Average land purchase price was \$28 for 1948 owners and \$117 for 1958 owners (Table 17).

Building costs were lowest for original dryland owners. Some had a home, barn, and some sheds on previously owned property that became part of the North Unit Project. Building costs increased considerably between 1946 and 1958. Housing costs were not directly related to size of farm. Two small units had homes costing over \$15,000 while five units of over 160 acres had older houses costing less than \$5,000.

The average cost of a residence increased from \$2,750 in 1948 to \$6,000 in 1958. The highest average residence cost in 1958 was \$7,327 for the smaller units. The lowest was \$5,012 for the medium-size farms. The larger farm residences averaged \$6,000 original cost.

Farm building investments were more in line with size of farm. The costs for small, medium and large farms were \$2,800, \$6,048 and \$8,977, respectively. Average per acre costs were \$10 less for farms over 160 acres than those under 160 acres.

Average farm building investment increased from \$677 in 1948 to \$5,811 in 1958 because of an increasing need for buildings in later years, such as potato cellars, tenant housing, storage buildings, and machine sheds, as farm operations became larger and more specialized. In some cases new owners were short on funds for buildings. Consequently, they got by without needed buildings for several years until they were able to accumulate funds and credit for the erection of needed buildings.

Small farms averaged \$99 per acre for investment in machinery and equipment which was 30 percent greater than the investment for the 90 to 159.9 acre size group. Equipment investment for the small farms varied considerably from a high of \$24,000 to a low of less than \$1,000. The low price was for a set of old equipment that came with the purchase of the farm. A full line of equipment on the small farm cost around \$9,500, only slightly less than the average investment of \$10,300 for the middle size farms. Average equipment investment increased from \$66 per acre in 1948 to \$84 per acre in 1958 because of higher prices and also because more expensive items of equipment were being used such as self-propelled combines and automatic balers.

The livestock water problem of the early project

years had been alleviated by stock ponds and cisterns for winter water by 1958. Twenty-six or 46 percent of the farmers had feeder cattle, six had dairy cows, and three had ewes. A total of 35 of the 56 farmers surveyed had livestock.

Large farms had a 50 percent greater per-acre livestock investment than medium size farms, the amounts being \$42 and \$28, respectively. The average 1958 investment for all farms of \$36 was two and one-half times as great as the 1948 livestock investment. Average livestock investment for the three farm sizes were: small, \$1,950; medium, \$3,675; and large, \$11,087.

The farmers' net worth or equity in his operation is an indicator of the financial strength of the operation whereas the change in equity measures growth of the farm operation over time. Net worth for 1958 was determined by summing the assets per operator and deducting the intermediate and long-term debts. Annual loans were not considered debts against assets but operating debts secured by production. Therefore, they were not deducted from asset values. Beginning net worth was the total equities owned by the operator at the time he began project farming. Not all farmers showed an increase in net worth from their first year of operation to 1958, but the average change over the 7.9

years was an increase of \$22,300. Table 18 shows the asset and debt situation for farm operators.

Table 18. Average Dollar Equities of North Unit Deschutes Project Farmers by Farm Size, Oregon, 1958.

Item	30-89.9 ac.	90-159.9 ac.	over 160 ac.
Investment:			
Land	6,769	13,846	27,275
Buildings	8,439	8,953	11,452
Machinery	6,255	10,300	22,725
Livestock	<u>1,950</u>	<u>3,765</u>	<u>11,087</u>
Total	23,413	36,864	72,539
Debt <u>/1</u>	3,827	5,597	4,126
Net Worth:			
1958	19,586	31,267	68,413
Beginning	<u>19,547</u>	<u>14,055</u>	<u>16,556</u>
Increase	39	17,212	51,857
<u>/1</u> Average intermediate and long-term debts.			

The average net worth of beginning small farmers was \$19,547, a greater amount than the average for the larger size groups. Net worth of small operators increased \$39 from beginning operations to 1958. The median beginning net worth of \$9,850 was much less than the average value because of the high average of the top four, \$54,450. Their average net worth was over

\$10,000 more than that of the operators on the four largest farms in the survey. Fifty percent of the small scale farmers started with over \$10,000 equity, the same proportion as for the large scale farmers.

Medium scale farm operators more than doubled their equity (\$14,055 to \$31,267) while farming on the project. They gained an average of \$2,000 for each year of operation (Table 18).

Although the farmers in the largest size farm group started with \$3,000 less in net worth than the small farm size group, they quadrupled their equity in an average of 7.9 years on the project (Table 18). These farmers increased their equity from \$16,556 to \$68,413, an average of \$6,560 a year.

New farms require heavy expenditures to get into full production. Therefore, beginning net worth is often of prime importance to the success of a new farm operation. Successful farmers either had sufficient funds or were able to borrow enough to get in the first crop. Farmers beginning in 1946, 1947, and 1948 borrowed an average of \$85 per acre (20, p. 26). There was no discernable relationship between beginning net worth and capital accumulation among these early project farmers just as was the case for the farmers surveyed in 1958.

The initial investment decision was a crucial factor in several instances. Several farmers with a large amount of assets bought a complete farm and set of equipment with farm size limited by the amount of cash they had available. They did not acquire sufficient funds to expand or perhaps had no desire to be larger. Others with fewer beginning assets rented land or bought on credit and were able to acquire larger operating units. The importance of renting for the larger operations is brought out by comparing the percentage of operators renting land in each size group: small, 11 percent; medium, 33 percent; and large, 71 percent.

No single pattern of development can be cited as the best path to financial success. Some farmers started on small units with few assets and developed large efficient units while others failed completely and sold their units. Some had substantial assets (usually acquired by selling a previously owned farm) and were prospering while others were losing their beginning equities. The only discernable difference between successful and unsuccessful farmers were the type and yields of crops grown.

#### Use of Credit

Credit has been an important factor in the

development and operation of project farms. Comparing 1948 to 1958 the average debt per farm was fairly constant, \$6,850 compared to \$6,123, but the type of credit used changed from primarily real estate and chattle loans to annual operating loans. During the development period long and intermediate term loans were needed for land development, buildings, machinery and equipment. After development operators required a greater proportion of short-term operating capital.

Farmers surveyed in 1948 had 94 percent of their loans with intermediate or long-term repayment periods (20, p. 33). Those surveyed in 1958 received 85 percent of their 1957 loans as short-term credit. Most of this short-term credit was used for operating rather than investment expenditures. Farmers also used dealer credit which was not included in the short-term loans.

Seventy-seven percent of the farmers in the survey had short-term loans during 1957. Twenty-one percent had intermediate term loans and 28 percent had long-term loans. Eight or one-seventh of the farmers used no credit of any kind during the year. Six of these operated small farms.

At the beginning of the 1957 crop year, operators of the small size farms owed an average of \$3,691. During the year they borrowed an additional \$2,618, half

Table 19. Average Annual Dollars of Credit  
Used for a Sample of North Unit  
Deschutes Project Farmers in Oregon,  
1957.

Term	All farms	30 - 89.9 acres	90-159.9 acres	over 160 acres
<b>Short:</b>				
Beginning	1,946	817	2,705	2,208
New	7,617	1,302	6,813	15,294
Ending	1,542	730	1,905	1,953
Paid off	8,021	1,389	7,613	15,549
<b>Intermediate:</b>				
Beginning	829	650	316	1,177
New	104	122	0	212
Ending	514	583	219	806
Paid off	419	189	97	583
<b>Long:</b>				
Beginning	2,906	2,224	4,270	1,941
New	1,249	1,194	1,190	1,379
Ending	4,067	3,244	5,378	3,320
Paid off	880	174	82	0

of which was short-term. The amount paid off during the year amounted to \$1,752. The end-of-year debt was about \$850 greater than the beginning debt. This increase was due to new long-term loans and did not signify debt repayment difficulties. Short and intermediate term debts were reduced over the year. For each dollar of debt there was an average of \$5.78 in assets at the end of the year.

The average small farm debt situation was very favorable. However, taking the individual situation, there was a high degree of variation. Eight of the 18 farmers had no debts at the end of the crop year. Three farmers had about \$15,000 each for the maximum year-end debt. Only one-sixth of this was other than long-term debt. Debts alone were not causing difficulties for the small scale farmer.

Farmers of the medium farm size group had \$7,291 debt outstanding at the beginning of 1957, twice as much as the small size group. They borrowed \$8,003 during the year, \$6,813 of which was short-term loans. They used five times as much short-term or operating credit as did the small size group. At the end of the year the middle group owed an average of \$7,502. Debts were reduced \$50 during 1957. There were no intermediate-term debts contracted during the year.

Eight of the 17 farmers in the middle size group had no debts at the end of 1957. The greatest debts outstanding were about \$32,000, \$25,000 and \$17,000. These large debts were secured by real estate mortgages of long repayment terms. In only one of the above three cases was the debt excessive in terms of farm income available for debt payments. This was a beginning farmer who had borrowed heavily to buy his farm in 1957.

His first crop was considerably below average. His net income was less than one-fourth of his real estate principle and interest payment due. He stated that he would like to sell his farm for its appraised price.

Farmers in the large size group acquired an average of \$16,885 of new credit in 1957. Ninety-one percent of this credit was for operating expenditures with less than one year repayment terms. The end of the year debt averaged \$6,079, nearly \$1,500 less than the debt for the middle size group.

The highest debt was over \$60,000, the second highest \$20,000. Six of the group had no year-end debt. The largest debt had favorable repayment terms. It was not causing financial difficulties for the operator.

Forty-eight of the farmers surveyed had a total of 70 loans. One-third of the loans were made by the local bank. Farmers Home Administration made 26 percent of the loans and the Production Credit Association made 20 percent of the loans. The above three sources accounted for 80 percent of all loans. About three-fourths of these loans were short-term loans. Fourteen percent of the remaining loans were made by private lenders.

Interest rates were generally low. Long-term loans averaged  $4\frac{1}{2}$  percent, intermediate-term loan rates were

5½ percent and short-term rates were between 6 and 8 percent. The highest rates were reported for private loans at 8 percent. F.H.A. interest rates were the lowest ranging from 3 to 5½ percent, depending on type of loan. Bank and P.C.A. rates were generally 6 percent.

Project farmers had been shifting from intermediate and long-term loans to annual operating loans. In general, the larger the farm, the greater the proportion of operating credit to total credit. Small and large farm operators had approximately the same long-term debt while the large farm operators used nearly 12 times as much short-term credit as did the small farm operators. High debts were a problem in only a few instances. Forty percent of the farmers had no debt of any kind at the end of 1957. Most farmers had a high equity to debt ratio, giving them adequate security for additional credit if it could be profitably used.

#### Personal Characteristics of Farmers

A farmer's ability to adjust to changing conditions is dependent on many factors including personal characteristics such as age, health, education, prior farm experience, and family, as well as financial and physical factors. Numerous adjustment studies have been made indicating that personal factors may be of primary

importance to adjustment possibilities. For example, in the Piedmont area of South Carolina, age and education were found to be closely related to management levels (2, p. 47).

The median age for the sample of North Unit Project farmers was 46 years. The range was 27 to 67 years. While 46 years does not indicate a young group of farmers, it is below the 1954 Oregon average of 50 years. A group of 60 North Unit farmers surveyed in 1948 averaged 39 years of age (15, p. 13). Operators who replaced original operators had a median age of 45 years in 1958.

The median age for farmers on the largest units was 40 years, six years less than it was for the small size farm operators and 12 years less than for the medium size farm operators. Four farmers in the large size group were over 50 with the oldest being 55. Ten farmers in the middle size farm group were over 50, five of whom were over 60. Six small scale farmers were 50 years or over, with one past 60.

One-half of the operators were high school graduates, 13 attended college, and six were college graduates. Two farmers had attended school less than eight years and 16 had eight years of schooling. There was no apparent relationship between education

and size of farm unit. Of the six college graduates, two each were on the small, medium, and large size farm units. The average settler had more education than farmers in the country as a whole who averaged only 8.6 years in 1950.

The number of people per family increased from 3.2 in 1948 to 4 in 1958. Families on the large units averaged one child more than those on the small units, 2.4 compared to 1.4. Thirty-nine percent of the families had 3 or more children at home while one-fourth had none. Families on small and medium size units ranged from 1 to 7 members; those on large size farms ranged from 2 to 7 members. Only 5 percent of the operators were unmarried.

Previous occupational experience of project farmers ranged from farm operation to career service men. About 42 percent of the operators had been farmers elsewhere, 30 percent were formerly laborers, 9 percent had been woods workers, and 19 percent had been engaged in business and professional occupations of various sorts.

There was no significant relationship between successful farm operation and previous farm experience. One-half of the large unit operators were farmers before coming onto the project. This group averaged \$25,400

net farm income as compared to \$13,550 for the large scale operators farming for the first time. The higher average for the farm group is the result of two very large incomes of over \$50,000. The operators with previous farm experience also had the two lowest net incomes in the large size group. Operators with previous business or farming success were generally successful on the North Unit Project. In some instances success could not be measured by size of farm or income. Several older farmers had stabilized their operations and were not trying to increase either acreage or other farm investments.

Occupational experience influenced opportunities available and adjustments attempted. For example, an operator who previously taught school but always wanted to operate his own farm, returned to teaching when income from his unit was insufficient to support his family. By contrast, a young farmer with no other job experience, who started in the same year, 1948, with about the same size unit and net worth (less than 80 acres and \$4,000), turned to farm enlargement to increase his income. He purchased 20 acres the second year on the project, 40 the third, 80 the fourth, and still another 20 acres five years later. He also rented an additional 80 acres, increasing the original unit to 240 acres of irrigated land. His 1958 net

income was 250 percent greater than the average on the project.

Other young operators with farm backgrounds and no other occupational experience turned to laboring for needed additional income. They neither enlarged their farm operation nor found adequate off-farm employment. Previous off-farm work experience did not always cause operators to look off the farm for supplemental income. For example, a carpenter began farming in 1950 with \$3,500 and 80 acres of rented land. He was able to rent three more parcels of land to bring his total irrigated acreage up to 387 in 1957. His 1957 income was greater than the average for the large farm group.

Each settler had a different complex of personal characteristics and each experienced different project results. The wide variation in personal characteristics and the small number of farmers sampled prevented the obtaining of significant relationships between personal characteristics and farm success. As a group, the project farmers were comparatively young and well educated. They were a group of people willing to try new enterprises or methods of farming to adjust to changing conditions.

## CHAPTER V

## FARM BUDGET ANALYSIS

Information obtained in the field survey indicated that some farmers were not earning adequate incomes. Two important reasons for this situation were small farm size and non-profitable organizations. Farm size was limited by availability of suitable land for expansion and by the reluctance of farmers to acquire additional land in view of uncertain profits. Farm size was also limited by operator and capital.

There was adequate harvest labor available for hire in the North Unit. In addition, some family labor was available in the summer months. The large farms had one or more full-time laborers. Farmers on average or smaller farm units stated that it was difficult to hire a man for only the summer months and that they could not afford to utilize a man for the whole year. Unless they could have a farm large enough to utilize a second man full-time, they preferred to operate only as many acres as they could handle themselves with hired labor during the harvest periods. This section of the study analyzes how much land an operator could farm with only hired harvest labor.

Another limiting factor for farm size and income was the amount of operating capital available to the operator. Survey data indicated that average size farms of 152 acres used about \$12,600 operating capital. In order to determine the effect of limited operating capital on farm size and income, the average of \$12,600 was used as maximum available to the operator.

After maximum sizes as limited by labor and capital were found for selected farm organizations, it was possible to determine the marginal value of an additional unit of each of the limiting factors. The marginal value was the increase in income resulting from using one more unit of the limiting factor after subtracting the additional cost of production.

The basis for the farm analysis was the budgets prepared from data obtained in the field survey (reference 3 and 4). Four different rotations were analyzed. Fixed costs were calculated for model farms representing small, medium, and large scale operations. Variable costs, returns and labor requirements were calculated for one acre of each of the four rotations. Maximum size with labor or operating capital limited was calculated by dividing the resource requirement per acre into the quantity of resource assumed available. It was assumed that the variable factors were combined

in a fixed proportion with land and that output per acre was constant.

Model farm organizations with the most prevalent rotation were illustrated in Table 14. Labor requirements and incomes were also developed for five selected rotations on farms with 60, 140, and 240 irrigated acres (Appendix Table 2). Average yields and prices for 1957 were used in preparing these models. Complete budgets were prepared for the three farm sizes with a basic rotation of 3 years alfalfa, 1 year potatoes and 2 years of grain. Other combinations were compared to the basic rotation in terms of labor requirements and income per acre.

Prices received for potatoes, alfalfa and grass seed in 1957 were low compared to previous years and to the following years while prices for grain dropped after 1957 (Table 20). These price changes greatly affected the returns for the several budgets considered previously. It was assumed that the average prices from 1957 to 1959 were more representative of normal price relationships. These average prices were used in preparing alternative budgets for comparison with those based on 1957 conditions.

Yields of crops varied considerably among project farmers. It was assumed that farmers could attain yields as high as the average for the highest one-third

of the farmers surveyed under better than average managements. These yields are compared to average yields in Table 20. High level yields were combined with the average prices obtained in the 1957 to 1959 period to prepare the budgets illustrating the higher level of achievement possible on the North Unit. This level of prices, yields, and income is referred to as "Level 1" in Table 20; "Level 2" was average 1957 conditions. Although prices for wheat and barley were lower under level 1, the higher yields more than compensated. As a result, net returns were 20 percent higher under level 1 than level 2 conditions; net returns to alfalfa doubled, and returns to Marion bluegrass nearly tripled; and net returns to potatoes increased about 75 percent.

#### Farm Size Limited by Labor

Crops were combined into the four rotations below and were compared in terms of variable costs, net income above variable costs, and maximum acreage for an operation limited to 250 hours of operator labor per month. The maximum sizes for these four rotations were analyzed for farms limited by operating capital.

Each rotation has different monthly labor requirements (Appendix Table 2). The peak labor months occur during harvest and first irrigation settings. Rotation 1 requires 1.54 hours per acre during August which

Table 20. Budgeted Income and Variable Costs per Acre for Selected Crops with Two Yield and Price Levels, North Unit Deschutes Project, Oregon.

Item	Alfalfa	Potatoes	Wheat	Barley	Marion bluegrass	Kenland red clover
<b>Yield:</b>						
Upper 1/3	5.1T.	20T.	75 bu.	90 bu.	250 lbs.	300 lbs.
Av. yield	4.2T.	18T.	56 bu.	70 bu.	150 lbs.	250 lbs.
<b>Prices per unit:</b>	<u>dollars</u>	<u>dollars</u>	<u>dollars</u>	<u>dollars</u>	<u>dollars</u>	<u>dollars</u>
1957-59 av.	20.00	28.00	1.80	.893	.97	.32
1957	15.50	23.95	2.08	.984	.70	.30
<b>Gross returns:</b>						
Level 1 <u>/1</u>	102.00	560.00	135.00	80.34	242.50	94.00
Level 2 <u>/2</u>	65.10	431.00	116.48	68.88	105.00	75.00
<b>Variable cost:</b>						
Level 1	33.90	309.70	23.34	20.94	80.48	19.43
Level 2	30.91	287.70	22.39	19.99	60.48	17.93
<b>Net returns:</b>						
Level 1	68.10	250.30	111.66	59.40	162.02	74.57
Level 2	34.19	143.40	94.09	48.89	44.52	57.07

/1 Average of 1957 to 1959 prices and average yield of upper 1/3 farms.

/2 1957 prices and average yield.

restricts a one man operation to 162 acres; the May labor requirement of 1.24 hours restricts rotation 2 to 201 acres; the July requirement of 1.82 limits rotation 3 to 137 acres; and August requirements of 1.62 hours limits rotation 4 to 154 acres. The acreage of each crop grown in the four rotations is shown in Table 21.

Rotation 1:

3 years alfalfa  
1 year potatoes  
2 years grain

Rotation 2:

2 years Kenland red  
                    clover  
1 year potatoes  
1 year grain

Rotation 3:

4 years Marion bluegrass  
1 year potatoes  
1 year grain

Rotation 4:

3 years alfalfa  
3 years grain

Net income above variable costs for the four rotations increased from 50 to over 100 percent with high levels of management and 1957 to 1959 average prices. The highest income above variable costs, \$24,778, was obtained from rotation 2, clover, potatoes, and grain. Income to the alfalfa and grain, rotation 4, was only one-half as much as rotation 2. The bluegrass rotation, number 3, was second highest with \$22,651 income above variable costs. The basic rotation, number 1, was third most profitable, with income above variable cost of \$17,363.

Table 21. Budgeted Crop Acreage and Variable Costs and Income for Selected Rotations with Operator's Labor Limited to 250 Hours per Month, North Unit Deschutes Project, Oregon.

	Acres	Variable costs		Income above variable costs	
		Level 1/1	Level 2/2	Level 1/1	Level 2/2
Rotation 1:					
Alfalfa	81	2,746	2,504	5,516	2,769
Potatoes	27	8,362	7,768	6,758	3,872
Wheat	36	840	336	4,020	1,411
Barley	18	377	780	1,069	1,907
Total	162	12,325	11,388	17,363	9,959
Rotation 2:					
Red clover	100	1,943	1,793	7,457	5,707
Potatoes	50	15,485	14,385	12,515	7,170
Wheat	34	794	336	3,796	1,411
Barley	17	356	720	1,010	1,760
Total	201	18,578	17,234	24,778	16,048
Rotation 3:					
Blue grass	91	7,324	5,504	14,744	4,051
Potatoes	23	7,123	6,617	5,757	3,298
Wheat	15	350	336	1,675	1,411
Barley	8	168	160	475	391
Total	137	14,965	12,617	22,651	9,151
Rotation 4:					
Alfalfa	77	2,610	2,380	5,244	2,633
Wheat	51	1,903	336	5,695	1,411
Barley	26	544	1,240	1,544	3,031
Total	154	5,057	3,956	12,483	7,075

/1 Yields obtained by upper 1/3 of farmers surveyed and average prices received from 1957 to 1959; wheat comprised 2/3 of the grain acreage.

/2 Average yield and prices; wheat limited to 15 acres (see reference 13, p. 52).

Rotation 2 had the greatest proportion and acreage of potatoes which accounted for its having the highest income both under level 1 and level 2 conditions. About 63 percent of the higher income of level 1 over level 2 was due to an increase of 2 tons per acre yield and \$4.05 per ton sales price of potatoes. Rotation 2 had its labor requirements more evenly distributed during the summer months than the other three. As a consequence, one man could handle a greater number of acres with this rotation.

Rotation number 3 was more profitable on a per acre basis than number 2, \$165 compared to \$123, but higher labor requirements limited its size to 137 acres. Level 1 returns were 150 percent greater than level 2 primarily because of the higher yield and price of Marion bluegrass, especially since bluegrass made up two-thirds of the rotation. Price and yields for bluegrass were more variable than any of the others considered. Therefore, price variability and risk would be greatest for rotation 3.

Alfalfa hay, the lowest net return crop of those considered, made up one-half of rotations 1 and 4. If the price of hay were \$25 per ton instead of \$20, net income to rotation 1 would increase by \$2,065. The average return per acre would then be \$132, the second

highest of the four rotations.

Rotation 4 is the only one without potatoes and consequently has the lowest return. However, the assumed potato yields were better than average. Lower grades, yields, and prices are not uncommon. A budget prepared with unfavorable price and yield conditions showed minus \$52 variable income per acre for potatoes. The yield was 14 tons; 50 percent of the potatoes graded number 1, and sold for \$1.25 a hundred weight (4, p. 69). Farmers with less than average ability in growing potatoes might find rotation number 4 their best alternative, especially if they added a supplementary beef feeding operation.

Fixed expenses were similar for the four rotations. The farms were similar enough in size to own the same equipment and buildings, which were assumed for the basic rotation presented in Table 14. Potato harvesting equipment was supplied by custom operators. Fixed expenses were the same for average, as for above average operation. Net farm income (returns above variable costs minus fixed expenses) for the two levels and four rotations were as follows:

Rotation	Level 1	Level 2
1	14,649	7,245
2	21,763	13,033
3	20,009	6,590
4	9,818	4,410

Budgeted net farm income to an individual operator who hires only harvest labor varied from a low of \$4,410 for an average 1957 hay and grain operation to a high of \$21,763 for a clover, potato, and grain operation with level 1 yields and prices.

Since operator labor limited the size of the above farms, larger farms would require hired labor or additional family labor. The return for an additional acre would equal the net return minus the labor charge, real estate tax and additional repairs. For example, rotation 1 had a net income above variable cost of \$107 per acre. The costs for an additional acre would be: labor \$2.50, property tax \$2.80, and repairs \$3.35. Net return to the additional acre would then equal about \$98 for level 1 returns and \$52 for level 2 returns.

If the net return for an additional acre of land was imputed as return to labor, the dollar earnings of an additional hour of labor for the four rotations and two levels would be as follows:

Rotation:	Level 1	Level 2
1	56	26
2	85	49
3	80	26
4	39	17

A capital charge of \$12.50 for the land was subtracted from net returns; no charge for labor was deducted.

Additional labor would be profitable for all four rotations at both levels.

At some acreage between 140 and 240, the set of equipment assumed for the budgets above, would have to be increased. Farm budgets of 140 acres required \$11,700 invested in equipment; budgets for 240 acres had equipment costing \$23,050 (13, p. 93-94). The increase was due to a second tractor, potato planting and harvesting equipment, self-propelled combine, hay baler and loader, and a two ton truck. On smaller farms, operations using this additional equipment was custom hired or the equipment was rented.

Rotation 1 was budgeted for 140 and 240 acres as shown in Table 14. Net income was \$5,922 for 140 acres and \$11,195 for 240 acres with average management and 1957 prices. The average net return for the 100 acres between 140 and 240 acres was \$52.73 which is very close to the \$52 calculated above for the net return to one additional acre.

#### Farm Size Limited by Operating Capital

The previous budgets showed maximum acreage and income obtained from four rotations when farm acreage was limited by operator's labor. Operating capital requirements limited each of the four rotations to

different maximums than did labor requirements presented above. With operating capital limited to \$12,600 and level 1 prices and yields the maximum acreages and returns would be as follows:

Rotation	Acres	Income above var. costs	Return per dollar expense
1	166	17,762	1.41
2	137	16,851	1.33
3	115	18,975	1.51
4	382	<u>1</u>	2.57

The highest income was obtained by rotation 4 with the highest return per dollar expenses, \$2.57. The average operating capital would allow rotation 4 to be expanded to over 300 acres while operator's labor restricted it to only one-half as many acres.

Rotations 2 and 3 were restricted more by the average operating expenditure limitation than they were by operator's labor. Rotation 1 was practically the same size under both restrictions. Rotation 2 required the most operating capital per dollar income. Consequently, income above variable cost for rotation 2 was the smallest of the group while with the labor restriction, it had the highest income.

Rotation 3 had the highest operating expenditure per acre and so was limited to the smallest acreage of the group. Net variable income per acre for rotation 3 was higher than for 1 and 2. As a result, on the

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/1 Cost data were not applicable to farms over 240 acres.

smallest acreage rotation 3 had the highest total income above variable costs.

If additional operating capital could be obtained along with land and labor, the percentage return on operating capital would be as follows:

Rotation	Level 1	Level 2
1	112	57
2	111	70
3	131	50
4	188	104

Additional taxes, repairs, labor, and a 5 percent charge for land investment was deducted from the net income for one additional acre. The remaining net income was imputed as a residual of operating capital. The residual divided by the amount of operating capital used per acre gave the percentage return. The high returns indicated that it would be profitable to add additional acres for the four rotations at both levels of prices and yields.

The analysis of returns from additional crop acreage is applicable to farmers on small units of less than 90 acres. Having excess labor and machinery, they could add 40 to 80 acres provided that it could be obtained and operating capital was available. Their incomes would be increased to levels indicated above under good management.

### Livestock Programs

It has been shown that the average size farmers could profitably farm additional acres. However, in many cases, land buying would be impossible since land may not be available close by, units for sale may be too large for the farmer to handle, or funds may not be available to the farmer. An alternative to buying land would be renting land which would also be profitable. If land expansion is impossible, or the farmer does not desire additional acreage, he can supplement his income by adding a livestock feeding operation.

Livestock feeding operations are well suited to the North Unit Project for several reasons. First, a large quantity of high quality hay is produced on the project. Second, farmers have excess labor in the winter months and small unit operators have labor available the year around. Third, crop residues such as cull potatoes, straw, bluegrass and clover after-math, can be profitably utilized through cattle feeding.

About one-third of the project farmers fed cattle in 1957. Seven fed yearlings and 12 fed calves. All except three fed to slaughter weights. Prices paid for cattle ranged from \$18 to \$24 per hundredweight.

Selling prices for slaughter cattle ranged from \$22 to \$26 a hundredweight. Table 22 presents a typical feeding program for calves and yearlings using average prices paid and received. The farm price of hay and grain was charged to the feeding enterprises as a cost. Grinding, mixing and additives cost \$3.10 per hundredweight of grain. Feed cost per hundred pounds of gain amounted to \$12.63 which was relatively low since the farm price of alfalfa was \$20 per ton and grain was \$39 per ton. The net returns above all costs, including interest on investment in livestock and facilities, amounted to \$40.43 for calves and \$38.14 for yearlings (Table 22). Net income to livestock would be greater if part of the feeding program included cull potatoes or seed crop aftermath.

In order to add livestock, a farmer would have to have labor available and funds for livestock purchase, expenses, and investment in facilities for handling livestock. Livestock facilities would cost about \$35 per head (21, p. 19). If funds and labor were limited, a supplementary livestock program would become competitive with the crop program at certain sizes depending on the crop and livestock programs selected. If a farmer reduced his crop acreage in order to add livestock, his total profit would be reduced because

Table 22. Estimated Costs and Returns per Head  
for Feeder Calves and Yearlings.

Item	Calves	Yearlings
Initial wt., lbs	440	640
Cost per lb.	.23	.20
Total cost	101.20	128.00
Ending wt., lbs.	1100	977.5
Selling price	.24	.24
Total value	264.00	234.60
Feeding period, days	300	150
Total feed <u>/1</u>		
Hay, lbs.	2804	1950
Concentrate, lbs.	2448	1305
Cost of feed:		
Hay	28.04	19.50
Concentrate	55.33	29.49
Other costs <u>/2</u>	39.00	19.47
Total costs	223.57	196.46
Net return	40.43	38.14

/1 Reference 1, page 6.

/2 Other costs include interest at 6 percent on value of cattle and 5 percent on facilities, depreciation and upkeep of facilities of \$8 per head, veterinarian and supplies \$1 per head, and death loss of 1 percent.

returns to labor and capital of the four crop rotations were all greater than the livestock returns.

Rotation 1 was selected to illustrate the possibility of fitting livestock to crop farms. Yearlings were bought in October and fed through February. During this period, the number of livestock that one man could handle on the average size farm of 152 acres was limited by December labor when he would have 180 hours available. The survey showed that one head of livestock requires approximately one man day of labor per month. Therefore, the operator of an average size farm could handle 180 head of yearlings and his net farm income would be increased by \$6,865.

If a farmer fed calves for 10 months, the number he could handle would be limited by June labor. He would have enough extra labor to feed 78 calves. Net farm income would increase by \$3,154.

Calves were more profitable than yearlings per dollar invested with the prices as given. A farmer on a smaller than average unit with limited operating capital would make more money raising calves than yearlings. For example, a farmer with 100 acres in rotation 1 with the average operating capital of \$12,600 could invest \$5,600 in livestock. He could buy 55 calves or 43 yearlings. Calves would return a net income of \$2,223 while yearlings would return only \$1,640.

The above examples show that the addition of yearlings to a typical farm is more profitable than calves when labor is limited. On the other hand, if operating capital is the limiting factor, the addition of calves will return a greater net income than yearlings.

## CHAPTER VI

### FARMERS' VIEWS ON ADJUSTMENTS

It is not enough to delineate the adjustment possibilities available to farmers in the North Unit Project. It is also necessary to equate the desires and abilities of the farmers to practical possibilities. Opportunities for adjustments in the farming operations have been explored above. In addition, growth of the business community indicated additional job opportunities for farmers who desire off-farm work.

Some possible adjustment opportunities available to farmers were as follows:

1. Increase size of farm operation by buying or renting land or by adding livestock.
2. Adjust the present farm operation in respect to organization and practices.
3. Sell farm and work full-time in the community.
4. Rent out farmland and work in the community.
5. Sell the farm and buy another in a different area.
6. Sell everything and move to an industrial area.
7. Older farmers may retire and live on social security and income from sale or rent of the farm.

The farmers surveyed were asked what adjustments they were willing to make. The results are summarized

in Table 23.

Only 17 percent of the farmers interviewed thought crop acreage expansion would be profitable while one-third stated that livestock expansion would be profitable.

Table 23. Adjustment Possibilities Reported by North Unit Project Farmers Classified by Farm Size.

Item	Farm Size			Average
	30-89.9 acres	90-159.9 acres	over 160 acres	
	Percent	Percent	Percent	Percent
Would expand farm:	39	48	59	50
Increase crop	11	19	18	17
Increase livestock	28	29	41	33
Could finance 25% expansion:				
Use own funds	33	47	40	40
Borrow funds	87	94	100	93
Could borrow all funds desired	81	89	93	88
Source of funds:				
Bank	31	21	35	27
Prod. Credit Assoc.	0	26	29	19
Farmers Home Adm.	6	26	0	11
Several sources	25	11	14	15
Other	6	11	14	10
Would leave farm	61	29	59	45
Would sell farm	65	25	75	51

Generally farmers with higher incomes and those on larger units thought expansion would be profitable.

Fifty-nine percent of the large-scale farmers would expand compared to 39 percent of the small-scale farmers. The average 1957 farm income of expansion-minded farmers was \$11,638 while income for those not wishing to expand averaged only \$4,730.

Five farmers desired additional land to increase the size of the farm business. They had excess labor and equipment and could become more efficient with additional land. Four farmers wished to increase the value of their output by adding specialty crops such as grass and mint.

Beef feeding was the livestock enterprise mentioned most often as a profitable addition to the farm operation. Two farmers thought dairying would be profitable but there was no market available for milk. Two other farmers thought raising hogs would be profitable.

It is one thing to consider expansion profitable but quite another for farmers to have the means to accomplish the expansion. Expansion requires management skills; capital for land, equipment and operating expenses; labor; and reliable markets. Low incomes found in the survey within the entire range of farm sizes indicated that some farmers were lacking in management ability. Markets were not available for Grade A milk. Price variability influenced some farmers not to

expand into such crops as grass seed, clover seed, and mint. For some farmers additional labor in the proper amount would be hard to obtain. And finally, expansion required financing.

### Financing Expansion

Farmers were asked if they could finance a 25 percent expansion if they knew it would be profitable. Forty percent said they could finance this expansion with their own funds. Only four farmers reported that they could not borrow for a profitable expansion. One is justified in doubting that 93 percent of the farmers could borrow for expansion. In many instances the lender would take a more conservative view on the possible profitability of expansion. Most of the farmers had not requested a loan for expansion and so, of course, could not actually know whether or not they could secure credit. Besides, one couldn't expect a person to declare that he couldn't get credit for a profitable undertaking. However, it is certain that farmers did not think that a deficiency of funds would prevent profitable expansion.

Credit worthiness is often considered directly proportional to size of farm or quantity of assets. Table 23 shows that 81 percent of the farmers on small

units and 93 percent of those on large units reported that they could borrow all that they desired. There was no significant difference between size groups.

Farmers reported a wide variety of credit sources. Table 23 shows the most frequently mentioned sources of credit for expansion. The local bank was mentioned 21 times, the Production Credit Association 15 times, Farmers Home Administration 8 times, eight farmers mentioned several sources and five mentioned sources other than those above. None of the farmers with farms smaller than 90 acres mentioned Production Credit Association as a loan source. This can be attributed to the Association's policy of lending only to farmers who have full time, efficient units.

At the other end of the size of farm scale, farmers on units of over 160 acres never mentioned Farmers Home Administration as a source of expansion credit. The loan limitations of Farmers Home Administration usually preclude loans on farms that are considerably larger than the average in an area. Large-scale farmers usually have other credit sources available and normally require more credit than the Farmers Home Administration loan limitations would allow.

#### Adjusting Farm Size

The past history of the project indicated that

adjustments in farm size and organization were taking place rapidly. In the past some farmers had quit farming as their solution to the problem of low income and in the future this adjustment would continue to take place. The farmers interviewed were asked if they would seriously consider moving off the farm and also whether or not they would sell their farm for its present appraised value. About one-half answered yes to both questions. Five farmers first stated that they would not move off the farm but when asked if they would sell their farm, answered yes. Presumably, these too would be willing to move if they could sell their farm.

One-half of the farmers willing to leave their farm indicated a high degree of dissatisfaction with farming conditions at the time of the survey. A local banker stated that the farmers' pessimism had changed to a generally optimistic outlook in 1960. Consequently, the percentage willing to sell in 1960 would be lower than was found in the survey.

There was no significant difference between areas within the project in the proportion of farmers willing to sell their farms. However, there was a significant difference between farmers on different sized units. More farmers on both the large and small units were

willing to sell their farms than were farmers on the middle-sized units. The small-unit farmers were dissatisfied with their income. Farmers on large units tended to be opportunists. They were more willing to make business-like adjustments for long-term gains, not from necessity but by choice.

The typical farmer with 90 to 160 acres of crop was more satisfied with his present situation than either the farmer with more or with less land. He had all of the land he could handle without the addition of considerable hired labor. He preferred farming to other occupations and liked the area. He had some good years as well as bad and he was trying to adjust his farm operation to changing conditions.

In Chapter III the growth in the size of the operating units was traced. Between first settlement and 1957 farmers had increased their irrigated land by 37 percent. This was a substantial increase in farm size and led to more efficient units. The increase in the size of the operating units was accomplished by combining the original ownership units. There were 642 original ownership units in the original division of the 50,000 irrigated acres. In 1958 the water office records showed 407 operating units. In 12 years 235 owners had either sold or rented out their farm units.

There were a variety of reasons given as to why most farmers were not enlarging the size of their farm business in 1958. The primary reasons and the number of farmers reporting are shown in Table 24.

Table 24. Reasons Farmers Were Not Presently Expanding Their Farm Business in the North Unit Project, Oregon, 1958.

Item	Number of farms reporting	Number reporting by size of farm		
		Small	Medium	Large
Expansion not presently profitable	12	4	5	3
Has enough work	11	2	5	4
Unable to finance	5	4	1	0
Too old	8	2	5	1
No land available	5	5	0	0
Doesn't want debt	4	1	2	1
Prefers off-farm work	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	46	19	18	9

None of the operators on small units were expanding. One farmer on a medium size unit and four on units of over 160 acres were in the process of expansion. One farmer was acquiring farm land in two other areas in

preference to expanding on the North Unit Project.

Reasons for non-expansion differed among farmers on the three size groups. Large-scale operators had as large a unit as they thought they could profitably operate. The older farmers tended to be on smaller units and they did not wish to take on more work, debts, or additional risks. Small operators were the only group to report that land suitable to add to their farms was not available. Actually, other reasons affected their judgment because land of all qualities was available.

Basically, the reluctance of farmers to expansion was caused by the uncertainty of future profits. Farm income had been slipping downward and the general feeling was one of pessimism. Several farmers indicated that survival would depend upon the adoption and use of the most economic practices.

## CHAPTER VII

### ANALYSIS OF FARM UNIT PLANNING

The preceding farm analysis indicated that farm organization and size had been changing rapidly since first project settlement. The farms were no longer similar to the type of farms that the Bureau of Reclamation had anticipated when the project was planned. In fact, the first farms were not organized in the manner that the Bureau had planned.

Predictions of the future are hazardous but are necessary to estimate whether or not a project will repay its costs. In addition, the Bureau wishes to estimate the size of units suitable for family farms. The mistakes made in forecasting mature farm development in the North Unit give rise to the following questions:

- (1) What assumptions were made in preparing representative farm budgets?
- (2) How do the farm operations as originally planned compare with the actual situation ten years later?
- (3) How can the planning procedure be improved?

#### Establishment of Farm Size

Under the present reclamation program, a project

cannot be authorized unless the benefits from the project exceed the costs. The North Unit Project was authorized two years before this provision was included in the 1939 Reclamation Project Act. Consequently, no benefit-cost calculations were prepared before the beginning of project construction. However, a project feasibility finding was required before construction could be authorized. The North Unit Project was found feasible by the Secretary of the Interior in September, 1937. The basis for the finding was that the costs of construction could be paid from project land earnings. Earnings were estimated from similar areas already under irrigation. It was assumed that the same earnings would occur on the North Unit Project.

Farm units were laid out on the project under the Bureau of Reclamation policy of providing the maximum number of family farms possible. Farm size limitations were based on studies made on other fully developed reclamation projects. The type of farm organization assumed was subsistence, family farming which included home produced foods, several types of supplementary livestock programs including dairy, hogs and chickens, and a variety of crops grown including feed for the livestock.

In the thirties a farmer with forty acres of good

irrigated land could subsist and pay off a small water construction charge. By 1946 when the North Unit was being settled, conditions had changed to the point where the subsistence farm was no longer adequate to support a farm family. Larger farm units had to be laid out than was first planned. Again, the basis for unit size was experience in similar areas. The use of farm models from previously developed projects forced the farm size pattern of the new North Unit into a mold from a farm era of the past.

The size of the original farm ownership units greatly influenced development and operation. Specialized machines of high capacity could not be economically utilized by operators on small units because these machines required a large acreage to pay for the high fixed investment costs. An economic analysis of machinery ownership of farmers surveyed showed that one-third had overinvested in specialized machinery. They did not have large enough acreages to pay the cost of owning and operating the machines (4, p. 64). Small farm operators had to utilize labor instead of machines. With land limited they added livestock to utilize their labor more fully. Historically, a dairy enterprise had formed an important part of subsistence-type family farms along with a few hogs and chickens.

Subsistence farms not only required a diversified livestock program but also a large amount of home produced foods for family living. The short growing season of the North Unit Project prevented farmers from growing fruits and vegetables for home use. In 1957 there were only five acres of berries and no vegetables except potatoes grown commercially on the project (14). Intensive family gardens were not developed in the area.

Rapid farm technological advances from 1930 through World War II changed the farming structure throughout the whole country. Small farms could not take advantage of many cost reducing innovations available to larger farmers. Farmers on larger units took advantage of new technology and were able not only to increase production but also to make a profit at lower farm prices and higher costs of production inputs. The market structure was also changed by technology. For example, milk markets shifted to centers of population and markets for farm separated cream disappeared.

Subsistence farmers were faced with higher living and operating costs. More farm income was needed. They required larger acreages to utilize new technology. As a result, successful operators on the North Unit

began buying and renting additional land as soon as they were established on the project. Very little expansion was made into dairying because of market conditions. Subsistence farms were not profitable and few were developed.

#### North Unit Farm Budget Planning

At the time of first settlement on the project, it was apparent to the Bureau of Reclamation that income from the farm units would not cover repayment of construction charges within the forty-year legal limitation. To determine annual repayment ability, a study was made of farming under actual project conditions in 1946 (16). The study indicated that the farm income would repay project costs in 64 years and that if there were any subsequent construction charges, the repayment period would have to be extended.

Additional expenditures did materialize when experience dictated the need for construction of the Haystack equalizing reservoir. A benefit-cost analysis was made to determine the feasibility of Haystack Reservoir (18). Farm organization and income data from the 1950 Economic Report and Repayment Plan was used in the benefit-cost analysis. An analysis of the 1950 Economic Report permitted an evaluation of the Bureau of Reclamation farm

planning procedures. The assumptions underlying the farm budgets and the resulting budgets will be compared with what actually occurred. With this procedure, improved planning techniques will be indicated and pointed out.

Although practically all of the North Unit was under irrigation in 1949, the Economic Report and Repayment Plan of 1950 was prepared with the assumption that there would be changes in the farm organization at mature development (16, p. 53). North Unit farm organizations would be similar to those in the Central Oregon Irrigation District which had been established in 1900. (The Central Oregon Irrigation District is located south of the North Unit in neighboring Deschutes County.)

Farm size distribution in the Central District was similar to operating unit size on the North Unit project (16, p. 50). In 1949 43 percent of the operating units on the North Unit were less than 80 acres compared to 48 percent of the Central District farms. For farms over 160 acres in size the proportions were 6 percent for the North Unit compared to 21 percent for the Central District. From these comparisons between the two districts, the Bureau assumed that the distribution of farm sizes on the North Unit would remain about the

same as in 1949. Farms of around 60 acres under intensive cultivation were assumed to be of family size since they had persisted for nearly half a century within the Central Oregon Irrigation District.

A percentage comparison of crop distributions was made between the mature Central District and the North Unit (16, p. 56). The two areas were found to be quite comparable with respect to the proportions of crops grown. Feed crops were grown on 77.5 percent of Central District land and 72.5 percent of North Unit District land. The percentages of cash crops grown in the two districts were also similar.

Although feed crop percentages were about the same in both areas, grain was grown on 19.3 percent and hay and pasture on 58.2 percent of the Central District land. In the North Unit area the proportions were reversed, with 55.9 percent grain and 19.3 percent hay and pasture. It was assumed that when the North Unit matured, livestock programs would necessitate the increasing of hay and pasture production with a balancing decrease in grain production. Final proportions of crops would be similar to those found on the Central District land in 1948.

After the cropping pattern was established in the

Economic Report and Repayment Plan by a historical comparison with the Central Irrigation District, livestock programs were fitted to representative farm organizations (16, p. 84-87). Livestock was assumed necessary for successful operation on virtually all of the farms in order to make effective use of family labor, to utilize feed crops produced, and to maintain soil fertility. The following livestock assumptions were made:

(1) Beef enterprises would not be intensive enough to produce sufficient returns on the small family-type farms. Some winter beef feeding would occur as a supplementary enterprise in maintaining soil fertility.

(2) Dairying would be the only livestock program that would be a major farm enterprise on the project. Dairying would provide full employment and utilize the feed grown on the farms.

(3) All other livestock programs would be of minor importance. However, typical farm operations would include a flock of chickens and one or two brood sows.

Budget prices used in the study represented the 1939 to 1944 average prices paid and received (16, p. 68). The price-cost ratio obtained was 93 percent of parity.

Yields used in the budgets were based on yields for the Central Irrigation District with minor upward adjustments because North Unit soils were considered

slightly superior to those in the Central District. The prices and yields of the more important products included in the budgets are presented in Table 25.

Table 25. Prices and Yields of Commodities Budgeted in the Economic Report and Repayment Plan of 1950 (16, p. 68).

Item	Unit	Price	Yield per acre
Potatoes	cwt.	1.05	180
Wheat	bu.	.90	41
Barley	bu.	.65	49.4
Ladino clover	lb.	.75	90
Alfalfa hay	ton	10.50	3
Fat cattle	cwt.	8.75	--

Five farm budgets were prepared for the Economic Report under the assumptions mentioned above (16, p. 88-96). Two additional budgets were added for the Haystack Reservoir report. Farm organizations and yields were based on the three land classes occurring on the project. The original five budgets differed from those in the Economic Report only in terms of prices. Prices paid and received were revised upward to a price index of 215.

The parity index increased from 93 to 100. The resultant budgets are summarized in Table 26. Payment capacities for the revised budgets averaged 36 percent higher than the original budgets. Only the 40 acre farm had a reduced payment capacity.

#### Differences Between Planned and Developed Farms

The budgets presented in Table 26 represent the Bureau of Reclamation's best estimate as to the type of farming that would occur on the North Unit during the repayment period. How representative were these budgets of conditions in the North Unit after an average of ten years of farm operation? None of the budgets could be considered representative of the area. Budgets numbered 6 and 2 had farm organizations similar to some of those found in the 1958 farm survey but the surveyed farms were twice as large as those budgeted by the Bureau of Reclamation. Budgets numbered 1, 4 and 5 had dairying as the major enterprise. Only two farmers in the survey had over 15 dairy cows. Only 18 percent of the farmers had dairy cows and they averaged nine cows per farm.

Barley was included in the budgets as feed for livestock. Wheat was not included since barley out yielded wheat by 16 percent. However, with prices and

Table 26. Summary of Farm Budget Analysis Made by the Bureau of Reclamation for the North Unit, Deschutes Project, Oregon /1

Item		Class 1	Mixed Class 1 and Class 2			Class 3		
		Budget 6	Budget 1	Budget 2	Budget 3	Budget 4	Budget 5	Budget 7
Total irrigable acreage	number	80	60	62	40	91	66	100
<u>Crops:</u>								
Barley	acres	24	11	11	5	16	13	14
Alfalfa hay	do	24	18	10	6	34	22	40
Other hay	do	(15)	(6)	(20)	(10)	(14)	(10)	--
Ladino clover seed	do	15	6	20	--	--	10	--
Alsike clover seed	do	--	--	--	10	14	--	--
Potatoes	do	10	10	15	11	--	--	--
Irrigated pasture	do	2	11	2	6	22	16	40
<u>Livestock:</u>								
Dairy cows	number	2	12	2	6	24	18	2
Brood sows	do	1	2	1	1	2	2	1
Feeder cattle	do	--	--	40	--	--	--	95
<u>Financial Summary:</u>								
Gross farm income	dollars	7,714	7,467	13,641	6,529	8,273	6,456	15,056
Less farm expense	do	3,415	3,467	9,720	3,221	3,744	2,737	10,174
Less invest. allowance	do	925	958	895	694	1,242	1,009	1,080
Less living allowance	do	2,250	2,250	2,250	2,250	2,250	2,250	2,250
Contingency allowance	do	126	108	105	47	139	57	210
Payment capacity:								
Total per farm	do	998	684	671	317	898	403	1,342
Total per acre	do	12.48	11.40	10.82	7.92	9.87	6.11	13.42
Total per acre/2		--	9.23	6.37	8.03	5.41	4.97	--

/1 Source, reference 18, page 27.

/2 Payment capacity from Economic Report and Repayment Plan, ref. 16.

yields as given in Table 25, wheat would have been worth about five dollars more per acre than barley. Consequently, income from an acre of wheat would have brought nearly eight more bushels of barley than could have been grown on one acre. Actually, in 1957 wheat was grown on 22.4 percent of the project acreage, compared to 8.8 percent for barley. The 1957 grain situation was influenced by support prices that made wheat production even more favorable over barley than the assumed prices used in the budgets.

Five of the seven budgeted crop rotations included from 15 to 40 percent pasture. Pasture was provided for a beef feeding enterprise in addition to the four dairy enterprises. One-third of the farmers surveyed in 1958 had an average of 17 acres each of irrigated pasture. Less than 4 percent of the total cropland included in the survey was irrigated pasture. All of the dairy farmers utilized pasture but only a few beef feeders included irrigated pasture in their programs. Under 1957 conditions pasture for beef was not as profitable as alternative feeding and cropping programs.

The Bureau of Reclamation's farm budgets have been shown to be quite different from farm organizations occurring ten years after project settlement. The greatest discrepancy between the budgets and actual

conditions was in farm size. While the budgeted farms ranged from 40 to 100 acres, the median size of the farms surveyed in 1958 was 139 acres and average size was 152 acres.

Information obtained in the survey indicated that farmers would continue to increase farm size in the future. Farm size analysis in Chapter IV showed that one man could efficiently handle about 160 acres. Survey data also showed that farmers on units of under 90 acres required off-farm income to supplement their inadequate farm earnings. With 1957 conditions, over 100 acres were required for a minimum family income.

The basic cause of the discrepancies between the planned and the developed farm was that North Unit farms did not follow the development pattern of older areas. Conditions that led to the mature development pattern of the Central Irrigation District were no longer operative for the North Unit. The major changes in conditions were brought on by changes in technology. The pre-1940 ways of farming could no longer compete with farms using new techniques.

The use of Central Irrigation District farms as models for mature North Unit development was wrong not only because of changing conditions, but also because of original conditions. The areas were contiguous but

soil conditions were superior in the North Unit. Farm organization and yields for the North Unit led to a much higher income per acre than in the Central District. In 1954 the average income per acre for the North Unit area was about  $2\frac{1}{2}$  times as great as in Deschutes County, which is primarily an irrigated farming area and contains the Central Irrigation District (Table 4).

The extent of the difference between actual North Unit yields and those used in the Economic Report is shown by the following comparisons. The 1957 North Unit yields averaged about 65 percent higher than those used in the budgets. The percentage increase of average 1957 yields over budgeted yields were as follows: potatoes 100, wheat 37, barley 14, clover 133, and hay 40. Yield differences of such magnitudes would require changes in budgeted crop proportions for economically efficient farm programs.

Higher yielding, more profitable North Unit soils provided income and incentive for expansion. Deschutes County farms were primarily subsistence units in the 1940's and were even in a worse financial condition in 1954. In 1954 average value of farm products sold was \$16,319 in Jefferson County compared to \$3,600 for Deschutes County (Table 4). Net income in Deschutes County would only average between \$900 and \$1200.

In 1949 Deschutes County irrigated farms averaged 56 acres compared to 86 acres for Jefferson County. Ten years later, irrigated farms in Deschutes averaged only 58 acres while those in Jefferson County had increased to 141 acres (Table 3). The Bureau's assumption that Central Irrigation District farms were mature with relatively fixed crop and livestock programs was essentially correct. Assuming a similar development pattern in the North Unit was incorrect.

New farming methods and changing economic conditions after 1930 have resulted in changes in proportions and levels of farm inputs used. As a result, farm production and costs had also been changing. The indices of farm costs and prices received reflects some of these changes. The parity index, which measures the relationship of a selected bundle of farm inputs and prices received for farm products, has fluctuated up and down over the past 50 years. There is little basis for establishing a certain level as the best representative level for some future period. However, some level of price paid and received was necessary for the preparation of farm budgets. The Bureau of Reclamation assumed that an index of 215 would best represent both price and cost conditions (parity ratio equals 100) over the life of the project.

In the 1949 to 1958 period, parity ranged from 107 to 82 averaging 92.3. Parity for the five years prior to 1960 averaged 83 (13, p. 424). The result of using a higher parity ratio than actually occurred was to increase budgeted net farm income. Higher income per farm allowed smaller farms to earn enough to be considered a family farm.

If the average prices paid and received indices of the 1955 to 1960 period were used in the budgets in Table 26, costs would increase 30 percent and income 8 percent; net income would be reduced. For example, net income in budget 1, Table 26, would be reduced from \$4,000 to \$3,557. Total payment capacity would be reduced from \$11.40 to \$4.01 per acre. The \$4.01 payment capacity obtained with prices at 83 percent of parity would only cover annual operating and maintenance costs. No income would remain to apply to project construction costs.

The above example illustrates the importance of the price-cost relationships selected for budget analysis. In the same manner, the selection of input-output relationships is also crucial to budget results. Economically efficient farm organizations change in response to change in prices and productivity.

The difference between budgeted and actual 1957 results are summarized as follows:

	Budgeted	Actual
Parity	100 percent	82 percent
Yields	100 percent	165 percent
Farm size	60 acres	152 acres
Pasture	30 percent	4 percent
Wheat	0 percent	22.4 percent
Cows	10 head	2 head

The above comparisons show that there were significant differences in prices, acreages, yields, and farm organization. As a result, the budgets did not represent conditions in 1957.

No one can accurately predict future prices or technology; any set of assumed future prices, yields, and costs are estimates based on past relationships. Budgets with one set of reasonable assumptions may indicate a profitable farm organization while another possible set would show that the farm would be unprofitable. Budgets are a tool of analysis and are only as accurate in reflecting the future as the set of assumptions represent the future.

### Improvements in Planning

In spite of the above criticisms of the use of farm budgets, budgeting is a useful analytical tool to determine repayment ability and minimum size of farms.

The variation in prices and input-output relationships can be estimated and incorporated into the budgeting procedure. A range of possible outcomes would allow a comparison of the possible variation between different projects.

After a project was built and in operation, a survey of project farms would allow comparison of size, organization, and income with the original budgets. Deviations between planned and actual farm operations could be determined and budgeting errors isolated. Planning procedures for other projects would be improved by this process of checking original estimations against actual experience. In the absence of predictive growth models in economics, such empirical testing procedure appears to be the best alternative. Improved project selection would follow from improved planning procedures.

An alternative to budgeting farm size and returns to determine whether or not a project was economically feasible would be to allow the market for irrigated land to make the determination. Assume that the Bureau of Reclamation was considering a number of projects. Engineers would make cost estimates for a number of possible projects under uniform budgeting procedures.

Then economists would make estimations of returns from the various projects. The results would be a range of projects ranked according to financial feasibility. The authority would select projects that promised the highest returns over all costs. The most promising project would be built and the land offered for sale to the highest bidders. Land value to each buyer may be different depending on his individual situation and his estimate of future earnings from the land. Information about expected farming programs would be available to all prospective buyers. Each buyer would make his own determination as to the value of the land based on his own ends. He would make the investment decision and bear the consequences.

If selling prices covered all costs, after all of the land was sold, the project would have proven financially feasible. If not, errors were made in planning and the government would take a loss on the project. If selling prices more than covered costs, the next ranking project would be built. Under certain conditions it would turn out that no new projects were feasible; none would be built. The procedure outlined above would allow predicted results to be checked against actual occurrence. This method more nearly approaches scientific procedure.

Size limitations could be incorporated into the above procedure if the goal of maximum number of family farms was desired. If sizes were set too low in the opinion of the buyers, the units would be harder to sell. Sizes could be adjusted to suit the buyers while a ceiling could be maintained to prevent the complete project from being taken over by a few buyers. The Bureau of Reclamation's goals of maximum number of settlers and prevention of speculation gains could be protected under the above land distribution program. There would be less likelihood that small, uneconomic units would be established than under the present system.

## CHAPTER VIII

### CONCLUSIONS

Farmers on the North Unit Project have made substantial adjustments in their farm operations since first settlement in 1946. In 1958 profitable adjustment opportunities were available to farmers and in many cases adjustments must be made or the farmers will not survive economically.

The need for adjustments in the operation of the farms came about through changes in prices, technology, and errors made in establishing the original farm sizes. The original units were too small. The farms were not operated as subsistence type farms as was originally planned. Within eight years of complete project settlement there were 407 operating units or one-third fewer units than the 642 originally planned farm units.

Findings of the study revealed that most farmers could not make an acceptable living on a farm of less than 100 acres. One-third of the farmers were on units of less than 90 acres. They had twice as much off-farm as farm income. Some of these farmers could make more money by working full time off the farm; others would find it profitable to increase farm size and quit

working off the farm.

Farm budget analysis indicated that it would be profitable for farmers to increase the number of acres farmed. Returns to land, labor, and capital were greater than costs when the level of management was average or better. Small scale farmers had enough labor to double the size of their operations with only a small increase in costs other than variable operating costs. If land was not available, feeder cattle would be a profitable addition to the farm operation.

Farmers on average size units were fully utilizing their labor during the peak summer months. They could add acres profitably if they could hire labor to suit their needs. At about 300 acres, farmers could fully utilize a hired man during the summer months.

Over 90 percent of the farmers said that capital was available to enlarge their farm or to add livestock. Of these, 40 percent said they could finance expansion with their own funds, the remainder said that they could get loans for expansion. Nine percent were expanding in 1958; 29 percent did not wish to expand because they had all of the land they wished to farm; 21 percent did not think expansion would be profitable. All of the small-scale farmers gave reasons for not wishing to expand in 1958 while only half of the large-scale farmers reported reasons for nonexpansion.

Farmers favored cattle feeding two to one over increasing crop acreage even though feeders returned less to labor and capital than land. Feeders were primarily considered as a supplementary enterprise to utilize labor available in the winter. Also, a majority of the farmers produced hay and grain which could be profitably marketed through feeder cattle.

It is not likely that many of the small-scale farmers will increase their farm acreage. None of this group had done so in the past. By contrast, the large-scale farmers are more expansion minded and have the requisites to make expansion possible. Project farmers with over 160 acres of farm land added land at an average of two and one-half times each. At the time of the survey about 60 percent of them wanted additional land. Judging by their past performances, many large-scale farmers would increase the size of their operations.

If every one of the 198 small farms of less than 100 acres were combined, the resulting 98 farms would average 124 acres. However, very few small-scale farmers have the desire, ability, or opportunity to farm large acreages. Those who continue to farm small units will require supplementary off-farm income in order to remain on the farm.

An accurate prediction of the number of farmers

who will leave their farms during the sixties is not possible. If they left at the same rate as during the fifties, there would be 200 fewer farmers. If all farms under 100 acres in 1957 were added to larger farms, there would be 198 fewer farms. Neither of the above possibilities is likely because some farmers are in a situation where they desire and are able to live on small farms of less than 100 acres. In addition, there were 40 percent fewer farms of less than 100 acres available for consolidation in 1957 than in 1949.

About 60 percent of the operators of small farms were willing to move off the farm. This would apply to 120 project farmers. For the displaced farmers, most likely employment opportunities would be in the project area, either in the community or on farms as laborers.

No extensive area-wide adjustments in proportions of crops grown seem likely. The most typical rotation of three years of hay, one year grain, and one year of potatoes utilized operator labor efficiently and provided an income comparable to alternative enterprise combinations. However, grass seed production was increasing. Acreage doubled to one-eighth of the project land between 1957 and 1959. Varieties of grass such as Marion blue, Kentucky blue, and creeping red fescue will replace some of the alfalfa grown in rotation. Excellent yields

can be obtained. A few farmers were beginning to specialize in grass seed production.

In 1957 the per-acre income was higher for potatoes than any other crop. However, potatoes require a high level of management for good yields of high quality. Not all farmers were able to grow potatoes profitably. In the first ten years of project operation, many farmers lost money from growing potatoes. Future production of potatoes will be carried on by fewer individuals who specialize in potatoes. It was common practice in 1957 for a potato grower to rent additional alfalfa land and put it into potatoes for one or two years; then he would rent other land for the following year's potato crop. His own land would be kept under a rotation including potatoes.

Farmers who are displaced by farm enlargement will have a number of alternative job opportunities including non-farm work and farm work for other operators. Although one-half of the off-farm work was farm labor, only two operators of small units worked full-time on other farms. The remaining farmers worked an average of two months. Assuming similar future employment opportunities, about one-sixth of the small farmers could be absorbed into enlarged units as farm workers.

Many under-employed farmers would stay on their

small units and work part time whenever they could find a job. If a full-time job opportunity became available, some would find it more profitable to quit farming altogether and they would leave the farm. Farmers would be more likely to find out about and to accept full-time employment in the local community than to seek work in another area.

A comparison of two neighboring counties to Jefferson County showed that Jefferson County's economic growth was greatly stimulated by the development of the North Unit Project. The other counties also had increased economic activity but at a much slower rate than in Jefferson County. The volume of trade in Jefferson County increased an average of 14 percent per year between 1947 and 1958. In the fifties, nearly 1,000 people immigrated into Jefferson County. Employment increased an average of 50 persons per year. Past community growth was more than adequate to absorb the farmers who quit farming up to 1958.

Future community job opportunities will depend on not only farm income from the project which had provided the major source of income in the area and led to increased job opportunities in related activities, but also on the general level of economic activity in the state and nation. One-sixth of the area non-farm employment in 1958 was in

lumber manufacturing. Before the project the proportion was about one-half. After project development, employment had shifted more into trade and service activities where one-half of the employment increase occurred. These industries are less affected by general economic changes than the lumber industry. Consequently, employment in the community will be more stable than before the project was built.

The rate of business growth of the past ten years will undoubtedly decline because the secondary benefits induced by project construction and development are no longer operating. The acreage of irrigated land reached a peak in the early fifties and is now stable. However, evidence indicates that trade and service industries will continue to grow to support the increasing population. A new water power project has been authorized for early construction. Industrial sites with adequate facilities are available for new industrial development. A larger area population and greatly improved community facilities may attract new industries. Tourism has increased and is being actively promoted by local business groups.

Community growth was important in providing job opportunities for operators of small farms who desired off-farm employment. In the early years of project

farming, many farmers found that the originally planned units were too small to provide a satisfactory income. The planned units were less than half the size allowed by law. If the Bureau would have allowed settlers 160 acres, fewer farm consolidations would have been made because 160 acres did provide an economically efficient unit.

The prediction of mature size, organization, and income is necessary under present Bureau of Reclamation policy. Their major goals are to provide the maximum number of family farms possible and prevent speculative gains to a few individuals. Farm budgeting was used to estimate farm size and repayment ability on the North Unit Project at mature development.

An analysis of mistakes made in farm planning for the North Unit Project will lead to improvements in future project planning. A comparison of the actual 1957 farm situation with the Bureau's estimates in 1950 showed that the planned budgets were much in error. Actual farm sizes were two to three times larger than those budgeted; crop yields were 65 percent higher; the parity index was 82 rather than 100 percent; and farm organizations were different.

The discrepancies between actual and planned farm organization occurred because the assumptions made for the Bureau of Reclamation's budget proved to be

incorrect. Budgeted farm size and organizations were based on fully matured irrigation projects assumed to be similar to the North Unit Project. The primary model was the Central Irrigation District which was established in 1900. In this area farms developed as small subsistence units. Farm land was of lower quality than on the North Unit Project and these farms remained subsistence units even after 1950. By contrast, higher yielding North Unit land provided incentive and income for farm expansion.

Because technology and economic conditions change over time, economically efficient farms will also have to change in size and organization. No such allowance was made in the budgets prepared by the Bureau. This would be done by estimating a number of likely price, cost, and input-output relationships. Several budgets would be prepared under the various assumptions. This would give the authority more information to make a determination of financial feasibility. After the project was in operation, the estimates would be compared to the actual situation; planning errors could be isolated and adjustments made in future planning.

An alternative to awaiting mature project development to check actual results with planned budgets would be to build the project that appeared most profitable

from a number of planned projects and offer the land for sale to the public. Land would be sold to the highest bidders while observing maximum size limitations under Reclamation law. If the selling value of the project was greater than costs, the project would have proven financially feasible. If not, less profitable projects could not be built until changes in conditions indicated that a new project would be feasible.

Each buyer would make his own determination of the value of expected future income from a project farm. He would not have to take up a small unit or nothing as has been the case in the past. However, he would not be required to buy the maximum size allowed. There is no guarantee that the buyer would make better predictions than the planners but because the settler bears the burden of these decisions, it might be desirable to give him a place in farm size and value determination.

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Appendix Table 1. Number of Units and Acreage by Size Class in the North Unit Project for Selected Years.

	Under 40 acres	40-79.9 acres	80-159.9 acres	Over 160 acres	Total
<b>Original ownership units:</b>					
Number	148	225	247	22	642
Percent	23	35	38	4	100
Acreage	3,730	13,815	26,640	4,495	48,800
Percent	8	29	54	9	100
<b>Operating units, 1949:</b>					
Number	77	163	281	29	550
Percent	14	30	51	5	100
Acreage	1,910	10,015	30,785	5,850	48,500
Percent	4	21	63	12	100
<b>Operating units, 1957:</b>					
Number	68	95	156	88	407
Percent	17	23	38	22	100
Acreage	1,580	6,165	18,557	22,198	48,500
Percent	3	13	39	45	100

Source: North Unit irrigation district water office.

# Appendix Table 2

A Comparison of Variable Net Returns Per Acre with Alternative Crop Rotations, North Unit Project, 1957.

Rotations:	1 3 years alfalfa 1 year potatoes 2 years grain /1					2 3 years alfalfa 2 years potatoes 1 year grain					3 2 years kenland red 1 year potatoes 1 year grain					4 4 years merion blue 1 year potatoes 1 year grain					5 3 years alfalfa 3 years grain				
Size of operating unit:	60 irrigated acres					140 irrigated acres					240 irrigated acres					240 irrigated acres					240 irrigated acres				
Rotation:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Agency Plains & Metolius-Culver Areas																									
Variable net returns/acre /2	\$ 63.10	\$ 76.30	\$ 82.90	\$ 64.70	\$ 46.00	\$ 62.10	\$ 78.00	\$ 83.00	\$ 61.80	\$ 46.40	\$ 72.30	\$ 100.00	\$ 97.00	\$ 75.10	\$ 45.60										
Labor requirements by month in terms of hours/acre																									
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	.08	.08	--	.32	.09	.08	.08	--	.32	.08	.08	.08	--	.32	.08	.08	.08	--	.32	.08	.08	.08	--	.32	.08
March	1.09	1.08	.82	.46	1.55	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06
April	.51	.41	.46	.31	.60	.45	.37	.40	.28	.52	.42	.35	.38	.26	.43	.52	.42	.35	.38	.26	.43	.52	.42	.35	.38
May	.30	.85	.93	.92	.75	.90	.95	.60	.77	.75	.80	.95	.92	.75	.92	.75	.80	.95	.92	.75	.92	.75	.80	.95	.92
June	1.13	1.36	1.24	.34	.93	1.13	1.36	1.24	.34	.93	1.13	1.36	1.24	.34	.93	1.13	1.36	1.24	.34	.93	1.13	1.36	1.24	.34	.93
July	1.14	1.45	.82	1.02	.93	1.06	1.37	.82	1.32	.75	1.07	1.11	.79	.43	1.30	1.14	1.45	.82	1.02	.93	1.06	1.37	.82	1.32	.75
August	1.13	1.36	.55	.33	.90	1.54	1.46	1.31	.54	1.62	1.07	1.11	.79	.43	1.30	1.14	1.45	.82	1.02	.93	1.06	1.37	.82	1.32	.75
September	.04	.07	.34	.33	--	.04	.07	.94	.27	--	.04	.07	.33	.25	--	.04	.07	.33	.25	--	.04	.07	.33	.25	--
October	.34	.68	.51	.67	--	.34	.68	.51	.67	--	.34	.68	.51	.67	--	.34	.68	.51	.67	--	.34	.68	.51	.67	--
November	.68	.68	1.02	.63	--	.46	.46	.70	.46	--	.46	.46	.70	.46	--	.46	.46	.70	.46	--	.46	.46	.70	.46	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mud Springs Area																									
Variable net returns/acre	\$ 61.40	\$ 73.00	\$ 79.10	\$ 62.10	\$ 45.40	\$ 59.10	\$ 74.10	\$ 73.40	\$ 63.60	\$ 44.20	\$ 67.30	\$ 91.90	\$ 88.70	\$ 70.30	\$ 42.70										
Labor requirements by month in terms of hours/acre																									
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	.08	.08	--	.32	.09	.08	.08	--	.32	.08	.08	.08	--	.32	.08	.08	.08	--	.32	.08	.08	.08	--	.32	.08
March	1.09	1.08	.82	.43	1.55	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06	.68	.68	.54	.28	.06
April	.51	.51	.54	.31	.60	.47	.42	.44	.30	.52	.42	.35	.38	.26	.43	.52	.42	.35	.38	.26	.43	.52	.42	.35	.38
May	1.33	1.28	1.31	1.68	1.38	1.33	1.23	1.31	1.68	1.38	1.33	1.23	1.31	1.68	1.38	1.33	1.23	1.31	1.68	1.38	1.33	1.23	1.31	1.68	1.38
June	1.52	1.97	1.74	1.39	1.06	1.38	1.33	1.75	1.39	.82	1.24	1.69	1.75	1.39	.82	1.24	1.69	1.75	1.39	.82	1.24	1.69	1.75	1.39	.82
July	1.68	2.13	1.46	1.37	1.46	1.59	1.99	1.39	2.41	1.18	1.54	1.99	1.46	2.12	1.08	1.54	1.99	1.46	2.12	1.08	1.54	1.99	1.46	2.12	1.08
August	1.59	2.05	1.07	.46	1.34	2.30	2.15	1.53	.77	1.05	1.38	1.30	1.36	.60	1.27	1.38	1.30	1.36	.60	1.27	1.38	1.30	1.36	.60	1.27
September	.08	.15	.40	.37	--	.08	.15	1.00	.31	--	.08	.15	.40	.37	--	.08	.15	.40	.37	--	.08	.15	.40	.37	--
October	.34	.68	.51	1.01	--	.34	.68	.51	1.01	--	.34	.68	.51	1.01	--	.34	.68	.51	1.01	--	.34	.68	.51	1.01	--
November	.67	.57	.86	.57	--	.34	.34	.52	.46	--	.34	.34	.52	.46	--	.34	.34	.52	.46	--	.34	.34	.52	.46	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Point where monthly labor becomes limiting in terms of hours/acre /3	250 (hours) 60 (acres) = 4.17					250 = 1.73 140					250 = 1.04 240														

- /1 Includes a combination of wheat and barley based upon the proportion of each crop grown. A 15 acre restriction was placed on wheat because of government allotments.  
 /2 Determined by subtracting variable expenses from gross receipts. Variable expense items include: fertilizer, seed, crop supplies, irrigation water, gas, oil, grease, custom work, machine rental, potato inspection and grading, seed cleaning, and labor. Hired labor is included when an operation requires more than one person or when operations overlap causing simultaneous operations to be performed.  
 /3 This assumes one operator is available 250 hours per month.