

RESEARCH TECHNICAL COMPLETION REPORT

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A DYNAMIC REGIONAL IMPACT ANALYSIS OF FEDERAL
EXPENDITURES ON A WATER AND RELATED LAND RESOURCE PROJECT --
THE BOISE PROJECT OF IDAHO

PART I

DIRECT ECONOMIC IMPACTS
ECONOMICS SUBPROJECT

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ABSTRACT

The Boise Project of Southwestern Idaho was built by the Bureau of Reclamation during the period from 1910 to 1956, at which time the irrigated acreage increased from 51,377 to 340,613 acres. This first report of the economic subproject brings together the relevant direct cost and return (benefit) information from the project. Since the public is often concerned about the economic justification for such a project, an effort is made to present the cost and return information in such a way as to indicate the public expenditures made in terms of tax dollars and the income benefits received in terms of value added. Benefit-cost ratios are presented in terms of value added (net income) per dollar of project cost for each year from 1910 to 1970. This measure of success (or failure) of the project varies from a negative \$0.59 in 1932 to a positive \$21.29. Prior to 1940, and especially during the depression years, the project was what one might consider a marginal economic success. After 1940 and the second World War, however, the above measure indicated each dollar of public funds expended were associated with about \$5 in income to someone in the area. Obviously, the project also had secondary or indirect impacts on the region in which it was located -- these impacts will be identified and discussed in the second volume of this report.

It should be emphasized that the numbers in this report (costs and returns) represent all the economic factors involved in the project and the subsequent irrigated crop production. No attempt has been made to allocate benefits to water, land, technology, or management. The income benefits of the project are the result of the use of all relevant inputs and should not be attributed to any one input (such as water). Income benefits are those associated with the economic activity resulting from the project.

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Introduction to Report

The reserch project entitled "A Dynamic Regional Impact Analysis of Federal Expenditures on a Water and Related Land Resource Project-- The Boise Project of Idaho" is divided into subprojects concerned with (1) social impacts, (2) environmental and physical impacts and, (3) economic impacts. The economic aspects of the project are in turn divided into three parts which deal with (1) direct economic impacts, (2) secondary or indirect economic impacts, and (3) flood control benefits associated with the project. This particular report is focused on the direct economic impacts of the Boise Project, which was built primarily for irrigation and power purposes. As time has passed, however, recreation and flood control uses have become more important and today the Boise Project is managed for all four purposes. Since the Boise Project was built primarily for irrigation with power generation a more secondary purpose this report on direct impacts deals primarily with costs and benefits of irrigation and power in the Boise Valley over the period from 1910 to 1973. The direct economic impacts are reported in two parts, the first dealing with the impact of irrigation itself and the second dealing with the costs and benefits from irrigation and power.

Chapter I

Direct Economic Impact of Irrigation

Boise Project, Idaho

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Introduction to Chapter I

The dams, reservoirs, and canals of the Boise Project were built to provide irrigation water in the Boise and Payette Valley's. Early economic success of the project was centered upon irrigation. Irrigation farming resulting from the project has not always been as successful as it is today. As Chapter I indicates the period from 1910 to 1950 was one of continual development as structures were built and reservoirs provided more storage water. Greater reservoir capacity was important in developing larger quantities of late summer irrigation water supplies necessary for many more intensive and more economically profitable crops. The major purpose of this chapter is to estimate gross and net income values from irrigation supported by the Boise Project. What had to be done was to estimate gross income from crop yield, acreage, and price data, and then to subtract the annual production costs and secondly the fixed production costs.

General Background

The Boise Irrigation Project is located in the Boise and Payette River watersheds in southwestern Idaho. Both rivers are tributaries of the Snake River, part of the Columbia River drainage. The lower watersheds for each river are composed of bottomlands, terraces, and rolling hills with an average elevation of 3,500 feet. The upper watersheds consist of rugged mountains and deep canyons. Elevation within the two river basins ranges from mountain peaks of nearly 10,000 feet, down to an elevation of 2,200 feet at the rivers' confluence with the Snake River.

The irrigated area lies in the lower bottomlands and terraces, shown as the shaded area in figure 1. Other landmarks within the region include Boise, the capitol of Idaho, which is situated near the eastern boundary of the project. Other notable centers of population include Caldwell, Nampa, Meridian, Payette, and Emmett. The irrigated area is bisected by Interstate 80N from east to west and is bounded to the south and west by the Snake River.

Two major irrigation divisions comprise the Boise Project--the Arrowrock Division and the Payette Division. The Arrowrock Division is supplied with water from the Boise River. Storage for the Arrowrock Division is provided by Lake Lowell, Arrowrock, and Anderson Ranch Reservoirs. Lucky Peak Reservoir provides some irrigation storage; however, its primary function is to provide flood control. Other facilities within the Arrowrock Division include the Boise Diversion Dam and the supporting water distribution and drainage systems. The Arrowrock Division can provide a full supply of irrigation water to an irrigable area of approximately 165,000 and a supplemental supply to roughly 111,000 acres for a combined service to 276,000 irrigable acres.

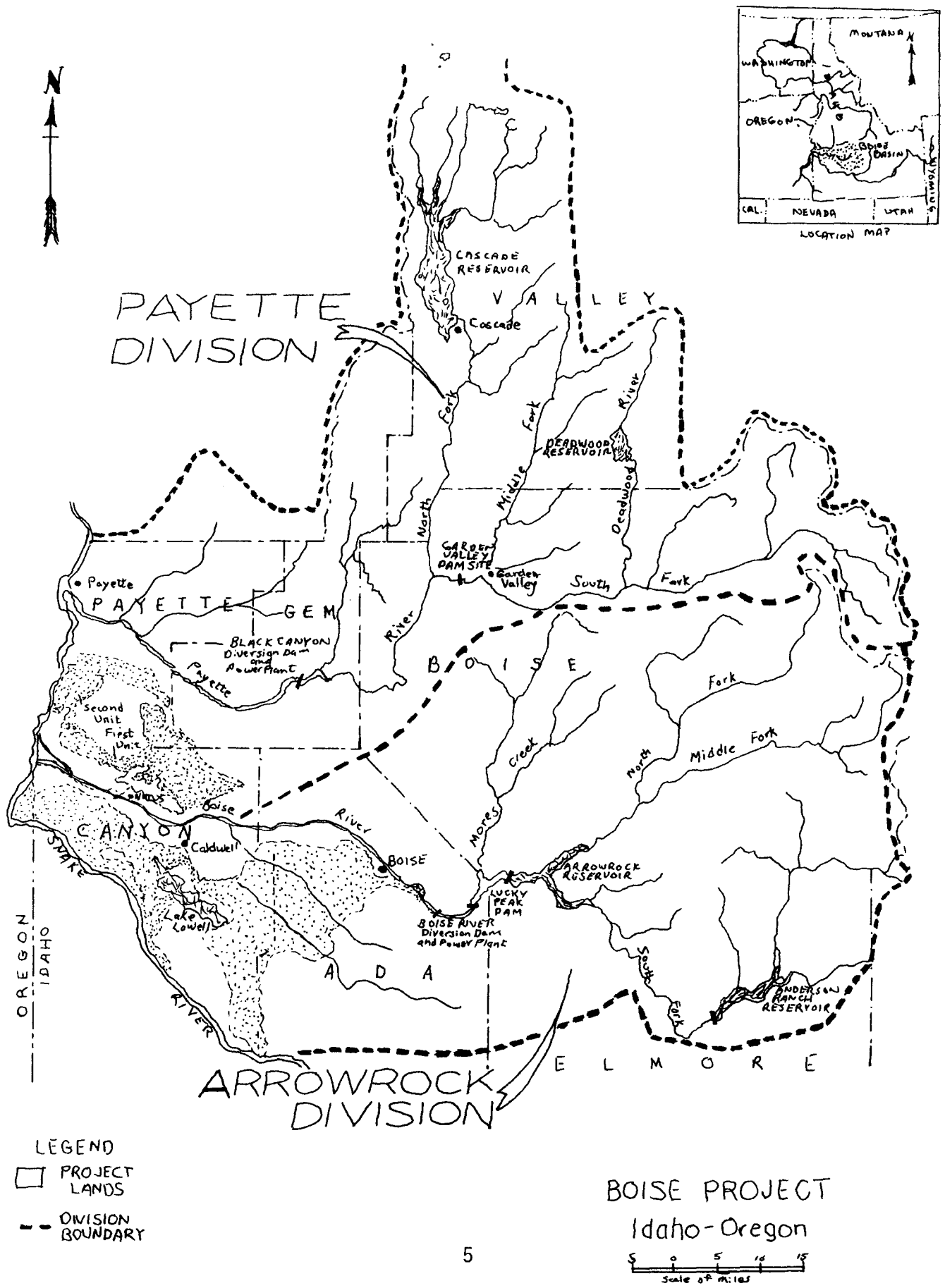
The Payette Division receives its irrigation water from the Payette River and some from return flows off Arrowrock Division lands. Storage for the Payette Division is provided by Cascade and Deadwood Reservoirs, with diversion for delivery into the Payette Valley at the Black Canyon Diversion Dam. These structures, combined with their complementary canal system can distribute full supply water to about 60,000 irrigable acres and a supplemental supply to an additional 54,000 acres. In total both divisions of the Boise Project service an irrigable acreage of 390,000 acres within the Boise Valley.

Climate

The climate of the lands occupied by the Boise Project follow a pattern typical to the arid intermountain west. Idaho lies in the northern extremity of the arid zone, where westerly winds prevail and where climatic conditions are determined by cyclonic storms that sweep in from the Pacific Ocean. Maximum precipitation occurs during the winter and early spring, while summers are very dry. August is often rainless in the river bottomlands.

Precipitation ranges from 8.5 inches to 13.0 inches in the lower valleys and up to 30.0 inches, largely in the form of snow, in the mountainous headwater areas. The heavy snowpacks of over 100.0 inches in the upper river basins provide most of the runoff occurring during the late spring and summer months.

Figure 1. Map of the Boise Project, Idaho



Temperature within the irrigated areas can vary from lows of less than -30°F to highs of over 110°F . The average January temperature is approximately 28°F and in July, about 74°F . The average growing season lasts approximately 150 days. The area near Deer Flat Reservoir has the longest season, 165 days, with lands near Parma, Idaho having the shortest season, 145 days. The total number of heat units measured from a base temperature of 42°F averages 4,340 units, with the greatest number of heat units generated in July. The number of heat units available to plant growth is obtained by subtracting 42°F from the mean daily temperature. For example, if the mean temperature is 57°F , the number of heat units would equal 15.

The climate of the Boise Valley allows production of all crops common to the northern temperate zone. Grains, alfalfa, clover, and other leguminous crops grow exceedingly well, as do sugar beets, potatoes, beans, corn, and seed crops--provided, adequate water for irrigation is available. Production of tree fruits, though risky due to late spring frosts, has been successful through proper care and management. Common fruits grown include plums, prunes, apples, cherries and peaches.

Physical Characteristics

The Arrowrock Division of the Boise Project occupies a triangular area of high terraces and uplands lying westward from Boise between the Boise and Snake Rivers (Fig. 1). According to early soil surveys, the soils in the eastern half of the division were largely loams and sandy loams through which there were found a scattering of slick spots. In the western section, soils were predominately fine sandy loams grading to sandy loam along the Snake River. Through land leveling and various cultural practices, the soils have become more or less modified during the period they have been cultivated. Textures now range from sand to clay loams.

A strongly developed hardpan is quite common to the soils eastward of Caldwell, with most of this land being used for pasture, hay, and grain crops in conjunction with dairy and livestock enterprises. Similar use is made of upland areas where the soils are shallow, over basalt. On the smooth terraces to the west, agriculture is much more diverse, intensively cropped with potatoes, sugar beets, beans, hops, mint, and fruits. The sandy slopes bordering the Snake River are used extensively for orchards.

The Payette Division of the Boise Project lies immediately north of the Arrowrock Division, and the surface soils for the most part, contain considerable silt, but vary from coarse gritty sand to clay loam. The most common soils are medium textured soils, such as silt loams and fine sandy loams. In the eastern portion where soils have clay subsoils at shallow depths, persistent slick spots exist. The claypan layer hinders water infiltration, deep percolation, moisture retention, and subsurface drainage. These soils require careful soil management to maintain their productivity.

In general, the same crops are observed in the Payette Division as in the Arrowrock Division. In both divisions approximately 70 per cent of the land is planted to grain, hay, and pasture. In the remaining area, several more

intensively cultivated crops can be found--potatoes, sugarbeets, seed crops, and fruits.

The Boise Project soils have organic and nitrogen deficiencies which are common to most semi-arid regions. These deficiencies can normally be corrected by following proper crop rotations with legumes and incorporation of crop residues. Most minerals are plentiful; however, phosphorus is often made unavailable to plants and therefore requires larger than normal applications.

Adequate water for normal plant development is essential for successful crop production with this area. Early irrigators (before the Project) attempted to raise irrigated crops using the natural river flows. Historic data on the Boise River shows extreme variability in flows from one year to the next. During the 80 years of recorded flows for irrigation, the lowest annual flow was only 892,000 acre-feet compared to a high of over 3,600,000 acre-feet. Lack of a late season water supply in the area made economically successful farming a problem even with irrigation. Natural river flows during an average year would have provided enough water in June to irrigate 230,000 acres. By July and August, flows often have tapered off to the point, that frequently, less than 30,000 acres could have been adequately irrigated. Storage of the spring runoff for use later in the summer seemed to be the obvious solution. It is not surprising that early irrigators welcomed the water provided by the Reclamation Service.

Economic and Social Description

In 1970, Ada and Canyon counties within which most of the Boise Project lies, contained 25 per cent of the state's population. Almost 70 per cent of the 175,000 people within the two countries live in the urban areas of Boise, Nampa, and Caldwell. Boise, located in Ada County, is the only designated Standard Metropolitan Statistical Area in Idaho.

Boise was designated as the Capitol of Idaho in 1890, the year that Idaho was admitted to statehood. Boise has grown into a major regional trade center and transportation hub for the northern Great Basin area. The city is located on major east-west and north-south highway arterials and also is served with transcontinental railroad and international air service.

Three schools of higher education are found within the region--Boise State University at Boise, College of Idaho in Caldwell, and the Northwest Nazarene College in Nampa. The University of Idaho also maintains an Agricultural Experiment Station, south of Caldwell.

Agriculture remains as a major thrust behind the area's economic prosperity. In latter analysis of secondary impacts, it was found that nearly \$650 million dollars of value-added income was generated in the Boise area in 1970. Irrigated agriculture contributed, directly, \$22 million dollars to this total. Another \$56 million dollars was stimulated within the economy by the agricultural production through food processing, marketing, and related services. In total, twelve percent of all value-added income generated in the Boise area is derived either directly or secondarily from the projects irrigation.

PROJECT HISTORY

Pre-history

Irrigation along the Boise River had been in progress for some 38 years prior to the passage of the Reclamation Act of 1902, though early efforts were confined to bottomlands along the river. Canals were constructed later that did reach benchlands south of the river, some 25 to 40 feet above the bottomlands. Most of the canals on the benchlands south of the river were constructed during the period between 1888 and 1892. Principal canals built during this period were the Settlers, Phyllis, Caldwell, and Ridenbaugh canals.

The New York Canal, located at a higher elevation than the previous canals, was constructed during the early 1900's. Diversion for the New York Canal took place at a site near the present location of the Boise Diversion Dam.

Prior to the Reclamation Service entrance into the valley, approximately 100,000 acres of land were under private irrigation. The private irrigation companies of the time were plagued with financial burdens and engineering failures. Without storage capabilities, early irrigation investments had no real opportunity for success. Private investment through the Carey Act might have resulted in the construction of storage facilities; however, the West had long been capital deficient. With a national goal to promote growth in the West by financing irrigation projects, the Reclamation Act provided the solution to the irrigation woes of the Boise Valley.

The Boise Reclamation Project rapidly gained both public and political support, and the state quickly passed legislation enabling reclamation to take place. On September 9, 1904, the Payette-Boise Water Users Association was organized to publically promote the project. Less than a year later, March 27, 1905, the Secretary of the Interior authorized the construction of the Boise Project.

During the growing season of 1906, the Reclamation Service controlled its first irrigation in the Boise Valley. The first irrigation water was provided to farmers supplied by the New York Canal. The Reclamation Service had contracted to control and to enlarge this canal system. This marked the beginning of federal construction and improvement of irrigation facilities for the Boise Project.

Project Development, 1907-1974

Lake Lowell, west of Nampa, Idaho, was essentially completed by 1908, providing 169,000 acre-feet of storage. The Boise Diversion Dam, on the Boise River, was also completed late in 1908, although the powerplant was not operational for another four years. By 1910, some 33,300 acres of new lands were being irrigated by the Project, including 18,000 acres of land held by stockholders of the New York Canal.

With no storage in the upper portion of the valley, the project usually experienced water shortages by early July. Sufficient quantities of irrigation water could not be furnished without the construction of an upstream reservoir. The Arrowrock Dam and Reservoir were authorized for construction in 1911 and completed in 1915. Arrowrock Reservoir increased the Project's active storage by 276,000 acre-feet.

In some years, even with Arrowrock Reservoir, the Project still suffered from late season water shortages. Stimulated by increasing demands for water, investigations were initiated to examine the possibility of additional upstream storage. In 1937, Arrowrock Dam was raised five feet to increase its active storage by 9,000 acre-feet to 285,000 acre-feet. Anderson Ranch Dam, authorized in 1940, was completed in 1951. Anderson Ranch Reservoir has an active storage capacity of 423,000 acre-feet.

Lucky Peak Dam, the only additional structure built on the Boise River, was completed in 1955 as a Corps of Engineers project for flood control purposes. However, 112,000 acre-feet of storage has been assigned irrigation water rights, and is used for irrigation purposes when the need arises. A coordinated operation of all three reservoirs on the Boise River is essential and currently practiced both for irrigation and flood control purposes.

With a combined storage capacity on the Boise River of 1,037,000 acre-feet, the Arrowrock Division irrigated nearly 236,000 acres of land in 1973. This included approximately 135,000 acres of full service land and 101,000 acres of land receiving only supplemental water supply.

The development on the Payette River has, in general, been undertaken more recently. The Black Canyon Diversion Dam and Power plant were completed in 1924 and 1925, respectively. Deadwood Dam, with an active storage of 162,000 acre-feet was authorized in 1928 and completed in 1930. Cascade Reservoir, with an active storage capacity of 653,000 acre-feet, was authorized in 1941 and completed in 1948.

The lands under the Payette Division are known as the First (Notus) and Second Units. The Notus Unit, constructed in the early 1920's, is provided with water entirely by return flows from the Arrowrock Division. The Notus Unit encompasses approximately 6,900 irrigable acres. The Second Unit includes both a pump and gravity served sections. Water for the Second Unit is diverted from the Payette River and can provide a full supply of water to 53,200 irrigable acres. The gravity area was put into operation in 1939, while the pump section was not ready for irrigation until the season of 1949. Another 54,200 irrigable acres are eligible for a supplemental water supply bringing the total irrigable area of the Payette Division to 114,300 acres. Measured in terms of irrigated acreage instead, the Payette Division in 1973 irrigated at total of 104,000 acres of which 54,000 acres were full supply and 50,000 were supplemental supply lands.

Irrigated Acreage

Initially, with only the construction of Lake Lowell and Arrowrock Reservoirs planned, it was anticipated that 243,000 acres of land would be serviceable for irrigation. In 1910, 33,400 acres received irrigation water supplied by the Project. This included 15,400 acres of new lands and 18,000 acres in the New York Canal system. By 1922, the project had reached its anticipated capacity to irrigate 243,000 acres. With the availability of more irrigable land in the valley and because water shortage still occurred during low flow years, the demand for more storage remained.

Table 1 presents total irrigated acreage data from the Boise Project from 1910-1973. Irrigated acreage grew rapidly as reservoirs were completed, canals built, and fields leveled. By 1940, the irrigated acreage had grown to 284,000 acres, an increase of 453 percent since 1910. The irrigated acreage continued to increase until the mid '60's, at which time it seemed to have reached a peak. In 1964, 349,000 acres were irrigated--a six-fold increase over the 1910 acreage.

Between 1964 and 1973 the irrigated acreage decreased to 341,000 acres. Part of this decline can be attributed to the rapid urban encroachment from Boise, Nampa, and Caldwell. The Bureau of Reclamation reports the project's irrigable area to be 390,100 acres; however, they classify 41,100 acres of this land in a nonproducing category, including roads, ditches, drains, farmsteads, and urban residential-commercial land uses. No new lands for irrigation service are included in current project plans.

Not all irrigated acres are harvested, yet those which are harvested have consistently averaged 96 percent of the total irrigated land. The difference is caused primarily by weather, market conditions and the water supply situation. All income estimates are based on returns from the harvested acreage. Table 2 shows actual acres harvested by year.

The Bureau of Reclamation projects provide three types of irrigation service; full, supplemental, and temporary. Full service lands generally obtain their entire water supply from Reclamation project facilities. Supplemental service is provided to lands which have an inadequate supply from non-reclamation facilities. Full and supplemental service users have permanent contracts for project water. Temporary service lands, none of which are in the Boise Project, receive water only when supplies are available in excess of permanent needs. Since 1940, the distribution of project lands receiving full or supplemental service has been reasonably constant. Roughly 60 percent of the total irrigated area receives full supply and 40 percent receives supplemental supply. Tables 1 and 2 show the annual distribution of irrigated acres that receive full or supplemental service. Figure 2 graphically displays annual irrigated acreage.

Irrigation Water Supply

The first irrigation via storage supplied water occurred during the 1909

Table 1. Total Irrigated Acreage, Boise Project, Idaho, 1910-1973. 1/

Year	Total acreage	Full supply acreage	Supplemental supply acreage
1910	33,377	15,377	18,000*
1911	45,575	27,575	18,000*
1912	61,725	43,725	18,000*
1913	58,265	40,265	18,000*
1914	83,590	65,590	18,000*
1915	97,127	76,705	20,422*
1916	76,922	55,424	21,498*
1917	157,024	117,024	40,000*
1918	182,921	117,024	65,897
1919	224,282	103,782	120,500
1920	237,160	109,760	127,400
1921	241,700	111,500	130,200
1922	243,300	112,000	131,300
1923	249,500	112,500	137,000
1924	239,530	113,630	125,900
1925	227,038	95,738	131,300
1926	289,080	158,080	131,000
1927	283,070	156,070	127,000
1928	291,175	160,975	130,200
1929	296,270	164,770	131,500
1930	301,042	167,242	133,800
1931	297,335	165,591	131,744
1932	289,389	156,341	133,048
1933	287,715	156,422	131,293
1934	288,997	152,120	136,877
1935	284,283	147,372	136,911
1936	284,358	148,758	135,600
1937	271,358	150,058	121,300
1938	268,942	150,152	118,790
1939	270,300	151,400	118,900
1940	284,002	161,002	123,000
1941	284,616	161,916	122,700
1942	287,740	165,040	122,700
1943	285,193	171,879	113,314
1944	287,140	170,812	116,328
1945	287,894	171,566	116,328
1946	287,732	171,404	116,328
1947	289,772	173,222	116,550
1948	294,268	177,368	116,900
1949	298,723	181,823	116,900
1950	305,348	188,448	116,900
1951	317,525	194,150	123,375
1952	318,272	195,372	122,900
1953	321,484	198,584	122,900
1954	323,810	200,256	123,554
1955	327,519	201,922	125,597
1956	325,482	201,677	123,805
1957	327,604	203,145	124,459
1958	327,909	203,446	124,463
1959	326,778	200,729	126,049
1960	324,340	198,603	125,737
1961	322,623	196,796	125,827
1962	322,380	196,516	125,864
1963	348,399	195,400	152,999
1964	348,649	195,532	153,117
1965	345,793	192,957	152,836
1966	345,260	192,608	152,652
1967	346,850	194,128	152,722
1968	344,999	192,315	152,684
1969	343,411	190,686	152,725
1970	342,528	189,867	152,661
1971	340,333	188,216	152,117
1972	336,851	185,583	151,268
1973	340,613	189,234	151,379

1/ Annual Report of the Reclamation Bureau, Reclamation Bureau, 1910-1932.
Crop Report, Bureau of Reclamation, 1933-1953.

Crop Reports and Related Data, Bureau of Reclamation, 1954-1968.

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* New York Canal lands.

Table 2. Irrigated Acres Harvested by Boise Project, Idaho, 1910-1973. 1/

Year	Total	Regular	Supplemental
1910*	33,377	15,377	18,000
1911*	45,575	27,575	18,000
1912*	61,725	43,725	18,000
1913*	58,265	40,265	18,000
1914*	83,590	65,590	18,000
1915*	97,127	76,705	20,422
1916*	76,922	55,424	21,498
1917*	157,024	117,024	40,000
1918*	182,921	117,024	65,897
1919	219,093	99,093	120,000
1920	225,100	100,700	124,400
1921	231,740	103,340	128,400
1922	236,900	108,500	128,400
1923	238,950	108,950	130,000
1924	230,610	111,050	119,560
1925	219,989	93,689	126,300
1926	267,846	139,846	128,000
1927	275,821	146,521	129,300
1928	274,764	149,064	125,700
1929	278,580	150,180	128,400
1930	283,359	154,059	129,300
1931	282,017	153,902	128,115
1932	277,417	148,669	128,748
1933	285,049	156,301	128,748
1934	276,836	144,582	132,254
1935	274,295	146,243	128,052
1936	275,515	147,130	128,385
1937	262,546	148,803	113,743
1938	254,631	141,941	112,690
1939	265,072	151,972	113,100
1940	271,493	157,993	113,500
1941	277,190	161,519	116,200
1942	279,032	162,832	116,200
1943	283,729	167,529	116,200
1944	295,915	179,715	116,200
1945	286,547	171,566	116,300
1946	280,380	164,080	116,300
1947	291,171	174,671	116,500
1948	294,771	177,871	116,900
1949	284,194	167,294	116,900
1950	304,764	187,864	116,900
1951	317,098	193,723	123,375
1952	317,218	195,966	123,400
1953	317,165	198,584	123,400
1954	322,427	198,873	123,554
1955	326,686	201,129	125,557
1956	324,415	200,610	123,805
1957	325,376	200,917	124,459
1958	326,652	202,189	124,463
1959	324,391	198,381	126,010
1960	322,098	196,376	125,722
1961	320,149	194,347	125,802
1962	315,143	190,702	124,441
1963	342,431	191,027	151,404
1964	343,724	192,191	151,533
1965	342,119	190,543	151,576
1966	341,308	189,829	151,479
1967	343,798	192,389	151,409
1968	340,364	188,922	151,442
1969	339,489	188,010	151,479
1970	338,330	187,473	150,857
1971	336,454	185,710	150,744
1972	331,918	182,115	149,803
1973	338,143	187,609	150,534

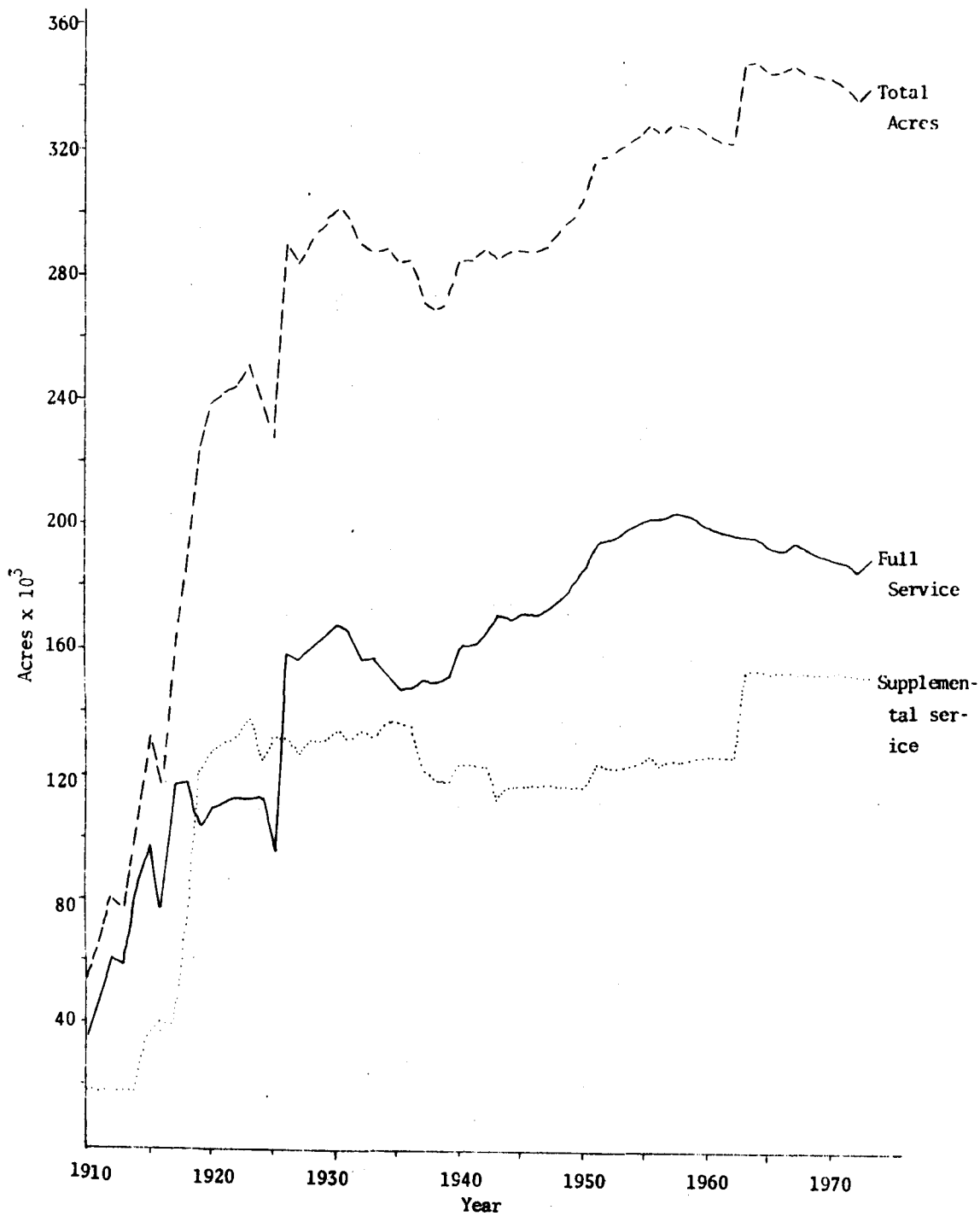
1/ Annual Report of the Reclamation Bureau, Reclamation Bureau, 1910-1933.
Crop Report, Bureau of Reclamation, 1933-1953.

Crop Reports and Related Data, Bureau of Reclamation, 1954-1963.

Water and Land Related Accomplishments, Bureau of Reclamation, 1969-1973.

* Irrigated acreage used, harvested acreage not available.

Figure 2. Total irrigated acreage, Boise Project, Idaho, 1910 - 1973



season, with water diverted from Lake Lowell. The project rapidly expanded over the next 63 years. Total diversion from the Boise and Payette Rivers increased from 978,000 acre-feet in 1915, to 2,304,000 acre-feet in 1973. Water deliveries to farms grew at a corresponding rate from 273,000 acre-feet in 1915 to 1,543,000 acre-feet in 1973. Table 3 summarizes annual diversions and farm deliveries for the Boise Project, 1910-1973. Total diversion equals the amount of water diverted at the river, while farm delivery represents the amount reaching farmer head gates.

Table 4 lists the capacity and completion dates for the Boise Project reservoirs. Today, the active storage capacity of the Bureau of Reclamation reservoirs is 1,693,900 acre-feet. Lucky Peak Dam, a Corps of Engineers structure, provides an additional 297,000 acre-feet. Until 1950, with the addition of Anderson Ranch Reservoir, the Project experienced wide annual fluctuation in total diversions (see Figure 3). Anderson Ranch Reservoir supplied the additional storage capacity needed to capture enough spring runoff for use in low flow years.

The average water application increased from 1.67 acre-feet per acre in 1910 to 4.53 acre-feet per acre in 1973, as shown in Table 5. Since the completion of Anderson Ranch Dam in 1950, there has been little reason to be concerned with the availability of water. Only in 1961 (when 3.84 acre-feet per acre were delivered to farms) did the rate drop below four acre-feet per acre. Considering the reuse of return flows that already occur, and the potential for more reuse, the quantity of water supplied does not appear to be a concern in the immediate future.

The average delivery efficiency rate over the project's life has been 67 percent (water delivered to farms as a percent of total diversions from the river). Comparisons of delivery efficiencies on other irrigation projects places the Boise Project at an average level (Table 6).

Better management, lining of canals and ditches, and the use of underground pipes could improve delivery efficiency. A study done recently by Conklin and Schmisser at Oregon State University indicated that water pricing can be an important tool to encourage water conservation by both districts and farms (13).

Table 3. Acre-feet of Water Delivered to Farms, Boise Project, Idaho, 1910-1973.

Year	Total diver- sions from Boise & Payette Rivers ^{1/}	Water delivered to farms		
		All users	Regular users ^{2/}	Supplemental users ^{3/}
1910	NA	55,739	37,739	18,000
1911	NA	71,552	53,552	18,000
1912	NA	107,401	89,401	18,000
1913	NA	120,025	102,025	18,000
1914	NA	196,436	178,436	18,000
1915	978,838	272,926	216,456	57,385
1916	1,217,572	273,842	197,309	76,532
1917	1,058,228	482,064	359,264	122,800
1918	1,279,916	685,954	438,840	247,114
1919	1,176,828	749,101	346,631	402,470
1920	1,254,640	853,776	395,136	458,640
1921	1,361,022	1,112,893	560,845	552,048
1922	1,305,946	1,110,647	534,240	576,407
1923	1,469,530	1,148,905	574,875	574,030
1924	791,072	519,780	246,577	273,203
1925	1,498,354	1,197,336	647,189	550,147
1926	1,041,730	702,464	384,134	318,330
1927	1,519,232	1,194,555	658,615	535,940
1928	1,409,832	1,004,554	555,364	449,190
1929	1,324,063	1,048,796	583,286	465,510
1930	1,341,524	933,230	518,450	414,780
1931	1,008,376	579,803	322,902	256,901
1932	1,553,710	963,665	520,615	443,050
1933	1,454,571	1,018,485	553,708	464,777
1934	1,155,690	670,335	352,780	317,555
1935	1,455,529	1,120,014	580,585	539,429
1936	1,435,816	1,083,086	566,450	516,636
1937	1,282,432	825,577	456,825	368,752
1938	1,629,439	1,234,405	710,542	523,863
1939	1,453,049	983,376	550,580	432,796
1940	1,420,823	922,706	522,956	399,750
1941	1,585,307	1,061,803	604,132	457,671
1942	1,604,777	1,065,158	611,168	453,990
1943	1,804,808	1,251,384	753,936	497,448
1944	1,511,997	1,137,931	677,272	460,659
1945	1,625,411	1,145,292	682,307	462,985
1946	1,753,846	1,261,144	751,628	509,516
1947	1,835,965	1,316,855	787,718	529,137
1948	1,751,171	1,259,676	759,344	500,332
1949	1,984,024	1,310,992	797,801	513,191
1950	2,061,011	1,404,734	886,867	517,867
1951	2,144,220	1,479,117	943,670	535,447
1952	2,188,105	1,515,568	1,001,846	513,722
1953	2,132,515	1,499,333	965,947	533,386
1954	2,409,646	1,640,810	1,084,817	555,993
1955	2,116,532	1,467,914	905,240	562,674
1956	2,450,861	1,656,127	1,102,719	553,408
1957	2,228,416	1,529,889	992,226	537,663
1958	2,294,688	1,552,939	1,027,705	525,234
1959	2,246,186	1,561,685	1,038,582	523,103
1960	2,400,695	1,662,898	1,088,280	574,618
1961	2,031,231	1,236,567	754,650	481,917
1962	2,241,787	1,424,482	868,163	556,319
1963	2,182,180	1,438,209	806,324	631,885
1964	2,245,748	1,407,582	788,990	618,592
1965	2,311,995	1,484,777	827,582	657,195
1966	2,439,838	1,583,278	972,670	610,608
1967	2,313,321	1,576,511	780,829	795,682
1968	2,284,481	1,495,393	837,325	658,068
1969	2,404,903	1,648,291	951,865	696,426
1970	2,344,872	1,572,488	936,879	635,609
1971	2,405,939	1,496,877	847,448	649,429
1972	2,375,507	1,518,785	829,501	689,284
1973	2,303,905	1,542,823	902,076	640,747

1/ Water Distribution of Boise River, District 63, 1974.
Boise Project History. (In addition there are about 30,000 irrigable acres within the Lower Payette Ditch Co. and Farmer's Cooperative Irrigation Co., to which an estimated annual diversion of 200,000 A. F. is made).

2/ Annual Report of the Reclamation Bureau, Reclamation Bureau, 1910-1932.
Crop Report, Bureau of Reclamation, 1933-1953.

Crop Report and Related Data, Bureau of Reclamation, 1954-68.

3/ Water and Land Related Accomplishments, Bureau of Reclamation, 1969-1973.
Estimated, 1967-1973 as reported, see footnote 2.

Table 4. Storage Reservoirs, Boise Project

Name	River	Capacity, Ac-ft		Year completed
		Active	Total	
Anderson Ranch	Boise-So. Fork	423,200	493,200	1950
Arrowrock	Boise	286,600	286,600	1915
Cascade	Payette-No. Fork	653,200	703,200	1948
Deadwood	Deadwood (Payette)	161,900	161,900	1931
Lake Lowell	Offstream	169,000	190,100	1908
SUBTOTAL		1,693,900	1,835,000	
Lucky Peak*	Boise	279,000	279,000	1955
TOTAL		1,972,900	2,114,000	

* Corps of Engineers Dam.

Table 5. Total acres irrigated, water delivered to farms, and water applications per acre, Boise Project, Idaho 1910-1973.

Year	Total acres irrigated by project ^{1/}	Total water delivered to farms ^{2/} (acre-feet)	Water application (ac-ft per acre)
1910	33,377	55,739	1.67
1911	45,575	71,552	1.57
1912	61,725	107,401	1.74
1913	58,265	120,025	2.06
1914	83,590	196,436	2.35
1915	97,127	272,926	2.81
1916	76,922	273,842	3.56
1917	157,024	482,064	3.07
1918	182,921	685,954	3.75
1919	224,282	749,101	3.34
1920	237,160	853,776	3.60
1921	241,700	1,112,893	4.61
1922	243,300	1,110,647	4.57
1923	249,500	1,148,905	4.61
1924	239,530	519,780	2.17
1925	227,038	1,197,336	5.28
1926	289,080	702,464	2.43
1927	283,070	1,194,555	4.22
1928	291,175	1,004,554	3.45
1929	296,270	1,048,796	3.54
1930	301,042	933,230	3.10
1931	297,335	579,803	1.95
1932	289,389	963,665	3.33
1933	287,715	1,018,485	3.54
1934	288,997	670,335	2.32
1935	284,283	1,120,014	3.94
1936	284,358	1,083,086	3.81
1937	271,358	825,577	3.05
1938	268,942	1,234,405	4.59
1939	270,300	983,376	3.64
1940	284,002	922,706	3.25
1941	284,616	1,061,803	3.73
1942	287,740	1,065,158	3.71
1943	285,193	1,251,384	4.39
1944	287,140	1,137,931	3.97
1945	287,894	1,145,292	3.98
1946	287,732	1,261,144	4.39
1947	289,772	1,316,855	4.55
1948	294,268	1,259,676	4.28
1949	298,723	1,310,992	4.39
1950	305,348	1,404,734	4.60
1951	317,525	1,479,117	4.66
1952	318,272	1,515,568	4.77
1953	321,484	1,499,333	4.67
1954	323,810	1,640,810	5.07
1955	327,519	1,467,914	4.49
1956	325,482	1,656,127	5.09
1957	327,604	1,529,889	4.67
1958	327,909	1,552,939	4.74
1959	326,778	1,561,685	4.78
1960	324,340	1,662,898	5.13
1961	322,623	1,236,567	3.84
1962	322,380	1,424,482	4.42
1963	348,399	1,438,209	4.13
1964	348,649	1,407,582	4.04
1965	345,793	1,484,777	4.30
1966	345,260	1,583,278	4.59
1967	346,850	1,576,511	4.55
1968	344,999	1,495,393	4.34
1969	343,411	1,648,291	4.80
1970	342,528	1,572,488	4.59
1971	340,333	1,496,877	4.40
1972	336,851	1,518,785	4.51
1973	340,613	1,542,823	4.53

^{1/} From Table 1.

^{2/} From Table 3.

Figure 3. Annual irrigation diversions, Boise Project, 1910-1973

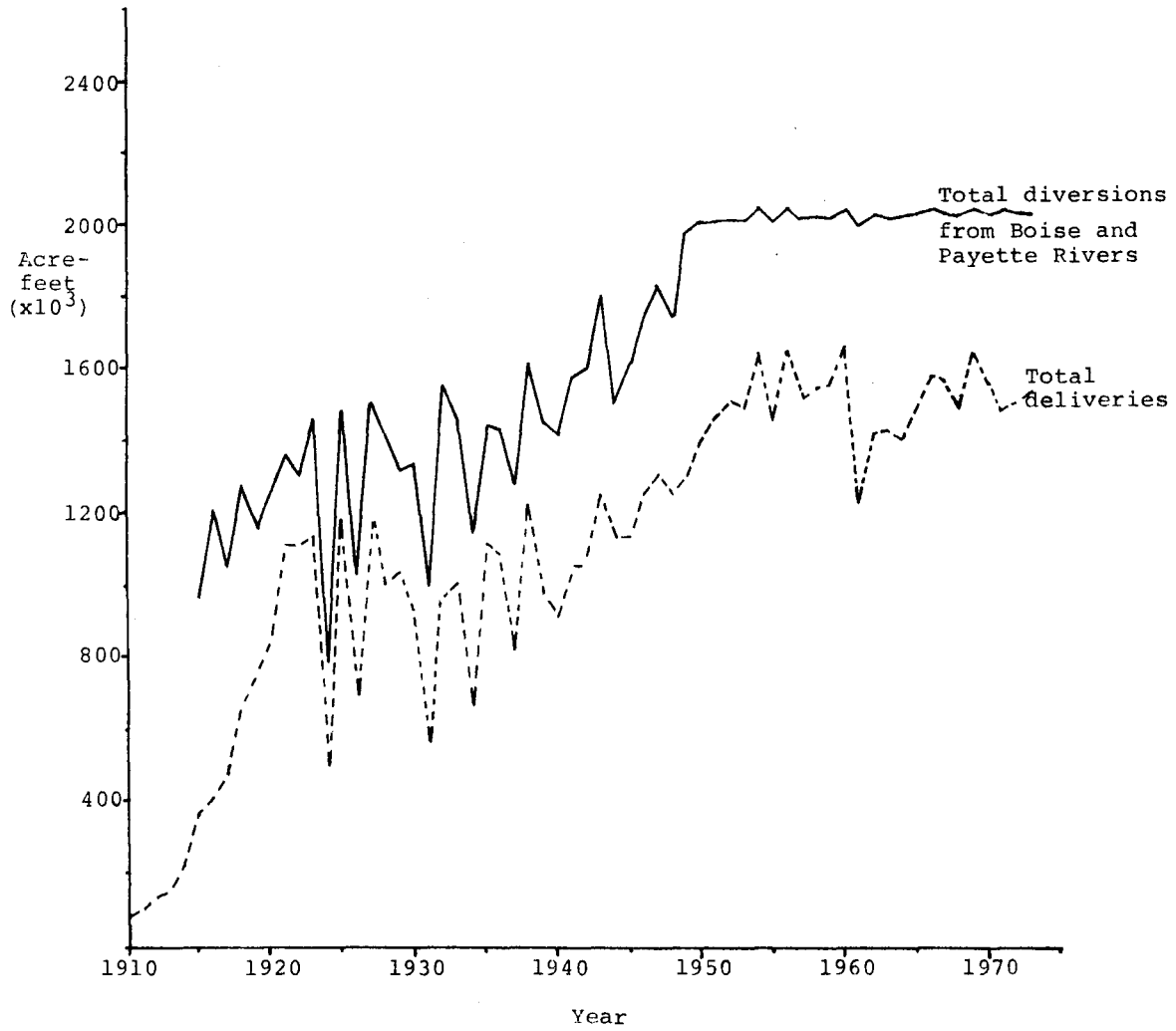


Table 6. Average Irrigation Delivery Efficiency

Project	Location	Efficiency
Boise	SW Idaho	67%
Crooked River	Central Oregon	60%
Owyhee	Eastern Oregon	72%
Stanfield	NE Oregon	75%
Uncompahgre	Colorado	69%
Yakima Basin	Central Washington	67-90%

CROP PATTERNS

Pre-project

Due to a lack of late season irrigation water, pre-project crops were primarily hay and pasture (which also supported livestock grazing and dairying). Grain crops, which do not have a high late season water requirement, were favored, and some fruits and vegetables were produced for the local population (Table 7). A notable increase in the acreage of more intensive, higher valued crops followed the emergence of an adequate water supply.

Table 7. Pre-project Cropping Patterns

Year	Hay and pasture	Grain	Other*	Total
1880	6,277	13,656	10	19,943
1890	15,900	7,600	1,200	24,700
1900	45,400	20,700	4,000	70,100

* Seed crops, fruits, and vegetables

Period from 1910 to 1940

With the development of the first two reservoirs, Lake Lowell and Arrowrock, little change in pre-project cropping patterns was noticeable.

Forage and cereal crops almost totally dominated the crop distribution throughout the period. Figure 4 graphically displays the annual cropping patterns from 1910 to 1973.

In relation to all other crops, forage crops increased 15 percent in acreage. In 1910, forage crops accounted for 41 percent of the total acreage and grew to 56 percent of the total acreage by 1940. The percentage increase of forage crops can be attributed, in part, to a simultaneous growth in livestock production and the high risk still attached to growing crops that require late season water.

Cereal crops dropped in relative importance from 1910 to 1940, going from 51 percent to 26 percent of the total crops grown. This was partially in response to market conditions and the comparative advantages of other grain producing regions. Grain, being a homogenous, easily transported commodity, competes in national markets.

The production of seeds, field crops, vegetables, and fruits increased slightly over this period, due to improved water availability, expanding markets and better transportation technology. In 1910, the above four crop categories occupied 5 percent of the irrigated acreage. By 1940, these same four crops accounted for nearly 16 percent of the cropland of the Boise Project.

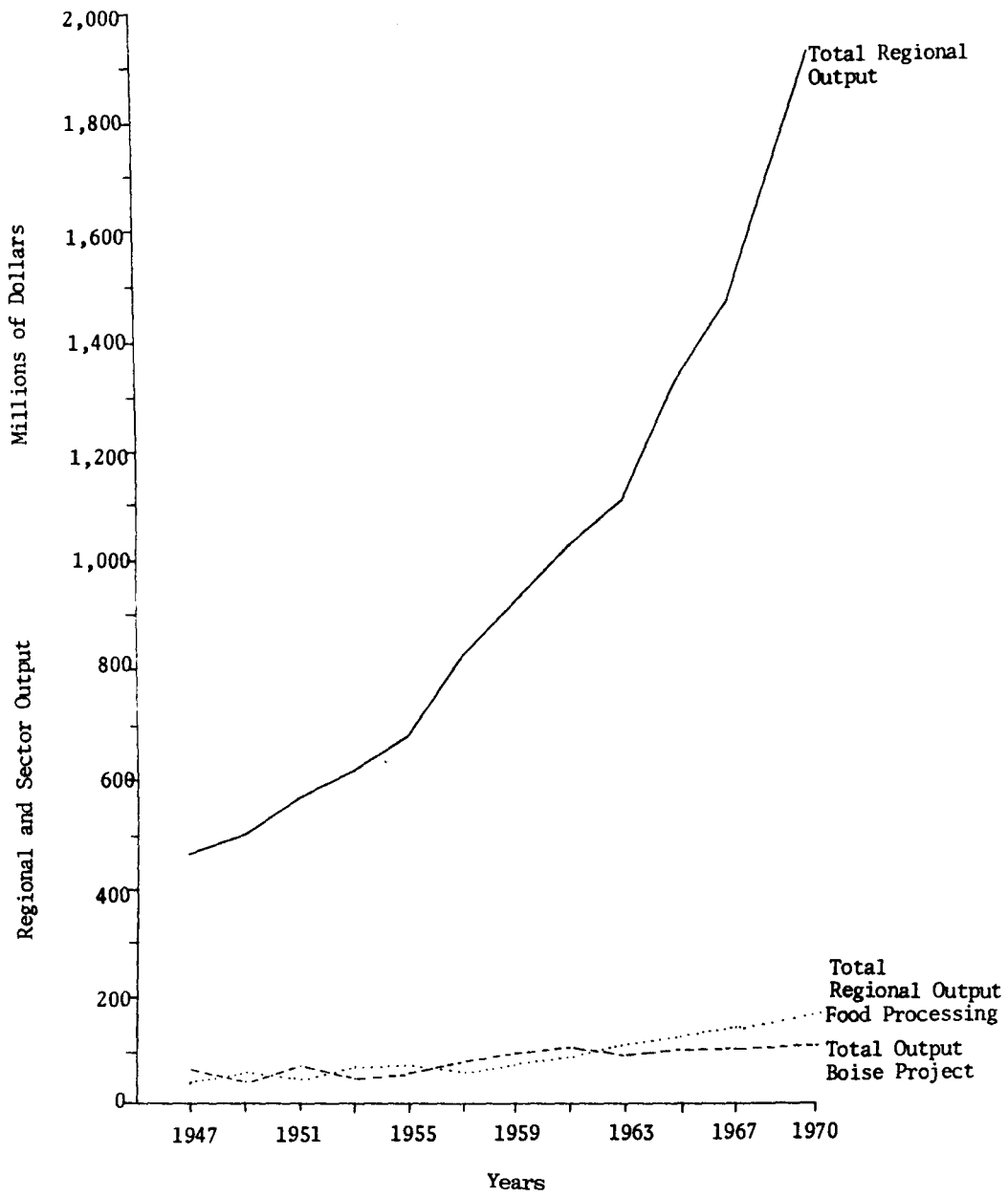
Period from 1940 to 1973

Several changes in the cropping patterns have emerged with the technologic and economic boom following World War II. With the addition of more reservoir storage (Anderson Ranch, 1951), the assurance of late season water has encouraged the production of more intensive crops.

Even so, forage and cereal crops have tended to dominate the crop distribution and account for almost 70 percent of the irrigated acreage. Grains have continued a general downward trend throughout the period. Forage crops have also declined from 1940 to 1973, so that they are now produced on only 50 percent of the acreage as compared to 56 percent in 1940. Both declines can be traced to the favorable conditions for the production of more intensive, high valued crops. Seed, field, vegetable, and fruit crops doubled in acreage, from 15 percent in 1940 to over 30 percent in 1973.

The relative importance of field crops rose significantly with the increased demand for sugar beets following the embargo of Cuban sugar. The production of two other field crops, hops and mint, was introduced to the Boise Valley after 1940. Both crops require special cultural practices and can be grown only in certain areas with the correct soil and climatic conditions. All field crops increased from 3 percent of the irrigated acreage in 1940 to 12 percent in 1973.

Figure 4. Comparison of total outputs for the Boise Region, food processing and the Boise Project, Idaho, 1910 - 1970.



Vegetable, seed, and fruit crops have not exhibited any definite trend since 1940 other than being quite sensitive to yearly fluctuations in price and market conditions. Changes in crop distribution within these three general crop categories have occurred. The relative importance of potatoes has increased in comparison with other crops. Alfalfa seed represents nearly half the seed crop, acreage, and apples have become the dominant fruit.

Table 8 shows the 1973 crop distribution. Alfalfa hay occupied the greatest area (22.0%), followed by pasture (17.0%), corn silage (9.0%), sugar beets (8.5%), barley (7.0%), wheat (5.0%), and potatoes (3.5%). These seven crops occupied three-fourths of the total acreage irrigated by the Boise Project.

CROP INCOME AND COST

Gross Crop Value

Gross crop value refers to the gross sales receipts from crops produced on project lands receiving either full or supplemental supplies of irrigation water. The Bureau of Reclamation, in its annual crop summary, reports the annual gross crop value for all the crops grown. The first column of Table 9 shows the annual value, as reported by the Bureau, from 1910 to 1973.

Yields and prices reported by the Bureau were compared to those given in the Census of Agriculture and the USDA's Agricultural Statistics to test their validity. Yields per acre and prices per unit for four crops are compared in Table 10. In most cases, both the prices and yields, as reported by the Bureau of Reclamation, are less than those shown by the other two sources. Using the Bureau's conservative estimates of gross crop values should minimize the probability of overestimating true project benefits.

As seen in Table 9, a great deal of cyclic behavior in crop values occurred during the first 30 years of the project. A definite trend upward, began during World War II, has been increasing dramatically in recent years. Gross crop value has increased from \$615,640 in 1910 to over \$87,400,000 in 1973. Over the 64 years of reported data, the Boise Project has accumulated over \$1.4 billion worth of gross crop income. Total investment, as of 1973, in project facilities was \$69 million, which is only one-twentieth of the gross income it permitted to be produced. In 1973 alone, the gross crop income from the project exceeded the projects total investment cost.

Table 8. Crop Distribution, Boise Project, 1973.

Crop	Acres	Percentage
<u>Cereals</u>	<u>65,013</u>	<u>19.23%</u>
Barley	24,159	7.14
Corn, field	10,148	3.00
Oats	3,317	0.98
Wheat	16,316	4.82
Other cereal	11,073	3.27
<u>Forage</u>	<u>169,434</u>	<u>50.11</u>
Alfalfa hay	74,520	22.04
Other hay	4,818	1.42
Pasture	58,720	17.36
Silage	31,136	9.21
Other forage	240	0.07
<u>Field Crops</u>	<u>40,931</u>	<u>12.10</u>
Beans, dry	6,031	1.78
Hops	3,303	0.98
Mint	2,755	0.82
Sugar beets	28,751	8.50
Other field crops	91	0.03
<u>Vegetables</u>	<u>25,914</u>	<u>7.66</u>
Beans, green	3,175	0.94
Corn, sweet	7,270	2.15
Potatoes	11,906	3.52
Onions	4,207	1.24
Other vegetables	356	0.10
<u>Seeds</u>	<u>24,341</u>	<u>7.20</u>
Alfalfa	10,607	3.14
Clover	1,740	0.52
Corn	8,520	2.52
Lettuce	759	0.22
Onion	606	0.18
Other	2,109	0.62
<u>Fruit</u>	<u>13,125</u>	<u>3.88</u>
Apples	7,891	2.33
Cherries	822	0.24
Prunes and plums	3,754	1.11
Other fruit	658	0.19
Garden	491	0.14
Nursery	19	0.01
<u>Total harvested acreage</u>	<u>338,143</u>	<u>100.00%</u>

Table 9. Value of Irrigated Crop Production, Boise Project, Idaho, 1910-1973.

Year	Total gross value ^{1/}	Gross value added ^{2/}	Net value added ^{3/}
1910	\$ 615,640*	\$ 205,508	\$ 81,176
1911	1,101,720*	334,404	189,453
1912	1,265,262*	446,460	237,580
1913	1,124,074*	422,508	264,639
1914	1,653,987*	625,794	421,598
1915	2,292,323*	1,223,496	965,848
1916	3,610,294*	2,364,163	2,138,503
1917	6,364,145*	4,386,583	4,483,035
1918	9,043,784	6,649,178	6,310,774
1919	14,458,454	9,307,614	8,903,234
1920	10,057,400	5,451,996	5,031,890
1921	8,879,640	5,897,874	5,462,042
1922	8,589,350	4,645,097	4,193,538
1923	9,544,520	5,649,150	5,181,865
1924	5,455,640	2,018,311	1,535,310
1925	7,352,884	4,086,952	3,588,214
1926	7,253,760	2,465,043	1,950,579
1927	9,091,670	4,711,171	4,180,981
1928	9,423,040	4,165,578	3,619,662
1929	10,435,830	5,443,099	4,881,456
1930	7,364,319	3,205,956	2,528,587
1931	4,555,381	784,920	191,625
1932	2,969,582	-64,381	-673,203
1933	5,440,066	2,378,805	1,754,257
1934	6,344,045	2,536,787	1,896,513
1935	6,833,231	2,669,291	2,013,291
1936	8,541,510	4,345,039	3,673,312
1937	7,521,942	3,189,857	2,502,404
1938	6,152,133	2,199,772	1,496,593
1939	5,993,025	2,028,310	1,309,314
1940	6,461,316	2,073,390	1,338,758
1941	8,705,121	4,508,685	3,707,068
1942	14,097,462	9,466,971	8,598,370
1943	19,771,146	13,780,499	12,844,913
1944	21,280,076	14,453,670	13,451,100
1945	23,087,659	16,290,567	15,221,022
1946	25,279,798	17,795,807	16,454,940
1947	30,067,483	21,060,300	19,448,121
1948	30,742,721	21,313,596	19,410,105
1949	28,065,257	18,320,614	16,165,811
1950	25,744,938	15,948,106	13,521,991
1951	32,679,113	21,754,253	19,056,826
1952	32,935,422	21,815,861	18,847,122
1953	25,302,614	15,929,736	12,689,685
1954	30,450,451	19,015,791	15,504,428
1955	31,272,677	20,044,711	16,262,036
1956	34,099,900	22,550,364	18,496,377
1957	32,575,497	20,800,651	16,648,853
1958	34,439,027	22,177,593	17,823,322
1959	40,405,464	27,717,337	23,208,302
1960	41,759,712	26,946,430	22,353,313
1961	43,549,434	30,370,028	25,692,651
1962	42,152,147	29,204,423	24,524,549
1963	46,123,079	31,500,603	26,353,046
1964	43,273,689	28,063,317	22,749,344
1965	46,320,776	30,264,651	24,824,959
1966	49,788,272	32,640,830	27,005,835
1967	48,484,969	31,123,577	25,193,062
1968	48,946,476	31,815,571	25,665,194
1969	52,671,563	35,031,581	28,574,500
1970	52,885,242	34,156,102	27,365,822
1971	58,443,534	39,329,179	32,129,063
1972	65,162,659	45,015,382	37,401,183
1973	87,467,937	63,126,442	54,740,496

1/ Water and Land Related Resource Accomplishments, Bureau of Reclamation, 1969-1973.
Crop Reports and Related Data, Bureau of Reclamation, 1963-1968.
Crop Report, Bureau of Reclamation, 1934-1962.

Annual Report of the Reclamation Bureau, Reclamation Bureau, 1910-1933.

2/ Gross value added=total gross value minus the cost of materials purchased from others.

3/ Net value added=gross value added minus depreciation on machinery and buildings.

* Estimated, see Table 6 and 7.

Table 10. Yield and price comparisons, Bureau of Reclamation and other sources, Boise Project, 1954-1959.

Year	Crop	Unit	Bureau*		Other Sources**	
			Price (\$/u)	Yield (u/a)	Price (\$/u)	Yield (u/a)
1954	Wheat	bu.	1.81	47.3	2.00	50.3
1959	Wheat	bu.	1.56	54.8	1.63	59.7
1964	Wheat	bu.	1.20	57.6	1.25	60.4
1969	Wheat	bu.	1.14	67.6	1.25	81.5
1954	Alfalfa hay	tons	15.12	3.8	21.00	3.5
1959	Alfalfa hay	tons	23.17	3.9	23.50	3.6
1964	Alfalfa hay	tons	18.50	3.7	20.20	3.8
1969	Alfalfa hay	tons	20.67	4.2	21.50	4.0
1954	Sugar beets	tons	9.50	20.9	11.40	22.7
1959	Sugar beets	tons	9.50	22.9	11.70	26.8
1964	Sugar beets	tons	9.60	20.3	11.80	22.9
1969	Sugar beets	tons	10.83	21.9	14.50	23.6
1954	Potatoes	cwt.	1.03	184.0	1.08	231.0
1959	Potatoes	cwt.	0.86	251.0	1.26	287.0
1964	Potatoes	cwt.	1.60	228.0	1.67	290.0
1969	Potatoes	cwt.	1.75	255.0	1.80	325.0

* Bureau of Reclamation annual crop report, Boise Project, see (3).

** Census of Agriculture, 1954, 1959, 1964, 1969. Average yields for Ada and Canyon counties.

Agricultural Statistics. USDA. Average prices for the State of Idaho.

Input Costs

In order to determine the net income earned from irrigated crop production, the costs of production must be deducted from gross crop income. The Bureau of Reclamation has not reported the annual production costs, so other sources of data had to be employed. A set of crop budgets were developed and projected to represent production costs over time. Appendix A explains in detail the procedures used in calculating net crop values.

Only the direct input costs of the chemicals, fertilizers, seed, fuel, oil, and other farm supplies are included in the costs of production, since labor, depreciation, rent, and interest are considered to be value-added income. Though these items may be costs to the farmer, they are income to the hired man and the banker who earned income because of the project. In this respect, value-added income is used to measure project benefits rather than farm income.

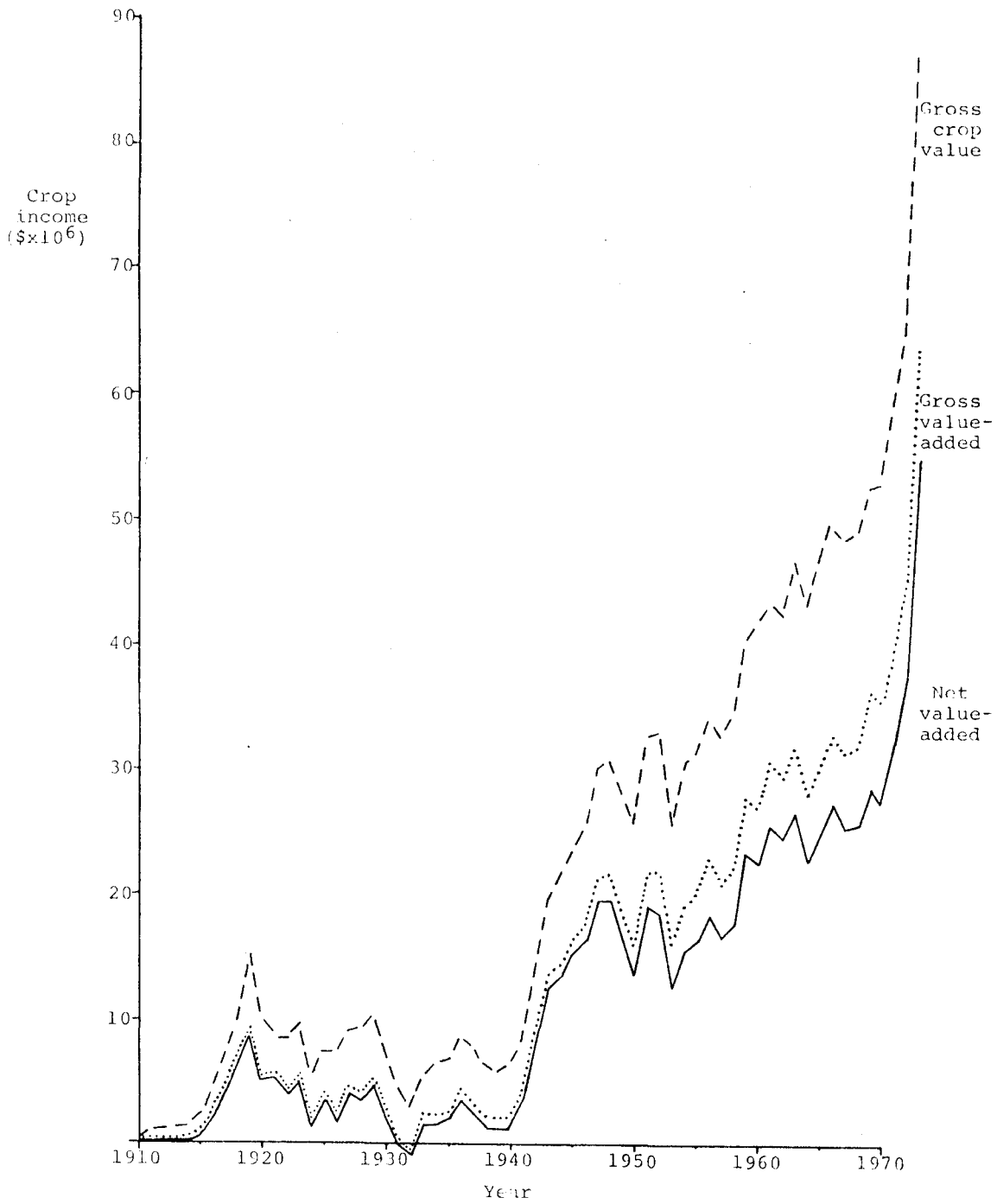
Value-Added Income

The concept of value-added income refers to income added directly to an economy from the production of goods and services. In producing crops, farmers receive a return for their labor and management; likewise, hired workers, landlords, and bankers receive a return for the input they furnished to the production process. Their income is in the form of wages, rent, and interest. The gross value added income, as used in this report, refers to the return to land, labor, management, and capital. The second column of Table 9 lists the annual gross value-added income while the third column, net value-added income, takes into account the cost of long term investment depreciation. The amount left after subtracting depreciation from gross value-added income is defined to be net value-added income. Figure 5 graphically displays the growth of gross value, gross value-added, and net value-added incomes. A detailed description of the procedures used to calculate income may be found in Appendix A.

The net value-added income is the amount used to represent primary benefits derived from irrigation with the Boise Project. The 1973 income of \$54,740,000 was over 600 times the amount earned in 1910. In addition, this \$54 million also generated a great deal of secondary income from sectors of the economy linked to agriculture. The output of food processing, farm supply, manufacturing, transportation, wholesale-retail trade, etc., are all affected by the output from crop production. These interrelationships will be analyzed in a subsequent chapters.

The net value-added income represents a benefit from the Boise Project. Appendix B shows the computations necessary to determine value-added income by crop over the period from 1910 to 1973. Other approaches to net irrigation benefits will be discussed later in the report.

Figure 5. Crop income, Boise Project, 1910-1973



SUMMARY

Besides being one of the first Bureau of Reclamation Projects, the Boise Project has been one of the most successful. In 1973, the Boise Project was the seventh largest of all Bureau projects with 339, 140 acres, and the eighth largest in terms of production with \$87 million of gross crop value. In 1973, the net value-added income of the Boise Project from irrigation was \$54 million dollars. At this rate of annual income, it would take less than two year's production to repay the tax cost (income) of \$69 million that has been invested in the project. Further analysis of development without the project will examine other possible investment alternatives.

Chapter II

Direct Costs and Benefits of the Boise Project

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Introduction to Chapter II

Once income estimates had been determined from irrigated crops in the Boise Project an attempt was made to assess the overall costs and benefits from the project. These results are presented in Chapter II and essentially include benefits from irrigation and power and project costs in terms of depreciation, alternative investments, and operation and maintenance items. Annual benefits are compared with annual costs for the period from 1910 to 1973. Annual comparison avoid price indexing problems and long term discounting problems. Economic success, as the reader will note, is a relative thing insofar as the Boise Project is concerned. During the early years (1910 to 1940) economic conditions were not always very bright; however, after World War II the situation changed dramatically with greater crop diversification, more late season water, more intensive operations, and market outlets.

The Boise Project is composed of seven major structures plus irrigation canals and drains. Boise River Diversion Dam, Deer Flat Reservoir, Arrow-rock Dam and Anderson Ranch Dam are located on the Boise River while Black Canyon Dam, Deadwood Dam, and Cascade Dam are part of the Payette system. In 1955, Lucky Peak Dam was built by the Corps of Engineers for flood control purposes and is not considered as part of the Boise Project by the Bureau of Reclamation. Lucky Peak Reservoir, however, does supply some irrigation water and benefits, and in a similar way the Boise Project provides some flood control benefits. These complementary benefits are in addition to the original purposes of the respective structures.

Benefits resulting from the Boise Project include irrigation water, power, recreation, and flood control. The Project was built primarily for irrigation and power generation purposes in the earlier years, while in later years it has become obvious that recreation and flood control benefits complement the original purposes of the project. The original purposes of each of the seven major structures in the Boise Project vary considerably. Their specific intent and use will be covered later in another part of this report.

Table 11 and 12 show the total costs of plant and cost allocations for the total Boise Project. Table 11 shows that 41.3 percent of the cost of the project was for irrigation purposes, 7.3 percent for electricity, and 51.4 percent for a combination of purposes in 1973. Table 12 shows that as far as cost allocations are concerned 69.8 percent of the project was for irrigation, 8.2 percent for power, and 22.0 percent for flood control purposes. Obviously, the purposes of the project were for irrigation first, and power second. Over time, however, the purposes of the project have changed somewhat. Today, the project is managed primarily for irrigation purposes, secondly for flood control and recreational benefits, and thirdly for power. Should the price of electricity increase dramatically, emphasis may shift again in the future.

For Bureau of Reclamation repayment purposes, irrigation and power costs are generally considered reimbursable by users, while recreation and flood control benefits are not charged specifically to anyone. Repayment reports are issued periodically by the Bureau of Reclamation to account for costs reimbursable by products of the projects. These reports are available to the public.

Table 11. Cost of plant, property and equipment as of June 30, 1973. 1/

<u>Completed works</u>	<u>Cost</u>	<u>Percent of total</u>
Multipurpose	\$33,452,877	50.8%
Irrigation	27,202,904	41.3
Electric, municipal, industrial	4,818,944	7.1
Construction work in progress	256,327	0.4
<u>Other physical property</u>	<u>135,683</u>	<u>0.2</u>
Total	\$65,866,735	100.0%

Table 12. Cost allocations, Boise Project Data as of June 30, 1973. 2/

<u>Allocations</u>	<u>Amounts</u>	<u>Percent of total</u>
Irrigation	\$47,397,616	69.8%
Commercial power	5,594,137	8.2%
Municipal and industrial water		
Fish and wildlife		
Recreation		
Navigation		
<u>Flood Control</u>	<u>14,950,394</u>	<u>22.0%</u>
Total	\$67,942,147	100.0%

1/ Water and Land Resource Accomplishments, 1973, Statistical Appendix 2, Finances and Physical Features, p. 61. Department of Interior, Bureau of Reclamation.

2/ Water and Land Resource Accomplishments, 1973, Statistical Appendix 3, Project Data. Department of Interior, Bureau of Reclamation.

COSTS OF THE BOISE PROJECT

Investment Costs

The first structure of the Boise Project, built in 1908, cost a modest \$572,353; however, by 1956, the total investment in the Project had risen to \$69,167,068 (Table 13). The investment is not so large when one considers that 71.1 percent is scheduled for repayment by irrigators in the area and by income earned by power generation. In terms of cost, Anderson Ranch Dam, built in 1950, was the most expensive. It cost \$29,885,441 or 43.2 percent of the total investment in the Boise Project. Its purpose was to supply more late season irrigation water for the project, and its completion is closely correlated with a rapid increase in income derived from the project irrigated lands.

The Arrowrock Division of the Boise Project (i. e., the Boise River Drainage) received 67.9 percent or \$46,959,418 of the total project investment, while the Payette Division received 32.1 percent or \$22,207,650 of the total Boise Project investment of \$67,167,068. The Arrowrock Division irrigates about 237,000 acres each year, while the Payette Division irrigates around 104,000 acres each year. On a per acre basis, project investments are much higher in the Payette than in the Boise irrigated areas. This analysis treats the Boise Project as a single unit; however, irrigation costs are probably higher and returns lower in the Payette drainage area than they are in the Boise Valley area.

Because Lucky Peak Dam was built by the Corps of Engineers for flood control purposes, its costs and benefits are considered separately from the Boise Project itself.

Annual Depreciation

Bureau of Reclamation structures are normally considered to have a life of one-hundred years. Occasionally, a structure fails prematurely, but most serve their one-hundred year life and more before they are replaced. For purposes of developing depreciation schedules for the structures in the Boise Project, all were assumed to have a useful life of one-hundred years. A straight line depreciation schedule was followed as is indicated when the investments of Table 13 are compared with the annual depreciation costs shown in Table 14. Essentially, annual depreciation shown is one-one hundredth of the total investment in any one year.

The oldest structure, Boise Diversion Dam, in the project is 68 years old and the newest structure, Anderson Ranch Dam, is 26 years old. While project structures require varying amounts of maintenance each year, there is no reason to believe that any of the structures will not last their estimated depreciated life.

Table 13. Chronology of Federal Investments, Boise Project, Idaho, 1908-1969. ^{1/}

Completion date	Structure	Structure costs	Accumulated costs
1908	Boise River Diversion Dam and Powerplant	\$ 572,353	\$ 572,353
1911	Deer Flat Dams (Lake Lowell)	1,067,836	1,640,189
1915	Arrowrock Dam	5,321,705	6,961,894
1918	Canals and drainage	9,490,559	16,452,453
1924	Black Canyon Dam and Powerplant	2,568,813	19,021,266
1927	Irrigation facilities (Payette Division)	505,659	19,526,925
1934	Deadwood Dam	1,398,298	20,925,223
1948	Cascade Dam	8,462,148	29,387,371
1950	Anderson Ranch Dam and Powerplant	29,885,441	59,272,812
1956	Irrigation facilities (Payette Division)	9,272,732	68,545,544
1908-1956	Common costs	621,524	69,167,068
1955	Lucky Peak Dam (Built for flood control purposes by U.S. Corps of Engineers)	22,066,000	91,233,068

^{1/} Source: Repayment of Reclamation Projects, Department of Interior, Bureau of Reclamation, 1972.

Table 14. Depreciation on Federal Investment, Boise Project, 1910-1974. (Based on 100-year life).

Year	Annual Depreciation
1910	\$ 5,723.53
1911	16,401.89
1912	16,401.89
1913	16,401.89
1914	16,401.89
1915	69,618.94
1916	69,618.94
1917	69,618.94
1918	164,524.53
1919	164,524.53
1920	164,524.53
1921	164,524.53
1922	164,524.53
1923	164,524.53
1924	190,212.66
1925	190,212.66
1926	190,212.66
1927	195,269.25
1928	195,269.25
1929	195,269.25
1930	195,269.25
1931	195,269.25
1932	195,269.25
1933	195,269.25
1934	209,252.23
1935	209,252.23
1936	209,252.23
1937	209,252.23
1938	209,252.23
1939	209,252.23
1940	209,252.23
1941	209,252.23
1942	209,252.23
1943	209,252.23
1944	209,252.23
1945	209,252.23
1946	209,252.23
1947	209,252.23
1948	293,873.71
1949	293,873.71
1950	592,728.12
1951	592,728.12
1952	592,728.12
1953	592,728.12
1954	592,728.12
1955	592,728.12
1956	691,670.68
1957	691,670.68
1958	691,670.68
1959	691,670.68
1960	691,670.68
1961	691,670.68
1962	691,670.68
1963	691,670.68
1964	691,670.68
1965	691,670.68
1966	691,670.68
1967	691,670.68
1968	691,670.68
1969	691,670.68
1970	691,670.68
1971	691,670.68
1972	691,670.68
1973	691,670.68
1974	691,670.68

Depreciation changes estimated in the above fashion do not reflect the changing value of the dollar. It is common practice, however, to repay long-term debts based only on the value of the initial loan. Inflation tends to favor the borrower in terms of repaying loans with cheaper dollars. To the extent that this is true, there may be some additional benefits to irrigators in the project; however, this subsidy would be nearly impossible to estimate over long time periods such as the 68 years involved in the Boise Project. For this reason, all costs and returns in this report represent dollar values as they occurred in each particular year. No attempts have been made to make adjustments for changes in the value of the dollar through index numbers.

Alternative Investment Costs

In a free market economy, investments are assumed to flow to where they would earn their highest returns. If the Federal government had not invested in the Boise Project, where else might these funds have been invested? In other words, could there have been another investment that would have yielded a higher return on the dollar? Since water resource development is usually a long-term process it was decided to use the long-term bond rate in the United States as the alternative that would be representative of what it cost the government to invest in the Boise Project. Data on long-term bond rates were available from one series from 1919 to 1974 (see Table 15). For the years prior to 1919 when data were not available for this same series, the 1919 rate (4.73 percent) was used.

Alternative investment costs represent part of the cost of using capital for the Boise Project. This cost is based on the interest rate and the total capital invested. Alternative investment costs were estimated to range from \$27,072.30 in 1908 to \$2,892,795.82 in 1974. These costs are real only in the sense that they represent opportunities foregone. They are also real if the government actually borrowed the money at this rate of interest to build the project. How the United States government actually financed the Boise Project each year is unknown; however, alternative investment costs represent the cost of financing long-term investments for each respective year. Again no attempts have been made to adjust to the changing value of the dollar.

The cost of capital varied considerably over the period. The low interest rate was 2.05 percent in 1941, while the high was 6.59 percent in 1970. It would seem unreasonable to assume a constant interest rate over the period given the changing economic conditions and interest rates. Actual historical records of interest rates are one advantage of ex post studies.

Table 15. Total alternative investment costs for all facilities,
Boise Project, Idaho, 1908-1974

Year	Long-term bond rate**	Alternative investment cost*
1908	4.73 percent	\$ 27,072.30
1909	4.73	26,801.34
1910	4.73	26,530.85
1911	4.73	76,768.77
1912	4.73	75,992.96
1913	4.73	75,217.15
1914	4.73	74,441.34
1915	4.73	325,382.18
1916	4.73	332,089.20
1917	4.73	318,796.22
1918	4.73	764,406.70
1919	4.73	756,624.68
1920	5.32	842,250.11
1921	5.09	797,462.75
1922	4.30	666,616.95
1923	4.36	668,745.31
1924	4.06	720,334.84
1925	3.86	677,517.66
1926	3.68	638,923.74
1927	3.34	590,428.66
1928	3.33	582,158.44
1929	3.60	622,330.79
1930	2.29	391,399.86
1931	3.34	564,340.69
1932	3.68	614,602.64
1933	3.31	546,344.94
1934	3.12	552,521.25
1935	2.79	488,240.68
1936	2.69	465,111.85
1937	2.74	468,023.82
1938	2.61	440,056.82
1939	2.41	401,570.03
1940	2.26	371,828.95
1941	2.05	333,005.12
1942	2.46	394,458.55
1943	2.47	390,893.49
1944	2.48	387,286.61
1945	2.37	365,149.29
1946	2.19	332,833.80
1947	2.25	337,244.37
1948	2.44	567,093.44
1949	2.31	530,090.96
1950	2.32	1,218,910.10
1951	2.57	1,335,025.06
1952	2.68	1,376,281.09
1953	2.94	1,492,374.70
1954	2.55	1,279,292.06
1955	2.84	1,407,946.69
1956	3.08	1,794,272.20
1957	3.47	1,997,683.72
1958	3.43	1,951,144.54
1959	4.07	2,287,308.49
1960	4.01	2,226,102.16
1961	3.90	2,138,304.27
1962	3.95	2,138,645.06
1963	4.00	2,138,296.14
1964	4.15	2,190,035.85
1965	4.21	2,192,841.36
1966	4.66	2,395,288.33
1967	4.85	2,459,741.73
1968	5.25	2,626,581.64
1969	6.10	3,010,024.95
1970	6.59	3,206,642.30
1971	5.74	2,755,811.53
1972	5.63	2,662,331.45
1973	6.80	2,935,979.49
1974	6.30	2,892,795.82

* Total net investment times long-term interest rate.

** Sources: Historical Statistics of the United States and Statistical Abstract, 1919 rate used for 1910-1918.

Operation and Maintenance Costs

Operation and maintenance costs are incurred by both the Bureau of Reclamation and the individual irrigation districts. Because part of these costs incurred by the Bureau are reimbursible by irrigation districts, and because each irrigation district incurs operation and maintenance costs, part of which are those reimbursed to the Bureau, the problem of separating out total Bureau and total irrigation district's operation and maintenance costs becomes very difficult, even in recent years. In addition to this accounting problem, many smaller irrigation districts do not keep complete records of these costs.

Table 16 shows operation and maintenance costs for both the Bureau of Reclamation and individual irrigation districts. Bureau costs are of two types: irrigation and power (reimbursible) and flood control (nonreimbursible). It was necessary to estimate costs for some years where records were not kept. During these years, 1927-1945, actual Bureau costs were probably lower than the estimates shown (primarily because of the depression when economic activity was quite low). Prior to 1926, the Bureau of Reclamation recorded both Bureau and district costs.

District operation and maintenance costs are shown for two types of water supply: full project service and supplemental service. Water is supplied on a supplemental basis only after full service users have received an adequate supply. District operation and maintenance costs shown in Table 16 do not show those costs reimbursed to the Bureau (irrigation and power costs are reimbursible to the Bureau by the District and to count them in both categories would overstate the actual costs). Table 16 shows that total operation and maintenance costs were \$2,101,154 in 1974 or \$6.17 per acre.

Total Costs

Total project costs are the sum of depreciation, alternative investment, and operation and maintenance costs, and are summarized for the life of the project in Table 17. These costs were \$92,253 in 1910, and rose to \$5,685,621 by 1974. Average total costs per irrigated acre were \$16.69 in 1974. Average total costs of water delivered to farms were \$3.68 per acre-foot in 1974.

Economic efficiency is measured in terms of cost per unit of output. Whether or not the Boise Project is the most efficient method of supplying water in the area depends on the cost of supplying water from alternative methods (wells and pumps, for example). In the case of pumping water for irrigation use, the cost of fuel can become the dominating factor. Because the Boise Project is mostly a gravity flow operation, fuel costs have little impact on project costs.

Since the economic efficiency of the Boise Project is of importance in comparison to alternative methods of supplying water, a more extensive examination of total, average, and marginal costs of supplying water will be analyzed later in this section.

Table 16. Tabulated Annual Operation and Maintenance Costs, Boise Project, 1910-1973

Year	Bureau 1/		District 2/		Total
	Irrigation and Power	Flood control	Full service	Supplemental service	
1910	\$ 60,000				\$ 60,000
1911	65,231				65,231
1912	85,912				85,912
1913	135,522				135,522
1914	124,397				124,397
1915	140,121				140,121
1916	167,088				167,088
1917	246,084				246,084
1918	294,216				294,216
1919	277,738				277,738
1920	350,327				350,327
1921 ^{3/}	354,569				354,569
1922	258,887				258,887
1923	242,840				242,840
1924	173,154				173,154
1925	204,401				204,401
1926 ^{4/}	173,591				173,591
1927 ^{5/}	80,539*		46,015	3,372	129,926
1928	139,770*		79,857	5,812	225,439
1929	181,139*		103,492	8,258	292,889
1930	144,894*		82,784	6,623	234,301
1931	109,002*		62,278	6,439	177,719
1932	109,903*		62,793	4,278	176,974
1933	104,157*		59,009	4,490	168,156
1934	118,199*		67,532	6,685	192,416
1935	117,267*		67,000	4,983	189,250
1936	137,147*		78,358	5,114	220,619
1937	145,351*		83,045	6,707	235,103
1938	123,784*		70,723	4,476	198,983
1939	136,642*		78,069	5,521	220,232
1940	133,007*		75,993	5,225	214,225
1941	129,926*		74,232	5,057	209,215
1942	130,847*		74,759	4,446	210,052
1943	126,169*		72,085	3,798	202,052
1944	171,341*		97,894	5,999	275,234
1945	168,915*		96,650	5,894	271,317
1946	132,439		193,126	10,488	336,053
1947	162,098		198,764	10,694	371,556
1948	236,128		202,521	10,679	449,328
1949	242,114		358,767	16,145	617,026
1950	338,762	4,107*	269,665	25,092	637,626
1951	407,642	5,489*	211,637	18,827	643,595
1952	512,880	6,431*	110,492	10,471	640,274
1953	565,602	3,626	69,773	6,471	645,471
1954	617,286	10,091	10,825	934	639,136
1955	434,981	10,857	243,763	40,931	730,532
1956	357,481	6,334	377,660	62,576	804,051
1957	320,889	5,776	395,664	70,309	792,638
1958	352,365	14,965	295,548	52,445	715,323
1959	409,344	6,243	276,319	52,071	743,977
1960	407,596	10,353	730,192	124,830	1,272,971
1961	444,967	9,909	242,700	43,441	741,017
1962	451,323	6,719	519,209	86,459	1,063,710
1963	479,749	6,669	570,958	102,824	1,160,200
1964	374,973	15,922	755,412	136,043	1,282,350
1965	364,959	15,905	808,528	140,884	1,330,276
1966	383,308	23,723	798,324	151,858	1,357,213
1967	431,752	33,059	918,936	137,367	1,521,114
1968	486,379	11,067	817,377	142,760	1,457,583
1969	512,855	24,892	785,958	138,497	1,462,202
1970	557,478	30,451	813,163	156,923	1,558,015
1971	579,435	29,764	953,980	161,927	1,725,106
1972	567,269	33,384	988,370	169,187	1,758,209
1973	587,782	30,211	1,113,301	204,829	1,936,123
1974	718,618	27,800	1,144,202	210,534	2,101,154

1/ "Bureau of Reclamation incurred O & M costs. Irrigation and power O & M costs include that portion paid by the districts; flood control expenses are not charged to the project users. Data based on annual reports of the Boise Project History and Bureau of Reclamation records."

2/ District O & M cost refers only to internal expenses; it does not include assessments for Bureau reimbursable cost. Full service refers to districts receiving their full water supply from Project storage facilities. Supplemental service are districts under the Warren Act or special contracts for water. Data based on historical records from Boise project Board of Control.

3/ Beginning of the Payette division, 1921.

4/ In 1926, the Boise Board of Control began management of Arrowrock division.

5/ Prior to 1927, data indicates total Bureau and district costs were recorded by the Bureau.

* Estimated by regression analysis.

Table 17. Total Annual Costs, Boise
Project, Idaho, 1910-1974.

Year	Total costs ^{1/}
1910	\$ 92,253
1911	158,401
1912	178,306
1913	227,141
1914	215,240
1915	535,122
1916	568,796
1917	634,499
1918	1,223,147
1919	1,119,887
1920	1,357,102
1921	1,316,556
1922	1,090,028
1923	1,076,110
1924	1,083,701
1925	1,072,131
1926	1,002,727
1927	915,623
1928	1,002,866
1929	1,110,489
1930	820,970
1931	937,329
1932	986,745
1933	909,770
1934	954,189
1935	886,742
1936	894,983
1937	912,378
1938	848,292
1939	831,054
1940	795,306
1941	751,472
1942	813,762
1943	802,197
1944	871,772
1945	845,719
1946	878,139
1947	918,052
1948	1,310,295
1949	1,440,990
1950	2,449,264
1951	2,571,348
1952	2,609,283
1953	2,730,573
1954	2,511,156
1955	2,731,207
1956	3,289,993
1957	3,481,992
1958	3,358,138
1959	3,722,956
1960	4,190,924
1961	3,570,992
1962	3,894,026
1963	3,990,167
1964	4,164,056
1965	4,214,788
1966	4,444,172
1967	4,672,526
1968	4,775,835
1969	5,163,897
1970	5,456,328
1971	5,172,588
1972	5,112,211
1973	5,563,773
1974	5,685,621

^{1/} From Tables 14, 15, and 16.

In order to evaluate the Boise Project, the reader must become familiar with its products, which are mainly the supplying of water to irrigated land and also power generation. As the investment in the project increased, so did the water supply and acreage irrigated. The major contribution of the project for irrigation purposes was in spreading the water supply over the irrigation season (roughly April through September) which allowed more intensive, higher valued and higher income crops to be grown. This subject will be treated more thoroughly in the section on irrigated crop production.

PROJECT WATER SUPPLY AND AREA IRRIGATED

Acres Irrigated

Prior to 1910, about 100,000 acres of land were irrigated in the Boise Valley from the Boise River. Farmers were limited primarily to hay and grain because of a lack of late season irrigation water. Without reservoirs, most winter precipitation went down the river with the spring runoff, leaving low water supplies in the late summer. As reservoirs and irrigation canals increased, there was a corresponding increase in the water supplies for irrigation, in the number of acres irrigated, and an increase in the acreage of more intensive, higher valued crops.

Table 18 presents total irrigated acreage data from the Boise Project from 1910-1973. The irrigated area supplied by the project has increased from 33,377 acres to 340,613 acres, an increase of 920 percent in 63 years. Over this period the area irrigated has grown at a rate of about 4,600 acres per year.

In 1973, 189,234 acres (55.6 percent of total) received its full supply of water from the project while 151,379 acres (44.4 percent) received a supplemental supply. The constancy of the supplemental acreage indicates that this water supply is available each year and as such becomes an integral part of cropping patterns and farm income. In 1973, 151,379 supplemental acres received 640,747 acre-feet of water or 4.2 acre-feet per acre. Regular users irrigated 189,234 acres with 902,076 acre-feet of water or 4.7 acre-feet per acre. Water supplies for both users should be ample.

Since not all acres irrigated are harvested, Table 2 is included to show the actual acres harvested by year. Income estimates are based on harvested acres. Under irrigated conditions, the number of acres planted and harvested are very close to being identical.

Table 18. Total Irrigated Acreage,^{1/}
Boise Project, Idaho 1910-1973.

<u>Year</u>	<u>Total acreage</u> ^{2/}
1910	33,377
1911	45,575
1912	61,725
1913	58,265
1914	83,590
1915	97,127
1916	76,922
1917	157,024
1918	182,921
1919	224,282
1920	237,160
1921	241,700
1922	243,300
1923	249,500
1924	239,530
1925	227,038
1926	289,080
1927	283,070
1928	291,175
1929	296,270
1930	301,042
1931	297,335
1932	289,389
1933	287,715
1934	288,997
1935	284,283
1936	284,358
1937	271,358
1938	268,942
1939	270,300
1940	284,002
1941	284,616
1942	287,740
1943	285,193
1944	287,140
1945	287,894
1946	287,732
1947	289,772
1948	294,268
1949	298,723
1950	305,348
1951	317,525
1952	318,272
1953	321,484
1954	323,810
1955	327,519
1956	325,482
1957	327,604
1958	327,909
1959	326,778
1960	324,340
1961	322,623
1962	322,380
1963	348,399
1964	348,649
1965	345,793
1966	345,260
1967	346,850
1968	344,999
1969	343,411
1970	342,528
1971	340,333
1972	336,851
1973	340,613

^{1/} Annual Report of the Reclamation Bureau, Reclamation Bureau, 1910-1932.
Crop Report, Bureau of Reclamation, 1933-1953.
Crop Reports and Related Data, Bureau of Reclamation, 1954-1968.
Water and Land Related Accomplishments, Bureau of Reclamation 1969-1973.

^{2/} Where total irrigated acreage includes both "full supply" and "supplemental" acreages.

Water Delivered to Farms

Water diversions and deliveries to farms increased steadily as the project developed. In 1910, 55,739 acre-feet of water were delivered to farms from the project. By 1973, water deliveries to farms increased to 1,542,823 acre-feet, an increase of 27 times the initial amount. Generally speaking, the study area is blessed with an ample potential supply of surface water. The Boise Project has helped to both increase the supply of water available to farmers and distribute the water supply over the crop year. Table 19 summarizes project performance in terms of supplying water. Water deliveries to farms are shown for both regular and supplemental users.

Water Applications

Table 5 summarizes acres irrigated by the project and water delivered to farms to derive water applications per acre-foot over the life of the project. Water applications have increased from 1.67 acre-feet per acre in 1910 to 4.53 acre-feet per acre in 1973. Since the completion of Anderson Ranch Dam in 1950, there has been little reason to be concerned with availability of water. Only in 1961 (when 3.84 acre-feet per acre were delivered to farms) did the average deliveries drop below four acre-feet per acre. Considering the potential for reuse in the area, the water supply does not appear to be a concern in the immediate future.

In summary, the Boise Project provides relatively large amounts of water to irrigated lands (normally over four acre-feet per acre) at a relatively low estimated cost (\$3.61 per acre-foot in 1973). Further analysis is necessary to determine if alternative methods could provide such large supplies of water at these costs.

BENEFITS FROM THE BOISE PROJECT

Irrigation

The Boise Project was constructed primarily for the purpose of supplying irrigation water to farmers, although power generations, flood control, and recreation were also considerations, especially in later years. The Boise Valley has numerous crop alternatives in terms of forage crops, grains, vegetables, seed crops, and fruits. As time has passed and water supplies have become more certain over the full length of the growing season, greater emphasis has been placed on more intensive, higher value crops. Growth of irrigated crop enterprises is described in the section on irrigated agriculture.

Table 19. Total Water Delivered to Farms, Boise Project, 1910-1973.

Year	Total diversions from Boise & Payette Rivers ^{1/}	Total water delivered to farms (acre-feet)
1910	NA	55,739
1911	NA	71,552
1912	NA	107,401
1913	NA	120,025
1914	NA	196,436
1915	978,838	272,926
1916	1,217,572	273,842
1917	1,058,228	482,064
1918	1,279,916	685,954
1919	1,176,828	749,101
1920	1,254,640	853,776
1921	1,361,022	1,112,893
1922	1,305,946	1,110,647
1923	1,469,530	1,148,905
1924	791,072	519,780
1925	1,498,354	1,197,336
1926	1,041,730	702,464
1927	1,519,232	1,194,555
1928	1,409,832	1,004,554
1929	1,324,063	1,048,796
1930	1,341,524	933,230
1931	1,008,376	579,803
1932	1,553,710	963,665
1933	1,454,571	1,018,485
1934	1,155,690	670,335
1935	1,455,529	1,120,014
1936	1,435,816	1,083,086
1937	1,282,432	825,577
1938	1,629,439	1,234,405
1939	1,453,049	983,376
1940	1,420,823	922,706
1941	1,585,307	1,061,803
1942	1,604,777	1,065,158
1943	1,804,808	1,251,384
1944	1,511,997	1,137,931
1945	1,625,411	1,145,292
1946	1,753,846	1,261,144
1947	1,835,965	1,316,855
1948	1,751,171	1,259,676
1949	1,984,024	1,310,992
1950	2,061,011	1,404,734
1951	2,144,220	1,479,117
1952	2,188,105	1,515,568
1953	2,132,515	1,499,333
1954	2,409,646	1,640,810
1955	2,116,532	1,467,914
1956	2,450,861	1,656,127
1957	2,228,416	1,529,889
1958	2,294,688	1,552,939
1959	2,246,186	1,561,685
1960	2,400,695	1,662,898
1961	2,031,231	1,236,567
1962	2,241,787	1,424,482
1963	2,182,180	1,438,209
1964	2,245,748	1,407,582
1965	2,311,995	1,484,777
1966	2,439,838	1,583,278
1967	2,313,321	1,576,511
1968	2,284,481	1,495,393
1969	2,404,903	1,648,291
1970	2,344,872	1,572,488
1971	2,405,939	1,496,877
1972	2,375,507	1,518,785
1973	2,303,905	1,542,823

^{1/} Water Distribution of Boise River, District 63, 1974.

Boise Project History. (In addition there are about 30,000 irrigable acres within the Lower Payette Ditch Co. and Farmer's Cooperative Irrigation Co., to which an estimated annual diversion of 200,000 A.F. is made).

Crop acreage and production data were accumulated by the Bureau of Reclamation over the history of the project. Table 20 shows the total gross value of crops produced under the Boise Project since 1910. In the year 1910, the total value of irrigated crops was \$615,640, but by 1973, this value had grown to \$87,467,937. Obviously, considerable economic development had taken place over the 63 year period. Since irrigation over the entire season is necessary for many crops, it was the ample supply of irrigation water which allowed this development to take place.

Gross value-added from irrigated crops is total gross crop value minus the cost of materials purchased from others. Net value-added (income) is gross value-added minus depreciation on machinery and buildings. Since it took income (in terms of tax dollars) to build the Boise Project, it is reasonable to evaluate the relative success of the project on the basis of the annual income earned by the project. Net value-added represents income to someone generated from irrigated agriculture supported by the project water.

Power

The second tangible direct income that is earning benefits from the Boise Project is electrical power. Three project structures generate power: Boise River Diversion Dam, Black Canyon Dam, and Anderson Ranch Dam (see footnote Table 21 for plant capacities). In total, the three plants have the potential to produce 238 million kilowatt hours of electricity each year.

Some project generated power is sold to irrigation districts for pumping purposes within the Boise Project. The irrigation districts pay the Bureau of Reclamation for this power and the costs are recorded in the annual Project Histories, files by the irrigation districts. Other power is sold outside the project for commercial purposes. Table 21 shows the amount of power generated, the average price, and the total value of power sold.

In 1973, the value of power generated was \$558,031, which amounts to 10 percent of the total annual cost of the Boise Project. Since 7.1 percent of the project (Table 11) is allocated for power, it appears that electricity generated more than covers costs.

Total Direct Benefits

Irrigation and power were the original purposes of most of the structures and provide direct tangible benefits which can be measured in dollar-values. Flood control and recreation, on the other hand, have real benefits, but they are much more intangible and quite difficult to measure in terms of dollars. Benefits derived from flood control (except for Lucky Peak Dam) and

Table 20. Income Value (Net Value-added) of Irrigated
Crop Production, Boise Project, Idaho, 1910-1973.

Year	Net value added ^{1/}
1910	\$ 81,176
1911	189,453
1912	237,580
1913	264,639
1914	421,598
1915	965,848
1916	2,138,503
1917	4,483,035
1918	6,310,774
1919	8,903,234
1920	5,031,890
1921	5,462,042
1922	4,193,538
1923	5,181,865
1924	1,535,310
1925	3,588,214
1926	1,950,579
1927	4,180,981
1928	3,619,662
1929	4,881,456
1930	2,528,587
1931	191,625
1932	-673,203
1933	1,754,257
1934	1,896,513
1935	2,013,291
1936	3,673,312
1937	2,502,404
1938	1,496,593
1939	1,309,314
1940	1,338,758
1941	3,707,068
1942	8,598,370
1943	12,844,913
1944	13,451,100
1945	15,221,022
1946	16,454,940
1947	19,448,121
1948	19,410,105
1949	16,165,811
1950	13,521,991
1951	19,056,826
1952	18,847,122
1953	12,689,685
1954	15,504,428
1955	16,262,036
1956	18,496,377
1957	16,648,853
1958	17,823,322
1959	23,208,302
1960	22,353,313
1961	25,692,651
1962	24,524,549
1963	26,353,046
1964	22,749,344
1965	24,824,959
1966	27,005,835
1967	25,193,062
1968	25,665,194
1969	28,574,500
1970	27,365,822
1971	32,129,063
1972	37,401,183
1973	54,740,496

^{1/} Net value-added = gross value-added minus de-
preciation on machinery and buildings.

* Estimated, see Table 9.

Table 21. Power Generated, Boise Project, Idaho, 1910-1973. *

Year	Power generated ^{1/} (Net kwh)	Rate ^{2/} (Mills/kwh)	Total value (\$)
1910	-0-		-0-
1911	-0-		-0-
1912 ^{3/}	7,933,647	1.7	13,518
1913	7,304,175	1.7	12,446
1914	3,841,527	1.7	6,545
1915	1,092,490	1.7	1,861
1916	1,653,256	1.7	2,817
1917	4,848,752	1.7	8,262
1918	5,573,593	1.7	9,497
1919	5,493,251	1.7	9,360
1920	5,332,796	1.7	9,087
1921	5,378,406	1.7	9,164
1922	4,784,998	1.7	8,153
1923	5,529,797	1.7	9,422
1924	3,224,258	1.7	5,494
1925	4,773,020	1.7	8,133
1926 ^{4/}	18,048,597	1.7	30,754
1927	35,683,802	1.7	60,805
1928	44,979,486	1.7	76,645
1929	34,570,222	1.7	58,907
1930	39,816,685	1.7	67,847
1931	39,117,630	1.7	66,656
1932	51,598,425	1.7	87,923
1933	54,328,774	1.7	92,576
1934	55,002,524	1.7	93,724
1935	52,328,960	1.7	89,168
1936	49,851,932	1.7	84,947
1937	41,786,268	1.7	71,203
1938	61,641,022	1.7	105,036
1939	54,825,245	1.7	90,014
1940	61,329,000	1.6	96,463
1941	52,446,000	1.8	95,987
1942	62,249,000	1.5	96,106
1943	58,744,000	1.6	95,172
1944	63,596,000	1.9	121,053
1945	57,107,000	1.6	94,910
1946	60,796,000	1.6	95,520
1947	68,505,000	1.4	95,720
1948	66,105,000	1.5	97,970
1949	69,201,000	1.4	97,617
1950	64,780,000	1.6	102,561
1951 ^{5/}	102,753,000	1.5	156,196
1952	240,673,000	2.9	644,560
1953	219,283,000	2.9	562,659
1954	278,214,000	2.9	724,181
1955	231,535,000	2.9	604,305
1956	307,847,000	2.9	786,504
1957	260,525,000	2.4	558,549
1958	274,962,000	3.1	769,336
1959	216,024,000	3.5	673,212
1960	205,912,000	3.2	667,658
1961	228,153,000	3.0	696,182
1962	167,214,000	3.8	636,731
1963	179,293,000	3.9	703,747
1964	192,459,000	2.8	544,370
1965	157,153,000	2.6	421,520
1966	196,846,000	2.7	534,111
1967	217,610,000	2.7	592,640
1968	203,336,000	2.7	549,033
1969	222,966,000	2.7	609,299
1970	231,069,000	2.7	631,545
1971	230,760,000	2.7	630,606
1972	254,761,000	2.7	698,811
1973	205,914,000	2.7	558,031

* Source: Boise Project Histories, 1910-1973, Bureau of Reclamation.

^{1/} 1912-1939 gross generation times .95 for loss adjustment.
1940-1973 generation sold as reported by the Bureau.

^{2/} 1912-1939 average mill rate over period.
1940-1963 rates applied by Bureau.
1964-1973 average rates for Bureau and Bonneville Power Administration sales.

<u>Plant added</u>	<u>Nameplate capacity</u>	<u>Average annual generation**</u>
^{3/} Boise River Diversion	1,500 kw	11,000,000 kwh
^{4/} Black Canyon	8,000 kw	75,000,000 kwh
^{5/} <u>Anderson Ranch</u>	<u>27,000 kw</u>	<u>149,000,000 kwh</u>
Total	36,500 kw	238,000,000 kwh

** Based on 20-year average.

recreation are considered as complementary to the original purposes of the structures. For these reasons, they are not included as part of total benefits, but will be considered separately later in this report.

Table 22 presents irrigation and power benefits from the Boise Project and these benefits are summed to give total annual benefits (income) from the Boise Project from 1910 to 1973. In 1973, power benefits were only 1.0 percent of the total project benefits while the remainder were irrigation benefits. Only in 1932, during the Great Depression, were total annual benefits from the project negative. Since the beginning of World War II, in 1941, irrigation benefits have increased steadily.

Benefits and Costs Compared

Table 23 compares annual direct income project benefits and costs over the life of the project. A benefit-cost ratio of 1.0 indicates a break-even point for the project. In 1931 and 1932 the benefit-cost ratio fell below the break even point. During and right after the second World War (1942-1949) the annual benefit-cost ratio exceeded 10;1. Prior to World War II, there were many years in which the project benefit-cost ratios were in the 1.00 to 2.00 range, indicating little income was available for farmers. Since that time, however, the project has been an unquestionable economic success based on costs and benefits.

PROJECT DATA ANALYSES

Water Cost Analysis

The economic efficiency of a production process is measured in terms of cost per unit of output. If comparisons are to be made between the Boise Project and other means of providing irrigation water and power, it should be made on the basis of average cost of production. Table 24 shows estimated values for total, average, and marginal costs of producing water as a function of water delivered to farmers. Figure 6 shows the actual data and the estimated functions.

Over the life of the project, water deliveries to farms have varied from 73,000 to 1,663,000 acre-feet, while estimated total costs have ranged some 5.6 million dollars. Variations in these data result from the fact that water deliveries change each year primarily with the amount of precipitation in the watershed. Average total costs per acre-foot of water delivered to farms were estimated to be nearly \$1.00 per acre-foot at the 300,000 acre-foot level, and then increased to an estimated \$2.42 per acre-foot at the 1,700,000 acre-foot level. The project reached peak efficiency at the 300,000 acre-foot level of water delivered; however, average costs per acre-foot appear to be quite low even at higher levels.

Table 22. Total Benefits, Boise Project, 1910-1973.

Year	Irrigation benefits ^{1/}	Power benefits ^{2/}	Total annual benefits
1910	\$ 81,176	\$ -0-	\$ 81,176
1911	189,453	-0-	189,453
1912	237,580	13,518	251,098
1913	264,639	12,446	277,085
1914	421,598	6,545	428,143
1915	965,848	1,861	967,709
1916	2,138,503	2,817	2,141,320
1917	4,483,035	8,262	4,491,297
1918	6,310,774	9,497	6,320,271
1919	8,903,234	9,360	8,912,594
1920	5,031,890	9,087	5,040,977
1921	5,462,042	9,164	5,471,206
1922	4,193,538	8,153	4,201,691
1923	5,181,865	9,422	5,191,287
1924	1,535,310	5,494	1,540,804
1925	3,588,214	8,133	3,596,347
1926	1,950,579	30,754	1,981,333
1927	4,180,981	60,805	4,241,786
1928	3,619,662	76,645	3,696,307
1929	4,881,456	58,907	4,940,363
1930	2,528,587	67,847	2,596,434
1931	191,625	66,656	258,281
1932	-673,203	87,923	-585,280
1933	1,754,257	92,576	1,846,833
1934	1,896,513	93,724	1,990,237
1935	2,013,291	89,168	2,102,459
1936	3,673,312	84,947	3,758,259
1937	2,502,404	71,203	2,573,607
1938	1,496,593	105,036	1,601,629
1939	1,309,314	90,014	1,399,328
1940	1,338,758	96,463	1,435,221
1941	3,707,068	95,987	3,803,055
1942	8,598,370	96,106	8,694,476
1943	12,844,913	95,172	12,940,085
1944	13,451,100	121,053	13,572,153
1945	15,221,022	94,910	15,315,932
1946	16,454,940	95,520	16,550,460
1947	19,448,121	95,720	19,543,841
1948	19,410,105	97,970	19,508,075
1949	16,165,811	97,617	16,263,428
1950	13,521,991	102,561	13,624,552
1951	19,056,826	156,196	19,213,022
1952	18,847,122	644,560	19,491,682
1953	12,689,685	562,659	13,252,344
1954	15,504,428	724,181	16,228,609
1955	16,262,036	604,305	16,866,341
1956	18,496,377	786,504	19,282,881
1957	16,648,853	558,549	17,207,402
1958	17,823,322	769,336	18,592,658
1959	23,208,302	673,212	23,881,514
1960	22,353,313	667,658	23,020,971
1961	25,692,651	696,182	26,388,833
1962	24,524,549	636,731	25,161,280
1963	26,353,046	703,747	27,056,793
1964	22,749,344	544,370	23,293,714
1965	24,824,959	421,520	25,246,479
1966	27,005,835	534,111	27,539,946
1967	25,193,062	592,640	25,785,702
1968	25,665,194	549,033	26,214,227
1969	28,574,500	609,299	29,183,799
1970	27,365,822	631,545	27,997,367
1971	32,129,063	630,606	32,759,669
1972	37,401,183	698,811	38,099,994
1973	54,740,496	558,031	55,298,527

^{1/} From Table 20 net value added.

^{2/} From Table 21 total value of power generated.

Table 23. Annual Benefits and Costs, Boise Project, Idaho, 1910-1974.

Year	Benefits ^{1/}	Costs ^{2/}	Benefits-costs ratio
1910	\$ 81,176	\$ 92,253	0.88
1911	189,453	158,401	1.20
1912	251,098	178,306	1.41
1913	277,085	227,141	1.22
1914	428,143	215,240	1.99
1915	967,709	535,122	1.81
1916	2,141,320	568,796	3.76
1917	4,491,297	634,499	7.08
1918	6,320,271	1,223,147	5.17
1919	8,912,594	1,119,887	7.96
1920	5,040,977	1,357,102	3.71
1921	5,471,206	1,316,556	4.16
1922	4,201,691	1,090,028	3.85
1923	5,191,287	1,076,110	4.82
1924	1,540,804	1,083,701	1.42
1925	3,596,347	1,072,131	3.35
1926	1,981,333	1,002,727	1.98
1927	4,241,786	915,623	4.63
1928	3,696,307	1,002,866	3.69
1929	4,940,363	1,110,489	4.45
1930	2,596,434	820,970	3.16
1931	258,281	937,329	0.28
1932	-585,280	986,745	-0.59
1933	1,846,833	909,770	2.03
1934	1,990,237	954,189	2.09
1935	2,102,459	886,742	2.37
1936	3,758,259	894,983	4.20
1937	2,573,607	912,378	2.82
1938	1,601,629	848,292	1.89
1939	1,399,328	831,054	1.68
1940	1,435,221	795,306	1.80
1941	3,803,055	751,472	5.06
1942	8,694,476	813,762	10.68
1943	12,940,085	802,197	16.13
1944	13,572,153	871,772	15.57
1945	15,315,932	845,719	16.05
1946	16,550,460	878,139	18.85
1947	19,543,841	918,052	21.29
1948	19,508,075	1,310,295	14.89
1949	16,263,428	1,440,990	11.29
1950	13,624,552	2,449,264	5.56
1951	19,213,022	2,571,348	7.47
1952	19,491,682	2,609,283	7.47
1953	13,252,344	2,730,573	4.85
1954	16,228,609	2,511,156	6.46
1955	16,866,341	2,731,207	6.18
1956	19,282,881	3,289,993	5.86
1957	17,207,402	3,481,992	4.94
1958	18,592,658	3,358,138	5.54
1959	23,881,514	3,722,956	6.41
1960	23,020,971	4,190,924	5.49
1961	26,388,833	3,570,992	7.39
1962	25,161,280	3,894,026	6.46
1963	27,056,793	3,990,167	6.78
1964	23,293,714	4,164,056	5.59
1965	25,246,479	4,214,788	5.99
1966	27,539,946	4,444,172	6.20
1967	25,785,702	4,672,526	5.52
1968	26,214,227	4,775,835	5.49
1969	27,183,799	5,163,897	5.65
1970	27,997,367	5,456,328	5.13
1971	32,759,669	5,172,588	6.33
1972	38,099,994	5,112,211	7.45
1973	55,298,527	5,563,773	9.94
1974		5,685,621	

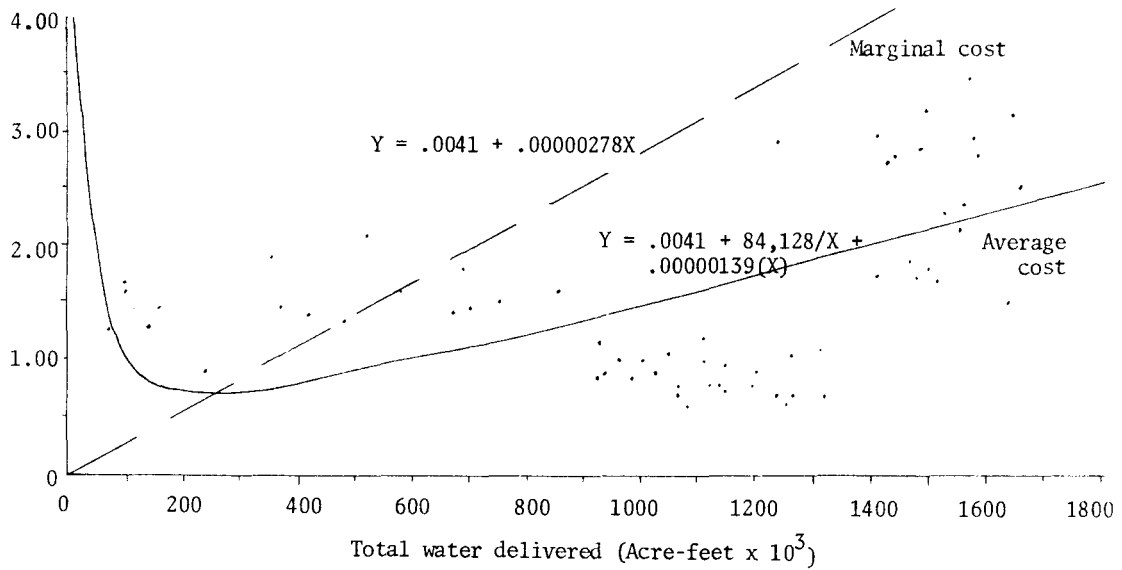
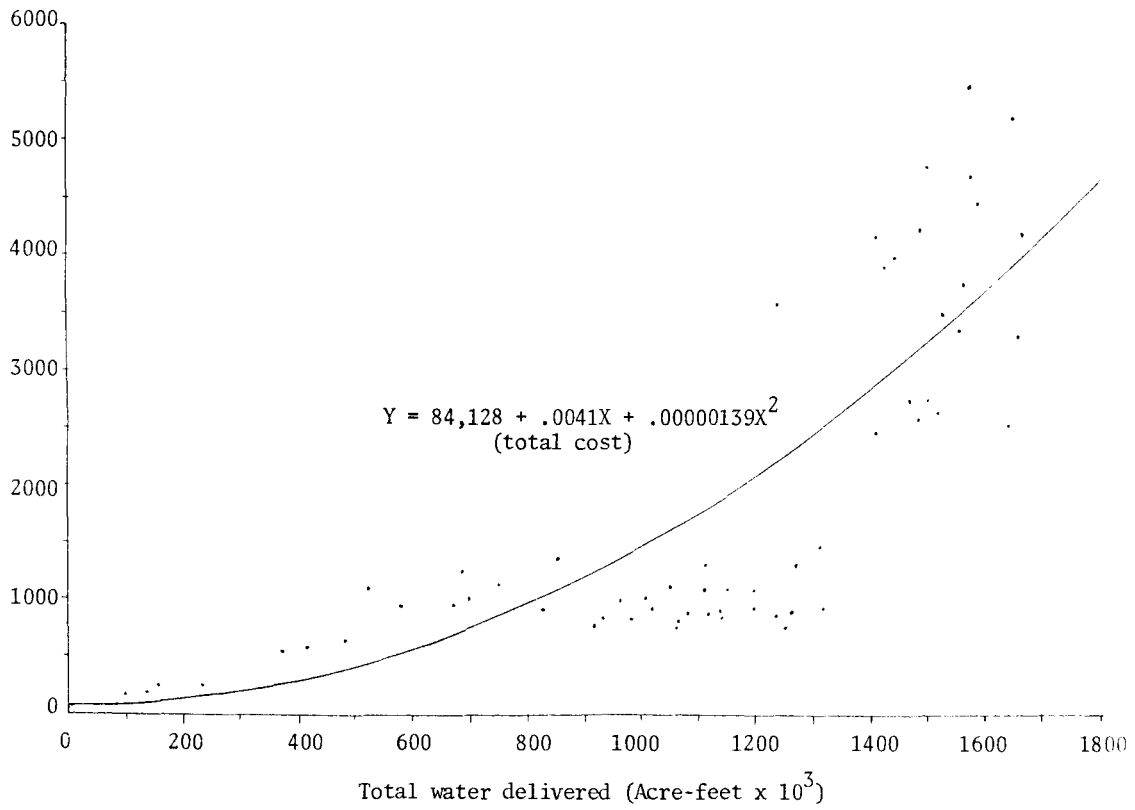
^{1/} From Table 14, total annual benefits.

^{2/} From Table 7, total annual costs.

Table 24. Estimated total, average and marginal costs of producing water,
Boise Project, Idaho, 1910-1973.

Water delivered to farms	Estimated total cost	Estimated average total costs	Estimated marginal cost
(acre-feet)	(dollars)	(dollars/ acre-foot)	(dollars/ acre-foot)
100,000	\$ 98,438	\$0.98	\$0.28
200,000	140,548	0.70	0.56
300,000	210,458	0.70	0.83
400,000	308,168	0.77	1.12
500,000	452,128	0.87	1.39
600,000	586,988	0.98	1.67
700,000	768,098	1.10	1.95
800,000	977,008	1.22	2.23
900,000	1,213,718	1.35	2.51
1,000,000	1,478,228	1.48	2.78
1,100,000	1,770,538	1.61	3.06
1,200,000	2,090,643	1.74	3.34
1,300,000	2,438,558	1.88	3.62
1,400,000	2,814,268	2.01	3.90
1,500,000	3,217,778	2.14	4.17
1,600,000	3,649,088	2.28	4.45
1,700,000	4,108,198	2.42	4.73

Figure 6. Total, average, and marginal costs as a function of total water delivered, Boise River, 1910-1970



The marginal cost of producing an additional acre-foot of water rises continually from \$0.28 at 100,000 acre-feet to \$4.73 at 1,700,000 acre-feet. Considering the necessity of water for irrigation purposes and crop success, few farmers would hesitate to pay the marginal cost of production, especially for more intensive, high valued crops.

Irrigation Benefits from Water

Since the Boise Project was constructed primarily for irrigation purposes, its success should probably be measured in terms of irrigation benefits (net income). Looking at the relationship between water delivered to farms and total income benefits from irrigation shows a full measure of this success, although the changing value of the dollar and increased technology also contribute to increased dollar benefits over time. Water, however, is a necessary condition to crop production benefits in the Boise Project area, so there is little doubt about its relevance.

Table 25 presents estimated total, average, and marginal crop benefits from water delivered to farms over the study period while Figure 7 presents the estimating functions. Estimated average benefits vary from \$74,546 for 100,000 acre-feet of water to \$27,210,050 for 1,700,000 acre-feet of water delivered to farms. Total benefits have continued to increase over time as additional water has become available, thus indicating a growing demand for the types of crops produced. Average benefits per acre-foot of water supplied increased from \$0.74 per acre-foot at the 100,000 acre-foot level to \$16.00 at the 1,700,000 acre-foot level. In the same way, marginal benefits per acre-foot increased from \$1.35 to \$41.60 per acre-foot.

When average estimated costs per acre-foot (\$2.42) are compared with average estimated benefits (\$16.00) at the 1,700,000 acre-foot level of water deliveries to farms, the return is about \$6.61 per dollar of cost (on an annual basis). Obviously water is not the only factor of production involved, but the investment in water resources for the Boise Project appears to have been quite successful using today's standards. One could hardly have predicted these results in 1910.

Irrigation Benefits from Land

As more water became available from the Boise Project, additional acres were irrigated and brought into crop production. From 1910 to 1973, the area under irrigation increased from 50,000 to 340,000 acres. Total benefits (in terms of income) increased steadily with the increases in water deliveries and land use. The estimated relationship between land use and benefits from irrigation indicate increasing incomes from irrigation. Table 26 shows the results of fitting a function between acres irrigated and benefits. As the acreage irrigated increased from 50,000 to 340,000, the project's irrigation

Table 25. Estimated total, average and marginal irrigation benefits from water delivered to farms, Boise Project, 1910-1973.

Water delivered to farms (acre-feet)	Total irrigation benefits (dollars)	Average total benefits from irrigation (dollars/acre-foot)	Marginal benefits from irrigation (dollars/acre-foot)
100,000	\$ 74,546	\$ 0.74	\$ 1.36
200,000	262,740	1.31	2.39
300,000	548,983	1.83	3.33
400,000	926,031	2.31	4.20
500,000	1,389,158	2.78	5.05
600,000	1,934,895	3.22	5.86
700,000	2,560,518	3.65	6.65
800,000	3,263,800	4.08	7.42
900,000	4,042,865	4.49	8.17
1,000,000	5,884,550	5.88	19.33
1,100,000	7,977,050	7.25	22.51
1,200,000	10,387,550	8.66	25.70
1,300,000	13,116,050	10.09	28.88
1,400,000	16,162,550	11.54	32.06
1,500,000	19,527,050	13.02	35.24
1,600,000	23,209,550	14.50	38.42
1,700,000	27,210,050	16.00	41.60

Figure 7. Total, average, and marginal irrigation benefits as a function of total water delivered, Boise River, 1910 - 1970

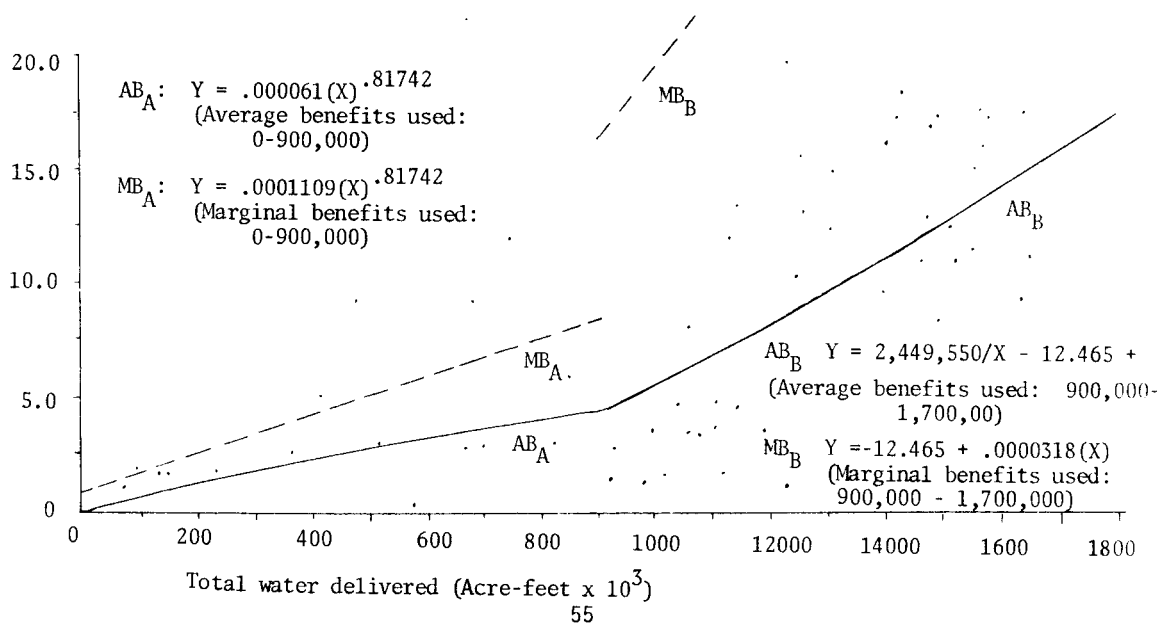
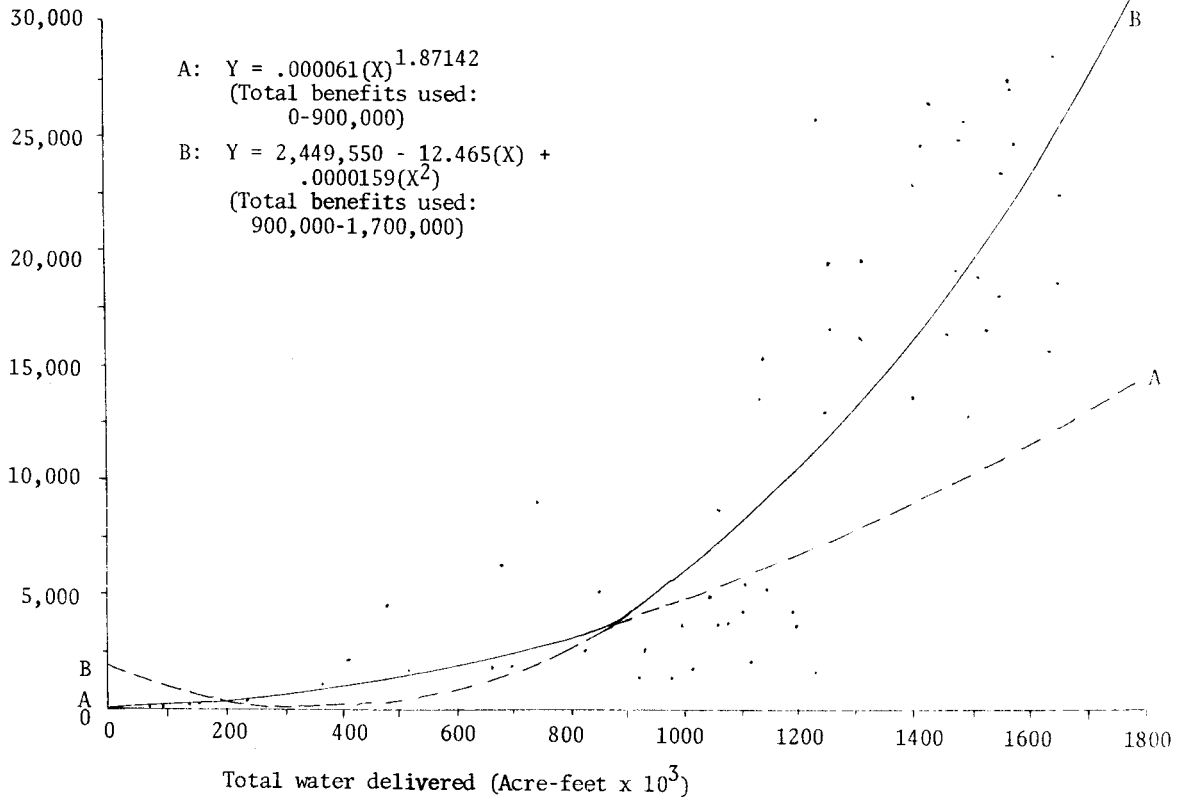


Table 26. Estimated irrigation benefits resulting from additional acreage, Boise Project, Idaho, 1910-1973.

Total acres irrigated	Total irrigation benefits	Average irrigation benefits	Marginal irrigation benefits
	(dollars)	(dollars/acre)	(dollars/acre)
50,000	\$ 82,871	\$ 1.66	\$ 4.04
100,000	449,689	4.50	10.96
150,000	1,209,404	8.07	19.66
200,000	2,440,167	12.21	29.75
250,000	3,367,350	13.47	138.69
300,000	12,180,100	40.60	213.82
350,000	24,749,350	70.71	288.95

benefits were estimated to increase from \$82,871 to \$24,749,350. Average benefits per acre increased from \$1.66 to \$70.71 per acre and marginal benefits per acre increased from \$4.04 to \$288.95. Table 26 summarizes estimated irrigation benefits from additional land irrigated. Marginal benefits per acre should be somewhat indicative of land rental values in the area.

INTANGIBLE DIRECT BENEFITS

Flood Control

The initial structures from the Boise Project plus Lucky Peak Dam all contribute to flood prevention; however, only the latter structure was built primarily for flood control purposes. Flood control is much more important in the Boise Valley than in the Payette because there are more people and buildings on the flood plain of the Boise River. Evaluating flood control benefits attributed to the Boise Project is quite a complex process; however, considerable work on the subject has been performed by the Corps of Engineers. Since flood control is a complementary benefit of the Boise Project itself and a direct benefit of Lucky Peak Dam the flood control benefits presented here are the results of analysis by the Corps of Engineers.

Briefly, these benefits from flood control are based on the assessed valuation of the property in the flood plain and the unregulated flow of the river without structures. Damage curves have been derived showing the value in dollars of damages prevented and the flow of the river (in cubic feet per second). The results of this analysis for the period 1935 to 1974 are summarized in Table 27. Prevented damages increased in later years as the valuation of property in the flood plain increased. Depending on the flows in the Boise River and the property values involved, prevented damages were estimated to range from zero to \$15,300,000 in a single year. Prevented damages are based on the assumption that any flood damages incurred are rebuilt the next year. This assumption appears reasonable as long as flood damages associated with any particular event are small and limited enough to be replaced in a single year.

Recreation

No doubt recreational benefits result from the Boise Project and Lucky Peak Dam. Accounting for the recreational use and assessing the value of this use, however, is both difficult and incomplete. In addition, certain wildlife and recreational resources were lost when the project was built. It would be a research project in itself to determine what physical changes have occurred, the loss and gains from recreational use, and the values associated with these uses. The physical and environmental impacts are being conducted as another part of this study.

Table 27. Flood Damages Prevented, Boise River, 1935-1974.*

Year	Unregulated flow (cfs)	Regulated flow (cfs)	Prevented damages (\$1000)
1935	9,500	5,812	\$ 0
1936	19,790	15,272	0
1937	7,700	2,467	0
1938	19,290	12,390	0
1939	8,410	4,494	0
1940	9,870	6,220	45
1941	8,860	5,330	38
1942	10,690	6,900	51
1943	25,040	20,500	890
1944	7,630	3,870	80
1945	11,640	7,080	179
1946	18,840	10,800	896
1947	13,840	8,390	330
1948	15,260	9,500	455
1949	12,830	5,710	450
1950	13,670	6,720	666
1951	14,030	7,510	612
1952	23,430	7,790	3,410
1953	12,780	8,110	520
1954	14,460	6,030	1,000
1955	10,480	1,740	370
1956	22,950	6,840	4,700
1957	16,930	6,870	1,880
1958	21,750	6,320	5,500
1959	9,040	1,800	210
1960	11,840	5,710	900
1961	7,830	1,560	135
1962	11,340	1,540	850
1963	11,480	5,870	1,000
1964	27,290	4,630	15,000
1965	20,500	7,170	8,920
1966	8,220	1,760	190
1967	15,600	1,640	4,600
1968	7,050	1,600	60
1969	15,930	6,280	6,000
1970	14,850	5,030	5,200
1971	20,250	6,850	14,000
1972	19,600	6,710	14,130
1973	9,550	1,460	550
1974	18,470	7,350	15,300
Total prevented damages			\$113,100

* Estimates of prevented damages are based on numerous publications by the Corps of Engineers and other water related agencies of the state and Federal government. Specific publications are available on request.

Some data are available on recreational use on the Boise and Payette Rivers. These data are only for recent years and probably do not represent the entire recreational story in terms of either use or value. Table 28 presents attendance figures and estimated values for recent years. Recreation use in 1974 amounted to about 1,774,079 visitor days in terms of attendance valued at \$2,838,526. For the period 1958 to 1974, total recreation benefits were estimated at \$31,746,662 or an average of \$1,867,450 per year. These values are based on attendance and a constant value per person. This, plus the fact that no market transactions take place to determine actual prices or values, tend to make estimated total values from recreation open to further question. Considering the use of the Boise and Payette Rivers for recreation purposes, however, the true value is probably higher than data indicate.

Total of Valued Benefits and Costs

For the year 1973, the identifiable benefits from the Boise Project and Lucky Peak Dam were as follows:

<u>Source</u>	<u>Dollar Benefits</u>
Irrigation	\$54,740,496
Power	558,031
Flood Control (20 year ave.)	5,655,000
<u>Recreation</u>	<u>2,622,675</u>
Total	\$63,576,202

The Project Costs were:

<u>Boise Project</u>	<u>Dollar Benefits</u>
Depreciation (100 year life)	\$ 691,670
Alternative investment	2,935,979
Operation and maintenance	1,936,123
 <u>Lucky Peak Dam</u>	
Depreciation (50 year life)	441,320
Alternative investment	1,390,158
<u>Operation and maintenance</u>	<u>181,739</u>
Total	\$7,576,989

Overall Benefit-Cost ratio for 1973 was:

$$\frac{\text{Benefits}}{\text{Costs}} = \frac{\$ 63,576,202}{7,576,989} = 8.391$$

Based on the dollar values of benefits and costs for the Boise Project, including Lucky Peak Dam, benefits exceeded costs at an eight to one ratio for 1973. If these estimates are accurate (they are based on the best information known to be available) the project is extremely successful in the economic sense. Social and environmental costs, if any, are not included here and should be considered in the overall analysis of the project. Secondary economic impacts are not included here either, and also should be included in the final conclusion. Clearly, the Boise Project which provides a plentiful, low cost water supply, has encouraged the successful development of a productive and diversified irrigated agriculture that is highly interrelated with the food processing industry in the area.

Annual benefit-cost ratios from Table 23 give an indication of the long-term success of the project. Prior to 1940, there were many years when benefits barely exceeded costs. During the 30 year period from 1910 to 1940, annual benefit cost ratios were below 2.0 in 13 years indicating questionable economic success. After 1940, however, the ratio of benefits to costs fell below 5.0 only two times in 33 years. It appears that investments in the Boise Project helped create an environment whereby other factors of production could be combined to generate a highly successful irrigated agriculture. It took, however, some 30 years for the investment to begin to reach its potential. It seems doubtful that private enterprise would have developed the area at such an early date under these conditions.

Table 28. Recreational use and value from structures of the Boise Project and Lucky Peak Dam.

Date	Attendance at Lucky Peak Reservoir (visitor days)	Attendance at Bureau of Reclamation Projects (visitor days)	Value of Corps and Bureau Projects* (dollars)
1958	568,900	152,850	\$1,154,800
1959	667,700	160,450	1,325,040
1960	674,100	222,386	1,434,377
1961	447,000	255,338	1,123,540
1962	551,000	277,511	1,325,617
1963	662,400	276,932	1,502,931
1964	671,400	383,530	1,687,888
1965	588,800	332,530	1,473,968
1966	595,600	355,460	1,521,020
1967	648,600	353,680	1,603,625
1968	738,800	339,573	1,725,457
1969	1,029,000	388,247	2,267,615
1970	1,251,100	496,269	2,750,868
1971	1,282,100	514,236	2,874,137
1972	1,169,800	373,725	2,469,640
1973	1,268,800	370,562	2,622,675
1974	1,366,600	407,479	2,838,526

* Based on a value of \$1.60 per recreational day.

Appendix A

Procedures for Estimating Crop Income, Boise Project, 1910-1973

Various Bureau of Reclamation reports and publications provide data on the irrigated acreage, crop yields, and gross crop values for the Boise Project. The gross crop values, as reported by the Bureau, were used for the period from 1918 to 1973. Prior to 1918, Bureau data on supplemental irrigation was incomplete, so supplemental acreage for this period was estimated. The average gross crop values per full service acre were imputed to the supplemental acreage estimated to have been irrigated before 1918. Table 9 shows the gross crop values for the entire Boise Project lands from the year 1910 to 1973.

Production costs were not reported by the Bureau of Reclamation, so these costs had to be determined from other sources. Approximately thirty crops are grown commercially within the Boise Valley. Crop budgets were computed for each of these thirty crops for the year, 1971. Most of the information for constructing these budgets was taken from the master's thesis of Oluwole Famure at the University of Idaho in 1974 (24). His budgets were modified to reflect Boise conditions and to exclude as costs, value-added items such as labor, land, rent, and capital. Crop budgets for other western irrigated areas were compared for consistency and to aid in the construction of budgets for crops not included in Famure's study.

The reconstruction of crop budgets over the life of the Boise Project was considered impractical. Instead, another set of crop budgets was created for the early 1920's using various University of Idaho Agricultural Experiment Station bulletins (11, 14, 16). By means of price relatives, the 1971 budgets were projected back to 1910 and forward to 1973. In a similar manner, the 1920 budgets were extended over the history of the Project (Appendix B outlines the steps followed in benefit estimation). Technology has vastly changed the mix of inputs that presently exist, from those in 1920. In recent years, agriculture has become significantly more capital intensive. For these reasons, price relatives cannot be assumed to give accurate estimations of production costs. It was assumed that the 1971 budgets extended back to 1950 would be reasonably accurate, while the 1920 budgets would be safe estimations of costs until 1930. The period between 1930 and 1950, however, was considered to be a transitional period. Production costs during this span were calculated by weighting the above two projections by an index of productivity and averaging the two estimates.

At this point, gross value-added by crop can be computed by taking the difference of gross crop value and production cost. Gross value-added is summed over all crops to calculate the total value-added by the Project. In order to obtain net value-added, depreciation costs were determined. Famure's study included a depreciation cost on equipment and buildings. Using price relatives, the depreciation cost per acre indicated in his budgets could be calculated for the period. With the aforementioned technological change from labor-intensive to capital-intensive agriculture, the 1971 depreciation charges tend to over estimate depreciation in the earlier part of the century.

In the Census of Agriculture, the value of land and buildings and the number and kinds of machinery are reported for Ada and Canyon counties. By extracting the value of buildings and imputing values to machinery, a total value of buildings and machinery was obtained for each census year.

Depreciation calculated from census data compared favorably (Appendix C) with the estimates from Famure in later years. Before 1955, however, the census data is consistently less, indicating the estimates from Famure's data does, in fact, overestimate capital investments these years. For this reason, census data was used for determining the net value-added; however, it lacks sufficient detail to determine depreciation costs for each crop. Total depreciation is estimated from census data and is subtracted from gross value-added to obtain the net value-added crop benefits generated "with" the project. Appendix D shows the annual gross crop values, gross value-added, and net value-added by the Boise Project.

Appendix B

Example Calculation of Agricultural Benefits*

Step 1. Take each of the 30 crops and record their gross crop value from Bureau of Reclamation crop reports (3).

For Alfalfa hay, 1943:

Gross Value Per Acre	\$	50.77
Acres		<u>88,197 acres</u>
Total Gross Value		\$4,477,761.69

Step 2. Estimate crop production costs for the years of 1971 and 1920.

Alfalfa hay:

1971 Budget:

Fuel, oil and grease	\$	4.59
Repairs		1.75
Insurance		8.44
Seed		4.10
Fertilizer and chemicals		7.60
Farm supplies and chemicals		<u>7.91</u>
		\$34.39/acre

1920 Budget:

Materials	\$	3.99
Insurance		1.30
Miscellaneous expenses		<u>8.43</u>
		\$13.78

Step 3. Determine annual production costs by using price relatives for both budgets determined in Step 2.

$$1971: \frac{PPI_i}{PPI_{1971}} \times C_{1971} = C_{i/1971}$$

$$1920: \frac{PPI_i}{PPI_{1920}} \times C_{1920} = C_{i/1920}$$

For Alfalfa hay, 1943:

$$\begin{array}{rcl}
 1971: & \frac{164}{331} & \times \quad \$34.39 = \$17.04 \text{ cost/acre} \\
 & & \text{in 1943} \\
 1920: & \frac{164}{195} & \times \quad \$13.78 = \$11.59 \text{ cost/acre} \\
 & & \text{in 1943}
 \end{array}$$

Where PPI_i = Prices paid by Farmers' Index (1910 base) for year, i.

Where C_i = Cost per acre for year, i.

Step 4. Average the two cost estimates by weighting each by productivity indexes and then averaging.

$$C_i = \frac{C_{i/1971} \times \frac{IP_i}{IP_{1971}} + C_{i/1920} \times \frac{IP_i}{IP_{1920}}}{\frac{IP_i}{IP_{1971}} + \frac{IP_i}{IP_{1920}}}$$

Where IP_i = Index of farm productivity for year i.

For Alfalfa hay, 1943:

$$C_{1943} = \frac{(\$17.04) \frac{125}{207} + (\$11.59) \frac{125}{74}}{\frac{125}{207} + \frac{125}{74}} = \$13.06/\text{acre}$$

Step 5. Calculate total cost by crop.

Total cost = Cost/acre X acres harvested

For Alfalfa hay, 1943:

$$\text{Total cost} = \$13.06 \times 88,197 \text{ acres} = \$1,151,852.82$$

Step 6. Calculate the gross value added by crop.

$$\text{Gross value-added} = \text{Gross value} - \text{Total cost}$$

For Alfalfa hay, 1943:

$$\text{Gross value-added} = \$4,477,761.69 - \$1,151,852.82 = \\ \$3,325,908.88$$

Step 7. Sum gross value-added by all 30 crops to obtain total gross value-added by the Boise Project for every year.

$$\text{Total gross value-added} = \sum_{i=1}^{30} x_i \text{ (gross value-added);}$$

$$\text{In 1943: Total Gross value-added} = \$12,993,650$$

Step 8. Compute depreciation expense for Boise Project using equations estimated from Census data.

$$D_i = a_i I - b_i$$

$$D_{1943} = 66,984.6 (1943) - 1,944,752 = \$935,586$$

Step 9. Compute total net value-added for each year.

$$\text{Total net value-added} = \text{total gross value-added} - \text{depreciation}$$

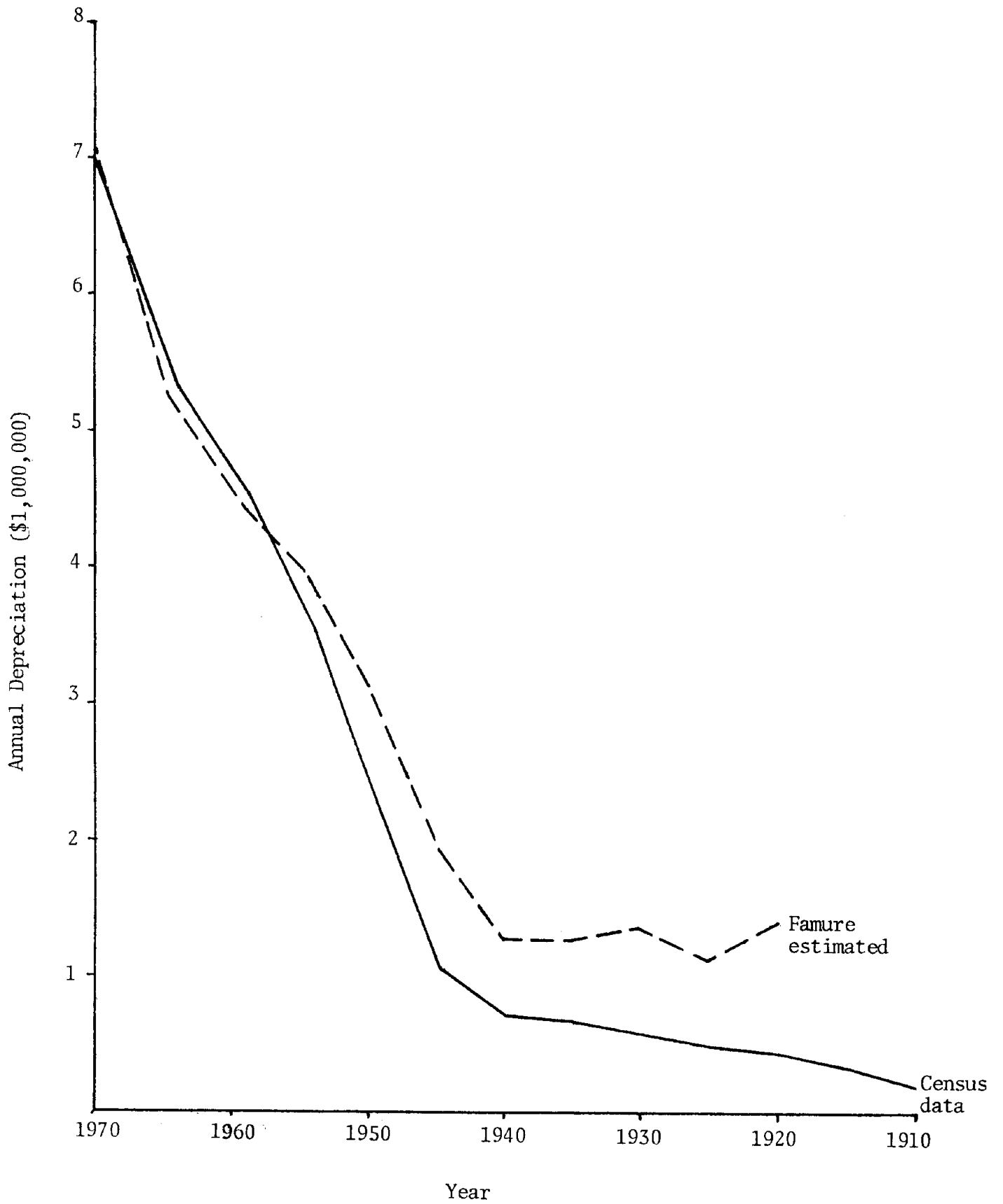
In 1943:

$$\text{Total net value-added} = \$12,993,650 - \$935,586 = \\ \$12,058,064$$

* 1943 used as sample year and alfalfa hay used as a sample crop.

Appendix C

Annual On-Farm Depreciation, Boise Project



Appendix D

Depreciation of Farm Equipment and Buildings,
Boise Project, 1910-1973.*

Year	Total de- preciation	Deprec- iation/ acre	Year	Total de- preciation	Deprec- iation/ acre
1910	262,843	2.43	1942	868,610	3.11
1911	278,569	2.29	1943	935,586	3.30
1912	294,296	2.11	1944	1,002,570	3.39
1913	310,021	2.06	1945	1,069,555	3.73
1914	325,748	2.01	1946	1,340,867	4.78
1915	341,474	1.94	1947	1,612,179	5.54
1916	357,201	1.92	1948	1,883,491	6.39
1917	372,927	2.01	1949	2,154,803	7.58
1918	388,653	1.85	1950	2,426,115	7.96
1919	404,380	1.85	1951	2,697,427	8.51
1920	420,106	1.87	1952	2,968,739	9.36
1921	435,832	1.88	1953	3,240,051	10.22
1922	451,559	1.91	1954	3,511,363	10.89
1923	467,285	1.96	1955	3,782,675	11.58
1924	483,001	2.09	1956	4,053,987	12.50
1925	498,738	2.27	1957	4,151,798	12.76
1926	514,464	1.92	1958	4,354,271	13.33
1927	530,190	1.92	1959	4,509,035	13.90
1928	545,916	1.99	1960	4,593,117	14.26
1929	561,643	2.02	1961	4,677,377	14.61
1930	677,369	2.39	1962	4,679,874	14.85
1931	593,095	2.10	1963	5,177,557	15.12
1932	608,822	2.20	1964	5,313,973	15.46
1933	624,548	2.19	1965	5,439,692	15.90
1934	640,274	2.31	1966	5,634,995	16.51
1935	656,000	2.39	1967	5,930,515	17.25
1936	671,727	2.49	1968	6,150,377	18.07
1937	687,453	2.62	1969	6,457,081	19.02
1938	703,179	2.76	1970	6,790,283	20.07
1939	718,906	2.71	1971	7,200,116	21.40
1940	734,632	2.71	1972	7,614,199	22.94
1941	801,617	2.89	1973	8,385,946	24.80

* Source: Estimated from Census of Agriculture data.

Appendix E

Table E1. Gross value added calculations for alfalfa hay, Boise Project, Idaho, 1910-1973

Alfalfa Hay					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$15.93	\$ 6.85	\$ 9.08	2,912	\$ 264,409.96
1911	17.50	6.92	10.85	6,273	66,368.34
1912	16.78	7.20	9.58	10,428	99,900.24
1913	19.31	7.14	12.17	15,428	187,758.76
1914	19.65	7.20	12.45	23,395	291,267.75
1915	22.93	7.35	15.58	22,259	346,795.22
1916	33.32	8.13	25.19	26,390	663,763.10
1917	58.44	11.02	47.42	34,087	1,616,405.54
1918	61.00	12.72	48.28	37,507	1,810,837.96
1919	62.77	13.78	48.99	41,851	2,050,280.49
1920	30.22	13.78	16.44	45,974	755,812.56
1921	18.24	9.04	9.20	43,061	396,161.20
1922	36.80	8.97	27.83	38,654	1,075,740.82
1923	27.00	9.75	17.25	38,523	664,521.75
1924	20.74	9.89	10.85	47,458	514,919.30
1925	22.70	10.25	12.45	35,158	437,717.10
1926	19.13	9.96	9.17	51,417	471,493.89
1927	23.51	9.96	13.55	47,634	645,440.70
1928	31.29	10.46	20.83	49,552	1,032,168.16
1929	32.32	11.61	20.71	56,583	1,171,833.93
1930	20.27	10.74	9.53	58,899	561,307.47
1931	15.03	8.99	6.04	60,025	3,621,551.00
1932	9.01	7.88	1.13	60,100	67,913.00
1933	16.95	7.87	9.08	63,742	578,777.36
1934	18.52	9.07	9.45	56,956	538,234.20
1935	20.08	9.71	10.37	53,392	553,675.04
1936	21.30	9.71	11.59	54,760	634,668.40
1937	25.47	10.51	14.96	51,673	773,028.28
1938	20.78	9.71	11.07	47,406	524,784.42
1939	15.42	9.63	5.79	49,065	284,086.35
1940	16.18	9.78	6.40	47,984	307,097.60
1941	25.76	10.35	15.41	47,799	736,582.59
1942	43.07	11.78	31.29	49,912	1,561,746.48
1943	50.77	13.06	37.71	88,197	3,325,908.87
1944	49.84	13.77	36.07	89,228	3,218,453.96
1945	50.80	14.00	36.80	86,407	3,179,777.60
1946	47.29	15.04	32.25	79,415	2,561,133.75
1947	57.52	20.17	37.35	76,088	2,841,886.80
1948	72.36	22.02	50.34	73,032	3,676,430.88
1949	66.06	22.35	43.71	74,602	3,260,853.42
1950	56.49	22.11	34.38	75,545	2,597,237.10
1951	70.44	23.34	47.10	77,960	3,671,916.00
1952	73.86	24.61	49.25	82,464	4,061,352.00
1953	44.59	24.34	20.25	87,514	1,772,158.50
1954	57.19	24.02	33.17	87,813	2,912,737.21
1955	75.59	24.13	51.46	89,101	4,585,137.46
1956	68.88	24.07	44.81	88,131	3,949,150.11
1957	48.94	24.53	24.41	87,584	2,137,925.44
1958	47.78	24.68	23.10	80,196	1,852,527.60
1959	89.85	24.82	65.03	79,267	5,154,733.01
1960	81.69	25.25	56.44	84,065	4,744,628.60
1961	80.95	25.71	55.24	85,421	4,718,656.04
1962	63.11	26.13	37.03	84,469	3,127,887.07
1963	68.38	26.69	41.69	84,967	3,542,272.23
1964	67.64	27.23	40.41	89,532	3,617,988.12
1965	66.94	28.03	38.91	85,321	3,319,840.11
1966	99.05	28.66	70.39	79,901	5,624,231.39
1967	72.43	29.63	42.80	77,840	3,331,552.00
1968	80.01	30.52	49.49	73,811	3,652,906.39
1969	87.77	31.17	56.60	72,681	4,113,744.60
1970	98.66	32.62	66.04	74,040	4,889,601.60
1971	143.91	34.10	109.81	72,958	8,011,517.98
1972	136.54	36.18	100.36	72,866	7,312,831.76
1973	193.93	43.30	150.63	74,520	11,224,947.60

Table E 2. Gross value added calculations for alfalfa seed, Boise Project, Idaho, 1910-1973

Alfalfa Seed					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	12.59	7.14	5.45	344	1,874.80
1914	12.36	7.20	5.16	310	1,599.60
1915	28.78	7.35	21.43	246	5,271.78
1916	21.61	8.13	13.48	677	9,125.96
1917	22.48	11.02	11.46	375	4,297.50
1918	47.41	12.72	34.69	429	14,882.01
1919	53.11	13.78	39.33	250	9,832.50
1920	24.49	13.78	10.71	1,031	11,042.01
1921	28.80	9.04	19.76	1,070	21,143.20
1922	29.52	8.97	20.55	985	20,241.75
1923	48.00	9.75	38.25	1,022	39,015.00
1924	17.04	9.89	7.15	966	6,906.90
1925	21.50	10.25	11.25	2,041	22,961.25
1926	23.85	9.96	13.89	1,302	18,084.78
1927	39.62	9.96	29.66	4,436	131,511.76
1928	31.01	10.46	20.55	2,567	52,751.85
1929	20.41	10.30	10.11	3,426	34,636.86
1930	16.74	9.53	7.21	3,723	26,842.83
1931	7.99	7.98	.01	2,816	28.16
1932	9.93	6.99	2.94	825	2,425.50
1933	7.13	6.99	.14	2,022	283.08
1934	20.90	8.06	12.84	1,022	13,122.48
1935	15.07	12.67	2.40	2,277	5,464.80
1936	26.02	12.67	13.35	992	13,243.20
1937	28.78	13.71	15.07	1,897	28,587.79
1938	23.06	12.67	10.39	1,698	17,642.22
1939	15.06	12.57	2.49	2,456	6,115.44
1940	10.84	12.78	-1.94	1,489	-2,888.66
1941	24.74	13.50	11.24	677	7,609.48
1942	33.27	15.38	17.89	765	13,685.85
1943	40.96	17.04	23.92	1,376	32,913.92
1944	58.19	17.97	40.22	1,759	70,746.98
1945	51.05	18.28	32.76	1,367	44,782.92
1946	66.35	19.84	46.51	1,373	63,858.23
1947	37.80	22.13	15.67	1,260	19,744.20
1948	109.15	23.92	85.23	864	73,638.72
1949	78.12	24.57	53.55	1,367	73,202.85
1950	51.28	24.24	27.04	1,850	49,483.20
1951	121.88	25.63	96.25	2,515	242,068.75
1952	80.07	26.68	53.39	2,063	110,143.57
1953	41.04	26.67	14.28	1,380	19,706.40
1954	116.17	26.79	89.38	1,133	101,267.54
1955	76.96	26.76	50.20	1,480	74,296.00
1956	103.73	26.79	76.94	2,140	164,651.60
1957	81.74	27.51	54.23	5,736	311,063.28
1958	109.75	27.71	82.04	6,259	513,488.36
1959	109.72	27.96	81.76	4,565	373,234.40
1960	122.51	28.47	94.04	5,483	515,621.32
1961	158.05	29.08	128.97	7,435	958,891.95
1962	220.30	29.55	190.75	12,238	2,334,398.50
1963	64.24	30.10	34.14	23,414	799,353.96
1964	125.22	30.75	94.47	12,567	1,187,204.49
1965	108.10	31.77	76.33	9,822	749,713.26
1966	144.34	32.62	111.72	8,514	951,184.08
1967	194.92	33.84	161.08	8,659	1,394,791.72
1968	158.49	34.62	123.87	10,877	1,347,333.99
1969	183.51	35.20	148.31	10,242	1,518,991.02
1970	176.62	36.86	139.76	10,691	1,494,174.16
1971	176.83	38.54	138.29	11,142	1,540,827.18
1972	250.51	40.88	209.63	10,318	2,162,962.34
1973	396.92	48.92	348.00	10,607	3,691,236.00

Table E3. Gross value added calculations for apples. Boise Project, Idaho, 1910-1973

Apples					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	81.83	48.65	33.18	165	5,474.70
1912	185.31	50.45	134.86	32	4,315.52
1913	121.98	53.15	68.83	91	6,263.53
1914	11.15	53.68	-42.53	272	-11,568.16
1915	21.51	54.73	-33.22	504	-16,742.89
1916	--	60.52	--	885	--
1917	31.56	82.10	-50.54	3,126	-157,988.04
1918	26.08	94.73	-68.65	1,570	-107,780.50
1919	59.40	102.63	-43.23	2,159	-93,333.57
1920	70.76	102.63	-31.87	1,319	42,036.53
1921	237.00	67.36	169.64	1,371	232,576.44
1922	112.50	66.84	45.66	1,390	63,467.40
1923	99.00	72.62	26.38	1,420	37,459.60
1924	51.26	73.68	-22.42	1,698	-38,069.16
1925	97.50	76.31	21.19	974	20,639.06
1926	30.15	74.21	-44.06	2,497	-110,017.82
1927	81.63	74.21	7.42	2,249	16,687.58
1928	70.92	74.21	-3.29	2,409	-7,925.61
1929	113.50	76.16	37.34	2,331	87,039.54
1930	108.56	77.96	30.60	2,553	78,121.80
1931	17.47	79.76	-62.29	2,453	-152,797.37
1932	22.54	81.56	-59.02	2,290	-135,155.80
1933	48.11	83.36	-35.25	2,413	-85,058.25
1934	36.92	85.16	-48.24	2,125	-102,510.00
1935	88.84	86.96	1.88	2,186	4,109.68
1936	76.66	88.76	-12.10	1,203	-14,556.30
1937	53.00	90.56	-37.56	1,237	-46,461.72
1938	61.74	92.36	-30.62	912	-27,925.44
1939	61.79	94.16	-32.37	958	-31,010.46
1940	43.02	104.30	-61.28	884	-54,171.52
1941	153.93	114.49	39.44	751	29,619.44
1942	169.90	124.67	45.23	772	34,917.56
1943	501.39	134.85	366.54	753	276,004.62
1944	376.46	133.88	242.58	690	167,380.20
1945	619.90	132.91	486.99	799	389,105.01
1946	319.72	131.97	187.75	1,447	271,674.25
1947	182.54	131.97	50.57	1,761	89,053.77
1948	238.05	142.57	95.48	1,732	165,371.36
1949	133.99	149.44	15.45	1,819	28,103.55
1950	125.25	149.49	24.24	2,050	49,692.00
1951	215.92	159.24	56.68	2,006	113,700.08
1952	321.22	166.02	155.20	2,113	327,937.60
1953	381.62	166.94	214.68	2,176	467,143.68
1954	571.46	167.89	403.57	3,097	1,249,856.29
1955	306.46	168.17	138.29	4,245	587,041.05
1956	414.98	171.49	243.49	4,388	1,068,434.12
1957	257.06	176.97	80.09	4,298	344,226.82
1958	285.44	180.24	105.20	4,306	452,991.20
1959	635.28	184.52	450.76	4,563	2,056,817.88
1960	846.37	188.84	657.53	4,345	2,856,967.85
1961	1,099.24	194.55	904.69	4,809	4,350,654.21
1962	972.01	199.37	772.64	5,207	4,023,136.48
1963	613.58	205.22	408.36	7,371	3,010,021.56
1964	546.57	212.47	334.10	7,656	2,557,869.60
1965	615.59	221.52	395.07	7,727	3,044,978.89
1966	420.95	231.17	189.78	7,808	1,481,802.24
1967	399.16	242.35	156.81	8,163	1,280,040.03
1968	562.84	251.71	311.13	7,289	2,267,826.57
1969	639.15	259.85	379.30	8,059	3,056,778.70
1970	347.67	273.51	74.16	7,324	543,147.84
1971	583.77	285.95	297.82	7,364	2,193,146.48
1972	412.05	303.35	108.70	7,569	822,705.30
1973	878.13	363.03	515.10	7,891	4,064,654.10

Table E4. Gross value added calculations for barley, Boise Project, Idaho, 1910-1973

Year	Barley				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 10.46	\$10.41	\$ 0.05	82	\$ 4.10
1911	13.72	10.53	3.19	288	918.72
1912	12.41	11.00	1.41	1,490	2,100.90
1913	9.35	10.88	-1.53	2,315	-3,541.95
1914	12.26	11.00	1.26	2,498	3,147.48
1915	13.93	11.23	2.70	2,776	7,495.20
1916	19.34	12.53	6.81	4,463	30,393.03
1917	24.48	17.36	7.12	3,217	22,905.04
1918	37.10	20.18	16.92	2,358	39,897.36
1919	41.94	21.95	19.99	2,222	44,417.78
1920	17.46	21.95	-4.49	3,108	-13,954.92
1921	12.60	14.06	-1.46	3,200	-4,672.00
1922	23.52	13.94	9.58	3,050	29,219.00
1923	17.98	16.24	1.74	3,175	5,524.50
1924	25.00	16.47	8.53	6,137	52,348.61
1925	22.90	17.06	5.84	7,248	42,328.32
1926	17.40	16.59	0.81	5,821	4,715.01
1927	27.20	17.42	9.78	8,432	82,464.96
1928	17.14	17.42	-0.28	7,992	-2,237.76
1929	20.80	17.18	3.62	8,564	31,001.68
1930	21.23	15.89	5.34	8,491	45,341.94
1931	7.31	13.30	-5.99	9,889	-59,235.11
1932	10.62	11.65	-1.03	10,356	-10,666.68
1933	18.25	11.65	6.60	7,100	46,860.00
1934	9.68	13.42	-3.74	7,968	-29,800.32
1935	18.51	14.36	4.15	8,586	35,631.90
1936	23.82	14.36	9.46	7,214	68,244.44
1937	21.94	15.53	6.41	9,218	59,087.38
1938	13.36	14.36	-1.00	11,387	-11,387.00
1939	16.09	14.24	1.85	9,078	16,794.30
1940	16.24	14.47	1.77	12,566	22,241.82
1941	28.15	15.30	12.85	13,830	177,715.50
1942	31.71	17.42	14.29	16,286	232,726.94
1943	40.84	19.30	21.54	24,329	524,046.66
1944	40.54	20.36	20.18	21,630	436,493.40
1945	37.79	20.71	17.08	20,278	346,348.24
1946	49.61	22.47	27.14	14,364	389,838.96
1947	64.41	20.76	43.65	12,077	527,161.05
1948	51.55	22.94	28.61	12,348	353,276.28
1949	36.61	23.12	13.49	12,150	163,903.50
1950	45.61	22.77	22.84	13,014	297,239.76
1951	63.32	23.93	39.39	11,488	452,512.32
1952	63.93	25.04	38.89	10,951	425,884.39
1953	52.82	24.79	28.03	9,286	260,286.58
1954	48.67	24.62	24.05	10,337	248,604.85
1955	47.74	24.75	22.99	9,383	215,715.17
1956	52.38	24.31	28.07	8,863	248,784.41
1957	47.67	25.00	22.67	8,053	182,561.51
1958	44.59	25.04	19.55	6,678	130,554.90
1959	56.16	25.06	31.10	6,920	215,212.00
1960	53.46	25.41	28.05	7,692	215,760.60
1961	63.01	25.70	37.31	9,793	365,376.83
1962	69.89	26.00	43.89	12,081	530,235.09
1963	58.46	26.36	32.10	12,011	385,553.10
1964	60.57	26.58	33.99	10,989	373,516.11
1965	70.28	27.17	43.11	15,557	670,662.27
1966	69.87	27.48	42.39	18,216	772,176.24
1967	67.43	28.18	39.25	21,065	826,801.25
1968	58.55	28.74	29.81	20,296	605,023.76
1969	69.62	29.11	40.51	22,181	898,552.31
1970	60.49	30.34	30.15	20,852	628,687.80
1971	67.99	31.72	36.27	19,087	691,959.06
1972	93.01	33.65	59.36	20,215	1,199,962.40
1973	167.07	40.27	126.80	24,159	3,063,361.20

Table E5. Gross value added calculations for beans, dry and edible, Boise Project, Idaho, 1910-1973

Beans, Dry and Edible					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$32.83	\$ --	--	\$ --
1948	--	36.28	--	--	--
1949	--	36.26	--	--	--
1950	--	35.58	--	--	--
1951	100.60	37.32	63.28	10,443	660,833.04
1952	124.07	39.44	84.63	5,432	459,710.16
1953	125.36	38.72	86.84	10,271	891,933.64
1954	103.75	38.03	65.72	9,101	598,117.72
1955	84.32	38.31	46.01	5,478	252,042.78
1956	106.58	37.26	69.32	3,739	259,187.48
1957	117.19	38.21	78.98	3,672	290,014.56
1958	105.48	38.24	67.24	4,932	331,627.68
1959	90.25	38.08	52.17	5,010	261,371.70
1960	110.84	38.67	72.17	3,624	261,544.08
1961	110.15	39.07	71.08	3,343	237,620.44
1962	125.06	39.60	85.46	3,452	295,007.92
1963	130.51	40.26	90.25	4,060	366,415.00
1964	113.95	40.65	73.30	5,689	417,003.70
1965	158.62	41.53	117.09	7,212	844,453.08
1966	103.71	41.87	61.84	9,653	596,941.52
1967	133.71	42.91	90.80	6,326	574,400.80
1968	125.57	43.88	81.69	7,577	618,965.13
1969	142.20	44.38	97.82	7,824	765,343.68
1970	150.79	46.34	104.45	9,024	942,556.80
1971	147.62	48.45	99.17	8,389	831,937.13
1972	170.09	51.40	118.69	6,546	766,944.74
1973	341.96	61.51	280.45	6,031	1,691,393.95

Table E6. Gross value added calculations for beets, Boise Project, Idaho, 1910-1973

Beets					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	40.00	14.00	26.00	2	52.00
1914	17.22	13.86	3.36	9	30.24
1915	26.67	14.00	12.67	3	38.01
1916	32.63	14.27	18.36	16	293.76
1917	90.00	15.78	74.22	25	1,855.50
1918	100.00	21.40	78.60	2	157.20
1919	30.00	24.70	5.30	1	5.30
1920	--	--	--	--	--
1921	--	--	--	--	--
1922	--	--	--	--	--
1923	--	--	--	--	--
1924	--	--	--	--	--
1925	--	--	--	--	--
1926	15.38	19.35	-3.97	13	-51.61
1927	--	--	--	--	--
1928	--	--	--	--	--
1929	52.50	23.58	28.92	2	57.84
1930	--	--	--	--	--
1931	--	--	--	--	--
1932	--	--	--	--	--
1933	--	--	--	--	--
1934	--	--	--	--	--
1935	--	19.72	--	--	--
1936	--	19.72	--	--	--
1937	64.88	21.34	43.54	277	12,060.58
1938	80.63	19.72	60.91	1,997	121,637.27
1939	64.63	19.56	45.07	3,040	137,012.80
1940	64.27	19.78	44.49	4,308	191,662.92
1941	83.64	21.02	62.62	3,013	188,674.06
1942	113.28	23.92	89.36	6,276	560,823.36
1943	144.70	26.51	118.19	6,501	768,353.19
1944	172.20	27.96	144.24	8,375	1,212,197.50
1945	174.26	28.45	145.81	17,169	2,503,411.89
1946	224.26	31.82	192.44	26,585	5,116,017.40
1947 - 1973			Data not available for these years.		

Table E7. Gross value added calculations for cherries, Boise Project, Idaho, 1910-1973

Cherries					
Year	Gross sales per acre	Cost acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$137.94	\$ --	--	\$ --
1948	--	141.03	--	--	--
1949	--	147.08	--	--	--
1950	--	147.25	--	--	--
1951	--	158.04	--	--	--
1952	--	163.27	--	--	--
1953	--	162.33	--	--	--
1954	501.71	163.90	337.81	926	312,812.06
1955	707.85	163.40	544.45	903	491,683.55
1956	763.42	165.84	597.58	628	375,280.24
1957	1,013.02	171.29	841.73	648	545,441.04
1958	799.94	174.99	624.95	680	424,966.00
1959	533.94	178.36	355.58	570	202,680.60
1960	821.14	182.93	638.21	477	304,426.17
1961	590.98	188.55	402.43	398	160,167.14
1962	882.57	193.87	688.70	517	356,057.90
1963	953.04	200.37	752.67	632	475,687.44
1964	933.93	207.78	725.55	761	552,143.55
1965	1,198.65	218.31	980.34	686	672,513.24
1966	982.98	228.82	754.16	597	450,233.52
1967	1,130.37	240.40	889.97	770	685,276.90
1968	978.34	248.89	729.45	730	532,498.50
1969	731.07	257.39	473.68	832	394,101.76
1970	530.83	270.99	259.84	900	233,856.00
1971	501.08	283.32	217.76	854	185,967.04
1972	289.94	300.55	-10.61	484	-5,135.24
1973	839.42	359.68	479.74	822	394,396.28

Table E8. Gross value added calculations for clover seed, Boise Project, Idaho, 1910-1973

Clover Seed					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	9.28	8.95	.33	298	98.34
1912	34.38	8.86	25.52	1,510	38,535.20
1913	34.81	13.62	21.19	3,244	68,740.36
1914	14.50	13.76	.74	8,172	6,047.28
1915	37.32	14.02	23.30	4,530	105,549.00
1916	33.39	15.51	17.88	6,381	114,092.28
1917	49.55	21.04	28.51	4,496	128,180.96
1918	66.21	24.27	41.94	4,569	191,623.86
1919	90.64	26.30	64.34	4,823	310,311.82
1920	37.32	26.30	11.02	5,804	63,960.08
1921	46.80	17.26	29.54	5,870	173,399.80
1922	50.40	17.13	33.27	5,790	192,633.30
1923	64.80	18.61	46.19	6,600	304,854.00
1924	33.87	18.88	14.99	3,250	48,717.50
1925	40.12	19.56	20.56	1,719	35,342.64
1926	38.94	19.01	19.93	9,693	193,181.49
1927	49.24	19.01	30.23	6,280	189,844.40
1928	46.82	19.96	26.86	12,281	329,867.66
1929	28.44	17.83	10.61	8,126	86,216.86
1930	35.02	16.50	18.52	7,347	136,066.44
1931	12.17	13.81	-1.64	5,717	-9,375.88
1932	14.52	12.10	2.42	1,588	3,842.96
1933	21.21	12.10	9.11	3,469	31,602.59
1934	47.62	13.93	33.69	3,281	110,536.89
1935	33.30	14.90	18.40	2,412	44,380.80
1936	51.19	14.90	36.29	5,710	207,215.90
1937	66.60	16.13	50.47	4,143	209,097.21
1938	30.46	14.90	15.56	6,343	98,697.08
1939	24.57	14.78	9.79	9,950	97,410.50
1940	17.69	15.02	2.67	6,240	16,660.80
1941	30.22	15.88	14.34	6,374	91,403.16
1942	53.64	18.08	35.56	3,711	131,963.16
1943	76.65	20.04	56.61	6,041	341,981.01
1944	87.88	21.14	66.74	7,254	484,131.96
1945	95.26	21.51	73.75	6,731	496,411.25
1946	93.83	23.34	70.49	9,151	645,053.99
1947	116.13	15.77	100.36	9,634	966,869.24
1948	131.73	17.10	114.63	10,525	1,206,480.75
1949	126.22	17.39	108.83	10,473	1,139,776.59
1950	69.75	17.18	52.57	14,149	743,812.93
1951	82.49	18.15	64.34	13,197	849,094.98
1952	74.20	19.14	55.06	8,347	459,585.82
1953	62.28	19.01	43.27	6,134	265,418.18
1954	166.45	18.83	147.62	5,783	853,686.46
1955	119.70	18.92	100.78	7,394	745,167.32
1956	122.88	18.83	104.05	8,537	888,274.85
1957	108.24	19.35	88.89	9,878	878,055.42
1958	130.97	19.53	111.44	10,160	1,132,230.84
1959	122.77	19.69	103.08	9,098	937,821.84
1960	74.43	20.15	54.28	7,507	407,479.96
1961	138.24	20.63	117.61	4,887	574,760.07
1962	152.12	21.07	131.05	3,604	472,304.20
1963	138.92	21.65	117.27	4,535	531,819.45
1964	102.32	22.26	80.06	5,109	409,026.54
1965	103.00	23.11	79.89	4,823	385,309.47
1966	106.81	23.84	82.97	4,584	380,334.48
1967	125.51	24.81	100.70	3,419	344,293.30
1968	144.17	25.63	118.54	2,689	318,754.06
1969	162.65	26.25	136.40	2,763	376,873.20
1970	180.78	27.57	153.21	3,739	572,852.19
1971	122.59	28.82	93.77	3,419	320,599.63
1972	193.93	30.58	163.35	2,387	389,916.45
1973	391.66	36.59	355.07	1,740	617,821.80

Table E9. Gross value added calculations for corn seed, Boise Project, Idaho, 1910-1973

Corn Seed					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$ 64.15	\$ --	--	\$ --
1948	--	69.77	--	--	--
1949	--	71.04	--	--	--
1950	--	68.84	--	--	--
1951	--	72.41	--	--	--
1952	--	75.37	--	--	--
1953	--	75.36	--	--	--
1954	136.72	75.00	61.72	7,198	444,260.56
1955	116.63	74.41	42.22	6,730	284,140.60
1956	164.50	72.94	91.56	5,396	494,057.76
1957	201.30	74.23	127.07	4,473	568,384.11
1958	189.31	74.35	114.96	4,672	537,093.12
1959	129.03	73.93	55.10	7,178	395,507.80
1960	132.78	74.99	57.79	9,871	570,445.09
1961	180.43	75.58	104.85	8,693	911,461.05
1962	179.64	76.19	103.45	9,360	968,292.00
1963	228.09	76.52	151.57	7,213	1,093,274.41
1964	238.35	77.09	161.26	6,362	1,025,936.12
1965	242.61	78.61	164.00	6,897	1,113,108.00
1966	181.48	78.86	102.62	7,452	764,724.24
1967	284.52	80.53	203.99	7,230	1,474,847.70
1968	208.24	80.33	127.91	9,027	1,154,643.57
1969	211.75	79.32	131.93	9,279	1,224,178.47
1970	240.76	82.90	157.86	9,296	1,467,466.56
1971	261.47	86.67	174.80	9,664	1,689,267.20
1972	336.79	91.94	244.85	9,195	2,251,395.75
1973	271.55	110.03	161.52	8,520	1,376,150.40

Table E10. Gross value added calculations for corn silage, Boise, Project, Idaho
1910-1973

Corn Silage					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	22.86	14.96	7.93	96	761.28
1914	22.86	15.10	7.76	921	7,146.96
1915	43.10	15.40	27.70	279	7,728.30
1916	10.69	17.03	-6.34	217	-1,375.78
1917	32.81	23.10	9.71	440	4,272.40
1918	37.24	26.65	10.59	477	5,051.43
1919	48.82	28.88	19.94	1,125	22,432.50
1920	34.35	28.88	5.47	278	1,520.66
1921	40.00	18.95	21.05	395	8,314.75
1922	44.00	18.81	25.19	410	10,327.90
1923	72.00	20.44	51.56	700	36,092.00
1924	10.78	20.73	-9.95	1,579	-15,711.05
1925	--	21.47	--	--	--
1926	12.53	20.88	-8.35	287	-2,396.45
1927	18.93	20.88	-1.95	613	-1,195.35
1928	24.80	21.92	2.88	301	866.88
1929	33.35	21.62	11.73	373	4,375.29
1930	36.94	19.99	16.95	390	6,610.50
1931	14.96	16.74	-1.78	842	1,488.76
1932	8.99	14.66	-5.67	820	4,649.40
1933	15.07	14.66	0.41	928	384.58
1934	23.45	16.88	6.57	676	4,441.32
1935	26.27	24.67	1.60	804	1,286.40
1936	21.22	24.67	-3.45	934	-3,222.30
1937	49.18	26.70	22.48	1,094	24,593.12
1938	34.03	24.67	9.36	1,403	13,132.08
1939	28.12	24.47	3.65	1,724	6,292.60
1940	30.59	24.87	5.72	1,761	10,072.92
1941	36.31	26.29	10.02	2,199	22,033.98
1942	33.50	29.93	3.57	3,345	11,941.65
1943	54.28	33.17	21.11	3,013	63,604.43
1944	56.15	34.99	21.16	3,631	76,831.96
1945	63.89	35.59	28.30	3,841	108,700.30
1946	67.06	38.63	28.43	1,463	41,593.09
1947	58.80	33.72	25.08	1,371	34,384.68
1948	68.85	36.90	31.95	1,903	60,800.85
1949	59.59	36.78	21.91	3,372	73,880.52
1950	48.31	37.02	11.29	3,254	36,737.66
1951	--	39.02	--	--	--
1952	--	40.57	--	--	--
1953	--	40.50	--	--	--
1954	67.99	40.40	27.59	6,713	185,211.67
1955	76.63	40.34	36.29	10,513	381,516.77
1956	81.10	39.93	41.17	13,391	551,307.47
1957	67.75	40.92	26.83	13,915	373,339.45
1958	82.59	41.04	41.55	13,158	546,714.90
1959	110.89	41.14	69.75	18,454	1,287,166.50
1960	72.97	41.67	31.30	18,593	581,960.90
1961	81.99	42.14	39.85	18,482	736,507.70
1962	76.90	42.56	34.34	18,397	631,752.98
1963	86.12	42.95	43.17	21,216	915,894.72
1964	77.19	43.37	33.82	21,908	740,928.56
1965	76.98	44.29	32.69	21,381	698,944.89
1966	96.97	44.80	52.17	22,944	1,196,988.48
1967	83.11	45.95	37.16	22,810	847,619.60
1968	89.10	46.53	42.57	22,241	946,799.37
1969	91.95	46.83	45.12	24,177	1,090,866.24
1970	84.28	48.82	35.46	22,407	794,552.22
1971	107.16	51.04	56.12	27,640	1,551,156.80
1972	125.20	54.15	71.05	30,204	2,145,994.20
1973	186.88	64.80	122.08	31,136	3,801,082.88

Table Ell. Gross value added calculations for field corn, Boise Project, Idaho
1910-1973

Field Corn					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$12.61	\$14.36	\$-1.75	20	\$ -35.00
1911	14.84	14.51	.33	264	87.12
1912	13.69	15.10	-1.41	1,689	-2,381.49
1913	14.14	14.96	-.82	2,862	-2,364.84
1914	12.96	15.10	-2.14	8,818	-18,870.52
1915	17.56	15.40	2.16	6,765	14,612.40
1916	36.63	17.03	19.60	3,055	59,878.00
1917	56.87	23.10	33.77	1,414	47,750.78
1918	90.02	26.65	63.37	2,491	157,854.67
1919	57.00	28.88	28.12	4,439	124,824.68
1920	35.89	28.88	7.01	3,835	26,883.35
1921	22.50	18.95	3.55	4,985	17,696.75
1922	22.95	18.81	4.14	6,990	28,938.60
1923	42.35	20.44	21.91	9,800	214,718.00
1924	23.90	20.73	3.25	7,086	23,029.50
1925	25.68	21.47	4.21	11,782	49,606.22
1926	29.68	20.88	8.88	6,251	55,079.20
1927	23.78	20.88	2.90	9,040	26,216.00
1928	29.10	21.92	7.18	4,707	33,796.26
1929	32.66	21.62	11.04	5,455	60,223.20
1930	29.27	19.99	9.28	6,157	57,136.96
1931	10.82	16.74	-5.92	6,682	-39,557.44
1932	10.66	14.66	-4.00	10,315	-41,260.00
1933	14.50	14.66	-.16	8,939	-1,430.24
1934	25.83	16.88	8.95	2,985	26,715.75
1935	23.87	18.07	5.80	6,235	36,163.00
1936	33.89	18.07	15.82	6,203	98,131.46
1937	25.66	19.55	6.11	7,263	44,376.93
1938	21.43	18.07	3.36	6,137	20,620.32
1939	20.69	17.92	2.77	7,205	19,957.85
1940	23.32	18.21	5.11	7,815	39,934.65
1941	26.96	19.25	7.71	8,306	64,039.26
1942	31.08	21.92	9.16	7,664	70,202.24
1943	49.54	24.29	21.67	7,000	151,550.00
1944	46.39	25.62	20.77	6,284	130,518.68
1945	44.12	26.06	18.06	6,030	108,901.80
1946	72.73	27.90	44.83	2,705	121,265.15
1947	79.47	33.00	46.47	3,044	141,454.68
1948	65.49	33.50	31.99	3,719	118,970.81
1949	56.22	34.00	22.22	5,414	120,299.08
1950	46.05	34.50	11.55	3,879	44,802.45
1951	100.48	35.00	65.48	5,169	338,466.12
1952	98.97	35.33	63.64	5,852	372,421.28
1953	63.63	35.25	28.38	6,029	139,390.48
1954	63.16	35.08	28.08	7,546	211,891.68
1955	82.86	34.93	47.93	9,873	473,212.89
1956	85.50	34.47	51.03	10,774	549,979.22
1957	88.43	35.22	53.21	12,578	669,275.38
1958	89.64	35.30	54.34	12,334	670,229.56
1959	98.87	35.30	63.57	12,585	800,028.45
1960	91.91	35.76	56.15	12,618	708,500.00
1961	96.01	36.11	59.90	10,832	648,836.80
1962	101.05	36.44	64.61	11,018	711,872.98
1963	73.95	36.72	37.23	9,390	349,589.70
1964	103.57	37.05	66.52	8,712	579,522.24
1965	104.79	37.79	67.00	11,105	744,035.00
1966	102.45	38.13	64.32	9,251	595,024.32
1967	102.17	39.01	63.16	11,372	718,255.52
1968	103.13	39.94	63.19	11,020	702,965.80
1969	112.48	39.38	73.10	10,272	750,883.20
1970	109.88	41.07	68.81	12,222	840,995.82
1971	94.38	42.94	51.44	12,208	627,979.52
1972	115.21	45.55	69.66	9,926	691,445.16
1973	201.04	54.51	146.53	10,148	1,486,986.44

Table E12. Gross value added calculations for garden, Boise Project, Idaho, 1910-1973

Garden					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1925	Data not available for these years.				
1926	\$ 50.00	\$ 20.62	\$ 29.38	521	\$ 15,306.98
1927	44.31	20.62	23.69	1,049	24,850.81
1928	54.98	21.64	33.34	679	22,637.86
1929	--	--	--	--	--
1930	--	--	--	--	--
1931	--	--	--	--	--
1932	--	--	--	--	--
1933	--	--	--	--	--
1934	--	--	--	--	--
1935	--	31.73	--	--	--
1936	53.10	31.73	21.37	817	17,459.29
1937	35.05	34.34	.71	3,445	2,445.95
1938	29.63	31.73	-2.10	722	-1,516.20
1939	32.02	31.48	.54	618	333.72
1940	33.54	31.99	1.55	625	968.75
1941	32.61	33.82	-1.21	454	-549.34
1942	65.97	38.50	27.47	440	12,086.80
1943	99.12	42.66	56.46	484	27,326.64
1944	99.79	45.01	54.78	475	26,020.50
1945	100.65	45.28	54.87	438	24,033.06
1946	123.94	49.69	74.25	372	27,621.00
1947	163.55	61.97	101.58	4,017	408,046.86
1948	174.76	55.40	119.36	3,886	463,832.96
1949	102.65	58.95	43.70	400	17,480.00
1950	129.75	61.08	68.67	2,857	196,190.19
1951	100.03	67.48	32.55	1,307	42,542.85
1952	100.87	67.48	33.39	1,151	38,431.89
1953	100.00	63.21	36.79	1,188	43,706.52
1954	100.05	63.21	36.84	1,042	38,387.28
1955	141.47	61.79	79.68	950	75,696.00
1956	130.12	61.79	68.33	992	67,783.36
1957	116.74	63.92	52.82	1,508	79,652.56
1958	113.56	65.34	48.22	1,505	72,571.10
1959	116.15	66.05	50.10	1,291	64,679.10
1960	116.63	65.34	51.29	1,413	72,472.77
1961	119.09	66.05	53.04	1,379	73,142.16
1962	115.75	66.77	48.98	1,513	74,106.74
1963	120.65	67.48	53.17	1,213	64,495.21
1964	102.97	66.77	36.20	1,263	45,720.60
1965	100.15	68.19	31.96	1,199	38,320.04
1966	100.00	70.32	29.68	926	27,483.68
1967	100.00	71.03	28.97	860	24,914.20
1968	100.00	72.42	27.58	930	25,649.40
1969	100.00	75.28	24.72	758	18,737.76
1970	100.00	78.13	21.87	583	12,750.21
1971	--	--	--	--	--
1972	--	--	--	--	--
1973	--	--	--	--	--

Table B13. Gross value added calculations for green beans, Boise Project, Idaho
1910-1973

Green Beans					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	32.10	14.76	17.34	119	2,036.46
1914	9.37	14.91	-5.54	570	-3,157.80
1915	6.44	15.20	-8.76	172	-1,506.72
1916	55.23	16.81	38.42	186	7,146.12
1917	60.63	22.81	37.82	475	17,964.50
1918	81.93	26.31	55.62	812	45,163.44
1919	70.13	28.51	41.62	55	2,289.10
1920	39.33	28.51	10.82	45	486.90
1921	41.40	18.71	22.69	50	1,134.50
1922	39.60	18.57	21.03	55	1,156.65
1923	60.00	20.18	39.82	105	4,181.10
1924	15.53	20.47	-4.94	233	-1,151.02
1925	33.29	21.20	12.09	284	3,433.56
1926	17.96	20.62	-2.66	132	-351.12
1927	30.19	20.62	9.57	37	354.09
1928	38.00	21.64	16.36	88	1,439.68
1929	39.19	21.71	17.48	119	2,080.12
1930	82.48	20.08	62.40	141	8,798.40
1931	12.43	16.80	-4.37	1,206	-5,270.22
1932	17.19	14.72	2.47	216	533.52
1933	27.78	14.72	13.06	607	7,927.42
1934	20.29	16.95	3.34	1,900	6,346.00
1935	36.49	18.14	18.35	672	12,331.20
1936	48.59	18.14	30.45	621	18,909.45
1937	36.92	19.63	17.29	405	7,002.45
1938	49.54	18.14	31.40	276	8,666.40
1939	34.91	17.99	16.92	56	947.52
1940	27.15	18.27	8.88	294	2,610.72
1941	57.37	19.33	38.04	1,097	41,729.88
1942	46.71	22.01	24.70	1,760	43,472.00
1943	69.72	24.38	45.34	3,315	150,302.10
1944	77.56	25.72	51.84	2,022	104,820.48
1945	93.69	26.17	67.52	2,056	138,821.12
1946	98.46	28.40	70.06	3,469	243,038.14
1947	121.13	49.37	71.76	4,658	334,258.08
1948	119.47	44.27	75.20	5,357	402,846.40
1949	94.36	47.10	47.26	7,445	351,850.70
1950	100.48	48.80	51.68	6,323	326,772.64
1951	--	53.91	--	--	--
1952	--	53.91	--	--	--
1953	--	50.50	--	--	--
1954	187.18	50.50	136.68	1,903	260,102.04
1955	171.77	49.37	122.40	2,059	252,021.60
1956	217.57	49.37	168.20	2,349	395,101.80
1957	240.64	51.07	189.57	2,986	566,056.02
1958	305.14	52.21	252.93	3,035	767,642.55
1959	293.16	52.78	240.38	2,989	718,495.82
1960	261.60	52.21	209.39	4,297	899,748.83
1961	278.71	52.78	225.93	4,195	947,776.35
1962	225.85	53.34	172.51	3,922	676,584.22
1963	244.96	53.91	191.05	4,034	770,695.70
1964	224.39	53.34	171.05	2,908	497,413.40
1965	236.26	54.48	181.78	3,545	644,410.10
1966	253.14	56.18	196.96	3,827	753,765.92
1967	204.18	56.75	147.43	3,352	494,332.79
1968	232.85	57.89	174.96	3,126	546,924.96
1969	245.30	60.15	185.14	2,369	438,596.66
1970	253.87	62.42	191.45	1,851	354,373.95
1971	325.84	65.26	260.58	2,403	626,293.89
1972	412.67	69.23	343.44	3,012	1,034,441.28
1973	289.11	82.85	206.26	3,175	654,875.50

Table E14. Gross value added calculations for hay, Boise Project, Idaho, 1910-1973

Year	Hay				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$14.00	\$ 6.35	\$ 7.65	1,709	\$ 13,073.85
1911	15.00	6.42	8.58	1,120	9,609.60
1912	10.83	6.70	4.13	1,845	7,619.85
1913	10.27	6.64	3.63	1,931	7,009.53
1914	11.26	6.70	4.56	8,080	36,844.80
1915	8.85	6.85	2.00	4,892	9,784.00
1916	11.98	7.63	4.35	7,168	31,180.80
1917	29.59	10.52	19.07	8,188	156,145.16
1918	22.80	12.82	10.58	5,944	62,887.52
1919	24.14	13.28	10.86	4,985	54,137.10
1920	10.38	13.28	-2.90	7,785	-22,576.50
1921	6.22	8.54	-2.32	7,954	-18,453.28
1922	13.70	8.47	-5.23	7,170	37,499.10
1923	12.12	9.75	2.37	8,245	19,540.65
1924	11.10	9.89	1.21	6,107	7,389.47
1925	9.72	10.25	-0.53	1,788	-947.64
1926	10.17	9.96	0.21	8,862	1,861.02
1927	10.45	9.96	0.49	5,143	2,520.07
1928	12.04	10.46	1.58	13,060	20,634.80
1929	12.27	11.61	0.66	7,622	5,030.52
1930	9.37	10.74	-1.37	7,923	-10,854.51
1931	10.53	8.99	1.54	5,493	8,459.22
1932	3.48	7.88	-4.40	2,823	-12,421.20
1933	7.35	7.87	-0.52	4,676	-2,431.52
1934	10.43	9.07	1.36	3,819	5,193.84
1935	6.35	9.71	-3.36	2,746	-9,226.56
1936	7.30	9.71	-2.41	5,346	-12,883.86
1937	8.60	10.51	-1.91	2,580	-4,927.80
1938	6.48	9.71	-3.23	4,817	-15,558.91
1939	4.78	9.63	-4.85	8,528	-41,360.80
1940	5.47	9.78	-4.31	6,447	-27,786.57
1941	10.30	10.35	-0.05	8,060	-403.00
1942	15.25	11.78	3.47	4,740	16,447.80
1943	19.07	13.06	6.01	3,611	21,702.11
1944	19.86	13.77	6.09	4,292	26,138.28
1945	23.48	14.00	9.48	7,300	69,204.00
1946	20.72	15.04	5.68	35,953	204,213.04
1947	23.58	20.17	3.41	6,547	22,325.27
1948	30.14	22.02	8.12	7,116	57,781.92
1949	23.88	22.35	1.53	7,978	12,206.34
1950	17.17	22.11	-4.94	9,347	46,174.18
1951	24.57	23.34	1.23	12,685	15,602.55
1952	29.46	24.61	4.85	9,016	43,727.60
1953	17.64	24.34	-6.70	6,707	-44,936.90
1954	25.31	24.02	1.29	7,704	9,938.16
1955	30.36	24.13	6.23	8,318	51,821.14
1956	28.78	24.07	4.71	8,226	38,744.46
1957	20.14	24.53	-4.39	10,709	-47,012.51
1958	18.33	24.68	-6.35	10,334	-65,620.90
1959	31.55	24.82	6.73	8,655	58,248.15
1960	30.22	25.25	4.97	8,508	42,284.76
1961	42.28	25.71	16.57	6,307	104,506.99
1962	32.88	26.13	6.75	6,002	40,513.50
1963	39.19	26.69	12.50	6,780	84,750.00
1964	35.54	27.23	8.31	6,308	52,419.48
1965	31.64	28.03	3.61	5,414	19,544.54
1966	51.65	28.66	23.99	5,790	138,902.10
1967	34.31	29.63	4.68	5,225	24,453.00
1968	33.47	30.52	2.95	5,304	15,646.80
1969	36.53	31.17	5.36	4,989	26,741.04
1970	39.75	32.62	7.13	5,959	42,487.67
1971	69.34	34.10	35.24	5,781	203,722.44
1972	69.95	36.18	33.77	5,345	180,500.65
1973	94.25	43.30	50.95	4,818	245,477.10

Table E15. Gross value added calculations for hops, Boise Project, Idaho, 1910-1973

Hops					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$172.93	\$ --	--	\$ --
1948	--	185.60	--	--	--
1949	--	191.92	--	--	--
1950	--	191.45	--	--	--
1951	--	203.15	--	--	--
1952	--	211.73	--	--	--
1953	--	212.66	--	--	--
1954	781.88	213.06	568.82	1,550	881,671.00
1955	894.01	213.40	680.61	1,726	1,174,732.86
1956	628.70	216.30	412.50	1,812	747,268.80
1957	754.04	222.75	531.29	2,343	1,244,812.47
1958	856.95	225.05	631.90	3,426	2,164,889.40
1959	753.38	228.67	524.77	3,458	1,814,447.18
1960	751.18	233.21	517.97	3,206	1,660,611.82
1961	750.62	239.72	510.90	3,151	1,609,845.90
1962	774.84	244.47	530.37	3,380	1,792,650.60
1963	830.16	250.38	597.78	3,670	2,127,792.60
1964	659.98	257.53	402.45	3,709	1,492,687.05
1965	795.07	267.38	527.69	3,444	1,817,364.36
1966	705.19	277.35	427.84	3,956	1,692,535.04
1967	748.57	289.35	459.22	3,531	1,621,505.82
1968	818.08	299.08	519.00	2,922	1,516,518.00
1969	725.15	307.68	417.47	2,481	1,035,743.07
1970	848.90	322.23	526.67	2,965	1,561,576.55
1971	915.96	336.89	579.07	3,126	1,810,172.82
1972	1,015.81	357.38	658.43	3,251	2,140,555.93
1973	1,350.74	427.70	923.04	3,303	3,048,801.12

Table E16. Gross value added calculations for lettuce seed, Boise Project, Idaho, 1910-1973

Lettuce Seed					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$124.38	\$ --	--	\$ --
1948	--	111.52	--	--	--
1949	--	118.65	--	--	--
1950	--	122.95	--	--	--
1951	--	135.82	--	--	--
1952	--	135.82	--	--	--
1953	--	127.24	--	--	--
1954	199.13	127.24	71.89	325	23,364.25
1955	--	128.67	--	--	--
1956	210.22	124.38	85.84	207	17,768.88
1957	206.36	128.67	77.69	316	24,550.04
1958	226.07	131.53	94.54	336	31,765.44
1959	164.43	132.96	31.47	361	11,360.67
1960	224.96	131.53	93.43	567	52,974.81
1961	193.27	132.96	60.31	523	31,542.13
1962	294.77	134.39	160.38	685	109,860.30
1963	332.69	135.82	196.87	592	116,547.04
1964	208.99	134.39	74.60	629	46,923.40
1965	341.47	137.25	204.22	1,057	215,860.54
1966	281.55	141.54	140.01	595	83,305.95
1967	259.18	142.97	116.21	599	69,609.79
1968	296.67	145.83	150.84	504	76,023.36
1969	406.64	151.54	255.10	557	142,090.70
1970	345.01	157.26	187.75	714	134,053.50
1971	296.02	164.41	131.61	576	75,807.36
1972	331.26	174.42	156.84	835	130,961.40
1973	321.28	208.73	112.55	759	85,425.45

Table E17. Gross value added calculations for mint, Boise Project, Idaho, 1910-1973

Mint					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$ 56.11	\$ --	--	\$ --
1948	--	61.29	--	--	--
1949	--	62.15	--	--	--
1950	--	60.19	--	--	--
1951	--	63.26	--	--	--
1952	--	66.03	--	--	--
1953	--	65.73	--	--	--
1954	--	65.17	--	--	--
1955	--	64.78	--	--	--
1956	240.00	63.17	176.83	24	4,243.92
1957	150.00	64.29	85.71	74	6,342.54
1958	272.16	64.33	207.83	74	15,379.42
1959	125.61	63.86	61.75	82	5,063.50
1960	250.30	64.74	185.56	66	12,246.96
1961	444.03	65.08	378.95	209	79,200.55
1962	319.68	65.56	254.12	279	70,899.48
1963	271.69	65.87	205.82	642	132,136.44
1964	249.84	66.25	183.59	720	132,184.80
1965	254.84	67.41	187.13	637	119,201.81
1966	221.98	67.39	154.59	973	150,416.07
1967	326.13	68.63	257.50	951	244,882.50
1968	259.21	68.50	196.71	1,912	364,637.52
1969	245.47	67.58	177.89	2,713	482,615.57
1970	183.71	70.59	113.12	2,755	311,645.60
1971	207.32	83.59	123.73	2,519	311,675.81
1972	270.27	88.67	181.60	2,575	467,620.00
1973	450.84	106.12	344.72	2,755	949,703.60

Table E18. Gross value added calculations for nursery, Boise Project, Idaho, 1910-1973

Nursery					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1956	Data not available for these years.				
1957	\$455.62	\$176.97	\$278.65	16	\$ 4,458.40
1958	412.50	180.24	232.26	4	929.04
1959	736.67	184.52	552.15	3	1,656.45
1960	750.00	188.84	561.16	15	8,417.40
1961	750.00	194.55	555.45	11	6,109.95
1962	757.41	199.32	558.04	27	15,067.08
1963	250.00	205.22	44.78	1	44.78
1964	500.00	212.47	287.53	1	287.53
1965	500.00	221.52	278.48	15	4,177.20
1966	500.00	231.17	268.83	10	2,688.30
1967	500.00	242.35	257.65	8	2,061.20
1968	500.00	251.71	248.28	14	3,476.06
1969	500.00	259.85	240.15	26	6,243.90
1970	500.00	273.51	226.49	5	1,132.45
1971	--	--	--	--	--
1972	--	--	--	--	--
1973	--	--	--	--	--

Table E19. Gross value added calculations for oats, Boise Project, Idaho, 1910-1973

Year	Oats				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$11.82	\$10.41	\$ 1.41	2,273	\$ 3,204.93
1911	14.68	10.53	4.15	3,799	15,765.85
1912	12.84	11.00	1.84	6,642	12,221.28
1913	7.31	10.88	-3.57	6,877	-24,550.89
1914	11.10	11.00	0.10	6,531	653.10
1915	9.09	11.23	-2.14	6,974	-14,924.36
1916	19.60	12.53	7.07	4,440	31,390.80
1917	25.52	17.36	8.16	3,205	26,152.80
1918	27.55	20.18	7.37	2,110	15,550.70
1919	36.67	21.95	14.72	2,407	35,431.04
1920	21.31	21.95	-0.64	2,399	-1,535.36
1921	12.25	14.06	-1.81	2,465	-4,461.65
1922	17.50	13.94	3.56	2,425	8,633.00
1923	17.60	16.24	1.36	2,650	3,604.00
1924	18.28	16.47	1.81	2,899	5,247.19
1925	17.59	17.06	0.53	3,068	1,626.04
1926	13.28	16.59	-3.31	1,821	-6,027.51
1927	26.71	17.42	9.29	2,555	23,735.95
1928	21.30	17.42	3.88	2,791	10,829.08
1929	22.29	17.18	5.11	3,813	19,484.43
1930	13.08	15.89	-2.81	3,633	-10,208.73
1931	10.33	13.30	-2.97	3,452	-10,252.44
1932	9.43	11.65	-2.22	5,081	-11,279.82
1933	8.60	11.65	-3.05	4,007	-12,221.35
1934	16.08	13.42	2.66	4,330	11,517.80
1935	15.97	14.36	1.61	4,732	7,618.52
1936	17.29	14.36	2.93	4,037	11,828.41
1937	16.83	15.53	1.30	3,334	4,334.20
1938	10.69	14.36	-3.67	3,789	-13,905.63
1939	13.51	14.24	-0.73	4,444	-3,244.12
1940	13.36	14.47	-1.11	5,177	-5,746.47
1941	22.58	15.30	7.28	5,162	37,579.36
1942	24.57	17.42	7.15	5,643	40,347.45
1943	35.02	19.30	15.72	9,150	143,838.00
1944	31.09	20.36	10.73	9,719	104,284.87
1945	30.36	20.71	9.65	11,031	106,449.15
1946	42.72	22.47	20.25	9,017	182,594.25
1947	46.48	20.76	25.72	7,816	201,027.52
1948	39.43	22.94	16.49	8,472	139,703.28
1949	33.88	23.12	10.76	9,579	103,070.04
1950	40.46	22.77	17.69	10,986	194,342.34
1951	47.03	23.93	23.10	10,414	240,563.40
1952	48.05	25.04	23.01	10,927	251,430.27
1953	37.50	24.79	12.71	10,555	134,154.05
1954	41.21	24.62	16.59	9,837	163,195.83
1955	44.06	24.75	19.31	10,694	206,501.14
1956	43.25	24.31	18.94	12,769	241,844.86
1957	44.90	25.00	19.90	11,112	221,128.80
1958	39.50	25.04	14.55	10,990	159,904.00
1959	47.63	25.06	22.57	10,782	243,349.74
1960	43.49	25.41	18.08	12,880	232,870.40
1961	43.57	25.70	17.87	10,165	181,648.55
1962	47.86	26.00	21.86	8,658	189,263.88
1963	42.20	26.36	15.84	7,334	116,170.56
1964	45.65	26.58	19.07	6,330	120,713.10
1965	44.35	27.17	17.18	6,412	110,158.16
1966	46.41	27.48	18.93	5,461	103,376.73
1967	45.01	28.18	16.83	4,058	68,296.14
1968	37.39	28.74	8.65	4,189	36,234.85
1969	59.21	29.11	20.10	5,017	100,841.70
1970	40.35	30.34	10.01	5,105	51,101.05
1971	52.76	31.72	21.04	3,380	71,115.20
1972	56.19	33.65	22.54	3,017	68,003.18
1973	97.88	40.27	57.61	3,317	191,092.37

Table E20. Gross value added calculations for onions, Boise Project, Idaho, 1910-1973

Onions					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	41.44	64.00	-22.56	9	-203.04
1914	21.40	64.00	-42.60	10	-426.00
1915	19.00	66.00	-47.00	7	-329.00
1916	76.00	72.00	4.00	1	4.00
1917	132.75	98.00	34.75	16	556.00
1918	134.48	110.00	24.48	21	514.08
1919	47.10	120.00	-72.90	29	-2,114.10
1920	52.48	120.00	-67.52	46	-3,105.92
1921	120.00	80.00	40.00	38	1,520.00
1922	150.51	80.00	70.51	75	5,288.25
1923	600.00	86.00	514.00	130	66,820.00
1924	163.74	88.00	75.74	132	9,997.68
1925	258.32	92.00	166.32	287	47,733.84
1926	123.42	88.00	35.42	376	13,317.92
1927	97.99	88.00	9.99	337	3,366.63
1928	393.52	94.00	299.52	328	98,242.56
1929	116.97	92.00	24.97	286	7,141.42
1930	133.44	86.00	47.44	412	19,545.12
1931	342.63	72.00	270.63	406	109,875.78
1932	60.68	62.00	-1.32	425	-561.00
1933	79.58	62.00	17.58	610	10,723.80
1934	242.31	72.00	170.31	618	105,251.58
1935	144.76	76.00	68.76	886	60,921.36
1936	110.70	76.00	34.70	653	22,659.10
1937	220.89	84.00	136.89	920	125,938.80
1938	162.46	76.00	86.46	948	81,964.08
1939	70.40	76.00	-5.60	1,317	-7,375.20
1940	143.32	78.00	65.32	1,235	80,670.20
1941	185.68	82.00	103.68	1,380	143,078.40
1942	243.60	94.00	149.60	1,804	269,878.40
1943	460.14	104.00	356.14	2,152	766,413.28
1944	251.63	110.00	141.63	3,891	551,082.33
1945	462.19	112.00	350.19	2,518	881,778.42
1946	133.13	121.00	12.13	2,347	28,469.11
1947	530.41	179.74	350.67	1,598	560,370.66
1948	425.24	194.79	230.45	1,447	333,461.15
1949	425.22	199.36	225.86	1,717	387,801.62
1950	158.77	193.89	-35.12	1,989	-69,853.68
1951	369.68	203.84	165.84	2,708	449,094.72
1952	418.72	213.17	205.55	2,731	561,357.05
1953	29.90	212.37	-182.47	2,000	-364,940.00
1954	181.12	209.78	-28.66	2,963	-84,919.58
1955	307.86	207.65	100.21	2,703	270,867.63
1956	289.74	203.72	86.02	2,284	196,469.68
1957	297.56	206.70	90.86	1,245	113,120.70
1958	693.81	206.53	487.28	1,181	575,477.68
1959	696.09	204.99	491.10	976	479,313.60
1960	471.53	206.98	264.55	1,152	304,761.60
1961	794.47	207.91	586.56	1,774	1,040,557.44
1962	466.87	208.54	258.33	1,805	466,285.65
1963	566.17	208.23	357.64	1,995	713,491.80
1964	714.49	208.75	505.74	2,076	1,049,916.24
1965	476.09	211.00	265.09	2,261	599,368.49
1966	1,035.36	210.50	824.86	2,986	2,463,031.96
1967	955.90	213.32	742.58	3,274	2,431,206.92
1968	552.64	212.02	340.62	3,667	1,249,053.54
1969	692.52	209.00	483.52	3,372	1,630,429.44
1970	328.95	217.19	111.76	4,014	448,604.64
1971	713.18	227.07	486.11	3,878	1,885,134.58
1972	1,133.96	240.88	898.08	4,081	3,644,659.48
1973	1,226.99	288.28	938.71	4,207	3,949,152.97

Table E21. Gross value added calculations for onion seed, Boise Project, Idaho
1910-1973

Onion Seed					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$179.74	\$ --	--	\$ --
1948	--	194.79	--	--	--
1949	--	199.36	--	--	--
1950	--	193.89	--	--	--
1951	--	203.84	--	--	--
1952	--	213.17	--	--	--
1953	--	211.37	--	--	--
1954	224.35	209.78	14.57	325	4,735.25
1955	--	207.65	--	--	--
1956	397.69	203.72	193.97	320	62,070.40
1957	433.60	206.70	226.90	413	93,709.70
1958	520.58	206.53	314.05	293	92,016.65
1959	421.14	204.99	216.15	333	71,977.95
1960	534.46	206.98	327.48	567	185,681.16
1961	415.68	207.91	207.77	366	76,043.82
1962	601.89	208.54	393.35	333	130,985.55
1963	516.76	208.73	308.03	484	149,086.52
1964	384.72	208.75	175.99	615	108,233.85
1965	449.52	211.00	238.52	678	161,716.56
1966	424.09	210.50	213.59	723	154,425.57
1967	445.32	213.32	232.00	619	143,608.00
1968	433.72	212.02	221.70	486	107,746.20
1969	551.17	209.00	342.17	526	179,981.42
1970	681.03	217.19	463.84	465	215,685.60
1971	537.22	227.07	310.15	453	140,497.95
1972	669.50	240.88	428.62	859	368,184.58
1973	589.46	288.28	301.18	606	182,515.08

Table E22. Gross value added calculations for "other cereal," Boise Project, Idaho, 1910-1973

Year	Other cereal				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 8.10	\$10.41	\$ -2.31	97	\$ -224.07
1911	6.57	10.53	-3.96	76	-300.96
1912	17.00	11.00	6.00	352	2,112.00
1913	2.02	10.88	-8.86	315	-2,790.90
1914	6.80	11.00	-4.20	163	-684.60
1915	6.50	11.23	-4.73	177	-837.21
1916	11.81	12.53	-0.72	110	-79.20
1917	16.33	17.36	-1.03	132	-135.96
1918	13.31	20.18	-6.87	127	-872.49
1919	18.59	21.95	-3.36	108	-362.88
1920	14.23	21.95	-7.72	123	-949.56
1921	6.30	14.06	-7.76	180	-1,396.80
1922	5.10	13.94	-8.84	190	-1,679.60
1923	12.92	16.24	-3.32	210	-697.20
1924	12.22	16.47	-4.25	37	-157.25
1925	6.07	17.06	-10.99	195	-2,143.05
1926	12.55	16.59	-4.04	78	-315.12
1927	12.94	17.42	-4.48	168	-752.64
1928	12.01	17.42	-5.41	88	-476.08
1929	13.66	17.18	-3.52	87	-306.24
1930	19.14	15.89	3.25	92	299.00
1931	--	13.30	--	--	--
1932	4.56	11.65	-7.09	61	-432.49
1933	4.49	11.65	-7.16	107	-766.12
1934	6.88	13.42	-6.54	118	-771.72
1935	34.95	15.00	19.95	250	4,987.50
1936	9.18	5.00	4.18	375	1,567.50
1937	6.91	5.00	1.91	304	580.64
1938	8.41	5.00	3.41	395	1,356.95
1939	5.70	5.00	0.70	364	254.80
1940	6.87	14.47	-7.60	302	-2,295.20
1941	31.64	15.30	16.34	961	15,702.74
1942	32.03	17.42	14.61	1,746	25,509.06
1943	36.60	19.30	17.30	4,916	85,046.80
1944	39.27	20.36	18.91	6,253	118,244.23
1945	43.96	20.71	23.25	6,691	115,565.75
1946	64.81	22.47	42.34	9,809	415,313.06
1947	71.64	20.76	50.88	13,009	661,897.92
1948	83.81	22.94	60.87	11,628	707,796.36
1949	59.87	23.12	36.75	10,778	396,091.50
1950	60.40	22.77	37.63	10,500	395,115.00
1951	70.51	23.93	46.58	8,897	414,422.26
1952	48.88	25.04	23.84	8,738	208,313.92
1953	65.74	24.79	40.95	8,512	348,566.40
1954	66.86	24.62	42.24	13,012	549,626.88
1955	66.75	24.75	42.00	18,346	770,532.00
1956	56.74	24.31	32.43	21,638	701,720.34
1957	51.66	25.00	26.66	21,186	564,818.76
1958	53.41	25.04	28.37	23,564	668,510.68
1959	66.27	25.06	41.21	22,793	939,299.53
1960	65.26	25.41	39.85	18,952	755,237.20
1961	68.22	25.70	42.52	21,049	895,003.48
1962	71.19	26.00	45.19	22,237	1,004,890.03
1963	59.28	26.36	32.92	23,319	767,661.48
1964	60.70	26.58	34.12	21,902	747,296.24
1965	69.71	27.17	42.54	21,585	918,225.90
1966	70.37	27.48	42.89	19,915	854,154.35
1967	66.39	28.18	38.21	16,719	638,832.99
1968	57.06	28.74	28.59	16,356	467,618.04
1969	64.58	29.11	35.47	16,756	594,335.32
1970	63.31	30.34	32.97	15,821	521,618.37
1971	73.64	31.72	41.92	13,367	560,344.64
1972	91.86	33.65	58.21	12,329	717,671.09
1973	165.55	40.27	125.28	11,073	1,387,225.44

Table E23. Gross value added calculations for "other forage," Boise Project, Idaho, 1910-1973

Year	Other Forage				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	20.83	14.76	6.07	30	182.10
1914	14.42	14.91	0.49	53	-25.97
1915	11.95	15.20	-3.25	77	-250.25
1916	55.13	22.68	32.45	16	519.20
1917	50.00	30.87	19.13	43	822.59
1918	90.51	35.91	54.60	146	7,971.60
1919	106.67	39.09	67.58	15	1,013.70
1920	--	--	--	--	--
1921	--	--	--	--	--
1922	--	--	--	--	--
1923	--	--	--	--	--
1924	14.21	20.47	-6.26	973	-6,090.98
1925	41.71	21.20	20.51	491	10,070.41
1926	--	--	--	--	--
1927	--	--	--	--	--
1928	--	--	--	--	--
1929	1.07	1.00	0.07	373	26.11
1930	51.06	20.08	30.98	390	12,082.20
1931	--	--	--	842	--
1932	2.58	1.15	1.43	820	1,172.60
1933	6.12	1.20	4.92	938	4,614.96
1934	1.38	1.20	0.18	676	121.68
1935	1.00	1.00	0.00	10,505	0.00
1936	0.83	1.50	-0.67	2,423	-1,623.41
1937	1.15	2.00	-0.85	3,150	-2,677.50
1938	2.75	2.50	0.25	506	126.50
1939	2.86	3.00	-0.14	4,638	-649.32
1940	4.46	3.70	0.76	4,304	3,271.04
1941	5.86	3.90	1.96	3,422	6,707.12
1942	7.13	4.45	2.68	7,154	19,172.72
1943	11.70	4.90	6.80	11,926	81,096.80
1944	5.31	5.23	0.08	12,609	1,008.72
1945	7.45	5.30	2.15	22,118	47,553.70
1946	9.88	5.70	4.18	21,883	91,470.94
1947	8.98	6.61	2.37	22,778	53,983.86
1948	14.74	7.04	21.78	9,657	210,329.46
1949	13.69	7.29	6.40	7,741	49,542.40
1950	14.05	8.05	6.00	7,746	46,476.00
1951	107.45	39.02	68.43	3,009	205,905.87
1952	89.18	40.57	48.62	5,624	273,438.88
1953	40.19	40.50	0.31	5,794	1,796.14
1954	--	40.40	--	--	--
1955	28.93	40.34	-11.41	35	-399.35
1956	48.17	39.93	8.24	52	428.48
1957	62.86	40.92	21.94	42	921.48
1958	79.30	41.04	38.26	54	2,066.04
1959	79.17	41.14	38.03	422	16,048.66
1960	69.16	41.67	27.49	464	12,755.36
1961	59.84	42.14	17.70	902	15,965.40
1962	61.97	42.56	19.41	210	4,076.10
1963	82.94	42.95	39.99	48	1,919.52
1964	58.60	43.37	15.23	5	76.15
1965	83.19	44.29	38.90	185	7,196.50
1966	99.00	44.80	54.20	25	1,355.00
1967	--	45.95	--	--	--
1968	71.14	46.53	24.61	90	2,214.90
1969	89.19	46.83	42.36	80	3,388.80
1970	77.24	48.82	28.42	332	9,435.44
1971	88.13	51.04	37.09	336	12,462.24
1972	87.74	54.15	33.59	47	1,578.73
1973	147.88	64.80	83.08	240	19,939.20

Table E24. Gross value added calculations for "other fruit", Boise Project, Idaho, 1910-1973

Other Fruit					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	21.80	47.30	-25.50	45	-1,147.50
1914	27.81	47.30	-19.49	188	-3,364.12
1915	30.79	48.80	-18.01	204	-3,674.04
1916	40.58	53.20	-12.62	189	-2,385.18
1917	44.68	69.50	-24.82	235	-5,852.70
1918	50.93	69.50	-18.57	270	-5,013.90
1919	89.57	76.00	13.57	222	3,012.54
1920	100.55	76.00	24.55	262	6,432.10
1921	332.80	59.20	273.60	289	79,070.40
1922	333.87	59.20	274.67	310	85,147.70
1923	248.38	63.60	184.78	370	68,368.60
1924	88.25	65.10	23.15	239	5,532.85
1925	70.84	68.00	2.84	133	377.72
1926	67.56	65.00	2.56	295	755.20
1927	126.91	65.00	61.91	256	15,848.96
1928	71.09	69.50	1.59	322	511.98
1929	112.05	68.00	44.05	343	15,109.15
1930	30.94	62.10	-31.16	405	-12,619.80
1931	65.58	51.80	13.78	344	4,740.33
1932	41.13	45.80	-4.67	372	-1,737.24
1933	88.16	45.80	42.36	504	21,349.44
1934	79.08	53.25	25.85	575	14,858.00
1935	138.98	86.96	52.02	548	28,506.96
1936	19.99	88.76	-68.77	530	-36,448.10
1937	71.65	90.56	-18.91	999	-18,891.09
1938	36.38	92.36	-52.98	1,544	-81,801.12
1939	43.65	94.16	-50.51	1,393	-70,360.43
1940	61.63	104.30	-42.67	1,375	-58,671.25
1941	85.92	114.49	-28.38	1,389	-39,419.82
1942	193.65	124.67	68.98	1,491	102,849.18
1943	202.66	134.85	67.81	4,320	292,939.20
1944	259.31	133.88	125.43	4,709	590,649.87
1945	295.54	132.91	162.63	4,610	749,724.30
1946	415.06	131.97	283.09	3,235	915,796.15
1947	320.99	137.94	183.05	3,904	714,627.20
1948	548.74	141.03	407.71	4,030	1,643,071.30
1949	401.99	147.08	254.91	4,114	1,048,699.74
1950	311.58	147.25	163.33	4,125	673,736.25
1951	383.47	158.04	225.45	4,383	988,285.12
1952	226.79	163.27	63.52	4,019	255,286.88
1953	284.71	162.33	122.38	3,909	478,383.42
1954	227.44	163.90	63.54	2,111	134,132.94
1955	193.14	163.40	29.74	2,011	59,807.14
1956	324.99	165.84	159.15	1,886	300,156.90
1957	405.94	171.29	234.65	976	229,018.40
1958	353.88	174.99	178.89	1,672	299,104.08
1959	467.22	178.36	288.86	1,449	418,558.14
1960	520.70	182.93	377.77	1,477	498,886.29
1961	493.15	188.55	304.60	1,292	393,543.20
1962	275.10	193.87	81.23	719	58,404.37
1963	503.87	200.37	303.50	1,245	377,857.50
1964	347.35	207.78	139.57	1,354	188,977.78
1965	573.35	218.31	355.04	1,279	454,096.16
1966	352.33	228.82	123.51	1,042	128,697.42
1967	377.14	240.40	136.74	1,309	178,992.66
1968	363.50	248.89	114.61	1,150	131,801.50
1969	515.28	257.39	257.89	1,351	348,409.39
1970	586.12	270.99	315.13	1,208	380,677.04
1971	536.24	283.32	252.92	1,252	316,655.84
1972	487.99	300.55	187.44	1,191	223,241.04
1973	424.33	359.68	64.65	658	42,539.70

Table E25. Gross value added calculations for "other miscellaneous", Boise Project, Idaho, 1910-1973

Other Miscellaneous					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 10.00	\$ 14.18	\$ -4.18	329	\$ -1,375.22
1911	26.63	14.33	12.40	340	4,216.00
1912	--	--	--	--	--
1913	32.81	14.76	18.05	123	2,220.15
1914	21.31	14.91	6.40	29	185.60
1915	24.60	15.20	9.40	188	1,767.20
1916	87.02	36.67	50.35	122	6,142.70
1917	94.81	49.10	47.71	495	22,626.45
1918	53.80	53.80	0.00	334	0.00
1919	62.78	60.88	1.90	215	408.50
1920	160.91	60.88	100.03	88	8,802.64
1921	123.51	41.93	81.58	154	12,563.32
1922	123.08	41.60	81.48	130	10,592.40
1923	--	--	--	--	--
1924	28.85	20.47	8.38	72	603.36
1925	72.73	21.20	51.33	60	3,091.80
1926	3.90	7.05	-3.15	1,591	-5,011.65
1927	14.22	7.50	6.72	1,167	7,842.24
1928	17.02	21.64	-4.62	1,989	-9,189.18
1929	9.24	8.00	1.24	5,958	7,387.92
1930	12.84	8.00	4.84	5,221	25,269.64
1931	10.23	8.00	2.23	8,379	18,685.17
1932	26.50	14.72	11.78	437	5,147.86
1933	1.33	1.33	0.00	7,162	0.00
1934	35.28	16.95	18.33	2,113	38,731.29
1935	21.45	18.14	3.31	769	2,545.39
1936	50.72	18.14	32.58	57	1,857.06
1937	135.48	19.63	115.85	93	10,774.05
1938	86.90	18.14	68.76	70	4,813.20
1939	83.97	17.99	65.98	116	7,653.68
1940	379.31	120.25	259.06	108	27,978.48
1941	154.44	127.10	27.34	158	4,319.72
1942	810.89	144.29	666.60	157	104,656.20
1943	210.00	144.29	65.71	740	48,625.40
1944	229.86	159.64	70.22	1,495	104,978.90
1945	268.93	184.76	84.17	808	68,009.36
1946	736.57	208.00	528.57	799	421,798.86
1947	958.42	209.00	749.42	265	198,596.30
1948	526.45	209.00	317.45	583	185,073.35
1949	597.74	210.00	387.74	830	321,824.20
1950	874.59	210.00	664.59	969	643,987.71
1951	668.58	210.00	458.58	1,508	691,538.64
1952	796.65	211.73	584.92	1,368	800,170.56
1953	556.62	212.66	343.96	1,522	523,507.12
1954	30.86	30.86	0.00	14	0.00
1955	94.25	38.31	54.94	16	895.04
1956	105.88	72.94	32.92	464	15,284.16
1957	--	38.21	--	--	--
1958	161.41	74.35	87.06	213	18,543.78
1959	106.65	73.93	32.72	124	4,057.28
1960	84.41	74.99	9.42	161	1,516.62
1961	113.16	75.58	37.58	61	2,292.38
1962	97.84	57.90	39.94	67	2,675.98
1963	200.00	76.52	123.48	10	1,234.80
1964	403.90	77.09	326.81	82	26,798.42
1965	120.00	41.53	78.47	22	1,726.34
1966	231.54	78.86	152.68	26	3,969.68
1967	322.43	80.53	241.90	70	16,933.00
1968	58.52	43.88	14.64	21	307.44
1969	--	44.38	--	--	--
1970	77.00	46.34	30.66	40	1,226.40
1971	307.46	48.42	259.04	59	15,283.36
1972	98.79	51.40	47.39	33	1,563.87
1973	261.62	61.51	200.11	91	18,210.01

Table E26. Gross value added calculations for "other seed," Boise Project, Idaho, 1910-1973

Year	Other Seed				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	10.19	13.62	-3.43	48	-164.64
1914	--	13.76	--	37	--
1915	8.18	14.02	-5.84	89	-519.76
1916	23.85	15.51	8.34	13	108.42
1917	17.20	21.04	-3.84	30	-115.20
1918	54.05	24.27	29.77	52	1,548.04
1919	87.81	26.30	61.51	58	3,567.58
1920	24.75	26.30	-1.55	53	-82.15
1921	19.18	17.26	1.92	11	21.12
1922	16.45	17.13	-0.68	11	-7.48
1923	65.88	38.78	27.10	57	1,544.70
1924	10.05	39.34	-29.29	19	-556.51
1925	38.29	40.74	-2.45	66	-161.70
1926	118.24	39.62	78.62	58	4,559.96
1927	128.30	39.62	88.68	43	3,813.24
1928	83.67	41.58	42.09	12	505.08
1929	--	41.03	--	--	--
1930	27.79	37.93	-10.14	14	-141.96
1931	--	31.75	--	--	--
1932	--	27.82	--	--	--
1933	38.40	27.82	10.58	5	52.90
1934	113.21	32.04	81.17	228	18,506.76
1935	72.00	34.28	37.72	2,244	84,643.68
1936	76.22	34.28	41.94	3,172	133,053.68
1937	73.78	37.09	36.69	4,845	177,763.05
1938	76.64	34.28	42.36	3,392	143,685.12
1939	47.08	34.00	13.08	3,660	47,872.80
1940	57.58	34.56	23.29	5,152	119,990.08
1941	76.69	36.53	40.16	6,510	261,441.60
1942	91.36	41.58	49.78	8,573	426,763.94
1943	143.07	46.08	96.99	12,818	1,181,435.19
1944	170.09	48.61	121.48	17,157	2,084,232.36
1945	165.79	49.45	116.34	12,046	1,401,431.64
1946	157.31	53.67	103.64	10,587	1,097,236.68
1947	178.09	69.14	108.95	10,673	1,162,823.35
1948	198.61	72.28	126.33	12,465	1,574,703.45
1949	177.28	74.62	102.66	10,360	1,063,557.60
1950	171.99	73.20	98.79	8,550	844,654.50
1951	208.99	77.58	131.41	9,010	1,184,004.10
1952	171.90	79.41	92.46	8,890	822,236.10
1953	296.22	79.48	216.74	9,883	214,204.42
1954	180.46	79.95	100.51	2,466	247,857.66
1955	169.27	79.01	90.26	2,174	196,225.24
1956	173.06	78.39	94.67	1,482	140,300.94
1957	195.44	80.12	115.32	1,301	150,031.32
1958	180.72	80.35	100.37	714	71,664.18
1959	273.85	80.35	193.50	793	153,445.50
1960	217.03	81.00	136.03	458	62,301.74
1961	216.35	81.75	134.60	953	128,273.80
1962	184.28	82.15	102.13	771	78,742.23
1963	281.47	82.16	199.31	796	158,650.76
1964	228.00	82.17	145.83	848	123,663.84
1965	176.99	83.62	93.37	954	89,074.98
1966	178.29	83.89	94.40	930	87,792.00
1967	215.07	85.77	129.30	1,877	242,696.10
1968	203.03	85.09	117.94	2,205	260,057.70
1969	198.71	84.86	113.85	1,367	155,632.95
1970	216.00	88.23	127.77	936	119,592.72
1971	203.32	92.24	111.08	745	82,754.60
1972	268.72	97.86	170.86	1,974	337,277.64
1973	262.56	117.11	145.45	2,109	306,754.05

Table E27. Gross value added calculations for pasture, Boise Project, Idaho, 1910-1973

Year	Pasture				
	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 5.00	\$ 2.85	\$ 2.15	395	\$ 849.25
1911	5.12	2.95	2.17	4,135	8,972.95
1912	5.89	3.06	2.83	4,099	11,600.17
1913	9.24	3.00	6.24	2,976	18,570.24
1914	9.09	3.00	6.09	6,213	37,837.17
1915	10.19	3.15	7.04	5,239	36,882.56
1916	12.47	3.42	9.05	5,108	46,227.40
1917	9.50	4.50	5.00	6,555	32,775.00
1918	19.36	4.60	14.76	5,345	78,892.20
1919	20.27	4.90	15.37	7,613	117,011.81
1920	20.00	4.90	15.10	5,857	88,440.70
1921	20.00	3.80	16.20	5,880	95,256.00
1922	20.00	3.80	16.20	6,100	98,820.00
1923	20.00	4.10	15.90	6,425	102,157.50
1924	8.99	4.20	4.79	13,373	64,056.67
1925	19.32	4.35	14.97	8,922	133,562.34
1926	14.99	4.20	10.79	16,582	178,919.78
1927	18.76	4.20	14.56	20,797	302,804.32
1928	16.68	4.45	12.23	25,454	311,290.19
1929	15.26	4.35	10.91	26,991	294,471.81
1930	19.88	3.95	15.93	22,992	366,262.56
1931	8.98	3.30	5.68	23,915	135,837.20
1932	6.68	2.95	3.73	26,419	98,542.87
1933	9.86	2.95	6.91	25,463	175,949.33
1934	8.99	3.40	5.59	29,324	163,921.16
1935	4.62	3.30	1.32	53,392	70,478.76
1936	4.70	3.30	1.40	54,760	76,664.00
1937	5.15	3.90	1.25	51,673	64,591.25
1938	6.91	3.60	3.31	47,406	156,913.86
1939	6.40	3.60	2.80	49,065	137,382.00
1940	8.12	3.70	4.42	43,384	191,757.28
1941	10.20	3.90	6.30	42,047	264,896.10
1942	17.65	4.45	13.20	40,660	536,712.00
1943	26.35	4.90	21.45	63,707	1,366,515.15
1944	22.29	5.23	17.06	69,195	1,180,466.70
1945	23.31	5.30	18.01	62,548	1,126,489.48
1946	22.87	5.70	17.17	40,506	695,488.02
1947	27.68	7.38	20.30	70,555	1,432,266.50
1948	28.42	6.61	21.81	71,172	1,552,261.32
1949	28.23	7.04	21.19	70,678	1,497,666.82
1950	27.27	7.29	19.98	72,092	1,440,398.16
1951	28.22	8.05	20.17	70,622	1,424,445.74
1952	28.41	8.05	20.36	72,473	1,475,550.28
1953	20.00	7.55	12.45	73,107	910,182.15
1954	19.14	7.55	11.59	73,995	857,602.05
1955	21.52	7.38	14.14	72,088	1,019,324.32
1956	28.50	7.38	21.12	66,921	1,413,371.52
1957	28.90	7.63	21.27	65,205	1,386,910.35
1958	29.36	7.80	21.56	64,163	1,383,354.28
1959	30.48	7.88	22.60	62,689	1,416,771.40
1960	32.00	7.80	24.20	59,861	1,448,636.20
1961	32.36	7.88	24.48	57,268	1,401,920.64
1962	31.91	7.97	23.94	58,558	1,401,878.52
1963	34.15	8.05	26.10	65,067	1,698,248.70
1964	29.38	7.97	21.41	63,895	1,367,991.95
1965	27.01	8.14	18.87	62,664	1,182,469.68
1966	32.37	8.39	23.98	62,883	1,507,934.34
1967	32.37	8.48	23.89	61,112	1,459,965.68
1968	31.67	8.65	23.02	61,505	1,415,845.10
1969	32.68	8.99	23.69	61,034	1,445,895.46
1970	32.69	9.33	23.36	61,097	1,427,225.92
1971	33.07	9.75	23.32	61,951	1,444,697.32
1972	32.55	10.35	22.20	61,657	1,368,785.40
1973	34.99	12.38	22.61	58,720	1,327,659.20

Table E 28. Gross value added calculations for potatoes, Boise Project, Idaho
1910-1973

Potatoes					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 40.71	\$ 31.77	\$ 8.94	659	\$ 5,891.46
1911	45.64	32.11	13.53	324	4,383.72
1912	50.25	33.41	16.84	1,322	22,262.48
1913	45.32	33.08	12.24	1,268	15,520.32
1914	56.18	33.41	22.77	1,441	32,811.57
1915	65.58	34.07	31.51	1,399	44,082.49
1916	132.24	37.67	94.57	1,101	104,121.57
1917	121.56	51.10	70.46	2,172	153,039.12
1918	195.38	58.97	136.41	1,865	254,404.65
1919	239.07	63.88	175.19	2,859	500,868.21
1920	253.65	63.88	189.77	4,395	834,039.15
1921	260.65	41.93	218.72	5,220	1,141,718.40
1922	29.04	41.60	-12.56	12,002	-150,745.12
1923	95.00	45.21	49.79	7,600	378,404.00
1924	58.52	45.86	12.66	5,107	64,654.62
1925	173.80	47.50	126.30	2,609	329,516.70
1926	144.21	46.19	98.02	1,844	180,748.88
1927	106.36	46.19	60.17	2,875	172,988.75
1928	39.34	48.48	-9.14	2,941	-26,880.74
1929	223.09	52.16	170.93	2,172	371,259.96
1930	149.29	48.22	101.07	2,594	262,175.58
1931	48.05	40.37	7.68	4,671	35,873.28
1932	22.99	35.36	-12.37	5,090	-62,963.30
1933	132.80	35.36	97.44	3,915	381,477.60
1934	63.55	40.72	22.83	4,598	104,972.34
1935	53.48	43.58	9.90	5,704	56,469.60
1936	173.40	43.58	129.82	4,975	645,854.50
1937	58.26	47.15	11.11	4,638	51,528.18
1938	62.38	43.58	18.80	5,511	103,606.80
1939	64.26	43.23	21.03	5,999	126,158.97
1940	63.64	43.91	19.73	5,278	104,134.94
1941	81.71	46.44	32.38	4,933	159,730.54
1942	161.48	52.87	108.61	4,300	467,023.00
1943	159.91	58.58	101.33	13,057	1,323,065.81
1944	218.34	61.79	156.55	9,184	1,437,755.20
1945	190.38	62.87	127.51	11,214	1,429,897.14
1946	149.08	68.23	80.85	8,953	723,850.05
1947	272.76	89.46	183.30	5,263	964,707.90
1948	263.24	95.31	167.93	6,287	1,055,775.91
1949	266.68	101.16	165.52	6,768	1,120,239.36
1950	132.17	107.01	25.16	6,351	151,791.16
1951	249.52	112.86	136.66	6,908	944,047.28
1952	584.33	118.71	465.62	5,547	2,582,794.14
1953	90.77	111.21	-20.44	4,515	-92,286.60
1954	198.78	111.21	87.57	7,445	651,958.65
1955	116.05	108.71	7.34	7,323	53,750.82
1956	300.59	107.00	193.39	6,614	1,280,404.26
1957	251.63	112.46	139.17	5,838	812,474.46
1958	146.15	114.96	31.19	6,723	209,690.37
1959	203.04	116.24	86.80	6,209	538,941.20
1960	343.07	114.96	228.11	6,148	1,402,420.28
1961	196.18	116.24	79.94	6,863	548,628.22
1962	204.15	117.46	86.69	4,045	350,661.05
1963	298.36	118.71	179.65	4,301	772,674.65
1964	367.03	117.46	249.57	5,320	1,327,712.40
1965	381.60	119.96	261.64	6,012	1,572,979.68
1966	362.32	123.71	238.61	7,607	1,815,106.27
1967	255.34	124.96	130.38	7,491	976,676.58
1968	330.07	127.46	202.61	7,682	1,556,450.02
1969	437.88	132.45	305.43	8,759	2,675,261.37
1970	416.88	137.45	279.43	10,888	3,042,433.84
1971	412.59	138.48	274.11	10,455	2,865,820.05
1972	487.53	146.90	340.63	8,905	3,033,310.15
1973	427.26	175.80	251.46	11,906	2,993,882.76

Table E29. Gross value added calculations for prunes, Boise Project, Idaho, 1910-1973

Prunes					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	--	--	--	--	--
1913	56.50	47.30	9.20	8	73.60
1914	38.50	47.30	-8.80	12	-105.60
1915	59.93	48.80	11.13	28	311.64
1916	--	53.20	--	229	--
1917	20.24	69.50	-49.26	266	-13,105.16
1918	15.12	69.50	-54.38	302	-16,422.76
1919	38.17	76.00	-37.83	701	-26,518.83
1920	39.78	76.00	-36.22	458	-16,588.76
1921	90.00	59.20	30.80	600	18,480.00
1922	120.00	59.20	60.80	630	38,304.00
1923	--	63.60	--	680	--
1924	50.90	65.10	-14.20	984	-13,972.80
1925	81.27	68.00	13.27	389	5,162.03
1926	34.84	65.00	-30.16	1,158	-34,925.28
1927	97.65	65.00	32.65	1,060	34,609.00
1928	59.15	69.50	-10.35	1,131	-11,705.85
1929	81.97	68.00	13.92	1,220	16,982.40
1930	84.17	62.10	22.07	1,071	23,636.97
1931	58.21	51.80	6.41	1,043	6,685.63
1932	6.55	45.80	-39.25	851	-33,401.75
1933	55.85	45.80	10.05	934	9,386.70
1934	57.03	53.25	3.78	938	3,545.64
1935	130.81	56.20	74.61	871	64,985.31
1936	95.60	56.20	39.40	816	32,150.40
1937	96.67	62.15	34.52	1,301	44,910.52
1938	62.88	56.20	6.68	989	6,606.52
1939	64.14	56.20	7.94	1,050	8,337.00
1940	52.50	57.70	-5.20	1,297	-6,744.40
1941	65.19	60.60	4.59	1,329	6,100.11
1942	159.45	69.56	89.89	1,333	119,823.37
1943	383.83	76.95	306.88	1,407	431,780.16
1944	277.38	81.40	195.99	1,358	266,154.42
1945	333.36	82.80	250.56	1,454	364,314.24
1946	337.12	88.80	248.32	2,389	593,236.48
1947	298.29	117.21	181.08	1,960	354,916.80
1948	132.92	105.08	27.84	2,037	56,710.08
1949	-70.10	111.82	-41.72	2,066	-86,193.52
1950	163.76	115.86	47.90	1,976	94,650.40
1951	146.48	127.98	18.50	1,851	34,243.50
1952	86.94	127.98	-41.04	1,738	-71,327.52
1953	182.26	119.90	62.36	1,686	105,138.96
1954	338.90	119.90	219.00	2,749	602,031.00
1955	280.90	117.21	163.69	3,177	520,043.13
1956	343.45	117.21	226.24	3,039	687,543.36
1957	377.01	121.24	255.77	3,026	773,960.02
1958	532.80	123.94	408.86	2,960	1,210,225.60
1959	294.80	125.29	169.51	3,792	642,781.92
1960	832.88	123.94	708.94	3,528	2,501,140.32
1961	495.16	125.29	369.87	3,640	1,346,326.80
1962	309.98	126.64	183.34	3,322	609,055.48
1963	374.32	127.98	246.34	4,307	1,060,986.38
1964	164.77	126.64	38.13	3,912	149,164.56
1965	270.19	129.34	140.85	1,279	180,147.15
1966	389.91	133.37	256.54	1,042	267,314.68
1967	223.91	134.72	89.19	1,309	116,749.71
1968	183.82	137.42	46.40	1,150	53,360.00
1969	141.92	142.81	-.89	1,351	-1,202.59
1970	278.92	148.19	130.73	1,208	157,921.84
1971	109.70	154.93	-45.23	3,898	-176,036.54
1972	355.04	164.35	190.69	3,612	688,772.28
1973	393.12	196.67	196.45	3,754	737,473.30

Table E30. Gross value added calculations for sugar beets, Boise Project, Idaho, 1910-1973

Sugar Beets					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years				
1947	\$210.78	\$49.80	\$160.98	32,500	\$5,231,850.00
1948	154.56	54.11	100.45	29,018	2,914,858.10
1949	177.87	55.48	122.39	23,444	2,869,311.16
1950	171.69	54.29	117.40	30,195	3,544,893.00
1951	195.38	57.27	138.11	26,160	3,612,957.60
1952	207.04	59.61	147.43	24,679	3,638,424.97
1953	195.44	59.63	135.81	26,264	3,566,913.84
1954	198.70	59.42	139.28	25,663	3,574,342.64
1955	215.08	59.11	155.97	23,277	3,630,513.69
1956	213.99	58.54	155.45	23,053	3,583,588.85
1957	217.90	59.80	158.10	24,563	3,883,410.30
1958	224.47	60.04	164.43	24,634	4,050,568.62
1959	228.01	60.13	167.88	25,652	4,306,457.76
1960	200.55	61.00	139.55	26,616	3,714,262.80
1961	209.45	61.71	147.74	28,336	4,186,360.64
1962	212.49	62.35	150.14	27,954	4,197,013.56
1963	225.13	62.92	162.21	31,863	5,168,497.23
1964	194.54	63.74	130.80	34,392	4,498,473.60
1965	223.81	65.20	158.61	32,304	5,123,737.44
1966	199.09	66.02	133.07	32,178	4,281,926.46
1967	218.61	67.76	150.85	34,186	5,156,958.10
1968	248.14	68.39	179.75	36,643	6,227,079.25
1969	237.44	68.53	168.91	36,181	6,111,332.71
1970	277.33	71.59	205.74	31,769	6,536,154.06
1971	267.54	74.85	192.69	31,743	6,116,558.67
1972	304.18	79.40	224.78	33,353	7,497,087.34
1973	375.32	95.02	280.30	28,751	8,058,905.30

Table E31. Gross value added calculations for sweet corn, Boise Project, Idaho, 1910-1973

Sweet Corn					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910 - 1946	Data not available for these years.				
1947	\$ --	\$ 64.15	\$ --	--	\$ --
1948	--	69.77	--	--	--
1949	--	71.04	--	--	--
1950	--	68.84	--	--	--
1951	--	72.41	--	--	--
1952	--	75.37	--	--	--
1953	--	75.36	--	--	--
1954	120.47	75.00	45.47	1,197	90,803.59
1955	80.75	74.41	6.34	2,213	14,030.42
1956	91.16	72.94	18.22	2,740	49,922.80
1957	139.42	74.23	65.19	2,950	192,310.50
1958	103.90	74.35	29.55	3,098	91,545.90
1959	113.96	73.93	40.03	3,874	155,076.22
1960	141.37	74.99	66.38	3,809	252,841.42
1961	108.66	75.58	33.08	4,155	137,447.40
1962	122.15	76.19	45.96	3,747	172,212.12
1963	128.53	76.52	52.01	4,270	222,082.70
1964	139.46	77.09	62.37	4,297	268,003.89
1965	147.79	78.61	69.18	4,657	322,171.26
1966	135.54	78.86	56.68	5,565	315,424.20
1967	142.56	80.53	62.03	6,289	390,106.67
1968	135.55	80.33	55.22	7,088	391,399.36
1969	135.70	79.32	56.38	6,878	387,781.64
1970	131.96	82.90	49.06	6,038	296,224.28
1971	135.89	86.67	49.22	6,487	319,290.14
1972	157.67	91.94	65.73	6,732	442,494.36
1973	149.47	110.03	39.44	7,270	286,728.80

Table E32. Gross value added calculations for truck gardens, Boise Project, Idaho
1910-1973

Truck Gardens					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ --	\$ --	\$ --	--	\$ --
1911	--	--	--	--	--
1912	29.71	14.91	14.80	528	7,814.40
1913	44.52	14.76	29.76	463	13,778.88
1914	36.28	14.91	21.37	726	15,514.62
1915	22.27	15.20	7.07	734	5,189.38
1916	59.54	16.81	42.73	524	22,390.52
1917	72.74	22.81	49.93	691	34,501.63
1918	77.53	26.31	51.22	572	29,297.84
1919	74.51	28.51	46.00	495	22,770.00
1920	101.95	28.51	73.44	590	43,329.60
1921	200.33	18.71	181.62	982	178,350.84
1922	164.36	18.57	145.79	1,915	279,187.85
1923	128.84	20.18	108.66	2,390	259,697.40
1924	54.72	20.47	34.25	439	15,035.75
1925	64.51	21.20	43.31	567	24,556.77
1926	13.63	20.62	-6.99	525	-3,669.75
1927	24.69	20.62	4.07	748	3,044.36
1928	49.98	21.64	28.34	611	17,315.74
1929	54.94	21.71	33.23	1,710	56,823.30
1930	56.45	20.08	36.37	836	30,405.32
1931	37.95	16.80	21.15	1,196	25,295.40
1932	47.10	14.72	32.38	2,263	73,275.94
1933	24.41	14.72	9.69	4,384	42,480.96
1934	38.16	16.95	21.21	2,282	48,401.22
1935	46.27	18.14	28.13	2,277	64,052.01
1936	55.41	18.14	37.27	2,522	93,994.94
1937	20.09	19.63	.46	1,413	649.98
1938	34.75	18.14	16.61	3,440	57,138.40
1939	92.42	17.99	74.43	3,829	284,992.47
1940	19.99	18.27	1.72	5,861	10,080.92
1941	28.59	19.33	9.26	4,653	43,086.78
1942	119.63	22.01	97.62	3,232	315,507.84
1943	175.89	24.38	151.51	6,781	1,027,389.31
1944	90.77	25.72	65.05	9,166	596,248.30
1945	160.56	26.17	134.39	8,608	1,156,829.12
1946	60.14	28.40	31.74	11,741	372,659.34
1947	68.32	61.33	6.99	4,692	32,797.08
1948	65.11	62.17	2.94	4,994	14,682.36
1949	122.75	66.14	56.61	6,909	391,118.49
1950	74.86	68.54	6.32	3,315	20,950.80
1951	107.17	75.71	31.46	3,931	123,669.26
1952	96.92	75.71	21.21	4,206	89,209.26
1953	116.59	70.93	45.66	4,996	228,117.36
1954	124.10	70.93	53.17	1,033	54,924.61
1955	111.60	69.33	42.27	968	40,917.36
1956	223.13	69.33	153.80	518	79,668.40
1957	286.81	71.73	215.08	469	100,872.52
1958	289.07	73.32	215.75	482	103,991.50
1959	138.09	74.12	63.97	261	16,696.17
1960	295.80	73.32	222.48	257	57,177.36
1961	337.82	74.12	263.70	106	27,952.20
1962	278.84	74.91	203.93	213	43,437.09
1963	307.63	75.71	231.92	347	80,476.24
1964	280.81	74.91	205.90	317	65,270.30
1965	249.09	76.51	170.58	267	45,544.86
1966	567.29	78.90	488.39	358	174,843.62
1967	680.75	79.70	601.05	204	122,614.20
1968	286.27	81.29	204.98	231	47,350.38
1969	408.53	84.47	324.06	387	125,411.22
1970	714.01	87.66	626.35	481	301,274.35
1971	247.79	91.65	156.14	364	56,834.96
1972	258.79	97.22	161.57	384	62,042.88
1973	403.02	116.35	286.67	356	102,054.52

Table E33, Gross value added calculations for wheat, Boise Project, Idaho 1910-1973

Wheat					
Year	Gross sales per acre	Cost per acre	Gross value added per acre	Acres	Gross value added
1910	\$ 11.70	\$ 11.41	\$ 0.29	3,785	\$ 1,097.65
1911	12.97	11.53	1.44	6,733	9,695.52
1912	11.64	12.00	-0.36	6,862	-2,470.32
1913	10.42	11.88	-1.46	12,042	-17,581.32
1914	16.71	12.00	4.71	14,322	67,456.62
1915	17.93	22.23	5.70	17,504	99,772.80
1916	33.60	15.53	20.07	17,101	343,217.07
1917	42.44	18.36	24.08	25,676	618,278.08
1918	44.86	21.18	23.68	30,071	712,081.28
1919	53.04	22.95	30.09	28,107	845,739.63
1920	52.75	22.95	29.80	23,460	699,108.00
1921	25.50	15.06	10.44	26,980	281,671.20
1922	25.60	14.94	10.66	27,618	294,407.88
1923	30.00	16.24	13.76	26,900	370,144.00
1924	31.98	16.47	15.51	15,437	239,427.87
1925	44.72	17.06	27.66	21,629	598,258.14
1926	26.87	16.59	10.28	38,530	396,098.68
1927	35.78	16.59	19.19	42,157	808,992.83
1928	29.47	17.42	12.05	38,573	464,804.65
1929	34.05	17.58	16.47	34,675	571,097.25
1930	20.00	16.26	3.74	31,024	116,029.76
1931	12.95	13.61	0.66	19,319	12,750.54
1932	11.28	11.92	-0.64	21,784	-13,941.76
1933	16.58	11.92	4.66	20,238	94,309.08
1934	23.15	13.73	9.42	25,721	242,291.82
1935	25.55	14.70	10.85	27,105	294,089.25
1937	26.15	14.70	11.45	27,193	311,359.85
1937	25.37	15.89	9.48	25,215	239,038.20
1938	15.36	14.70	0.66	25,520	16,843.20
1939	19.51	14.57	4.94	17,393	85,921.42
1940	20.47	14.63	5.84	21,758	127,066.72
1941	28.46	15.66	12.80	19,459	249,075.20
1942	37.21	17.83	19.38	11,086	214,846.68
1943	49.26	19.75	29.51	19,038	561,811.38
1944	51.61	20.84	30.77	20,507	631,000.39
1945	51.19	21.29	30.00	20,151	604,530.00
1946	63.87	23.00	40.87	22,538	921,128.06
1947	81.33	23.30	58.03	26,707	1,549,807.21
1948	79.44	25.50	53.94	33,550	1,809,687.00
1949	71.54	25.70	45.84	35,357	1,620,764.88
1950	80.25	25.20	55.05	31,828	1,752,131.40
1951	87.66	26.40	61.26	39,067	2,393,244.42
1952	83.81	27.89	55.92	44,096	2,499,400.32
1953	85.56	27.62	57.94	37,742	2,186,771.48
1954	85.79	27.29	58.50	30,277	1,771,204.50
1955	87.75	27.59	60.16	28,435	1,710,649.60
1956	91.21	27.33	63.08	28,030	1,790,556.40
1957	98.83	28.14	70.69	30,244	2,137,948.36
1958	72.65	28.46	44.19	35,091	1,550,671.29
1959	28.79	85.44	56.73	28,347	1,608,125.31
1960	29.44	82.96	53.52	22,070	1,181,186.40
1961	30.04	85.42	55.38	21,328	1,181,144.64
1962	30.68	110.94	80.26	15,963	1,281,190.38
1963	31.43	90.58	56.73	28,347	1,608,125.31
1964	32.07	69.15	37.08	21,037	780,051.96
1965	33.14	77.86	44.72	18,432	824,279.04
1966	34.08	92.85	58.77	17,093	1,004,555.61
1967	35.44	89.94	54.50	23,509	1,281,240.50
1968	36.88	73.14	36.26	20,339	737,492.14
1969	38.14	77.13	38.99	15,073	587,696.27
1970	40.17	78.88	38.71	14,793	572,637.03
1971	95.71	41.99	53.72	12,877	691,752.44
1972	112.58	44.55	68.03	10,457	711,389.71
1973	234.09	53.32	180.77	16,316	2,949,443.32

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