CONSUMPTIVE USE OF WATER

IN THE

IRRIGABLE AREAS

OF THE

COLUMBIA RIVER BASIN IN NEVADA

by

Clyde E. Houston, Irrigation Engineer

and

Edmund A. Naphan, Soil Scientist

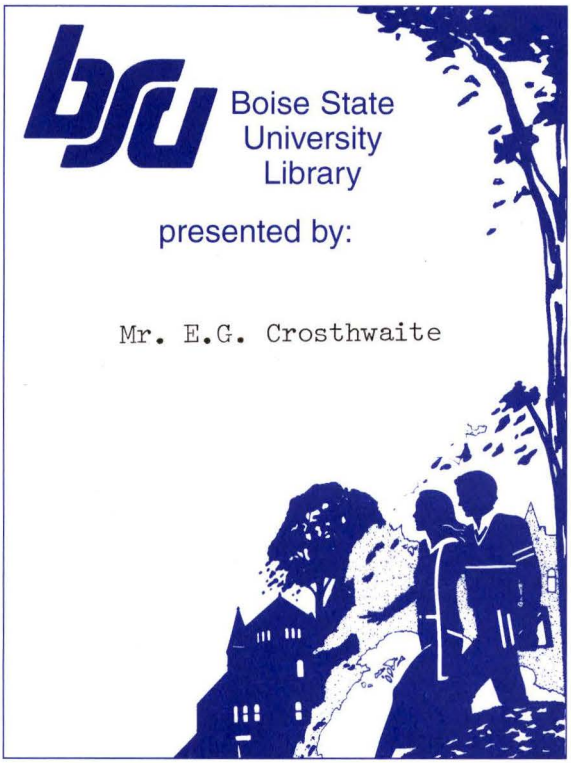
September 1952

Prepared under the direction of George D. Clyde, Chief
Division of Irrigation Engineering and Water Conservation-Research

and

George Hardman, Nevada State Conservationist

United States Department of Agriculture
Soil Conservation Service



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FOREWORD

The study covered by this report was made at the suggestion of the State Engineer acting on behalf of his office and the Columbia Basin Interstate Compact Commission of Nevada, in order to obtain data as to irrigated lands, irrigable lands not presently being irrigated, and consumptive use of water by both agricultural and nonagricultural crops within the Columbia River Basin in Nevada.

The work was performed under a cooperative agreement between the Soil Conservation Service, U. S. Department of Agriculture, Nevada Agricultural Experiment Station, and the Nevada State Engineer, which was authorized by Chapter 117, Statutes of Nevada, 1945.

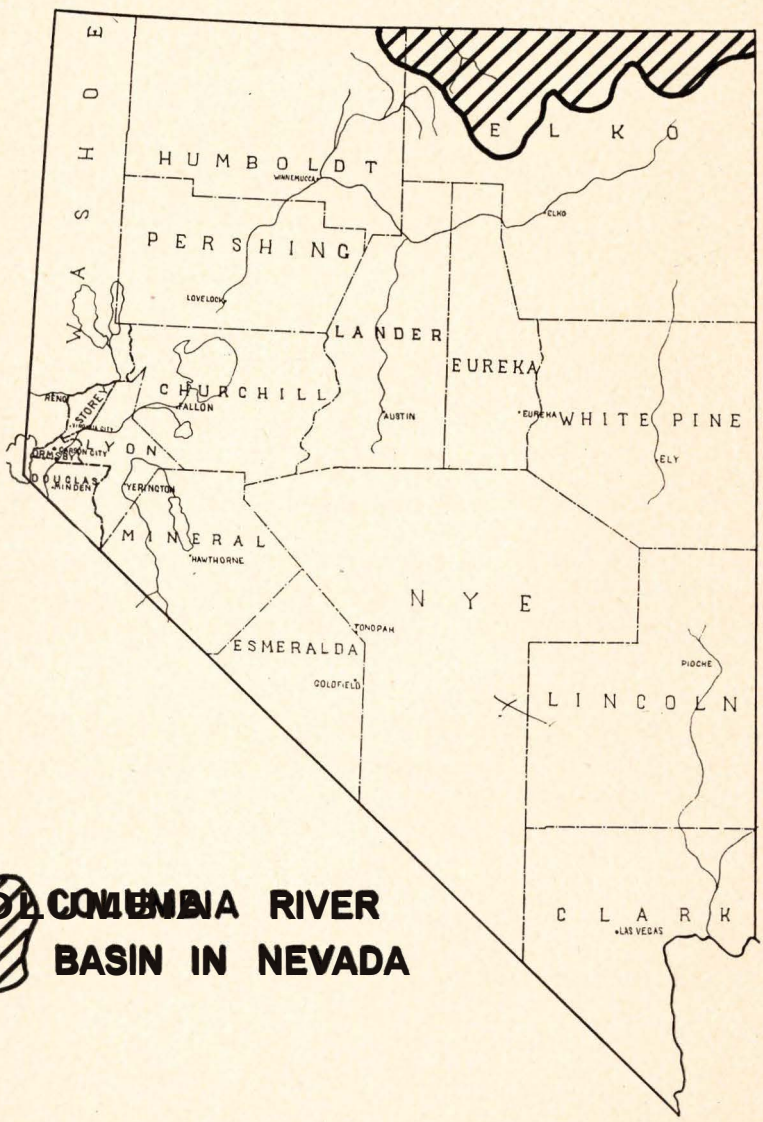
The importance of studies of this nature can be well realized by a review of this excellent report. When we consider the importance of our water and land resources, and the necessity of increasing the beneficial use of these resources, a report such as this gives us a great deal of data necessary for future development.

We are indebted to the Soil Conservation Service for the fine services they have given the State, not only on this particular study but on numerous occasions in past years. It is hoped that this type of study can be continued in other areas of our State.

HUGH A. SHAMBERGER, *State Engineer,*
Chairman, Columbia Basin Interstate
Compact Commission of Nevada.
ALFRED MERRITT SMITH, *Member.*
MEL LUNDBERG, *Member.*

December 5, 1952.

NEVADA



COLUMBIA RIVER BASIN IN NEVADA

CONSUMPTIVE USE OF WATER IN THE IRRIGABLE AREAS OF THE COLUMBIA RIVER BASIN IN NEVADA

INTRODUCTION

During the 1951 session of the Nevada Legislature an Act was passed creating the Columbia River Basin Compact Commission of Nevada with the State Engineer as a member. The general purpose of this commission is to represent Nevada in any dealings concerning the water of Columbia River.

The Nevada State Engineer requested the assistance of Soil Conservation Service in developing basic information on land and water and their use in the Columbia River Basin in Nevada. Specifically, he requested information on (1) irrigated area, (2) nonirrigated irrigable area, (3) consumptive use of water by agricultural crops, and (4) change in consumptive use of water by substituting agricultural crops for native vegetation in irrigable areas.

The authors were assigned the task of developing the information from available data with a minimum of field work.

The dearth of basic information indicated that any report developed by the authors should be of a preliminary nature, and subject to revision from time to time as more detailed data develop. With this in mind, the following report was prepared which, in general, describes the area, its climate and soils, and tabulates the irrigated and nonirrigated irrigable areas. From this information, consumptive-use data were developed by the Blaney-Criddle method (7). There was no consideration given to the water rights situation in the area.

Acknowledgement is made to Hugh A. Shamberger, Nevada State Engineer; George Hardman, State Conservationist, Soil Conservation Service; and Wayne D. Criddle of the Division of Irrigation Engineering, Soil Conservation Service, for their assistance in planning the study and suggestions in reporting it.

DESCRIPTION OF AREA

LOCATION AND PHYSIOGRAPHY

The area involved in this report is located in Northeastern Nevada, and includes the northern portion of Elko County and a small portion of northeastern Humboldt County. In size it totals approximately 5,500 square miles.

The area is situated on the southern fringe of the Snake River Plains and is characterized by semiarid climate, steep rugged mountains and undulating plateaus. It is a headwaters area for streams which are tributary to the Snake River. Major Nevada tributaries consist of the Owyhee River, Bruneau and Jarbidge Rivers, Salmon Falls Creek and Goose Creek.

CLIMATE

The climate of the area is semiarid and typical of most of Northern Nevada with warm summers and cold winters. In the irrigated sections the average monthly temperature during July is nearly 70 degrees, while the average during January is about 25 degrees. The average time between frosts in these areas is approximately 90 days. Three years of evaporation records from a standard pan at Knoll Creek near Contact indicate an average growing period evaporation of about 28 inches. The average annual precipitation on the valley floors ranges from 8 to 14 inches while that in the mountains is as high as 35 inches. Sixty percent of the annual precipitation occurs in the winter in the form of snow. Appendix tables 1 and 2.

SOILS

Cropland and potential cropland soils in the area are situated predominantly on alluvial bottomlands, fans, and terraces. They have been derived from a great variety of parent materials the most common of which are basalt, gabbro, rhyolite, quartzite, granodiorite and limestone. Textures range from sandy loams to silty clays, but loams, silt loams and clay loam soils tend to predominate.

Profile of a deep alluvial bottomland soil showing top soil with big sagebrush roots penetrating into subsoil and substratum. Section shown represents approximately 12 feet.

The bottomland soils are as a general rule some of the most fertile in the area. Depths average around 3 feet and they are usually underlaid by loose gravels or dense clay. These lands are, however, at the present time subject to varying degrees of wetness due to seasonal overflow and high water table. Present use is confined largely to the production of native meadow hay and pasture. When drained and

protected from overflow they are suitable for the production of all crops adapted to the climate of the area.

The soils of the alluvial fans and terraces have been developed under conditions of good drainage. These fans, however, are for the most part old formations and the soils on them have developed dense claypans and hardpans at depths varying from 15 to 24 inches. Large areas of these soils have been made into meadow by flood irrigation, but yields under such conditions are low due to inefficient irrigation and low fertility. Under proper management, however, they have proven to be well suited for the production of adapted grains, grasses and clovers.

LAND USE AND IRRIGATION PRACTICES

LAND USE

The irrigated area under consideration totals approximately 64,000 acres. About 46,000 acres of this is devoted to the production of native hay and pasture while the remainder is being used for grain and improved species of grasses, clovers and alfalfa. The area is a livestock area and the forage crops are used to supplement the use of the adjacent rangelands.

Table 1 summarizes present land use by watershed areas for irrigated and nonirrigated irrigable lands.

IRRIGATION PRACTICES

In general, irrigation begins with the melting of snow about the middle of April. In irrigated areas dependent upon low elevation snow, the water supply is usually exhausted by July 1 and water application ceases. Where late water is available from high elevation watersheds there may be irrigation until the middle of October.

Water is applied to about 70 percent of the irrigated area by the wild flooding method. On the lower land of the valley floor wild flooding is produced by placing temporary dams in the streams, thus causing the water to flood the banks onto the adjacent fields. On the higher areas water is diverted into highline ditches containing numerous takeouts, allowing water to spread at random over the land below the ditch. Practically no control is kept on the water by this method and the fields may be submerged for as much as two months, at which time either the streams cease to flow or the water is turned back into the main channel so the field can dry out for haying. As a result, irrigation efficiencies are probably less than 25 percent, and only those coarser plants which live under conditions of nearly continual submergence can survive.

Irrigation by furrows, borders or controlled flooding, is becoming increasingly popular and at the present time about 30 percent of the irrigated area is served by one of these methods. In order to control the irrigation water some land preparation must be undertaken. In some cases the preparation consists of simple leveling or smoothing of the fields while in others it may mean extensive earth moving, stream realignment, and a complete new distribution system. Along with any land improvement, there must be a closer control of water application. The results of such controlled irrigation is at least doubling hay and pasture production and a much better quality of hay and pasture with a doubling of the irrigation efficiency.

TABLE NO. 1—PRESENT LAND USE IRRIGATED AND NONIRRIGATED IRRIGABLE ACREAGE, BY WATERSHEDS, COLUMBIA RIVER BASIN IN NEVADA

	South Fork Owyhee River (acres)	East Fork Owyhee River (acres)	Bruneau River (acres)	Lower Salmon Falls Creek (acres)	Upper Salmon Falls Creek (acres)	Goose Creek (acres)	Total
Alfalfa	340	200	----	600	----	----	1,140
Improved hay and pasture	12,810	1,440	----	510	----	550	15,310
Native hay and pasture	23,390	11,040	3,120	3,540	4,000	1,160	46,250
Grain	1,160	250	160	50	----	90	1,710
Total irrigated	37,700	12,930	3,280	4,700	4,000	1,800	64,410
Big sage	67,480	19,150	13,170	31,290	7,360	5,190	143,640
Rabbitbrush	6,160	50	2,640	2,520	----	930	12,300
Greasewood	2,090	----	----	2,970	----	60	5,120
Salt grass, meadow	----	----	----	4,400	----	----	4,400
Willows	1,010	1,160	790	650	1,420	200	5,230
Low sage	----	3,380	----	2,500	1,600	----	7,480
Total nonirrigated irrigable	76,740	23,740	16,600	44,330	10,380	6,380	178,170
Total irrigable	114,440	36,670	19,880	49,030	14,380	8,180	242,580

TABLE NO. 2—IRRIGABLE LAND CAPABILITY SUBCLASSES, BY WATERSHEDS, COLUMBIA RIVER BASIN IN NEVADA

	Land Capability Subclass									
	I (acres)	IIs (acres)	IIe (acres)	IIw (acres)	IIIs (acres)	IIIe (acres)	IIIw (acres)	IVs (acres)	IVe (acres)	IVw (acres)
South Fork Owyhee River	4,900	23,580	2,380	18,230	15,720	11,640	3,260	500	32,380	1,850
East Fork Owyhee River	710	920	160	5,630	17,730	1,890	1,420	----	7,450	760
Bruneau River	----	----	160	2,600	850	5,920	1,270	2,650	5,710	720
Lower Salmon Falls Creek	260	1,380	1,940	7,290	6,960	12,630	1,790	4,350	12,180	250
Upper Salmon Falls Creek	----	340	460	3,020	2,400	3,500	1,060	300	3,000	300
Goose Creek	----	1,640	700	1,430	940	1,820	1,200	----	330	120
Totals	5,870	27,860	5,800	38,200	44,600	37,400	10,000	7,800	61,050	4,000

LAND CAPABILITIES

Irrigated and nonirrigated irrigable lands in this area have been classified into broadly delineated land capability subclasses as developed and used by the Soil Conservation Service (18). In accomplishing this, all existing information on the area was used as far as possible (21). Field reconnaissance to check and supplement existing information was made to obtain a reasonable degree of accuracy.*

*The Soil Conservation Service in connection with its operation program is presently engaged in making land capability surveys on the private lands in this area.

In this report only those land capability classes which are suited for cultivation with irrigation (Class I to IV) have been given consideration. In determining this the physical land factors were given primary consideration. The location of the land with respect to possible water supply was given broad consideration only, as the determination of a water supply within the foreseeable future for many areas involves problems beyond the scope of this report.

The land capability classes have been divided into subclasses which indicate both the degree of hazard or limitation for use and the character of the dominant limitation. The Land Capability Subclasses for irrigated and irrigable lands which have been considered in this area are as follows:

CLASS I: *Very good* land that can be cultivated safely with ordinary good farming methods; subject to no, or very slight, continuing limitations in use or risks of damage because of permanent land characteristics. This land ordinarily has a slope of less than one percent and a deep, medium textured, moderately permeable soil of good water-holding capacity and fertility. Some areas may be wet and affected by saline and alkali conditions which are easily corrected by drainage.

CLASS II: *Good land* that can be cultivated with easily applied protective measures; subject to moderate limitations in use, or moderate risks of damage, because of permanent land characteristics.

Subclass IIs: This is land which has moderate limitations due either to soils of only moderate depths or unfavorable texture.

Subclass IIe: This is land which has a moderate limitation due predominantly to a moderate erosion hazard.

Subclass IIw: This is land which has a moderate limitation due to moderate overflow or moderate wetness which is correctable by drainage.

CLASS III: *Moderately good land* that can be used regularly for crops in a good rotation but needs intensive treatment; subject to severe limitations in use for cropland, or severe risks of damage, because of permanent land characteristics.

Subclass IIIs: This is land which has severe limitations due to either shallow depth or unfavorable texture.

Subclass IIIe: This is land which has severe limitations due to a severe erosion hazard.

Subclass IIIw: This is land which has severe limitations due to excessive wetness.

CLASS IV: *Fairly good land* that is best maintained in perennial vegetation but can be cultivated occasionally or in a limited way if handled with great care; subject to very severe permanent limitations or hazards in use for cropland.

Subclass IVs: This is land which has very severe limitations due to unfavorable soil characteristics such as shallow soil or unfavorable textures.

Subclass IVe: This is land having very severe limitations due to very severe erosion hazards.

Subclass IVw: This is land having very severe limitations due to very severe wetness conditions.

Table 2 summarizes the Land Capability Subclasses by watersheds. The field reconnaisance indicated that for the purpose of this report, land capability subclasses I, IIs, IIe, IIw, IIIw and IVw should be considered bottomland and subclasses IIIs, IIIe, IVs, IVe should be considered upland.

CONSUMPTIVE USE OF WATER

WATER RESOURCES

For the most part surface streamflow is derived from melting snow in the mountains. Snow usually begins melting and contributing to the streams early in April, with peak flows being realized during May and June, depending upon watershed elevation and melt conditions. Also dependent upon watershed elevation, the streamflow will recede from the peak and may entirely cease between July 1 and late winter. Only the major streams are perennial.

There are three U. S. Geological Survey gauging stations in operation in the Nevada portion of the Basin. These are:

Salmon Falls Creek near San Jacinto, Nevada.
Owyhee River near Gold Creek, Nevada.
Owyhee River above China Diversion Dam, near Owyhee, Nevada.

In the past, stations have been maintained at:

Bruneau River (West Fork) near Rowland, Nevada.
Owyhee River at Mountain City, Nevada.

All of these records can be obtained from U. S. Geological Survey Water Supply papers. Runoff data were obtained on the headwaters of Salmon Falls Creek in 1950 by the Nevada State Engineer.

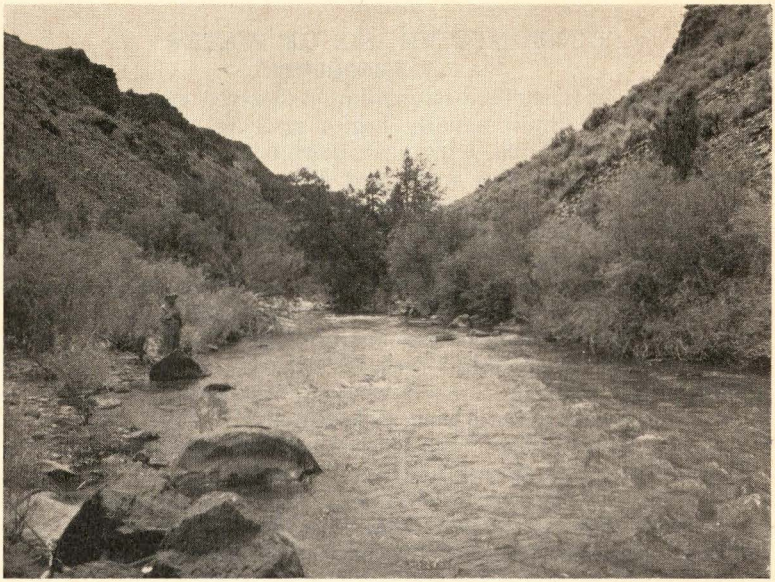
A formal groundwater study has never been made but a reconnaissance of the area indicates that limited supplies may be available in the larger valley areas. A satisfactory flowing irrigation well was developed in Goose Creek area. Stock water wells are used on the extensive Owyhee Desert.

METHODS OF CONSUMPTIVE USE DETERMINATIONS

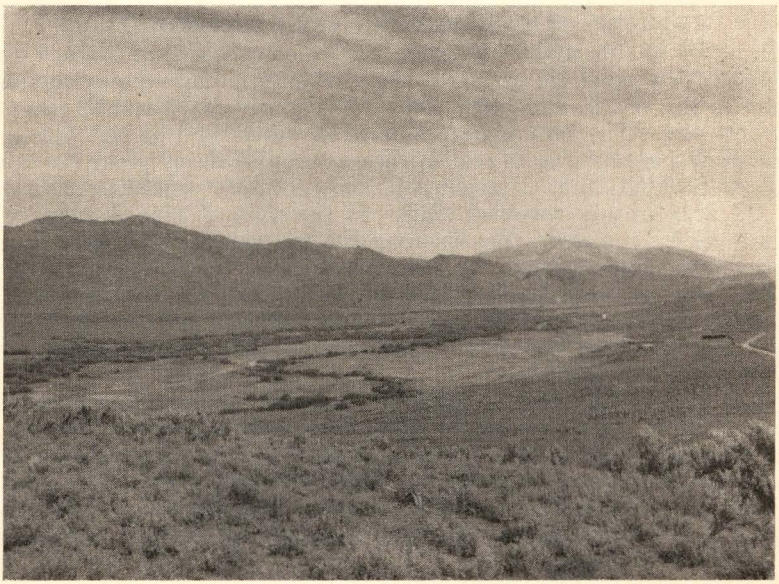
In order to equitably divide the waters of a drainage basin, careful consideration must be given to the consumptive-use requirements of water in the basin. The term "consumptive use" is defined by technical workers as: "The sum of the volumes of water used by the vegetative growth of a given area in transpiration or building of plant tissue and that evaporated from adjacent soil, snow, or intercepted precipitation on the area in any specified time. If the unit of time is small, such as a week or a month, the consumptive use rate is expressed in acre inches per acre or depth in inches; whereas, if the unit of time is large, such as crop growing season or a 12-month period, the consumptive use rate is usually expressed as acre-feet per acre or depth in feet. The source of water to supply consumptive use are precipitation, surface and groundwater."

It is recognized that in addition to water consumptively used as above defined, there is need for water to satisfy conveyance and application losses incident to irrigation. Under proper water management and from an over-all standpoint within a basin, these losses may be considered incidental since such water is frequently picked up and reused lower down on the stream. This applies to both surface and deep percolation losses.

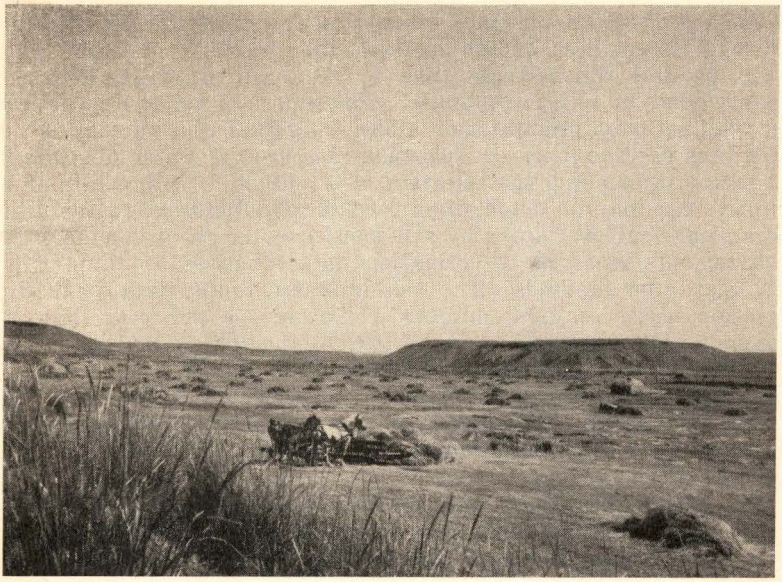
Studies have been carried on to determine consumptive use of water by agricultural crops and native vegetation, and the following description is quoted from one such study by Blaney and Criddle in 1949 on the Upper Colorado River Basin (9):



Jarbridge River in August 1951 with about 150 c.f.s. leaving Nevada.



Typical native meadowland showing a large acreage of willows. Irrigation is by wild flooding directly from the stream channels.



Typical native meadowland during hay harvest. Irrigation is by wild flooding from ditches.

A bottomland which has been drained and prepared for proper irrigation. Drainage, land preparation and other land and water management practices have increased yields approximately two to three times.

"Various methods have been used throughout the West to determine the amount of water consumed by agricultural crops and native vegetation (6). Regardless of the method, the problems encountered are numerous and considerable time is required to make satisfactory measurements of consumptive use. The source of water used by plant life, whether from precipitation alone, irrigation plus rainfall, ground water plus precipitation, or irrigation plus ground water plus rainfall, is a factor influencing the selection of a method. Unit values of consumptive use may be determined for different kinds of native vegetation and agricultural crops by soil moisture studies, lysimeter or tank measurements, analysis of irrigation data; analysis of climatological data, and other methods (2). For irrigated crops, data on depth of irrigation water applied, number of irrigations per year, irrigation efficiency, water-holding capacity (field capacity) of soil and length of growing season may be used in estimating unit values of consumptive use (3). Unit values observed in one area may be used in estimating consumptive use for other areas having somewhat similar climatic conditions, provided temperature and precipitation records are available for both areas (2).

"The effect of sunshine and heat in stimulating transpiration was studied (8) as early as 1691, according to a review of the literature by Abbe (1). Measurements of transpiration of various kinds of plants by Briggs and Shantz indicate a close correlation between transpiration and evaporation from free-water surfaces, air temperature, solar radiation, and wet-bulb depression readings (10).

"Many formulas have been developed in the past for determining evaporation from meteorological observations. Formulas for estimating consumptive use are not so numerous. A few suggested methods of determining consumptive use, based on climatic factors, have been found to give reasonable results. For many years irrigation engineers have used temperature data in estimating annual valley consumptive use of water in arid and semiarid areas of the West (4). Hedke developed the effective heat method on the Rio Grande (16). By this method, consumptive use is estimated from a study of the heat units available to the crops of a particular valley (15). It assumes that there is a linear relation between the amount of water consumed and the quantity of available heat. From studies of the Bureau of Reclamation, conducted intermittently from 1937 to 1940 by Lowry and Johnson (18), a similar method was suggested which has been adopted quite generally by the Bureau of Reclamation in making its estimates of valley consumptive use. This method also assumes a direct relationship between temperatures and consumptive use. It assumes a linear relation between consumptive use and accumulated daily maximum temperatures above 32° Fahrenheit during the growing season.

"Studies conducted by the Division of Irrigation, Soil Conservation Service, in 1939–1941, in connection with the Pecos River Joint Investigation of the National Resources Planning Board, indicated that evaporation, evapotranspiration, mean monthly temperature, monthly percent of daytime hours, growing season, monthly precipitation and efficiency of irrigation data could be used to estimate irrigation requirements (2). Later, Blaney and Morin (5) developed empirical formulas from the Pecos River studies for estimating unit annual values of

evaporation from free-water surfaces and consumptive use by native vegetation subsisting on ground water. This method gives consideration to temperature, daytime hours, and humidity records and is applicable to those areas in which there is ample water to take care of evaporation and transpiration. Blaney and Morin also show how the formulas might be applied in estimating consumptive use by irrigated crops having access to an ample water supply. Various methods of determining consumptive use of water have been described by Blaney (6). In 1945, Blaney and Criddle simplified the Pecos formulas by eliminating the humidity factor (7)."

There have been no consumptive-use studies made in the Columbia River Basin in Nevada. Consequently, estimates of unit use by the various agricultural crops and native vegetation in this Basin are based on studies in other areas of the West, transferred to the Columbia River Basin in Nevada by the method suggested by Blaney and Criddle (7).

Briefly, the procedure is to correlate existing consumptive use data with monthly temperature, percent of daytime hours and precipitation for the frost-free period or irrigation season. The coefficients so developed for different crops are used to transfer consumptive use data from one section to other areas where only climatological data are available.

Neglecting the unmeasured factors, consumptive use varies with the temperature and the daytime hours, and available moisture (precipitation, irrigation and/or ground-water). By multiplying the mean monthly temperature (t) by the monthly percent of daytime hours of the year (p), there is obtained a monthly consumptive-use factor (f). Then it is assumed that the consumptive use varies directly as this factor when an ample water supply is available. Expressed mathematically, $U = KF =$ sum of kf where—

U = Consumptive use of crop (or evaporation) in inches for any period.

F = Sum of the monthly consumptive use factors for the period (sum of the products of mean monthly temperature and monthly percent of annual daytime hours).

K = Empirical coefficient (annual or irrigation season).

t = Mean monthly temperature in degrees Fahrenheit.

p = Monthly percent of daytime hours of the year.

$f = \frac{t \times p}{100}$ = monthly consumptive use factor.

k = Monthly coefficient.

u = kf = monthly consumptive use in inches.

By knowing the consumptive requirement of water by a particular crop in some locality an estimate of the use by the same crop in some other area may be made by application of the formula $U = KF$.

The consumptive-use coefficients (K) for the more important irrigated crops grown in the Columbia River Basin in Nevada and native vegetation are shown in Table 3. These coefficients were developed from actual measurements of consumptive use in tank and soil moisture field studies and inflow-outflow measurements made throughout the West over a period of years by the Division of Irrigation Engineering and Water Conservation and other agencies. These coefficients are

based on the assumption that the crops receive a full water supply throughout the growing season or frost-free period (7). When the water supply is short during the latter part of the irrigation period a correction is made.

TABLE 3—COEFFICIENTS USED IN COMPUTING CONSUMPTIVE USE OF WATER IN THE COLUMBIA RIVER BASIN IN NEVADA

Land use	Growing season or period	Consumptive use coefficient (K)
Agricultural Crops—		
Alfalfa	Frost-free period	0.85
Alfalfa	Prefrost-free period	0.70
Alfalfa	Postfrost-free period	0.70
Native hay and pasture	Frost-free period	0.75
Native hay and pasture	Prefrost-free period	0.75
Native hay and pasture	Postfrost-free period	0.60
Improved hay and pasture	Frost-free period	0.75
Improved hay and pasture	Prefrost-free period	0.60
Improved hay and pasture	Postfrost-free period	0.60
Small grain	3½ months	0.75
Native Vegetation—		
Willows	Growing season	1.20
Saltgrass	Growing season	0.80
Bottomland: Sage, Rabbitbrush, Greasewood	Growing season	0.70
Upland: Sage, Rabbitbrush, Greasewood	Growing season	Precipitation only

For most perennial crops, such as alfalfa and grass hay and pastures, growth starts before the last killing frost in the spring and continues after the first in the fall. Even though growth starts and continues it is not as vigorous as during the frost-free period. This has been taken into account by reducing the coefficient "k" during these periods.

APPLICATION OF CONSUMPTIVE USE RATES

As previously stated, the purpose of this report is to determine the (1) irrigated area, (2) nonirrigated irrigable area, (3) consumptive use of water by agricultural crops, and (4) change in consumptive use of water by substituting agricultural crops for native vegetation in irrigable areas.

IRRIGATED CROPS

For most annual crops the growing season is considered to be the period between killing frosts. Small grains, the only annual crop grown in the Columbia River Basin in Nevada, needs a growing period of three and one half months or about two weeks longer than in most other areas. This is due to the fact that it is usually planted around May 1 or about one month prior to the beginning of the frost-free period. During the latter part of May it is still subject to slight frost damage.

Native hay and pasture is irrigated by continual wild flooding. During the prefrost-free period plants are low and irrigation water

is exposed to evaporation at a greater rate than where irrigation water is applied and removed at regular intervals. These losses are taken into account by using the same coefficient during the prefrost-free period as is used during the frost-free period.

In areas where the water supply is derived from low elevation watersheds and practically no surface irrigation water is available after July 1, crop species have adjusted to this shortage and are able to remain alive by drawing from soil moisture storage and in some cases from ground water. In these cases the coefficient "k" for the period July 1 to the end of the growing period has been reduced.

The estimates of consumptive use of agricultural crops have been computed and tabulated in Appendix Table 11. In summary the results show that the 64,410 acres of irrigated land consume about 89,000 acre feet of water annually.

NATIVE VEGETATION

One of the nearly untouched sources of additional irrigation water in the West is by reclaiming water now consumed by native or uneconomic vegetation. Nature has sorted the many varieties of vegetation by climatic and soil characteristics until now the species are an indicator of soil and climate. In an area of similar soils the available moisture will usually determine the species of native vegetation.

In the Columbia River Basin in Nevada the predominant irrigable areas are located on two general sites, i.e., bottomlands and uplands. Bottomland native vegetation consists of willows, saltgrass, big sage, rabbitbrush, and greasewood. Native vegetation on the upland areas consists of big sage, low sage, and small areas of rabbitbrush and greasewood. Willows and saltgrass are supported by waste water throughout the irrigated areas while bottomland brush is supported by waste water and ground water. Dense stands of these types of vegetation are consuming water at a greater rate than would agricultural crops on the same areas. Appendix Table 12 indicates that if native vegetation were removed from the 43,000 acres of bottomland and the area planted to improved hay and pasture, there would be a net decrease in water consumption of about 10,000 acre-feet.

The 135,000 acres of nonirrigated irrigable upland sage, rabbitbrush and greasewood are almost wholly dependent for existence on natural precipitation. Should these areas be reclaimed, summer precipitation could be utilized but there would be need for an additional 175,000 acre-feet of water to produce improved hay and pasture crops.

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APPENDIX TABLE 1
COLUMBIA RIVER BASIN IN NEVADA—AVERAGE PRECIPITATION (Inches)*

Station	Elevation, feet	Years record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Tuscarora	6400	41	1.60	1.47	1.53	1.36	1.49	1.00	0.32	0.59	0.56	1.14	1.34	1.64	14.04
North Fork	6200	38	1.08	1.22	1.24	0.94	1.02	0.62	0.46	0.78	0.55	0.58	1.33	1.01	10.83
Jarbidge	6100	12	2.50	2.13	2.38	2.56	2.45	2.05	0.40	0.32	0.93	1.91	1.99	2.04	21.66
Owyhee	5400	29	1.37	1.28	1.22	1.44	1.73	1.15	0.41	0.33	0.73	1.32	1.15	1.32	13.45
San Jacinto	5200	45	0.67	0.54	0.58	0.93	1.24	1.09	0.52	0.45	0.52	0.64	0.60	0.53	8.31

*From records of U. S. Weather Bureau.

APPENDIX TABLE 2
AVERAGE SNOW SURVEY MEASUREMENTS*

Snow Course	Elevation, feet	Sec.	Twp.	Range	March Survey: Years record	March Survey: Snow depth, inches	March Survey: Water content inches	April Survey: Years record	April Survey: Snow depth, inches	April Survey: Water content, inches
Bear Creek	7800	31	46N	58E	21	53.5	16.5	10	65.7	21.9
Fox Creek	6800	33	46N	58E	21	30.7	8.9	16	27.1	9.2
76 Creek	7100	6	44N	58E	6	40.0	12.3	4	38.6	10.0
Gold Creek	6600	31	45N	56E	20	22.9	6.7	13	20.2	6.9
Big Bend	6700	30	45N	56E	24	31.7	9.2	25	29.8	10.0
Lower Jack Creek	6800	18	42N	53E	25	15.3	4.7	18	13.2	4.2
Upper Jack Creek	7250	9	42N	53E	16	32.2	9.8	12	32.2	11.4
Taylor Canyon	6200	35	39N	53E	18	19.5	5.9	12	11.7	4.2

*From records of Nevada Cooperative Snow Surveys.

APPENDIX TABLE 3
AVERAGE TEMPERATURE (Degrees F)*

Station	Elevation, feet	Years record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Jarbidge	6100	12	25.2	27.7	32.3	40.7	48.4	53.5	64.7	63.1	53.8	45.8	34.7	29.0
Owyhee	5400	29	25.8	30.0	35.8	43.8	51.8	58.1	68.0	65.4	56.4	47.8	39.1	30.2
San Jacinto	5200	45	24.2	29.2	36.1	43.4	50.3	58.0	65.9	63.0	54.6	44.7	33.6	25.9

*From records of U. S. Weather Bureau.

APPENDIX TABLE 4
AVERAGE GROWING SEASON (Between Frosts)*

Station	Elevation, feet	Years record	Last in spring (date)	First in fall (date)	Days
Gold Creek	6600	8	June 14	September 3	81
Tuscarora	6400	8	June 10	September 11	93
North Fork	6200	20	June 6	September 4	90
Jarbidge	6100	13	June 24	August 12	49
Owyhee	5400	16	June 8	September 6	90
San Jacinto	5200	41	June 14	August 28	75

*From records of U. S. Weather Bureau.

APPENDIX TABLE 5
ACREAGE TABULATION—South Fork, Owyhee River—Nevada

Land capability class	IRRIGATED										
	Alfalfa		Improved Hay and Pasture		Native Hay and Pasture* Private			Grain		Total	
	Private	Public	Private	Public	Long water season	Short water season	Public	Private	Public	Private	Public
I	240	-----	1,330	-----	1,000	1,300	-----	250	-----	4,120	-----
IIs	-----	-----	2,140	-----	1,000	3,300	-----	410	-----	6,850	-----
IIe	-----	-----	-----	-----	80	-----	-----	-----	-----	80	-----
IIw	100	-----	6,800	-----	1,140	7,000	-----	300	-----	15,340	-----
IIIs	-----	-----	840	-----	1,000	2,730	-----	100	-----	4,670	-----
IIIe	-----	-----	700	-----	600	-----	-----	100	-----	1,400	-----
IIIw	-----	-----	-----	-----	500	1,980	-----	-----	-----	2,480	-----
IVs	-----	-----	-----	-----	-----	500	-----	-----	-----	500	-----
IVe	-----	-----	1,000	-----	-----	900	-----	-----	-----	1,900	-----
IVw	-----	-----	-----	-----	360	-----	-----	-----	-----	360	-----
Subtotal	340	-----	12,810	-----	5,680	17,710	-----	1,160	-----	37,700	-----
Total	340		12,810			23,390		1,160		37,700	

Land capability class	IRRIGABLE					
	Big Sage		Rabbitbrush		Greasewood	
	Private	Public	Private	Public	Private	Public
I	680	-----	100	-----	-----	-----
IIs	5,940	8,750	1,860	-----	180	-----
IIe	2,300	-----	-----	-----	-----	-----
IIw	1,050	-----	1,600	-----	-----	-----
IIIs	6,100	1,220	1,500	320	1,910	-----
IIIe	9,860	-----	-----	-----	-----	-----
IIIw	-----	-----	780	-----	-----	-----
IVs	-----	-----	-----	-----	-----	-----
IVe	15,430	15,050	-----	-----	-----	-----
IVw	1,100	-----	-----	-----	-----	-----
Subtotal	42,460	25,020	5,840	320	2,090	-----
Total	67,480		6,160		2,090	

Land capability class	IRRIGABLE						
	Willows		Low Sage		Total		Grand total
	Private	Public	Private	Public	Private	Public	
I	.....	.....	.....	.....	780	.....	4,900
IIs	.....	.....	.....	.....	7,980	8,750	23,580
IIe	.....	.....	.....	.....	2,300	.....	2,380
IIw	220	20	.....	.....	2,870	20	18,230
IIIs	.....	.....	.....	.....	9,510	1,540	15,720
IIIe	360	20	.....	.....	10,220	20	11,640
IIIw	.....	.....	.....	.....	780	.....	3,260
IVs	.....	.....	.....	.....	.....	.....	500
IVe	.....	.....	.....	.....	15,430	15,050	32,380
IVw	260	130	.....	.....	1,360	130	1,850
Subtotal	840	170	.....	.....	51,230	25,510	114,440
Total	1,010		.....		76,740		

*Long water season: Water available throughout growing season. Short water season: Little or no water available after July 1.

APPENDIX TABLE 6
ACREAGE TABULATION—East Fork, Owyhee River—Nevada

Land capability class	IRRIGATED: Alfalfa Private	Alfalfa Public†	Improved Hay and Pasture Private	Improved Hay and Pasture Public†	Native Hay and Pasture* Private: Long water season	Native Hay and Pasture* Private: Short water season	Native Hay and Pasture* Public†	Grain Private	Grain Public†	Total Private	Total Public†
I	———	100	———	120	———	———	360	———	130	———	710
IIs	———	60	———	600	———	———	200	———	60	———	920
IIe	———	———	60	———	80	———	———	20	———	160	———
IIw	———	———	120	240	1,750	1,000	2,300	———	———	2,870	2,540
IIIs	———	40	———	300	400	200	1,540	———	40	600	1,920
IIIe	———	———	———	———	120	———	———	———	———	120	———
IIIw	———	———	———	———	240	———	420	———	———	240	420
IVs	———	———	———	———	———	———	———	———	———	———	———
IVe	———	———	———	———	770	1,200	———	———	———	1,970	———
IVw	———	———	———	———	260	———	200	———	———	260	200
Subtotal	———	200	180	1,260	3,620	2,400	5,020	20	230	6,220	6,710
Total	200		1,440		11,040			250		12,930	

*Long water season: Water available throughout growing season. Short water season: Little or no water available after July 1.
†Irrigated public land includes Indian lands only.

Land capability class	IRRIGABLE: Big Sage Private	Big Sage Public	Rabbitbrush Private	Rabbitbrush Public	Willows Private	Willows Public	Low Sage Private	Low Sage Public	Total Private	Total Public	Grand total
I	———	———	———	———	———	———	———	———	———	———	710
IIs	———	———	———	———	———	———	———	———	———	———	920
IIe	———	———	———	———	———	———	———	———	———	———	160
IIw	———	———	———	———	140	80	———	———	140	80	5,630
IIIs	60	15,100	50	———	———	———	———	———	110	15,100	17,730
IIIe	1,030	740	———	———	———	———	———	———	1,030	740	1,890
IIIw	60	60	———	———	400	240	———	———	460	300	1,420
IVs	———	———	———	———	———	———	———	———	———	———	———
IVe	1,040	1,060	———	———	———	———	2,160	1,220	3,200	2,280	7,450
IVw	———	———	———	———	140	160	———	———	140	160	760
Subtotal	2,190	16,960	50	———	680	480	2,160	1,220	5,080	18,660	36,670
Total	19,150		50		1,160		3,380		23,740		

APPENDIX TABLE 7
ACREAGE TABULATION—Bruneau River—Nevada

Land capability class	IRRIGATED: Alfalfa Private	Alfalfa Public	Improved Hay and Pasture Private	Improved Hay and Pasture Public	Native Hay and Pasture Private	Native Hay and Pasture Public	Grain Private	Grain Public	Total Private	Total Public
I	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
IIs	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
IIe	-------	-------	-------	-------	-------	-------	160	-------	160	-------
IIw	-------	-------	-------	-------	1,860	-------	-------	-------	1,860	-------
IIIs	-------	-------	-------	-------	40	-------	-------	-------	40	-------
IIIe	-------	-------	-------	-------	80	-------	-------	-------	80	-------
IIIw	-------	-------	-------	-------	540	-------	-------	-------	540	-------
IVs	-------	-------	-------	-------	80	-------	-------	-------	80	-------
IVe	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
IVw	-------	-------	-------	-------	520	-------	-------	-------	520	-------
Subtotal	-------	-------	-------	-------	3,120	-------	160	-------	3,280	-------
Total					3,120		160		3,280	

Land capability class	IRRIGABLE: Big Sage Private	Big Sage Public	Rabbitbrush Private	Rabbitbrush Public	Willows Private	Willows Public	Low Sage Private	Low Sage Public	Total Private	Total Public	Grand total
I	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
IIs	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
IIe	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	160
IIw	-------	-------	390	-------	230	120	-------	-------	620	120	2,600
IIIs	110	540	-------	160	-------	-------	-------	-------	110	700	850
IIIe	2,240	3,600	-------	-------	-------	-------	-------	-------	2,240	3,600	5,920
IIIw	360	-------	130	-------	180	60	-------	-------	670	60	1,270
IVs	610	-------	1,960	-------	-------	-------	-------	-------	2,570	-------	2,650
IVe	-------	5,710	-------	-------	-------	-------	-------	-------	-------	5,710	5,710
IVw	-------	-------	-------	-------	140	60	-------	-------	140	60	720
Subtotal	3,320	9,850	2,480	160	550	240	-------	-------	6,350	10,250	19,880
Total	13,170		2,640		790				16,600		

APPENDIX TABLE 8

ACREAGE TABULATION—Lower Salmon Falls Creek—Nevada

Land capability class	IRRIGATED									
	Alfalfa		Improved Hay and Pasture		Native Hay and Pasture		Grain		Total	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
I	120	-----	120	-----	-----	-----	20	-----	260	-----
IIs	120	-----	120	-----	1,000	-----	-----	-----	1,240	-----
IIe	140	-----	-----	-----	-----	-----	10	-----	150	-----
IIw	80	-----	100	-----	1,000	-----	-----	-----	1,180	-----
IIIs	60	-----	90	-----	470	-----	20	-----	640	-----
IIIe	80	-----	-----	-----	-----	-----	-----	-----	80	-----
IIIw	-----	-----	80	-----	510	-----	-----	-----	590	-----
IVs	-----	-----	-----	-----	440	-----	-----	-----	440	-----
IVe	-----	-----	-----	-----	120	-----	-----	-----	120	-----
IVw	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Subtotal	600	-----	510	-----	3,540	-----	50	-----	4,700	-----
Total	600		510		3,540		50		4,700	

Land capability class	IRRIGABLE							
	Big Sage		Rabbitbrush		Greasewood		Saltgrass Meadow	
	Private	Public	Private	Public	Private	Public	Private	Public
I	-----	-----	-----	-----	-----	-----	-----	-----
IIs	140	-----	-----	-----	-----	-----	-----	-----
IIe	1,320	470	-----	-----	-----	-----	-----	-----
IIw	760	-----	830	-----	-----	-----	4,400	-----
IIIs	4,100	1,340	290	160	170	260	-----	-----
IIIe	5,490	6,580	-----	220	20	240	-----	-----
IIIw	80	-----	-----	-----	420	420	-----	-----
IVs	-----	1,450	-----	1,020	-----	1,440	-----	-----
IVe	260	9,300	-----	-----	-----	-----	-----	-----
IVw	-----	-----	-----	-----	-----	-----	-----	-----
Subtotal	12,150	19,140	1,120	1,400	610	2,360	4,400	-----
Total	31,290		2,520		2,970		4,400	

Land capability class	IRRIGABLE						Grand total
	Willows		Low Sage		Total		
	Private	Public	Private	Public	Private	Public	
I	-----	-----	-----	-----	-----	-----	260
IIs	-----	-----	-----	-----	140	-----	1,380
IIe	-----	-----	-----	-----	1,320	470	1,940
IIw	120	-----	-----	-----	6,110	-----	7,290
IIIs	-----	-----	-----	-----	4,560	1,760	6,960
IIIe	-----	-----	-----	-----	5,510	7,040	12,630
IIIw	160	120	-----	-----	660	540	1,790

IVs	------	------	------	------	------	3,910	4,350	
IVe	------	------	------	2,500	260	11,800	12,180	
IVw	250	------	------	------	250	------	250	
Subtotal	530	120	------	2,500	18,810	25,520	49,030	
Total	650		2,500		44,330			

APPENDIX TABLE 9

ACREAGE TABULATION—Upper Salmon Falls Creek—Nevada

Land capability class	IRRIGATED									
	Alfalfa		Improved Hay and Pasture		Native Hay and Pasture		Grain		Total	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
I	------	------	------	------	------	------	------	------	------	------
IIs	------	------	------	------	340	------	------	------	340	------
IIe	------	------	------	------	------	------	------	------	------	------
IIw	------	------	------	------	2,600	------	------	------	2,600	------
IIIs	------	------	------	------	200	------	------	------	200	------
IIIe	------	------	------	------	------	------	------	------	------	------
IIIw	------	------	------	------	360	------	------	------	360	------
IVs	------	------	------	------	300	------	------	------	300	------
IVe	------	------	------	------	200	------	------	------	200	------
IVw	------	------	------	------	------	------	------	------	------	------
Subtotal	------	------	------	------	4,000	------	------	------	4,000	------
Total					4,000				4,000	

Land capability class	IRRIGABLE								
	Big Sage		Willows		Low Sage		Total		Grand total
	Private	Public	Private	Public	Private	Public	Private	Public	
I	------	------	------	------	------	------	------	------	------
IIs	------	------	------	------	------	------	------	------	340
IIe	300	160	------	------	------	------	300	160	460
IIw	------	------	300	120	------	------	300	120	3,020
IIIs	------	2,200	------	------	------	------	------	2,200	2,400
IIIe	1,300	2,200	------	------	------	------	1,300	2,200	3,500
IIIw	------	------	200	500	------	------	200	500	1,060
IVs	------	------	------	------	------	------	------	------	300
IVe	200	1,000	------	------	------	1,600	200	2,600	3,000
IVw	------	------	300	------	------	------	300	------	300
Subtotal	1,800	5,560	800	620	------	1,600	2,600	7,780	------
Total	7,360		1,420		1,600		10,380		14,380

APPENDIX TABLE 10
ACREAGE TABULATION—Goose Creek—Nevada

Land capability class	IRRIGATED									
	Alfalfa		Improved Hay and Pasture		Native Hay and Pasture		Grain		Total	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
I	------	------	------	------	------	------	------	------	------	------
IIs	------	------	20	------	70	------	30	------	120	------
IIe	------	------	110	------	150	------	20	------	280	------
IIw	------	------	300	------	590	------	------	------	890	------
IIIs	------	------	80	------	------	------	20	------	100	------
IIIe	------	------	------	------	------	------	------	------	------	------
IIIw	------	------	40	------	330	------	20	------	390	------
IVs	------	------	------	------	------	------	------	------	------	------
IVe	------	------	------	------	------	------	------	------	------	------
IVw	------	------	------	------	20	------	------	------	20	------
Subtotal	------	------	550	------	1,160	------	90	------	1,800	------
Total			550		1,160		90		1,800	

Land capability class	IRRIGABLE										
	Big Sage		Rabbitbrush		Greasewood		Willows		Total		Grand total
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	
I	------	------	------	------	------	------	------	------	------	------	------
IIs	370	720	330	80	20	------	------	------	720	800	1,640
IIe	200	220	------	------	------	------	------	------	200	220	700
IIw	60	------	400	------	------	------	60	20	520	20	1,430
IIIs	680	------	120	------	40	------	------	------	840	------	940
IIIe	620	1,200	------	------	------	------	------	------	620	1,200	1,820
IIIw	790	------	------	------	------	------	------	20	790	20	1,200
IVs	------	------	------	------	------	------	------	------	------	------	------
IVe	------	330	------	------	------	------	------	------	------	330	330
IVw	------	------	------	------	------	------	80	20	80	20	120
Subtotal	2,720	2,470	850	80	60	------	140	60	3,770	2,610	------
Total	5,190		930		60		200		6,380		8,180

APPENDIX TABLE 11
CONSUMPTIVE USE OF WATER BY AGRICULTURAL CROPS IN THE COLUMBIA RIVER BASIN IN NEVADA

Area and Crop	CONSUMPTIVE USE														
	Early					Frost Free					Late				
	From	K	F	U‡	To	From	K	F	U‡	To	From	K	F	U‡	To
Goose Creek—															
Imp. hay and pasture	4–15	.60	10.00	6.0	6–15	6–15	.75	15.83	11.9	9–1	9–1	.60	6.32	3.8	10–15
Nat. hay and pasture	4–15	.75	10.00	7.5	6–15	6–15	.75	2.96	2.2	7–1	7–1	.60	19.19	11.5	10–15
Grain	5–1	.75	5.09	3.8	6–1	6–1	.75	15.75	11.8	8–15					
Upper Salmon Falls Creek—															
Nat. hay and pasture	5–1	.75	9.44	7.1	6–25	6–25	.75	13.66	10.2	9–1	9–1	.60	4.52	2.7	10–1
Lower Salmon Falls Creek—															
Imp. hay and pasture	4–15	.60	10.00	6.0	6–15	6–15	.75	15.83	11.9	9–1	9–1	.60	6.32	3.8	10–15
Nat. hay and pasture	4–15	.75	10.00	7.5	6–15	6–15	.75	15.83	11.9	9–1	9–1	.60	6.32	3.8	10–15
Alfalfa	4–15	.70	10.00	7.0	6–15	6–15	.85	15.83	13.5	9–1	9–1	.70	4.59	3.2	10–1
Grain	5–1	.75	5.09	3.8	6–1	6–1	.75	15.75	11.8	8–15					
Jarbidge—Bruneau—															
Nat. hay and pasture	5–1	.75	9.44	7.1	6–25	6–25	.75	10.63	8.0	8–15	8–15	.60	7.56	4.5	10–1
Grain	5–1	.75	4.90	3.7	6–1	6–1	.75	15.75	11.8	8–15					
Owyhee—															
Imp. hay and pasture	4–15	.60	9.20	5.5	6–10	6–10	.75	18.05	13.5	9–5	9–5	.60	5.80	3.5	10–15
Nat. hay and pasture*	4–15	.75	9.20	6.9	6–10	6–10	.75	18.05	13.5	9–5	9–5	.60	5.80	3.5	10–15
Nat. hay and pasture†	4–15	.75	9.20	6.9	6–10	6–10	.75	3.95	3.0	7–1	7–1	.60	19.90	11.9	10–15
Alfalfa	4–15	.70	9.20	6.4	6–10	6–10	.85	18.05	15.3	9–5	9–5	.70	5.80	4.1	10–1
Grain	5–1	.75	5.25	3.9	6–1	6–1	.75	16.09	12.1	8–15					

Area and Crop	Total consumptive use (inches)	Precipitation (inches)	Consumptive use irrigation water (inches)	Acres	Areal consumptive use (acre-feet)
Goose Creek—					
Improved hay and pasture	21.7	4.6	17.1	550	784
Natural hay and pasture	21.2	4.6	16.6	1,160	1,605
Grain	15.6	3.1	12.5	90	94
Total	-------	-------	-------	1,800	2 483

Upper Salmon Falls Creek—					
Natural hay and pasture	20.0	6.2	13.8	4,000	4,600
Total				4,000	4,600
Lower Salmon Falls Creek—					
Improved hay and pasture	21.7	4.6	17.1	510	727
Natural hay and pasture	23.2	4.6	18.6	3,540	5,487
Alfalfa	23.7	4.3	19.4	600	970
Grain	15.6	3.1	12.5	50	52
Total				4,700	7,236
Jarbidge—Bruneau—					
Natural hay and pasture	19.6	6.2	13.4	3,120	3,484
Grain	15.5	5.1	10.4	160	139
Total				3,280	3,623
Owyhee—					
Improved hay and pasture	22.5	5.7	16.8	14,250	19,950
Natural hay and pasture*	23.9	5.7	18.2	14,320	21,718
Natural hay and pasture†	21.8	5.7	16.1	20,110	26,981
Alfalfa	25.8	5.1	20.7	540	932
Grain	16.0	3.5	12.5	1,410	1,469
Total				50,630	71,050
Grand total				64,410	88,992

*Full season water supply. †Short season water supply. ‡Inches.

APPENDIX TABLE 12
CONSUMPTIVE USE OF WATER BY NATIVE VEGETATION IN IRRIGABLE AREAS OF COLUMBIA RIVER BASIN IN NEVADA

Area and Crop	Growth starts	Growth stops	K	F	U*	Precipitation (inches)
Goose Creek—						
Willows	4–15	10–15	1.20	32.15	38.6	4.6
Bottomland—Sage, Rabbitbrush, Greasewood	4–15	10–15	.70	32.15	22.5	4.6
Upland—Sage, Rabbitbrush, Greasewood	4–15	10–15		Prec. only	4.6	4.6
Upper Salmon Falls Creek—						
Willows	5–1	10–1	1.20	27.62	33.1	6.2
Bottomland—Sage, Rabbitbrush, Greasewood	5–1	10–1	.70	27.62	19.3	6.2
Upland—Sage, Rabbitbrush, Greasewood	5–1	10–1		Prec. only	6.2	6.2
Lower Salmon Falls Creek—						
Willows	4–15	10–15	1.20	32.15	38.6	4.6
Saltgrass	4–15	10–15	.80	32.15	25.7	4.6
Bottomland—Sage, Rabbitbrush, Greasewood	4–15	10–15	.70	32.15	22.5	4.6
Upland—Sage, Rabbitbrush, Greasewood	4–15	10–15		Prec. only	4.6	4.6
Jarbidge—Bruneau—						
Willows	5–1	10–1	1.20	27.63	33.2	6.2
Bottomland—Sage, Rabbitbrush, Greasewood	5–1	10–1	.70	27.63	19.3	6.2
Upland—Sage, Rabbitbrush, Greasewood	5–1	10–1		Prec. only	6.2	6.2
Owyhee—						
Willows	4–15	10–15	1.20	33.05	39.7	5.7
Bottomland—Sage, Rabbitbrush, Greasewood	4–15	10–15	.70	33.05	23.1	5.7
Upland—Sage, Rabbitbrush, Greasewood	4–15	10–15		Prec. only	5.7	5.7
Grand total						

Area and Crop	Consumptive use, irrigation water (inches)	Acres	Areal consumptive use (acre-feet)	Subst. imp. hay and pasture (U-P)	Areal consum. use, subst. crop (acre-feet)	Additional water required (acre-feet)
Goose Creek—						
Willows	34.0	200	567	17.1	285	
Bottomland—Sage, Rabbitbrush, Greasewood	17.9	3,190	4,758	17.1	4,546	
Upland—Sage, Rabbitbrush, Greasewood	0	2,990	0	17.1	4,261	
Total		6,380	5,325		9,092	3,767

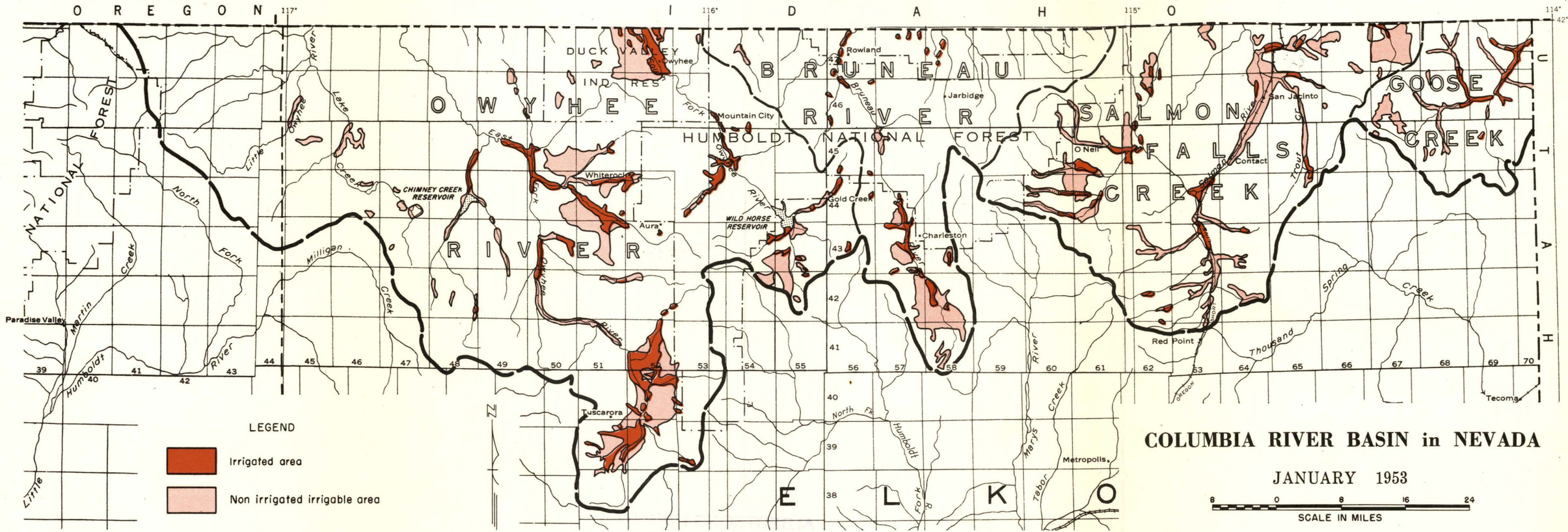
Upper Salmon Falls Creek—						
Willows	26.9	1,420	3,183	12.4	1,467	
Bottomland—Sage, Rabbitbrush, Greasewood	13.1	460	502	12.4	475	
Upland—Sage, Rabbitbrush, Greasewood	0	8,500	0	12.4	8,783	
Total	----	10,380	3,685	----	10,725	7,040
Lower Salmon Falls Creek—						
Willows	34.0	650	1,842	17.1	926	
Saltgrass	21.1	4,400	7,737	17.1	6,270	
Bottomland—Sage, Rabbitbrush, Greasewood	17.9	4,440	6,623	17.1	6,327	
Upland—Sage, Rabbitbrush, Greasewood	0	34,840	0	17.1	49,647	
Total	----	44,330	16,202	----	63,170	46,968
Jarbidge—Bruneau—						
Willows	27.0	790	1,778	14.8	974	
Bottomland—Sage, Rabbitbrush, Greasewood	13.1	880	961	14.8	1,085	
Upland—Sage, Rabbitbrush, Greasewood	0	14,930	0	14.8	18,414	
Total	----	16,600	2,739	----	20,473	17,734
Owyhee—						
Willows	34.0	2,170	6,148	16.8	3,038	
Bottomland—Sage, Rabbitbrush, Greasewood	17.4	24,400	35,380	16.8	34,160	
Upland—Sage, Rabbitbrush, Greasewood	0	73,850	0	16.8	103,390	
Total	----	100,420	41,528	----	140,588	99,060
Grand total	----	178,110	69,479	----	244,048	174,569

*Inches.

U. S. DEPARTMENT OF AGRICULTURE

PACIFIC REGION

SOIL CONSERVATION SERVICE



LEGEND

Irrigated area

Non irrigated irrigable area

AGR-SCS-PORTLAND, ORE. DEC. 1952

COLUMBIA RIVER BASIN in NEVADA

JANUARY 1953

8 0 8 16 24

SCALE IN MILES

7-R-14061